Priority Development Project (PDP)
Storm Water Quality Management Plan (SWQMP)

Planning Area 61 – Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone

Project No. TBD

Drawing No. TBD

☐ **Check if electing for offsite alternative compliance**

Engineer of Work:

Will sign and stamp upon approval

Wayne W. Chang, PE 46548
Provide Wet Signature and Stamp Above Line

Prepared For:

Tri Pointe Homes

13400 Sabre Springs Parkway, Suite 200

San Diego, CA 92128

(858) 794-2500

Prepared By:

Chang Consultants
P.O. Box 9496
Rancho Santa Fe, CA 92067
(858) 692-0760

Date:
April 29, 2021

Approved by: City of San Diego Date

FOR REVIEW ONLY

The City of SAN DIEGO

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Table of Contents

- Attachment 3: Structural BMP Maintenance Plan
    - Maintenance Agreement (Form DS-3247) (when applicable)
- Attachment 4: Copy of Plan Sheets Showing Permanent Storm Water BMPs
- Attachment 5: Project's Drainage Report
- Attachment 6: Project's Geotechnical and Groundwater Investigation Report

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: Planning Area 61 - Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone
Permit Application TBD

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.

Will sign and stamp upon approval

Engineer of Work's Signature

46548 — PE#

6/30/2021 — Expiration Date

Wayne W. Chang

Print Name

Chang Consultants

Company

April 29, 2021

Date

Engineer's Stamp

Project Name: Planning Area 61 – Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone

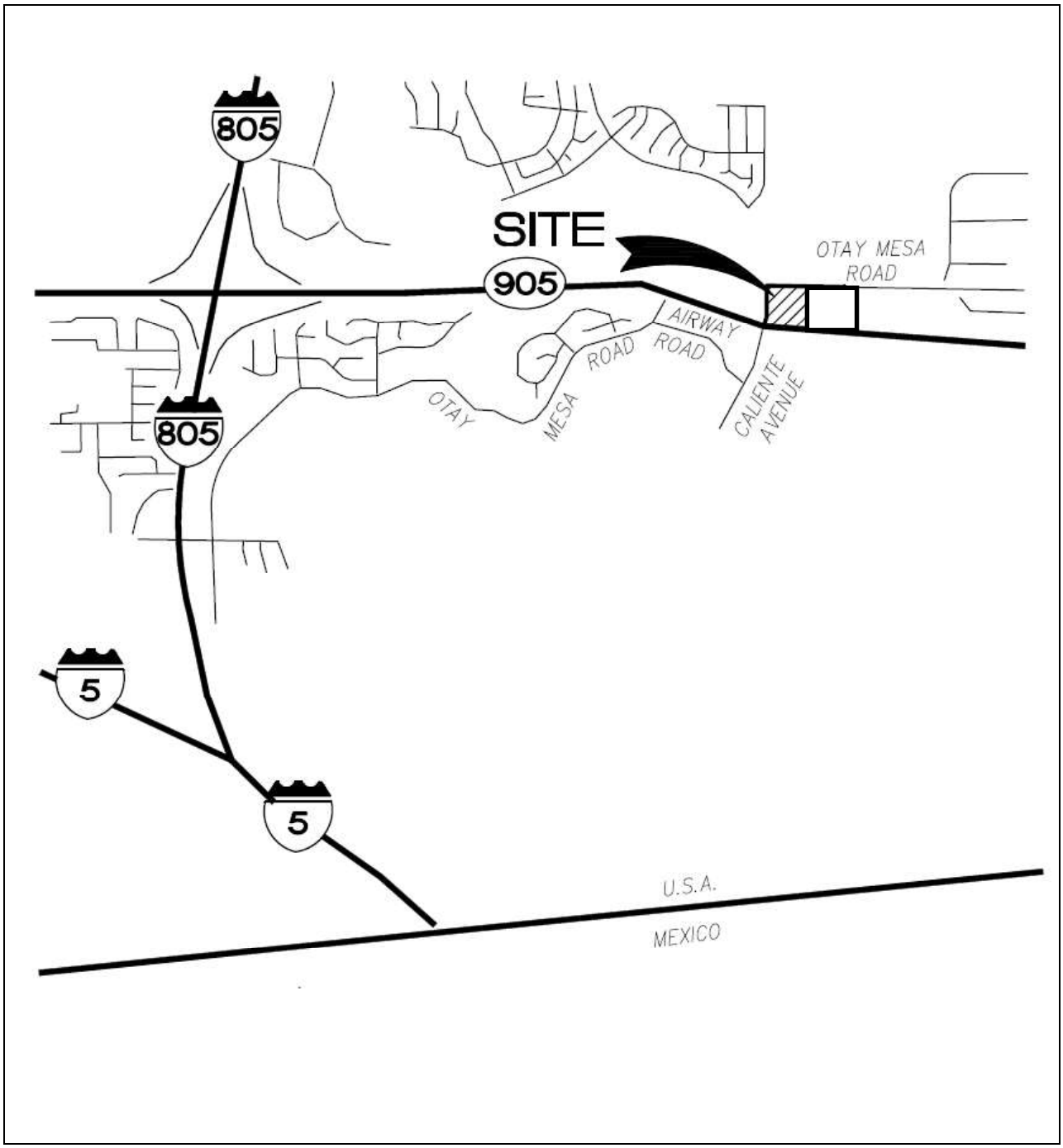
Submittal Record

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 plancheck comments is included. When applicable, insert response to plancheck comments.

Submittal Number	Date	Project Status	Changes
1	4/29/2021	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Initial Submittal
2		☐ Preliminary Design/Planning/CEQA ☐ Final Design	
3		☐ Preliminary Design/Planning/CEQA ☐ Final Design	
4		☐ Preliminary Design/Planning/CEQA ☐ Final Design	

Project Vicinity Map

Project Name: Planning Area 61 - Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone
Permit Application TBD



City of San Diego Form DS-560 Storm Water Requirements Applicability Checklist

Attach DS-560 form.

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: SE Corner of Otay Mesa Rd & Caliente Av, SD, 92108

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 ☒

Wayne W. Chang (Agent)	Principal
Name of Owner or Agent *(Please Print)*	Title
	04/29/2021
Signature	Date

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

Project Identification

Project Name: Planning Area 61 - VTM/SDP/MDP/NDP/CPA & Rezone	
Permit Application Number: TBD	Date: April 29, 2021

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 the manual sections and/or separate forms referenced in each step below.

Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the manual (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, PDP, or PDP Exempt? To answer this item, see Section 1.4 of the manual in its entirety for guidance AND complete Form DS-560, 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 of 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 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 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:		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the 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 San Diego County Regional Watershed Management Area Analysis (WMAA) and associated Google Earth kmz overlay do not map CCSYA's at the site (see Attachment 2b).		

HMP Exemption Exhibit

Attach a HMP Exemption Exhibit that shows direct storm water runoff discharge from the project site to HMP exempt area. Include project area, applicable underground storm drain line and/or concrete lined channels, outfall information and exempt waterbody.
Reference applicable drawing number(s).

Exhibit must be provided on 11"x17" or larger paper.

N/A. The project is not exempt.

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Project Name: Planning Area 61 – Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	PA 61 - Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone
Project Address	Southeast corner of Otay Mesa Road and Caliente Avenue, San Diego, CA 92154
Assessor's Parcel Number(s) (APN(s))	645-080-16-00
Permit Application Number	TBD
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)	Otay Valley Hydrologic Area (910.20)
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	13.93 Acres (606,791 Square Feet)
Area to be disturbed by the project (Project Footprint)	4.91 Acres (213,678 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	2.85 Acres (124,153 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	2.06 Acres (89,525 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	> 100 %

Form I-3B Page 2 of 11

Description of Existing Site Condition and Drainage Patterns

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

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

Description / Additional Information:

The site is being mass graded by the adjacent, recently approved California Terraces - PA 61 project to the east.

Existing Land Cover Includes (select all that apply):

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

Description / Additional Information:

The site is being mass graded, so contains non-vegetated pervious surfaces.

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

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

Approximate Depth to Groundwater:

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

Existing Natural Hydrologic Features (select all that apply):

- ☐ Watercourses
- ☐ Seeps
- ☐ Springs
- ☐ Wetlands
- ☑ None

Description / Additional Information:

The site is disturbed.

Form I-3B Page 3 of 11

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.

Descriptions/Additional Information

The site runoff is directed over the natural ground surface towards the northwest corner of the site (towards the intersection of Otay Mesa Road and Caliente Avenue) and into an existing storm drain system.

There are no other existing on-site drainage facilities.

There is minimal off-site run-on. The drainage report in Attachment 5 summarizes the pre- and post-project drainage areas and flow rates.

Form I-3B Page 4 of 11

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The project proposes 71 multi-family dwelling units in 11 buildings with private access driveways, surface parking, passive turf recreational space, walkways and landscaping. The on-site project area covers 4.46 acres.

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

The proposed impervious features include the multi-family buildings, private driveways, parking, curb, gutter, trash enclosures, and hardscape.

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

The proposed pervious features include landscaping and the recreational space.

Does the project include grading and changes to site topography?

☑ Yes

☐ No

Description / Additional Information:

The existing site is gently sloping, but grading will be required for the project. The cut and fill heights will not be large since the site does not have much relief.

Form I-3B Page 5 of 11

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:

Storm runoff from the development footprint will flow off the proposed roofs and adjacent hardscape onto surrounding landscaping areas for dispersion, where feasible. The overall project runoff will be conveyed by the private driveways to two on-site private storm drain systems. A Modular Wetland System Linear will treat runoff at the lower downstream (north) end of each storm drain system. The treated runoff will then enter a single vault for flow control. The runoff will be conveyed west out of the vault by a proposed pipe to an existing public storm drain system at the intersection of Caliente Avenue and Otay Mesa Road. The existing storm drain system crosses Otay Mesa Road and continues north along Ocean View Hills Parkway (Ocean View Hills Parkway is named Caliente Avenue south of Otay Mesa Road) before outletting into a natural drainage within Dennery Canyon. The natural drainage continues north within Dennery Canyon and ultimately flows into the Otay River.

The drainage report in Attachment 5 provides preliminary hydrologic analyses for the project including drainage areas and flow rates.

Form I-3B Page 6 of 11

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

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

Description/Additional Information:

The project will construct private on-site drainage systems with downspouts, inlets, and pipes. Pest control will be used for indoor and outdoor areas, as needed. The project will include designated refuse storage areas. Fire sprinklers will be installed per code. The buildings will generate miscellaneous drain and wash water typical of condominiums. The project will include hardscaping, sidewalks, and parking.

Form I-3B Page 7 of 11
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) The project runoff will be conveyed by on-site drainage facilities to an existing public storm drain system in Otay Mesa Road at Caliente Avenue. The existing storm drain system outlets into Dennery Canyon north of site. The runoff is conveyed north down the canyon to the Otay River, which is over 1.5 miles north of the site. The Otay River continues west over 4.6 miles to San Diego Bay.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations The existing beneficial uses from the 2011 "Water Quality Control Plan for the San Diego Basin" (Otay Mesa Hydrologic Area 910.20) for inland surface waters include AGR, REC2, WARM, and WILD. The potential beneficial uses are IND and REC1. The existing groundwater beneficial uses are MUN, AGR, and IND.
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations There are no ASBS receiving waters downstream of the project discharge locations.
Provide distance from project outfall location to impaired or sensitive receiving waters The project runoff ultimately enters the southerly end of San Diego Bay, which is approximately 4.8 miles west of the project outfall and impaired for PCBs.
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 Dennery Canyon is located just north of Otay Mesa Road and the project site. Dennery Canyon is within the City's MHPA and contains associated vegetation communities.

Form I-3B Page 8 of 11

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 (Refer to Appendix K)	Pollutant(s)/Stressor(s) (Refer to Appendix K)	TMDLs/WQIP Highest Priority Pollutant (Refer to Table 1-4 in Chapter 1)
San Diego Bay	PCBs	Per the 2010 303(d) list, TMDLs are req'd, but not completed. The highest priority pollutants are indicator bacteria, dissolved copper, 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 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	☐	☑	☐

Form I-3B Page 9 of 11

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6)?

☑ 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):

Note: If "No" answer has been selected the SWQMP must include an exhibit that shows the storm water conveyance system from the project site to an exempt water body. The exhibit should include details about the conveyance system and the outfall to the exempt water body.

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:

The San Diego County Regional Watershed Management Area Analysis (WMAA) and associated Google Earth kmz overlay do not map CCSYA's at the site.

Form I-3B Page 10 of 11

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.

The project runoff will be conveyed away from the site an existing public storm drain system in Otay Mesa Road near Caliente Avenue. The storm drain continues north across Otay Mesa Road, then over 800 feet north along Ocean View Hills Parkway before outletting into Dennery Canyon on the east side of Ocean View Hills Parkway. This is the project's POC.

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

☑ No, the low flow threshold is $0.1Q_2$ (default low flow threshold)

☐ Yes, the result is the low flow threshold is $0.1Q_2$

☐ Yes, the result is the low flow threshold is $0.3Q_2$

☐ Yes, the result is the low flow threshold is $0.5Q_2$

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

A geomorphic assessment has not been performed for this SWQMP submittal.

Discussion / Additional Information: (optional)

N/A

Form I-3B Page 11 of 11

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.

N/A

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.

• Vegetation in the natural or landscaped area is native and/or non-native/ non-invasive drought tolerant species that do not require regular application of fertilizers and pesticides.

• Soils are undisturbed native topsoil, or disturbed soils that have been amended and aerated to promote water retention characteristics equivalent to undisturbed native topsoil.

Project Name: Planning Area 61 – Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone

Source Control BMP Checklist for PDPs	Form I-4B

Source Control BMPs

All development projects must implement source control BMPs 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?		
4.2.1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.1 not implemented:			
4.2.2 Storm Drain Stenciling or Signage	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.3 not implemented:			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.4 not implemented:			
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.5 not implemented:			

Project Name: Planning Area 61 – Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone

Form I-4B Page 2 of 2			
Source Control Requirement	**Applied?**		
4.2.6 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 Facilities	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.			

Project Name: Planning Area 61 – Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone

Site Design BMP Checklist for PDPs	Form I-5B

Site Design BMPs

All development projects must implement site design BMPs 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?		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	☐ Yes	☐ No	☑ N/A

Discussion / justification if 4.3.1 not implemented:

The site is being mass graded and cleared by the adjacent, recently approved California Terraces - PA61 project (Project No. 648290), so contains no natural pathways or hydrologic features.

Trees are not implemented for this SWQMP.

1-1	Are existing natural drainage pathways and hydrologic features mapped on the site map?	☐ Yes	☐ No	☑ N/A
1-2	Are trees implemented? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
1-3	Implemented trees meet the design criteria in 4.3.1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☐ No	☑ N/A
1-4	Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
4.3.2 Have natural areas, soils and vegetation been conserved?		☐ Yes	☑ No	☐ N/A

Discussion / justification if 4.3.2 not implemented:

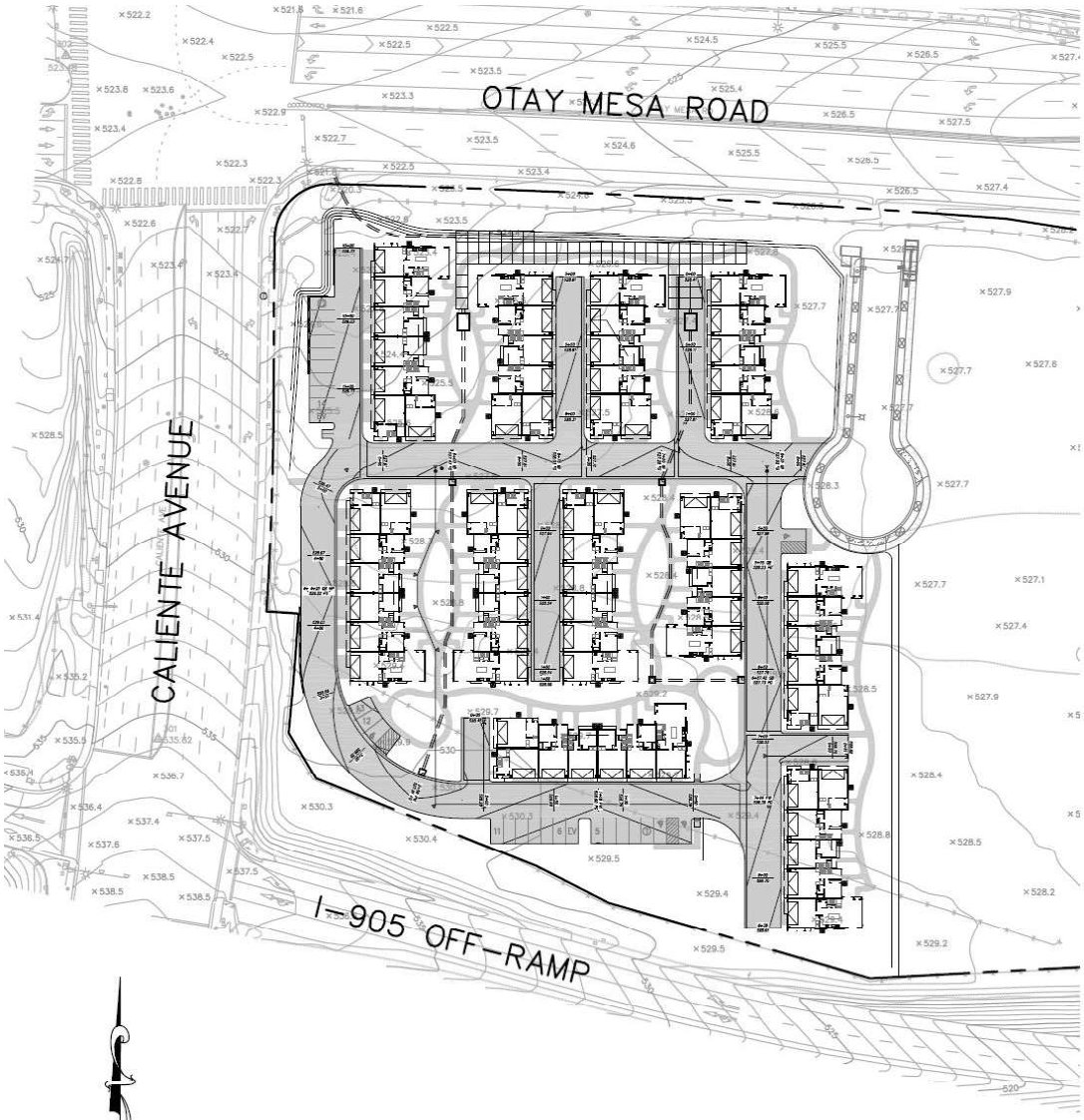
The site is being mass graded and cleared by the adjacent, recently approved California Terraces - PA61 project (Project No. 648290), so there are no natural areas or vegetation to be conserved.

Form I-5B Page 2 of 4			
Site Design Requirement	**Applied?**		
4.3.3 Minimize Impervious Area	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.3 not implemented:			
4.3.4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented:			
4.3.5 Impervious Area Dispersion	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.5 not implemented:			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☑ Yes	☐ No	☐ N/A
5-2 Does the pervious area satisfy the design criteria in 4.3.5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☑ Yes	☐ No	☐ N/A
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and 4.3.5 Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A

Form I-5B Page 3 of 4			
Site Design Requirement	**Applied?**		
4.3.6 Runoff Collection	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.6 not implemented: Green roofs and permeable pavement are not proposed. The post-construction structural treatment (pollutant) control BMPs selected are two Bio Clean Environmental Services, Inc.'s Modular Wetland System (MWS) Linear units.			
6a-1 Are green roofs implemented in accordance with design criteria in 4.3.6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	☐ N/A
6a-2 Is the green roof credit volume calculated using Appendix B.2.1.2 and 4.3.6A Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A
6b-1 Are permeable pavements implemented in accordance with design criteria in 4.3.6B Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	☐ N/A
6b-2 Is the permeable pavement credit volume calculated using Appendix B.2.1.3 and 4.3.6B Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A
4.3.7 Landscaping with Native or Drought Tolerant Species	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.7 not implemented:			
4.3.8 Harvest and Use Precipitation	☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.8 not implemented: Harvest and use is considered to be infeasible per Form I-7 from the City "Storm Water Standards, Part 1: BMP Design Manual - Appendices." The harvest and use assessment is included in Attachment 1c.			
8-1 Are rain barrels implemented in accordance with design criteria in 4.3.8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	☐ N/A
8-2 Is the rain barrel credit volume calculated using Appendix B.2.2.2 and 4.3.8 Fact Sheet in Appendix E?	☐ Yes	☑ No	☐ N/A

Form I-5B Page 4 of 4

Insert Site Map with all site design BMPs identified:



1" = 80'

0 80

NOTES:
THE PROPOSED IMPERVIOUS AREAS ARE SHADED GREY. UNSHADED AREAS WITHIN THE MULTI-FAMILY DEVELOPMENT WILL BE LANDSCAPED. THE SITE DESIGN BMPS INCLUDE MINIMIZING IMPERVIOUS AREA, MINIMIZING SOIL COMPACTION IN LANDSCAPE AREAS, IMPERVIOUS AREA DISPERSION, AND LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES.

SITE DESIGN BMPS

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.

The project must meet pollutant control and flow control requirements. The City of San Diego's 2016 "Storm Water Standards" outlines steps in selecting structural BMPs. Harvest and use is considered first. Per Attachment 1c, harvest and use is not feasible for the project.

Infiltration is considered next. Both full and partial infiltration were determined to be infeasible per Geocon's March 15, 2018, "Update Geotechnical Investigation," in Attachment 6. The report determined low infiltration rates and the potential for undesirable impacts on downstream properties.

The proposed condition runoff will be treated by Modular Wetland System (MWS) Linear BMPs along the northerly portion of the site. MWS Linear BMPs are TAPE certified. An MWS Linear BMP will be installed at two locations. One MWS Linear will serve the westerly portion of the site and the other will serve the easterly portion of the site. An underground storage vault will be connected to the outlet of both MWS Linear units to meet flow control requirements.

(Continue on page 2 as necessary.)

Form I-6 Page 2 of 2

(Continued from page 1)

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Form I-6 Page 1 of 2 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 1 - MWS Linear	
Construction Plan Sheet No. TBD	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☑ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☑ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Henry Peng, Civil Sense, Inc. 13475 Danielson Street, Suite 150 Poway, CA 92064
Who will be the final owner of this BMP?	Homeowner's Association
Who will maintain this BMP into perpetuity?	Homeowner's Association
What is the funding mechanism for maintenance?	Developer initially, then HOA after development

Form I-6 Page 2 of 2 (Copy as many as needed)
Structural BMP ID No. 1 - MWS Linear
Construction Plan Sheet No. TBD
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): BMP 1 is an MWS Linear that will provide pollutant control for the easterly portion of the project.

Form I-6 Page 1 of 2 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 2 - MWS Linear	
Construction Plan Sheet No. TBD	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☑ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☑ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Henry Peng, Civil Sense, Inc. 13475 Danielson Street, Suite 150 Poway, CA 92064
Who will be the final owner of this BMP?	Homeowner's Association
Who will maintain this BMP into perpetuity?	Homeowner's Association
What is the funding mechanism for maintenance?	Developer initially, then HOA after development

Form I-6 Page 2 of 2 (Copy as many as needed)
Structural BMP ID No. 2 - MWS Linear
Construction Plan Sheet No. TBD
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): BMP 2 is an MWS Linear that will provide pollutant control for the westerly portion of the project.

Form I-6 Page 1 of 2 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 3 - Vault	
Construction Plan Sheet No. TBD	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☑ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☑ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Henry Peng, Civil Sense, Inc. 13475 Danielson Street, Suite 150 Poway, CA 92064
Who will be the final owner of this BMP?	Homeowner's Association
Who will maintain this BMP into perpetuity?	Homeowner's Association
What is the funding mechanism for maintenance?	Developer initially, then HOA after development

Form I-6 Page 2 of 2 (Copy as many as needed)
Structural BMP ID No. 3 - Vault
Construction Plan Sheet No. TBD
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): BMP 3 is a vault that will provide flow control for the entire project.

Attachment 1
Backup For PDP Pollutant Control BMPs

This is the cover sheet for Attachment 1.

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Project Name: Planning Area 61 – Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone

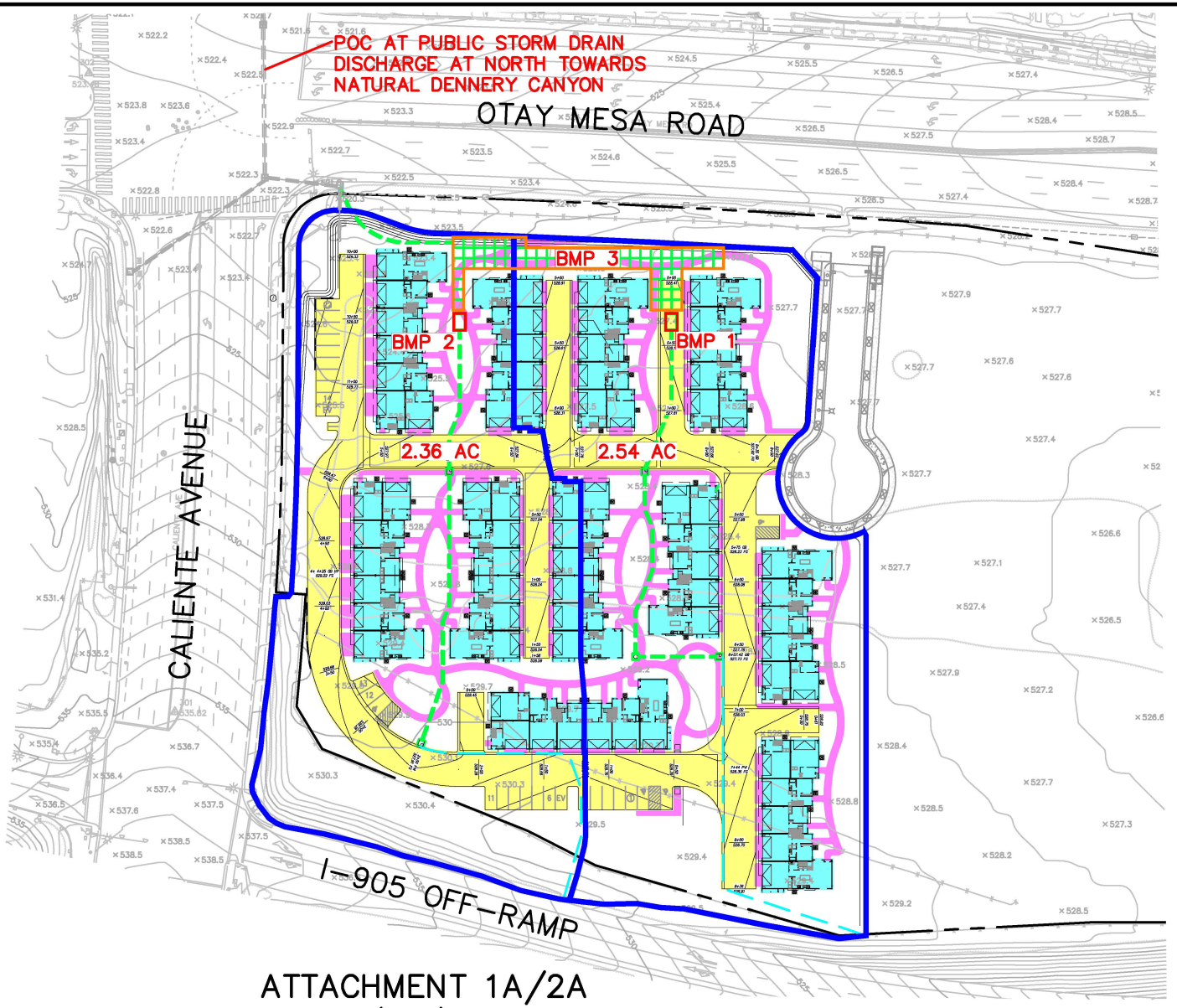
Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☒ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☐ Included on DMA Exhibit in Attachment 1a ☑ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	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	Infiltration Feasibility Information. Contents of Attachment 1d depend on the infiltration condition: • No Infiltration Condition: ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) ○ Form I-8A (optional) ○ Form I-8B (optional) • Partial Infiltration Condition: ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) ○ Form I-8A ○ Form I-8B • Full Infiltration Condition: ○ Form I-8A ○ Form I-8B ○ Worksheet C.4-3 ○ Form I-9 Refer to Appendices C and D of the BMP Design Manual for guidance.	☑ 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:

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, size/detail, and include cross-section)



1" = 80'

0 80

NOTES:

THE UNDERLYING HYDROLOGIC SOIL GROUP IS D. GROUNDWATER WAS NOT ENCOUNTERED IN BORINGS UP TO 17' DEEP. THERE ARE NO EXISTING ON-SITE NATURAL HYDROLOGIC FEATURES, CCSYA, OR IMPERVIOUS AREAS.

THE POINT OF COMPLIANCE IS AT THE OUTLET OF THE PUBLIC STORM DRAIN IN OTAY MESA ROAD TOWARDS DENNERY CANYON.

SEE ATTACHED SHEET FOR SUMMARY OF AREAS.

LEGEND:

- DMA BOUNDARY
- 2.36 AC — DRAINAGE/DMA AREA
- PROPOSED DRAINAGE FACILITY
- BMP 1 — PROP. MWS LINEAR (OR EQUIV.)
- PROP. FLOW CONTROL VAULT
- PROPOSED BUILDINGS
- PROPOSED STREETS
- PROPOSED HARDSCAPE/DRIVEWAYS
- PROPOSED LANDSCAPING

ATTACHMENT 1A/2A

DRAINAGE MANAGEMENT AREAS (DMA) AND HYDROMODIFICATION EXHIBIT

Project Name: Planning Area 61 – Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone

Tabular Summary of DMAs								Worksheet B-1	
DMA Unique Identifier	Area (acres)	Impervious Area (acres)	% Imp	HSG	Area Weighted Runoff Coefficient	DCV (cubic feet)	Treated By (BMP ID)	Pollutant Control Type	Drains to (POC ID)
1	2.54	1.52	59.8	D	0.58	2,565	BMP 1 MWS	MWS-L	POC
2	2.36	1.33	56.2	D	0.55	2,262	BMP 2 MWS	MWS-L	POC
Summary of DMA Information (Must match project description and SWQMP Narrative)									
No. of DMAs	Total DMA Area (acres)	Total Impervious Area (acres)	% Imp		Area Weighted Runoff Coefficient	Total DCV (cubic feet)	Total Area Treated (acres)		No. of POCs
2	4.90	2.85	55.2		0.56	4,827	4.91		1

Where: DMA = Drainage Management Area; Imp = Imperviousness; HSG = Hydrologic Soil Group; DCV= Design Capture Volume; BMP = Best Management Practice; POC = Point of Compliance; ID = identifier; No. = Number

Attachment 1b

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Attachment 1c

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? No demand since these are infeasible.

- ☐ 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]

The overall DCV from Attachment 1b is 4,827 cubic feet or 36,108 gallons and 0.25DCV is 9,027 gallons. Items 3a to 3c below indicate that the 36 hour demand is compared to DCV to assess harvest and use feasibility. The demand from attached Table B.3-1 is 9.3 gallons per resident per day (24 hours) or 14 gallons per 36 hours. In order for the residential demand to exceed 0.25DCV, the site must have 645 residents (9,027/14=645). The project will have 71 dwelling units and 645/71 is 9.1. The project will not have 9.1 residents per dwelling unit, so harvest and use is not feasible.

3. Calculate the DCV using worksheet B-2.1.
DCV = 4,827 (cubic feet) See attached for DCV analysis.

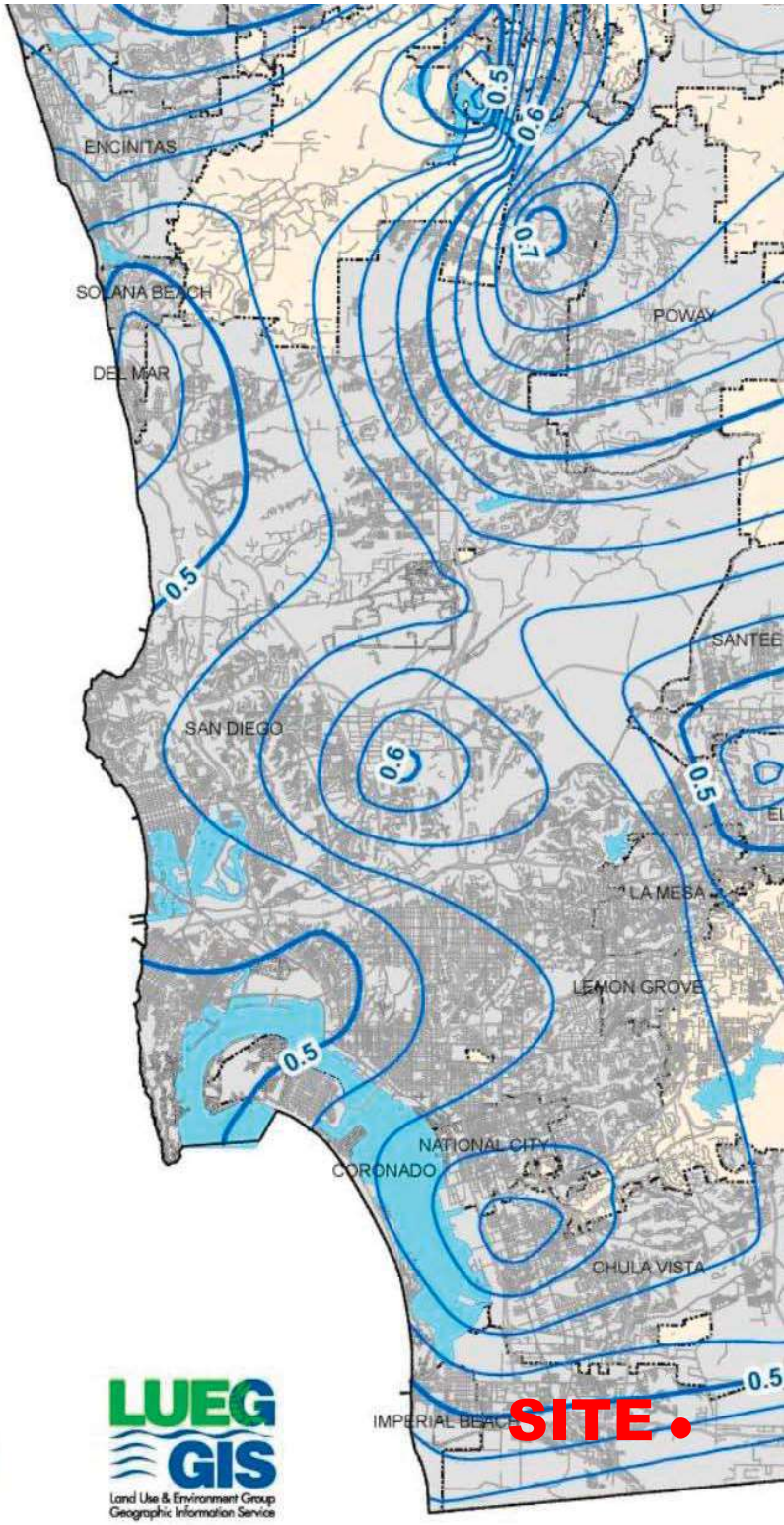
3a. Is the 36 hour demand greater than or equal to the DCV?	3b. Is the 36 hour demand greater than 0.25DCV but less than the full DCV?	3c. Is the 36 hour demand less than 0.25DCV?
☐ Yes / ☒ No ⇨ ⇩	☐ Yes / ☒ No ⇨ ⇩	☒ Yes ⇩
Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing 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.

Furthermore, per discussions with city staff, toilet and urinal flushing harvest and use is not allowed by the plumbing code.

San Diego County
85 th Percentile Isopluvials



Legend

- 85th PERCENTILE ISOPLUVIAL
- INCORPORATED CITY

NOTE:
The 85th percentile is a 24 hour rainfall total. It represetns a value such that 85% of the observed 24 hour rainfall totals will be less than that value.

N

0 1 2 4 6 8 Miles

LUEG GIS
Land Use & Environment Group
Geographic Information Service

05/14/2015
P:\Flood Control\NOAA_ATLAS_14\PCT85_REVISITED_2015\PCT85_DISPLAY.mxd

EXCERPT FROM FIGURE B.1-1
(24-HOUR, 85TH PERCENTILE PRECIPITATION = 0.48")

Table B.3-1: Toilet and Urinal Water Usage per Resident or Employee

Land Use Type	Toilet User Unit of Normalization	Per Capita Use per Day		Visitor Factor[4]	Water Efficiency Factor	Total Use per Resident or Employee
		Toilet Flushing[1,2]	Urinals[3]			
Residential	Resident	18.5	NA	NA	0.5	9.3
Office	Employee (non-visitor)	9.0	2.27	1.1	0.5	7 (avg)
Retail	Employee (non-visitor)	9.0	2.11	1.4	0.5	
Schools	Employee (non-student)	6.7	3.5	6.4	0.5	33
Various Industrial Uses (excludes process water)	Employee (non-visitor)	9.0	2	1	0.5	5.5

[1]Based on American Waterworks Association Research Foundation, 1999. Residential End Uses of Water. Denver, CO: AWWARF

[2]Based on use of 3.45 gallons per flush and average number of per employee flushes per subsector, Table D-1 for MWD (Pacific Institute, 2003)

[3]Based on use of 1.6 gallons per flush, Table D-4 and average number of per employee flushes per subsector, Appendix D (Pacific Institute, 2003)

[4]Multiplied by the demand for toilet and urinal flushing for the project to account for visitors. Based on proportion of annual use allocated to visitors and others (includes students for schools; about 5 students per employee) for each subsector in Table D-1 and D-4 (Pacific Institute, 2003)

[5]Accounts for requirements to use ultra-low flush toilets in new development projects; assumed that requirements will reduce toilet and urinal flushing demand by half on average compared to literature estimates. Ultra low flush toilets are required in all new construction in California as of January 1, 1992. Ultra low flush toilets must use no more than 1.6 gallons per flush and Ultra low flush urinals must use no more than 1 gallon per flush. Note: If zero flush urinals are being used, adjust accordingly.

B.3.2.2 General Requirements for Irrigation Demand Calculations

The following guidelines should be followed for computing harvested water demand from landscape irrigation:

- If reclaimed water is planned for use for landscape irrigation, then the demand for harvested storm water should be reduced by the amount of reclaimed water that is available during the wet season.
- Irrigation rates should be based on the irrigation demand exerted by the types of landscaping that are proposed for the project, with consideration for water conservation requirements.
- Irrigation rates should be estimated to reflect the average wet season rates (defined as November through April) accounting for the effect of storm events in offsetting harvested water demand. In the absence of a detailed demand study, it should be assumed that irrigation demand is not present during days with greater than 0.1 inches of rain and the subsequent 3-day period. This irrigation shutdown period is consistent with standard practice in land application of wastewater and is applicable to storm water to prevent irrigation from resulting in dry weather runoff. Based on a statistical analysis of San Diego County rainfall patterns, approximately 30 percent of wet season days would not have a demand for irrigation.

Attachment 1d
(see Attachment 6 for Infiltration Feasibility Letter)

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
Part 1 - Full Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	Project Phase:
Project Site	
Criteria 1: Infiltration Rate Screening	
1A	Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[11]? ☐Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing. ☐No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B). ☐No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result. ☑No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B).
1B	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1? ☑Yes; Continue to Step 1C. ☐No; Skip to Step 1D.
1C	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour? ☐Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result. ☑No; full infiltration is not required. Answer "No" to Criteria 1 Result.
1D	**Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation. ☐Yes; continue to Step 1E. ☐No; select an appropriate infiltration testing method.

Note that it is not required to investigate each and every criterion in the worksheet, a single "no" answer in Part 1, Part 2, Part 3, or Part 4 determines a full, partial, or no infiltration condition.

[10] This form must be completed each time there is a change to the site layout that would affect the infiltration feasibility condition. Previously completed forms shall be retained to document the evolution of the site storm water design.

[11] Available data includes site-specific sampling or observation of soil types or texture classes, such as obtained from borings or test pits necessary to support other design elements.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
1E	**Number of Percolation/Infiltration Tests.** Does the infiltration testing method performed satisfy the minimum number of tests specified in Table D.3-2? ☐Yes; continue to Step 1F. ☐No; conduct appropriate number of tests.
IF	**Factor of Safety.** Is the suitable Factor of Safety selected for full infiltration design? See guidance in D.5; Tables D.5-1 and D.5-2; and Worksheet D.5-1 (Form I-9). ☐Yes; continue to Step 1G. ☐No; select appropriate factor of safety.
1G	**Full Infiltration Feasibility.** Is the average measured infiltration rate divided by the Factor of Safety greater than 0.5 inches per hour? ☐Yes; answer "Yes" to Criteria 1 Result. ☐No; answer "No" to Criteria 1 Result.
Criteria 1 Result	Is the estimated reliable infiltration rate greater than 0.5 inches per hour within the DMA where runoff can reasonably be routed to a BMP? ☐Yes; the DMA may feasibly support full infiltration. Continue to Criteria 2. ☑No; full infiltration is not required. Skip to Part 1 Result.

Summarize infiltration testing methods, testing locations, replicates, and results and summarize estimates of reliable infiltration rates according to procedures outlined in D.5. Documentation should be included in project geotechnical report.

We performed field-saturated, hydraulic conductivity tests, A-1 and A-2, using a Soil Moisture Corp Aardvark Permeameter (see Geologic Map, Figure 2). The test holes were hand excavated using 4-inch diameter hand augers. The unfactored test results of the saturated hydraulic conductivity testing for A-1 is 0.002 in/hr and 0.068 in/hr for A-2. Factored rates are 0.001 and 0.034 in/hr using a factor of 2.0.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 2: Geologic/Geotechnical Screening			
2A	If all questions in Step 2A are answered "Yes," continue to Step 2B. For any "No" answer in Step 2A answer "No" to Criteria 2, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
2A-1	Can the proposed full infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick below the infiltrating surface?	☐Yes	☐No
2A-2	Can the proposed full infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐Yes	☐No
2A-3	Can the proposed full infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐Yes	☐No
2B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 2B are answered "Yes," then answer "Yes" to Criteria 2 Result. If there are "No" answers continue to Step 2C.		
2B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can full infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐Yes	☐No
2B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can full infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐Yes	☐No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
2B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐Yes	☐No
2B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐Yes	☐No
2B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐Yes	☐No
2B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
2C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered "Yes," then answer "Yes" to Criteria 2 Result. If the question in Step 2C is answered "No," then answer "No" to Criteria 2 Result.	☐Yes	☐No
Criteria 2 Result	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐Yes	☐No
Summarize findings and basis; provide references to related reports or exhibits.			

Part 1 Result – Full Infiltration Geotechnical Screening [12]	Result
If answers to both Criteria 1 and Criteria 2 are "Yes", a full infiltration design is potentially feasible based on Geotechnical conditions only. If either answer to Criteria 1 or Criteria 2 is "No", a full infiltration design is not required.	☐Full infiltration Condition ☑Complete Part 2

[12] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	Project Phase:
Project Site	

Criteria 3 : Infiltration Rate Screening	
3A	**NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data? ☐ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☐ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☑ No; infiltration testing is conducted (refer to Table D.3-1), continue to Step 3B.
3B	**Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr? ☐ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result. ☑ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result.
Criteria 3 Result	Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP? ☐ Yes; Continue to Criteria 4. ☑ No: Skip to Part 2 Result.

Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate).

We performed field-saturated, hydraulic conductivity tests, A-1 and A-2, using a Soil Moisture Corp Aardvark Permeameter (see Geologic Map, Figure 2). The test holes were hand excavated using 4-inch diameter hand augers. The unfactored test results of the saturated hydraulic conductivity testing for A-1 is 0.002 in/hr and 0.068 in/hr for A-2. Factored rates are 0.001 and 0.034 in/hr using a factor of 2.0.

Test results indicate infiltration rates less than 0.05 in/hr and are not high enough to support infiltration.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 4: Geologic/Geotechnical Screening			
4A	If all questions in Step 4A are answered "Yes," continue to Step 2B. For any "No" answer in Step 4A answer "No" to Criteria 4 Result, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
4A-1	Can the proposed partial infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick?	☐Yes	☐No
4A-2	Can the proposed partial infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐Yes	☐No
4A-3	Can the proposed partial infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐Yes	☐No
4B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1 If all questions in Step 4B are answered "Yes," then answer "Yes" to Criteria 4 Result. If there are any "No" answers continue to Step 4C.		
4B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can partial infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐Yes	☐No
4B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can partial infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐Yes	☐No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐Yes	☐No
4B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐Yes	☐No
4B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐Yes	☐No
4B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls?	☐Yes	☐No
4C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result. If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result.	☐Yes	☐No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 4 Result	Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐Yes	☐No

Summarize findings and basis; provide references to related reports or exhibits.

Part 2 – Partial Infiltration Geotechnical Screening Result[13]	Result
If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only. If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site.	☐Partial Infiltration Condition ☑No Infiltration Condition

[13] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

ATTACHMENT 1e
POLLUTANT CONTROL BMP DESIGN

Pollutant control BMPs were selected to treat the project's pollutants of concern identified on Form I-3B. Two Bio Clean Environmental Services, Inc. Modular Wetland System Linear (see the Attachment 1A/1B, Drainage Management Areas (DMA) and Hydromodification Management Exhibit) were used because these have a high pollutant removal efficiency for the project's pollutants of concern. MWS-Linear are TAPE-certified and recently approved by the City of San Diego on similar multi-family residential projects. Furthermore, infiltration and partial infiltration are not feasible according to Geocon, Inc. (see Attachment 1d and 6).

MWS Linear can use flow-based sizing. The *BMP Design Manual*, outlines the flow-based sizing procedure. Worksheet B.6-1 is used to determine the design flows. This worksheet was used for MWS Linear BMPs 1 and 2. The impervious and pervious areas tributary to each MWS Linear are shown and tabulated in Attachment 1A/1B. Worksheet B.6-1 for these two BMPs is attached. The attached MWS Linear sizing table from the Bio Clean brochure shows that BMP 1 and 2 can be treated by a single unit (MWS-L-8-16 each).

BMP 1 MWS

Worksheet B.6-1: Flow-Thru Design Flows

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	2,565	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow-thru}$	2,565	cubic-feet
5	Adjustment factor (Line 4 / Line 1)	AF=	1.5	unitless
6	Design rainfall intensity	i=	0.20	in/hr.
7	Area tributary to BMP (s)	A=	2.54	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.58	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.442	cfs

1. Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.
2. Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.
3. Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

Use MWS-L-8-16

BMP 2 MWS

Worksheet B.6-1: Flow-Thru Design Flows

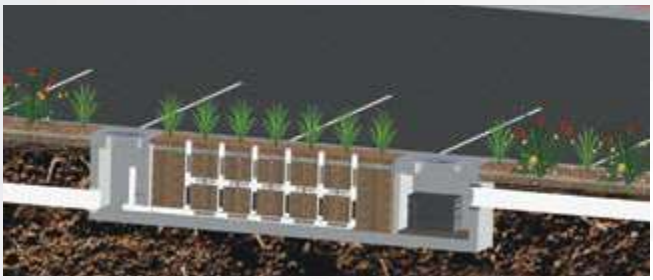
Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	2,262	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow-thru}$	2,262	cubic-feet
5	Adjustment factor (Line 4 / Line 1)	AF=	1.5	unitless
6	Design rainfall intensity	i=	0.20	in/hr.
7	Area tributary to BMP (s)	A=	2.36	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.55	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.390	cfs

1. Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.
2. Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.
3. Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

Use MWS-L-8-16

Flow Based Sizing

The MWS Linear can be used in stand alone applications to meet treatment flow requirements. Since the MWS Linear is the only biofiltration system that can accept inflow pipes several feet below the surface it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.



Treatment Flow Sizing Table

Model #	Dimensions	WetlandMedia Surface Area	Treatment Flow Rate (cfs)
MWS-L-4-4	4' x 4'	23 ft^2	0.052
MWS-L-4-6	4' x 6'	32 ft^2	0.073
MWS-L-4-8	4' x 8'	50 ft^2	0.115
MWS-L-4-13	4' x 13'	63 ft^2	0.144
MWS-L-4-15	4' x 15'	76 ft^2	0.175
MWS-L-4-17	4' x 17'	90 ft^2	0.206
MWS-L-4-19	4' x 19'	103 ft^2	0.237
MWS-L-4-21	4' x 21'	117 ft^2	0.268
MWS-L-8-8	8' x 8'	100 ft^2	0.230
MWS-L-8-12	8' x 12'	151 ft^2	0.346
MWS-L-8-16	8' x 16'	201 ft^2	0.462

Volume Based Sizing

Many states require treatment of a water quality volume and do not offer the option of flow based design. The MWS Linear and its unique horizontal flow makes it the only biofilter that can be used in volume based design installed downstream of ponds, detention basins, and underground storage systems.

Treatment Volume Sizing Table

Model #	Treatment Capacity (cu. ft.) @ 24-Hour Drain Down	Treatment Capacity (cu. ft.) @ 48-Hour Drain Down
MWS-L-4-4	1140	2280
MWS-L-4-6	1600	3200
MWS-L-4-8	2518	5036
MWS-L-4-13	3131	6261
MWS-L-4-15	3811	7623
MWS-L-4-17	4492	8984
MWS-L-4-19	5172	10345
MWS-L-4-21	5853	11706
MWS-L-8-8	5036	10072
MWS-L-8-12	7554	15109
MWS-L-8-16	10073	20145

This form is for BMP 1 and BMP 2

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Compact (high rate) biofiltration BMPs have a media filtration rate greater than 5 in/hr. and a media surface area smaller than 3% of contributing area times adjusted runoff factor. Compact biofiltration BMPs are typically proprietary BMPs that may qualify as biofiltration.

A compact biofiltration BMP may satisfy the pollutant control requirements for a DMA onsite in some cases. This depends on the characteristics of the DMA **and** the performance certification/data of the BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite storm water alternative compliance program to meet its pollutant control obligations.

An applicant using a compact biofiltration BMP to meet the pollutant control requirements onsite must complete Section 1 of this form and include it in the PDP SWQMP. A separate form must be completed for each DMA. In instances where the City Engineer does not agree with the applicant's determination, Section 2 of this form will be completed by the City and returned to the applicant.

Section 1: Biofiltration Criteria Checklist (Appendix F)

Refer to Part 1 of the Storm Water Standards to complete this section. When separate forms/worksheets are referenced below, the applicant must also complete these separate forms/worksheets (as applicable) and include in the PDP SWQMP. The criteria numbers below correspond to the criteria numbers in Appendix F.

Criteria	Answer	Progression
Criteria 1 and 3: What is the infiltration condition of the DMA? Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. Applicant must complete and include the following in the PDP SWQMP submittal to support the feasibility determination: • Infiltration Feasibility Condition Letter; or • Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B. Applicant must complete and include all applicable sizing worksheets in the SWQMP submittal	○ Full Infiltration Condition	**Stop**. Compact biofiltration BMP is not allowed.
	○ Partial Infiltration Condition	Compact biofiltration BMP is only allowed, if the target volume retention is met onsite (Refer to Table B.5-1 in Appendix B.5). Use Worksheet B.5-2 in Appendix B.5 to estimate the target volume retention (Note: retention in this context means reduction). If the required volume reduction is achieved **proceed to Criteria 2**. If the required volume reduction is not achieved, compact biofiltration BMP is not allowed. **Stop**.
	◉ No Infiltration Condition	Compact biofiltration BMP is allowed if volume retention criteria in Table B.5-1 in Appendix B.5 for the no infiltration condition is met. Compliance with this criterion must be documented in the PDP SWQMP. If the criteria in Table B.5-1 is met **proceed to Criteria 2**. Attached after this form. If the criteria in Table B.5-1 is not met, compact biofiltration BMP is not allowed. **Stop**.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 1 and 3:

Feasibility Analysis:

Summarize findings and include either infiltration feasibility condition letter or Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B in the PDP SWQMP submittal.

If Partial Infiltration Condition:

Provide documentation that target volume retention is met (include Worksheet B.5-2 in the PDP SWQMP submittal). Worksheet B.5-7 in Appendix B.5 can be used to estimate volume retention benefits from landscape areas.

If No Infiltration Condition:

Provide documentation that the volume retention performance standard is met (include Worksheet B.5-2 in the PDP SWQMP submittal) in the PDP SWQMP submittal. Worksheet B.5-6 in Appendix B.5 can be used to document that the performance standard is met.

Criteria	Answer	Progression
Criteria 2: Is the compact biofiltration BMP sized to meet the performance standard from the MS4 Permit? Refer to Appendix B.5 and Appendix F.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Meets Flow based Criteria	Use guidance from **Appendix F.2.2** to size the compact biofiltration BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP. Use parameters for sizing consistent with manufacturer guidelines and conditions of its third party certifications (i.e. a BMP certified at a loading rate of 1 gpm/sq. ft. cannot be designed using a loading rate of 1.5 gpm/sq. ft.) **Proceed to Criteria 4.**
	○ Meets Volume based Criteria	Provide documentation that the compact biofiltration BMP has a total static (i.e. non-routed) storage volume, including pore-spaces and pre-filter detention volume (Refer to Appendix B.5 for a schematic) of at least 0.75 times the portion of the DCV not reliably retained onsite. **Proceed to Criteria 4.**
	○ Does not Meet either criteria	**Stop**. Compact biofiltration BMP is not allowed.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 2:

Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., loading rate, etc., as applicable).

Flow-based sizing calculations are provided at the beginning of Attachment 1e for BMP 1 and 2. These MWS will be installed in the standard layout before a vault.

Criteria	Answer	Progression
Criteria 4: Does the compact biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern? Refer to Appendix B.6 and Appendix F.1 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes, meets the TAPE certification.	Provide documentation that the compact BMP has an appropriate TAPE certification for the projects most significant pollutants of concern. **Proceed to Criteria 5.**
	○ Yes, through other third-party documentation	Acceptance of third-party documentation is at the discretion of the City Engineer. The City engineer will consider, (a) the data submitted; (b) representativeness of the data submitted; and (c) consistency of the BMP performance claims with pollutant control objectives in Table F.1-2 and Table F.1-1 while making this determination. If a compact biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2. **Proceed to Criteria 5.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 4:

Provide documentation that identifies the projects most significant pollutants of concern and TAPE certification or other third party documentation that shows that the compact biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.

TAPE certification is attached after this form.

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 5: Is the compact biofiltration BMP designed to promote appropriate biological activity to support and maintain treatment process? Refer to Appendix F of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes	Provide documentation that the compact biofiltration BMP support appropriate biological activity. Refer to Appendix F for guidance. **Proceed to Criteria 6.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 5:

Provide documentation that appropriate biological activity is supported by the compact biofiltration BMP to maintain treatment process.

MWS Linear brochure is attached after this form and shows biofiltration.

Criteria	Answer	Progression
Criteria 6: Is the compact biofiltration BMP designed with a hydraulic loading rate to prevent erosion, scour and channeling within the BMP?	◉ Yes	Provide documentation that the compact biofiltration BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification. **Proceed to Criteria 7.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 6:

Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., maximum tributary area, maximum inflow velocities, etc., as applicable).

Flow-based sizing calculations are provided at the beginning of Attachment 1e. The units are designed to withstand erosion, scour, and channeling if sized for the design flow rate. The units are concrete, which will withstand hydraulic forces.

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 7: Is the compact biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)?	◉ Yes, and the compact BMP is privately owned, operated and not in the public right of way.	Submit a maintenance agreement that will also include a statement that the BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification. **Stop**. The compact biofiltration BMP meets the required criteria.
	◉ Yes, and the BMP is either owned or operated by the City or in the public right of way.	Approval is at the discretion of the City Engineer. The city engineer will consider maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business or other relevant factors while making the determination. **Stop**. Consult the City Engineer for a determination.
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 7:

Include copy of manufacturer guidelines and conditions of third-party certification in the maintenance agreement. PDP SWQMP must include a statement that the compact BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.

The three MWS Linear BMPs in Street A and B will be public. The other will be private.

Compact (high rate) Biofiltration BMP Checklist	Form I-10
Section 2: Verification (For City Use Only)	
Is the proposed compact BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA?	◉ Yes ○ No, See explanation below
Explanation/reason if the compact BMP is not accepted by the City for onsite pollutant control compliance:	

Table B-5.1

Infiltration Feasibility Condition	Performance Standard
No Infiltration Condition (Based on Infiltration Feasibility Condition Letter and/or Worksheet C.4-1: Form I-8A and/or Worksheet C.4-2: Form I-8B) [There is no hierarchy in selecting the type of biofiltration BMP as long as the performance standard for the selected biofiltration BMP is met]	**Standard Biofiltration BMPs:** BMPs must meet the criteria in Appendix B.5.1.2 **Non-Standard Biofiltration BMPs:** Pollutant Removal: BMP must be sized using Worksheet B.5-1 and Worksheet B.5-4; **AND** Volume Retention: DMA must meet the target volume retention calculated using Worksheet B.5-2 (based on Figure B.5-2). Compliance with volume retention requirements can be documented by: • DMA has a combined BMP footprint and landscaped area (that meet the criteria in SD-B and SD-F factsheet) of 3% of contributing area times adjusted runoff factor or greater. The landscaped area must have an impervious area to pervious area ratio greater than 1.5:1. This can be documented using Worksheet B.5-6. [OR] • Applicant has an option to use other site design BMPs that will meet the target volume retention calculated using Worksheet B.5-2. This can be documented using Worksheet B.5-6 and/or Worksheet B.5-7. **Compact Biofiltration BMPs:** Pollutant Removal: BMP must meet the criteria in Appendix F. Form I-10 must be completed and submitted with the PDP SWQMP; **AND** Volume Retention: DMA must meet the target volume retention calculated using Worksheet B.5-2 (based on Figure B.5-2). Compliance with volume retention requirements can be documented by: • DMA has a combined BMP footprint and landscaped area (that meet the criteria in SD-B and SD-F factsheet) of 3% of contributing area times adjusted runoff factor or greater. The landscaped area must have an impervious area to pervious area ratio greater than 1.5:1. This can be documented using Worksheet B.5-6. [OR] • Applicant has an option to use other site design BMPs that will meet the target volume retention calculated using Worksheet B.5-2. This can be documented using Worksheet B.5-6 and/or Worksheet B.5-7.

Worksheet B.5-2 and B.5-6 are attached.

The City of SAN DIEGO	Project Name	PA-61	
	BMP ID	BMP 1	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	110,812	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.58	
3	85th percentile 24-hour rainfall depth	0.48	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2571	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	59	cu. ft.

The City of SAN DIEGO	Project Name	PA-61
	BMP ID	BMP 1

Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	110,812	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.58	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	64271	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	1928	sq. ft.
5	Biofiltration BMP Footprint	0	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-B and SD-F Fact Sheet (sq. ft.)	1928				
7	Impervious area draining to the landscape area (sq. ft.)	2892				
8	Impervious to Pervious Area ratio [Line 7/Line 6]	1.50	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	1928	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	1928	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	1928	sq. ft.

Volume Retention Performance Standard

12	Is Line 11 ≥ Line 4?	No, Proceed to Line 13	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	1	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	59	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	0	cu. ft.

Site Design BMP

	Identification	Site Design Type	Credit	
16	1			cu. ft.
	2			cu. ft.
	3			cu. ft.
	4			cu. ft.
	5			cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met		

The City of SAN DIEGO	Project Name	PA-61	
	BMP ID	BMP 2	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	102,886	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.55	
3	85th percentile 24-hour rainfall depth	0.48	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2263	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	52	cu. ft.

The City of SAN DIEGO	Project Name	PA-61				
	BMP ID	BMP 2				

Volume Retention for No Infiltration Condition						Worksheet B.5-6	
1	Area draining to the biofiltration BMP					102,886	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)					0.55	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]					56587	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]					1698	sq. ft.
5	Biofiltration BMP Footprint					0	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-B and SD-F Fact Sheet (sq. ft.)		1698				
7	Impervious area draining to the landscape area (sq. ft.)		2547				
8	Impervious to Pervious Area ratio [Line 7/Line 6]		1.50	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		1698	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]					1698	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]					1698	sq. ft.
Volume Retention Performance Standard							
12	Is Line 11 ≥ Line 4?		Volume Retention Performance Standard is Met				
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]					1	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]					52	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]					0	cu. ft.
Site Design BMP							
	Identification	**Site Design Type**				**Credit**	
16	**1**						cu. ft.
	2						cu. ft.
	3						cu. ft.
	4						cu. ft.
	5						cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.					0	cu. ft.
17	Is Line 16 ≥ Line 15?		Volume Retention Performance Standard is Met				

WASHINGTON STATE DEPARTMENT OF ECOLOGY

TAPE Certification

April 2014

GENERAL USE LEVEL DESIGNATION FOR BASIC, ENHANCED, AND PHOSPHORUS TREATMENT

For the

MWS-Linear Modular Wetland

Ecology's Decision:

Based on Modular Wetland Systems, Inc. application submissions, including the Technical Evaluation Report, dated April 1, 2014, Ecology hereby issues the following use level designation:

1. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Basic treatment

   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

2. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Phosphorus treatment

   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

3. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Enhanced treatment

   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

4. Ecology approves the MWS - Linear Modular Wetland Stormwater Treatment System units for Basic, Phosphorus, and Enhanced treatment at the hydraulic loading rate listed above. Designers shall calculate the water quality design flow rates using the following procedures:

    - Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
    - Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
    - Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

5. These use level designations have no expiration date but may be revoked or amended by Ecology, and are subject to the conditions specified below.

Ecology's Conditions of Use:

Applicants shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the MWS – Linear Modular Wetland Stormwater Treatment System units, in accordance with Modular Wetland Systems, Inc. applicable manuals and documents and the Ecology Decision.
2. Each site plan must undergo Modular Wetland Systems, Inc. review and approval before site installation. This ensures that site grading and slope are appropriate for use of a MWS – Linear Modular Wetland Stormwater Treatment System unit.
3. MWS – Linear Modular Wetland Stormwater Treatment System media shall conform to the specifications submitted to, and approved by, Ecology.
4. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.

    - Typically, Modular Wetland Systems, Inc. designs MWS - Linear Modular Wetland systems for a target prefilter media life of 6 to 12 months.
    - Indications of the need for maintenance include effluent flow decreasing to below the design flow rate or decrease in treatment below required levels.
    - Owners/operators must inspect MWS - Linear Modular Wetland systems for a minimum of twelve months from the start of post-construction operation to determine site-specific maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30). After the

first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.

- Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.
- When inspections are performed, the following findings typically serve as maintenance triggers:
    - Standing water remains in the vault between rain events, or
    - Bypass occurs during storms smaller than the design storm.
    - If excessive floatables (trash and debris) are present (but no standing water or excessive sedimentation), perform a minor maintenance consisting of gross solids removal, not prefilter media replacement.
    - Additional data collection will be used to create a correlation between pretreatment chamber sediment depth and pre-filter clogging (see *Issues to be Addressed by the Company* section below)

6. Discharges from the MWS - Linear Modular Wetland Stormwater Treatment System units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant: Modular Wetland Systems, Inc.
Applicant's Address: *PO. Box 869*
Oceanside, CA 92054

Application Documents:

- *Original Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., January 2011
- *Quality Assurance Project Plan*: Modular Wetland system – Linear Treatment System performance Monitoring Project, draft, January 2011.
- *Revised Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., May 2011
- *Memorandum: Modular Wetland System-Linear GULD Application Supplementary Data, April 2014*
- *Technical Evaluation Report: Modular Wetland System Stormwater Treatment System Performance Monitoring, April 2014.*

Applicant's Use Level Request:

General use level designation as a Basic, Enhanced, and Phosphorus treatment device in accordance with Ecology's Guidance for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) January 2011 Revision.

Applicant's Performance Claims:

- The MWS – Linear Modular wetland is capable of removing a minimum of 80-percent of TSS from stormwater with influent concentrations between 100 and 200 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 50-percent of Total Phosphorus from stormwater with influent concentrations between 0.1 and 0.5 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 30-percent of dissolved Copper from stormwater with influent concentrations between 0.005 and 0.020 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 60-percent of dissolved Zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/l.

Ecology Recommendations:

- Modular Wetland Systems, Inc. has shown Ecology, through laboratory and field-testing, that the MWS - Linear Modular Wetland Stormwater Treatment System filter system is capable of attaining Ecology's Basic, Total phosphorus, and Enhanced treatment goals.

Findings of Fact:

Laboratory Testing

The MWS-Linear Modular wetland has the:

- Capability to remove 99 percent of total suspended solids (using Sil-Co-Sil 106) in a quarter-scale model with influent concentrations of 270 mg/L.
- Capability to remove 91 percent of total suspended solids (using Sil-Co-Sil 106) in laboratory conditions with influent concentrations of 84.6 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 93 percent of dissolved Copper in a quarter-scale model with influent concentrations of 0.757 mg/L.
- Capability to remove 79 percent of dissolved Copper in laboratory conditions with influent concentrations of 0.567 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 80.5-percent of dissolved Zinc in a quarter-scale model with influent concentrations of 0.95 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 78-percent of dissolved Zinc in laboratory conditions with influent concentrations of 0.75 mg/L at a flow rate of 3.0 gpm per square foot of media.

Field Testing

- Modular Wetland Systems, Inc. conducted monitoring of an MWS-Linear (Model # MWS-L-4-13) from April 2012 through May 2013, at a transportation maintenance facility in Portland, Oregon. The manufacturer collected flow-weighted composite

samples of the system's influent and effluent during 28 separate storm events. The system treated approximately 75 percent of the runoff from 53.5 inches of rainfall during the monitoring period. The applicant sized the system at 1 gpm/sq ft. (wetland media) and 3gpm/sq ft. (prefilter).

- Influent TSS concentrations for qualifying sampled storm events ranged from 20 to 339 mg/L. Average TSS removal for influent concentrations greater than 100 mg/L (n=7) averaged 85 percent. For influent concentrations in the range of 20-100 mg/L (n=18), the upper 95 percent confidence interval about the mean effluent concentration was 12.8 mg/L.
- Total phosphorus removal for 17 events with influent TP concentrations in the range of 0.1 to 0.5 mg/L averaged 65 percent. A bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 58 percent.
- The lower 95 percent confidence limit of the mean percent removal was 60.5 percent for dissolved zinc for influent concentrations in the range of 0.02 to 0.3 mg/L (n=11). The lower 95 percent confidence limit of the mean percent removal was 32.5 percent for dissolved copper for influent concentrations in the range of 0.005 to 0.02 mg/L (n=14) at flow rates up to 28 gpm (design flow rate 41 gpm). Laboratory test data augmented the data set, showing dissolved copper removal at the design flow rate of 41 gpm (93 percent reduction in influent dissolved copper of 0.757 mg/L).

Issues to be addressed by the Company:

1. Modular Wetland Systems, Inc. should collect maintenance and inspection data for the first year on all installations in the Northwest in order to assess standard maintenance requirements for various land uses in the region. Modular Wetland Systems, Inc. should use these data to establish required maintenance cycles.
2. Modular Wetland Systems, Inc. should collect pre-treatment chamber sediment depth data for the first year of operation for all installations in the Northwest. Modular Wetland Systems, Inc. will use these data to create a correlation between sediment depth and pre-filter clogging.

Technology Description:
Download at http://www.modularwetlands.com/

Contact Information:

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P.O. Box 869
Oceanside, CA 92054
gkent@biocleanenvironmental.net

Applicant website: http://www.modularwetlands.com/

Ecology web link: http://www.ecy.wa.gov/programs/wg/stormwater/newtech/index.html

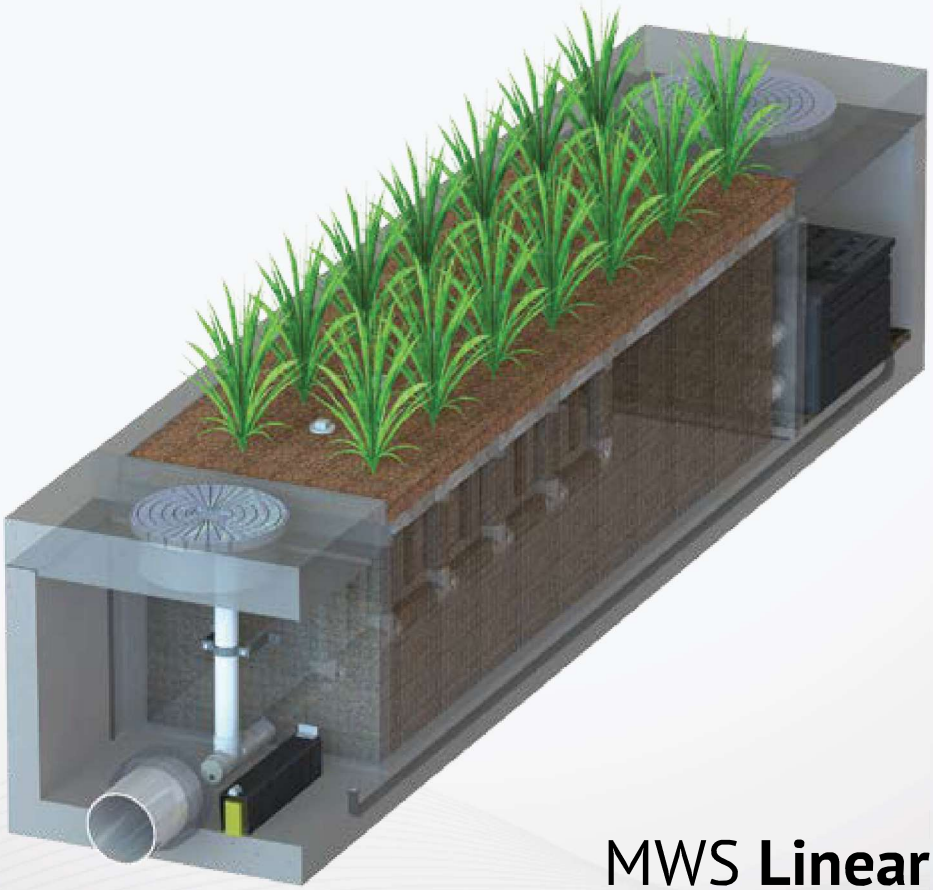
Ecology: Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 407-6444
douglas.howie@ecy.wa.gov

Revision History

Date	**Revision**
June 2011	Original use-level-designation document
September 2012	Revised dates for TER and expiration
January 2013	Modified Design Storm Description, added Revision Table, added maintenance discussion, modified format in accordance with Ecology standard
December 2013	Updated name of Applicant
April 2014	Approved GULD designation for Basic, Phosphorus, and Enhanced treatment

MODULAR WETLANDS™

*Advanced **Stormwater** Biofiltration*



MWS **Linear**

Contents

The Urban Impact

For hundreds of years natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as our cities grow and develop, these natural wetlands have perished under countless roads, rooftops, and parking lots.

Plant A Wetland

Without natural wetlands our cities are deprived of water purification, flood control, and land stability. Modular Wetlands and the MWS Linear re-establish nature's presence and rejuvenate water ways in urban areas.

MWS **Linear**

The Modular Wetland System Linear represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint and higher treatment capacity. While most biofilters use little or no pre-treatment, the MWS Linear incorporates an advanced pre-treatment chamber that includes separation and pre-filter cartridges. In this chamber sediment and hydrocarbons are removed from runoff before it enters the biofiltration chamber, in turn reducing maintenance costs and improving performance.

Applications

The MWS Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.

Industrial

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA mandated effluent limits for dissolved metals and other pollutants.

Residential

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.

Streets

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.

Parking Lots

Parking lots are designed to maximize space and the MWS Linear's 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.

Commercial

Compared to bioretention systems, the MWS Linear can treat far more area in less space - meeting treatment and volume control requirements.

Mixed Use

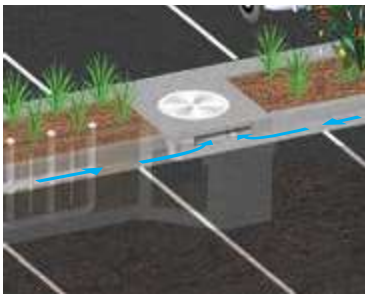
The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications are available on our website: www.ModularWetlands.com/Applications

- Agriculture
- Reuse
- Low Impact Development
- Waste Water

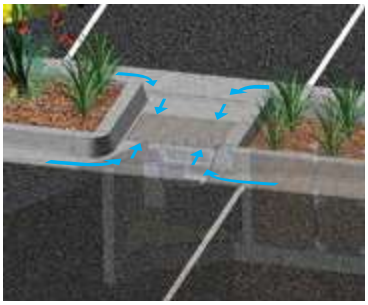
Configurations

The MWS Linear is the preferred biofiltration system of Civil Engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your stormdrain design.



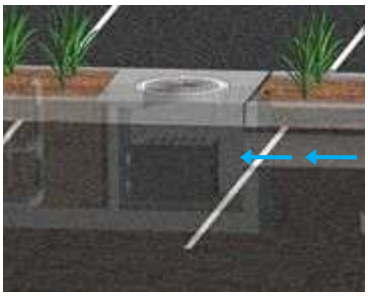
Curb Type

The *Curb Type* configuration accepts sheet flow through a curb opening and is commonly used along road ways and parking lots. It can be used in sump or flow by conditions. Length of curb opening varies based on model and size.



Grate Type

The *Grate Type* configuration offers the same features and benefits as the *Curb Type* but with a grated/drop inlet above the systems pre-treatment chamber. It has the added benefit of allowing for pedestrian access over the inlet. ADA compliant grates are available to assure easy and safe access. The *Grate Type* can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



Vault Type

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pre-treatment chamber, meaning the MWS Linear can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretention systems. Another benefit of the "pipe in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

Downspout Type

The *Downspout Type* is a variation of the *Vault Type* and is designed to accept a vertical downspout pipe from roof top and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

Advantages & Operation

The MWS Linear is the most efficient and versatile biofiltration system on the market, and the only system with horizontal flow which improves performance, reduces footprint, and minimizes maintenance. Figure-1 and Figure-2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

Featured Advantages

- Horizontal Flow Biofiltration
- Greater Filter Surface Area
- Pre-Treatment Chamber
- Patented Perimeter Void Area
- Flow Control
- No Depressed Planter Area

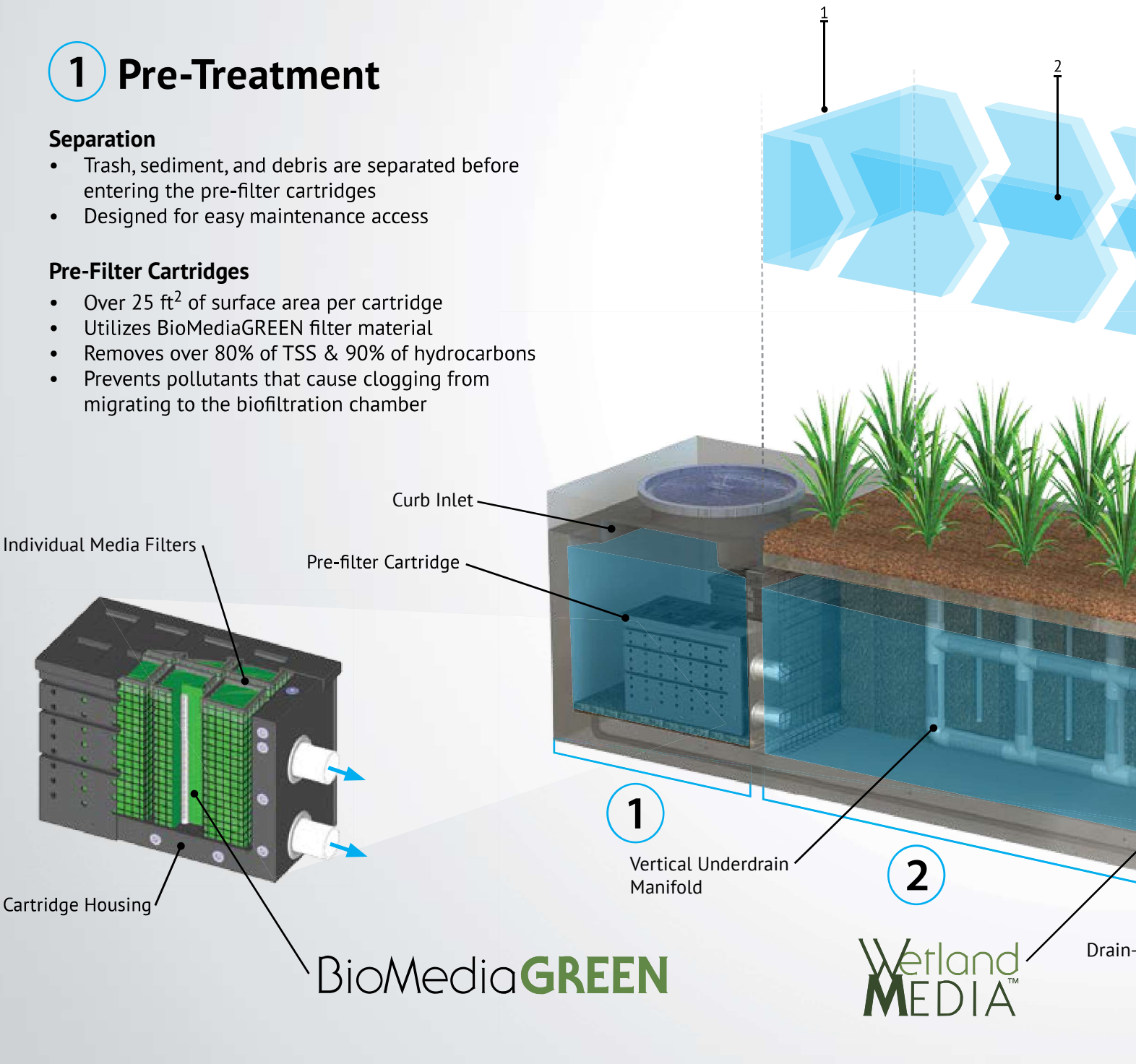
1 Pre-Treatment

Separation

- Trash, sediment, and debris are separated before entering the pre-filter cartridges
- Designed for easy maintenance access

Pre-Filter Cartridges

- Over 25 ft^2 of surface area per cartridge
- Utilizes BioMediaGREEN filter material
- Removes over 80% of TSS & 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber



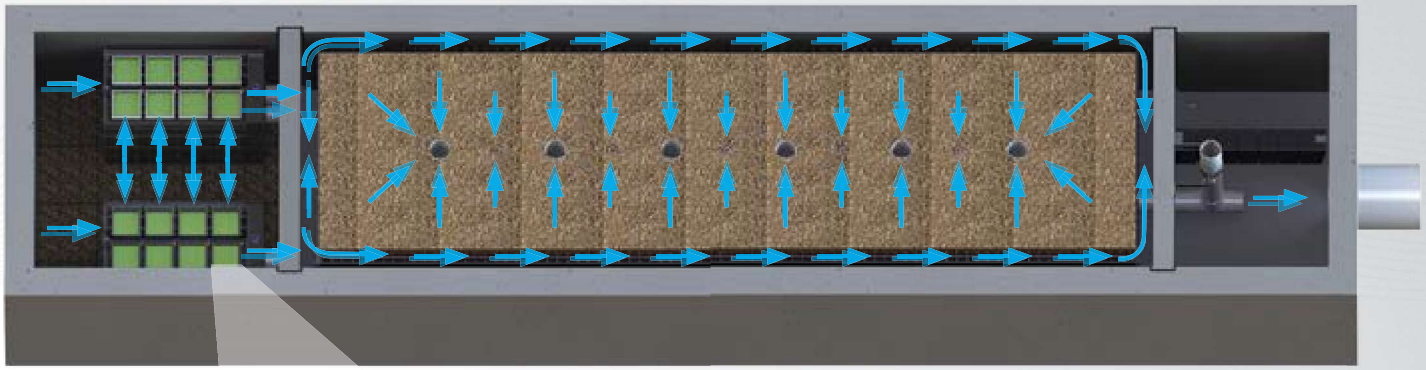
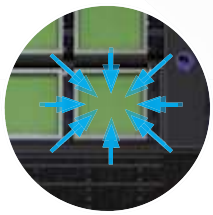


Fig. 2 - Top View

2x to 3x More Surface Area Than Traditional Downward Flow Bioretention Systems.



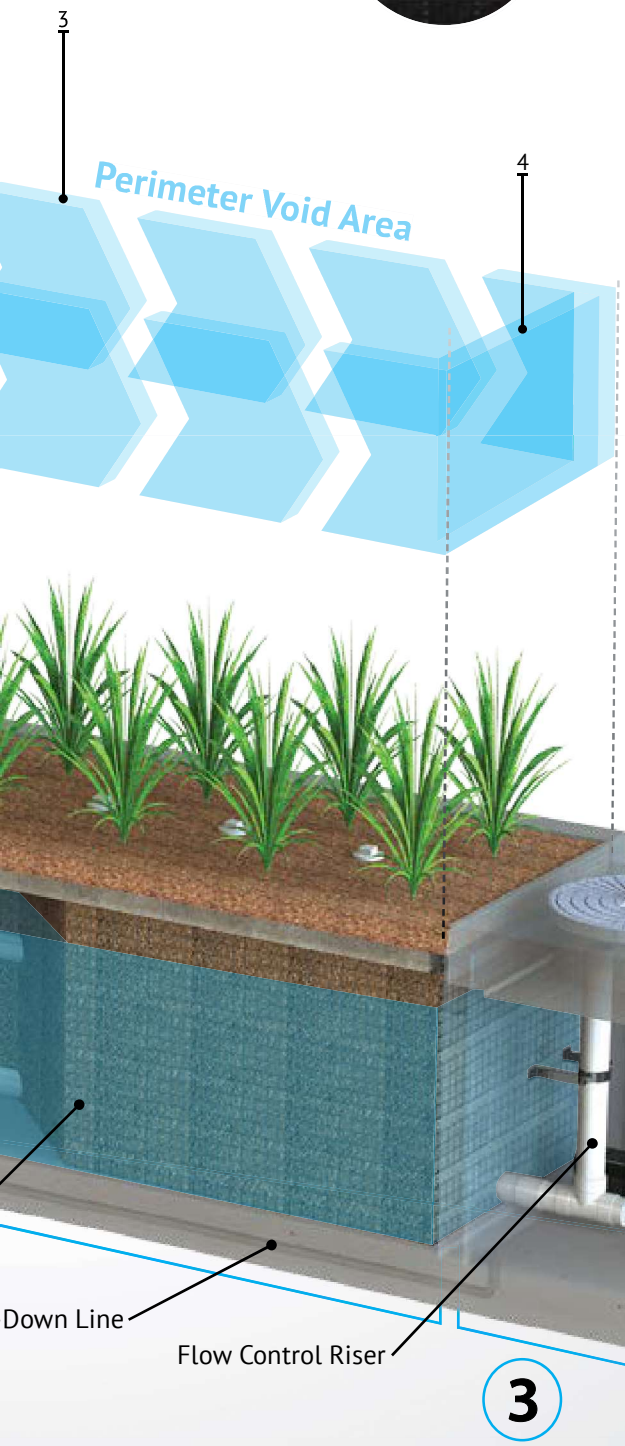


Fig. 1

2 Biofiltration

Horizontal Flow

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

Patented Perimeter Void Area

- Vertically extends void area between the walls and the WetlandMEDIA on all four sides.
- Maximizes surface area of the media for higher treatment capacity

WetlandMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and light weight

3 Discharge

Flow Control

- Orifice plate controls flow of water through WetlandMEDIA to a level lower than the media's capacity.
- Extends the life of the media and improves performance

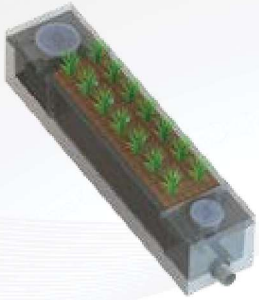
Drain-Down Filter

- The Drain-Down is an optional feature that completely drains the pre-treatment chamber
- Water that drains from the pre-treatment chamber between storm events will be treated

Orientations

Side-By-Side

The *Side-By-Side* orientation places the pre-treatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.



End-To-End

The *End-To-End* orientation places the pre-treatment and discharge chambers on opposite ends of the biofiltration chamber therefore minimizing the width of the system to 5 ft (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is bypass must be external.

Bypass

Internal Bypass Weir (Side-by-Side Only)

The *Side-By-Side* orientation places the pre-treatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pre-treatment chamber directly to the discharge chamber.

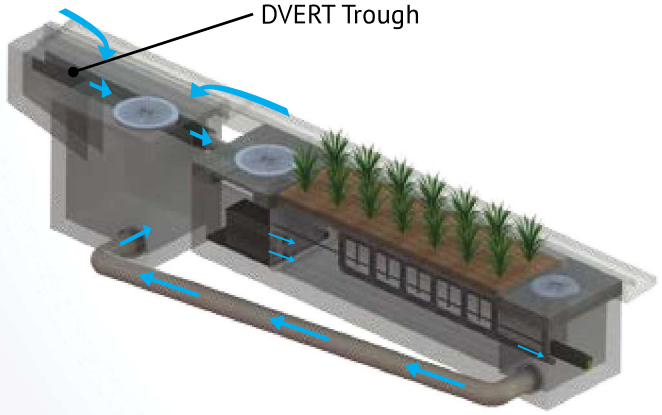
External Diversion Weir Structure

This traditional offline diversion method can be used with the MWS Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

Flow By Design

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT Low Flow Diversion



This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the MWS Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allows the MWS Linear to be installed anywhere space is available.

Performance

The MWS Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country. With it's advanced pre-treatment chamber and innovative horizontal flow biofilter, the system is able to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. With the same biological processes found in natural wetlands, the MWS Linear harnesses natures ability to process, transform, and remove even the most harmful pollutants.

Approvals

The MWS Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation, and perhaps the world.

Washington State TAPE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

TSS	Total Phosphorus	Ortho Phosphorus	Nitrogen	Dissolved Zinc	Dissolved Copper	Total Zinc	Total Copper	Motor Oil
85%	64%	67%	45%	66%	38%	69%	50%	95%

DEQ Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear, the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) Technical Criteria.

Maryland Department Of The Environment Approved

Granted ESD (Environmental Site Design) status for new construction, redevelopment and retrofitting when designed in accordance with the Design Manual.

MASTEP Evaluation

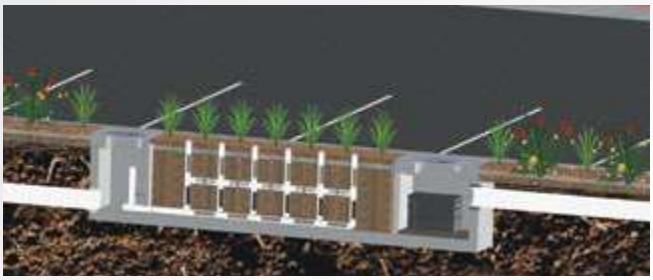
The University of Massachusetts at Amherst – Water Resources Research Center, issued a technical evaluation report noting removal rates up to 84% TSS, 70% Total Phosphorus, 68.5% Total Zinc, and more.

Rhode Island DEM Approved

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% Pathogens, 30% Total Phosphorus, and 30% Total Nitrogen.

Flow Based Sizing

The MWS Linear can be used in stand alone applications to meet treatment flow requirements. Since the MWS Linear is the only biofiltration system that can accept inflow pipes several feet below the surface it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.



Treatment Flow Sizing Table

Model #	Dimensions	WetlandMedia Surface Area	Treatment Flow Rate (cfs)
MWS-L-4-4	4' x 4'	23 ft^2	0.052
MWS-L-4-6	4' x 6'	32 ft^2	0.073
MWS-L-4-8	4' x 8'	50 ft^2	0.115
MWS-L-4-13	4' x 13'	63 ft^2	0.144
MWS-L-4-15	4' x 15'	76 ft^2	0.175
MWS-L-4-17	4' x 17'	90 ft^2	0.206
MWS-L-4-19	4' x 19'	103 ft^2	0.237
MWS-L-4-21	4' x 21'	117 ft^2	0.268
MWS-L-8-8	8' x 8'	100 ft^2	0.230
MWS-L-8-12	8' x 12'	151 ft^2	0.346
MWS-L-8-16	8' x 16'	201 ft^2	0.462

Volume Based Sizing

Many states require treatment of a water quality volume and do not offer the option of flow based design. The MWS Linear and its unique horizontal flow makes it the only biofilter that can be used in volume based design installed downstream of ponds, detention basins, and underground storage systems.

Treatment Volume Sizing Table

Model #	Treatment Capacity (cu. ft.) @ 24-Hour Drain Down	Treatment Capacity (cu. ft.) @ 48-Hour Drain Down
MWS-L-4-4	1140	2280
MWS-L-4-6	1600	3200
MWS-L-4-8	2518	5036
MWS-L-4-13	3131	6261
MWS-L-4-15	3811	7623
MWS-L-4-17	4492	8984
MWS-L-4-19	5172	10345
MWS-L-4-21	5853	11706
MWS-L-8-8	5036	10072
MWS-L-8-12	7554	15109
MWS-L-8-16	10073	20145

Installation

The MWS Linear is simple, easy to install, and has a space efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles pre-cast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians are available to supervise installations and provide technical support.

Maintenance

Reduce your maintenance costs, man hours, and materials with the MWS Linear. Unlike other biofiltration systems that provide no pre-treatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pre-treatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pre-treatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pre-treatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter cartridges is required for long term operation and there is absolutely no need to replace expensive biofiltration media.

Plant Selection

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the MWS Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more "contact time" so that pollutants are more successfully decomposed, volatilized and incorporated into the biomass of The MWS Linear's micro/macro flora and fauna.

A wide range of plants are suitable for use in the MWS Linear, but selections vary by location and climate. View suitable plants by selecting the list relative to your project location's hardy zone.

Please visit **www.ModularWetlands.com/Plants** for more information and various plant lists.

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.

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Project Name: Planning Area 61 - Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone

Indicate which Items are Included:

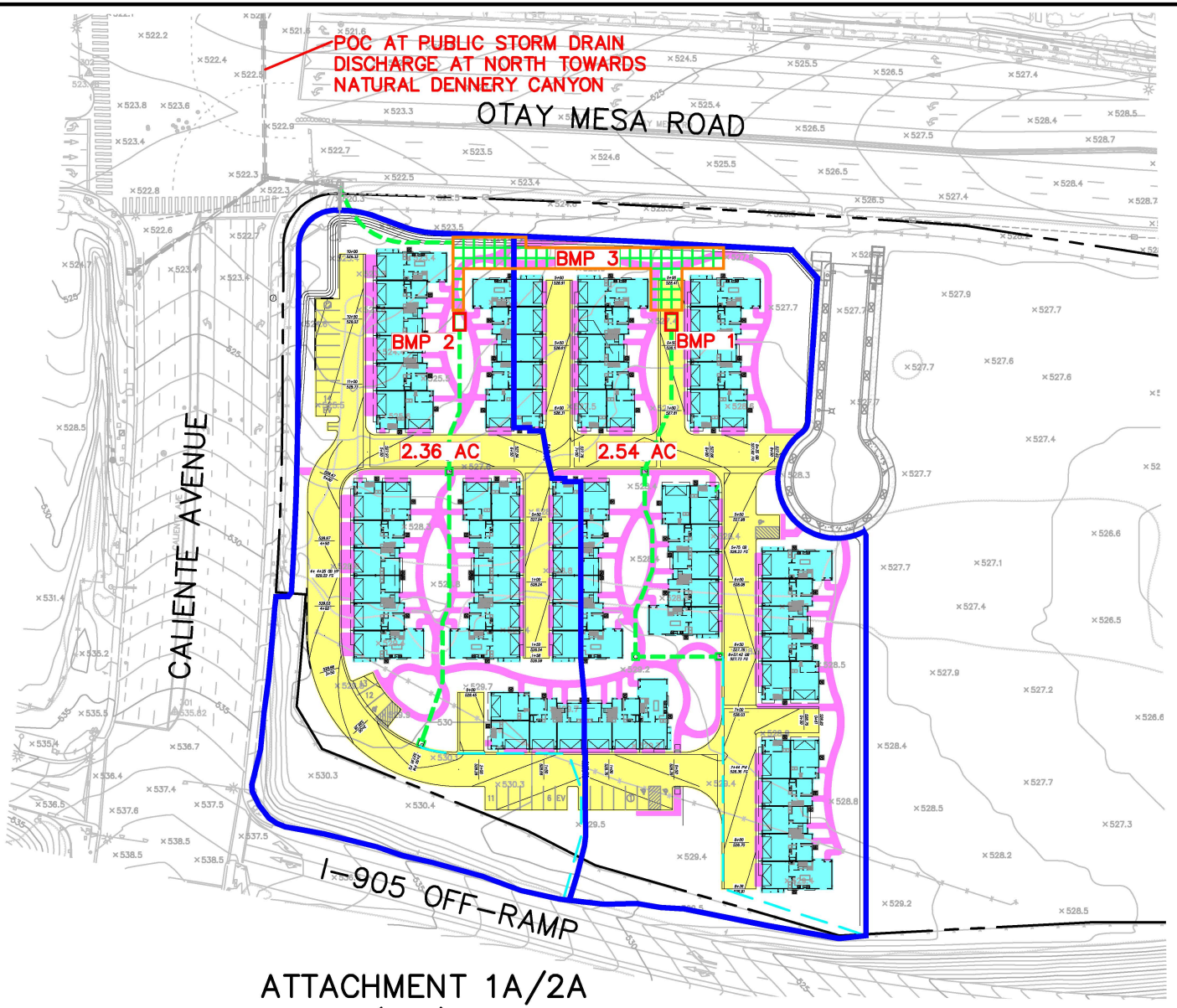
Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 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
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☑ Not Performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	☑ Included ☐ Submitted as separate stand-alone document

Project Name: Planning Area 61 – Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone

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

The Hydromodification Management Exhibit must identify:

- [x] Underlying hydrologic soil group
- [x] Approximate depth to groundwater
- [x] Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- [x] Critical coarse sediment yield areas to be protected OR provide a separate map showing that the project site is outside of any critical coarse sediment yield areas
- [x] Existing topography
- [x] Existing and proposed site drainage network and connections to drainage offsite
- [x] Proposed grading
- [x] Proposed impervious features
- [x] Proposed design features and surface treatments used to minimize imperviousness
- [x] 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).



1" = 80'

0 80

NOTES:

THE UNDERLYING HYDROLOGIC SOIL GROUP IS D. GROUNDWATER WAS NOT ENCOUNTERED IN BORINGS UP TO 17' DEEP. THERE ARE NO EXISTING ON-SITE NATURAL HYDROLOGIC FEATURES, CCSYA, OR IMPERVIOUS AREAS.

THE POINT OF COMPLIANCE IS AT THE OUTLET OF THE PUBLIC STORM DRAIN IN OTAY MESA ROAD TOWARDS DENNERY CANYON.

SEE ATTACHED SHEET FOR SUMMARY OF AREAS.

LEGEND:

- DMA BOUNDARY
- 2.36 AC — DRAINAGE/DMA AREA
- PROPOSED DRAINAGE FACILITY
- BMP 1 — PROP. MWS LINEAR (OR EQUIV.)
- PROP. FLOW CONTROL VAULT
- PROPOSED BUILDINGS
- PROPOSED STREETS
- PROPOSED HARDSCAPE/DRIVEWAYS
- PROPOSED LANDSCAPING

ATTACHMENT 1A/2A

DRAINAGE MANAGEMENT AREAS (DMA) AND HYDROMODIFICATION EXHIBIT

Attachment 2b - CCSYA's Per Google Earth kmz

ATTACHMENT 2d
FLOW CONTROL FACILITY DESIGN

Per Attachment 1e, the project will use two Modular Wetland System Linear BMPs for pollutant control. The MWS-Linear BMPs are TAPE-certified and have been used for similar recent projects approved by the city of San Diego. A single underground vault will capture the storm runoff after the two MWS Linear units. The vault volume was determined using the BMP Sizing Spreadsheet v3.0 (attached). The spreadsheet vault sizing is based on the *Storm Water Standards* Cistern sizing factors. The project contains hydrologic soil group D, has a flat slope, and is the Lindbergh gage. Furthermore, this SWQMP does not include a geomorphic assessment so $0.1Q_2$ is assumed.

The outflow and vault volume are then used to determine the drawdown. The vault has a drawdown less than 96 hours, so meets the hydromodification criteria.

BMP Sizing Spreadsheet V3.0

Project Name:	PA-61 Commercial
Project Applicant:	Pardee Homes
Jurisdiction:	City of San Diego
Parcel (APN):	645-080-16
Hydrologic Unit:	Otay Valley
Rain Gauge:	Lindbergh
Total Project Area (sf):	213,678
Channel Susceptibility:	High

BMP Sizing Spreadsheet V3.0			
Project Name:	PA-61 Commercial	Hydrologic Unit:	Otay Valley
Project Applicant:	Pardee Homes	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	213,678
Parcel (APN):	645-080-16	Low Flow Threshold:	0.1Q2
BMP Name:	BMP	BMP Type:	Cistern
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	NA

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Volume	Volume (CF)
Roofs	57,660	D	Flat	Roofs	1.0	0.09	5189
Hardscape	17,959	D	Flat	Concrete	1.0	0.09	1616
Streets	48,534	D	Flat	Concrete	1.0	0.09	4368
Landscaping	124,153	D	Flat	Landscape	0.1	0.09	1117
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	248,306					Minimum BMP Size	12291
						Proposed BMP Size*	12291

* Assumes standard configuration

Standard Cistern Depth (Overflow Elevation)	3.5	ft
Provided Cistern Depth (Overflow Elevation)	3.5	ft
Minimum Required Cistern Footprint)	3512	CF

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manual.

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
Designated Staff have final review and approval authority over the project design.

This BMP Sizing Spreadsheet has been updated in conformance with the San Diego Region Model BMP Design Manual, April 2018. For questions or concerns please contact the jurisdiction in which your project is located.

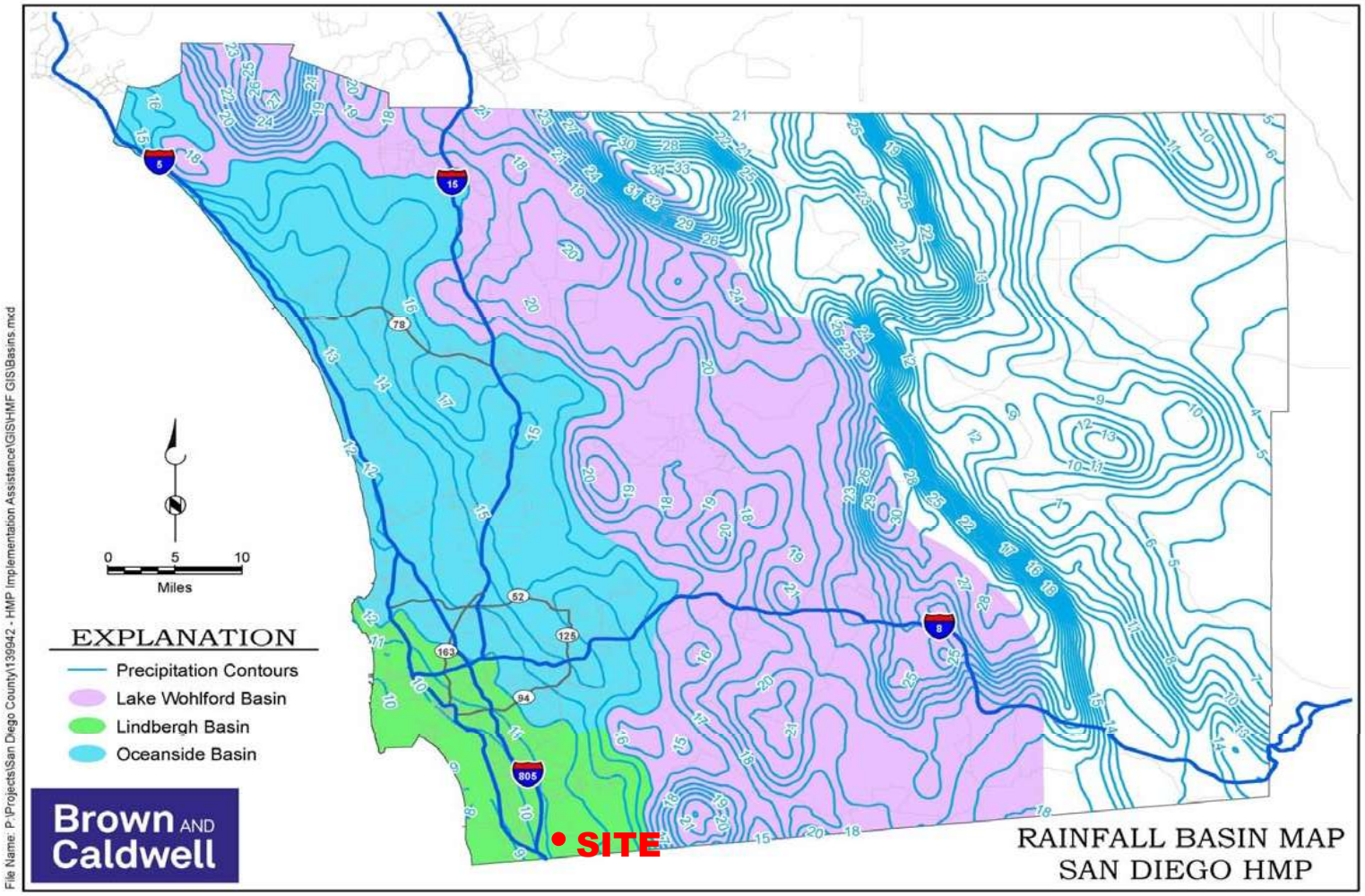
BMP Sizing Spreadsheet V3.0			
Project Name:	PA-61 Commercial	Hydrologic Unit:	Otay Valley
Project Applicant:	Pardee Homes	Rain Gauge:	Lindbergh
Jurisdiction:	City of San Diego	Total Project Area:	213,678
Parcel (APN):	645-080-16	Low Flow Threshold:	0.1Q2
BMP Name	BMP	BMP Type:	Cistern

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
Roofs	Lindbergh	3	Flat	0	1.324	0.000	**0.00**
Hardscape	Lindbergh	D	Flat	0.429	0.412	0.018	**0.26**
Streets	Lindbergh	D	Flat	0.429	1.114	0.048	**0.71**
Landscaping	Lindbergh	D	Flat	0.429	2.850	0.122	**1.80**

3.50	**0.188**	**2.77**	**1.88**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

Provide Hand Calc.	**0.188**	**2.78**	**1.880**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	Provide Hand Calculation


0
5
10
Miles
EXPLANATION
Precipitation Contours
Lake Wohlford Basin
Lindbergh Basin
Oceanside Basin
Brown AND Caldwell
SITE
RAINFALL BASIN MAP
SAN DIEGO HMP
File Name: P:\Projects\San Diego County\139942 - HMP Implementation Assistance\GIS\HMF GIS\Basins.mxd

0.1Q2	A	Flat	Oceanside	0.15
0.1Q2	A	Moderate	Oceanside	0.14
0.1Q2	A	Steep	Oceanside	0.135
0.1Q2	B	Flat	Oceanside	0.085
0.1Q2	B	Moderate	Oceanside	0.085
0.1Q2	B	Steep	Oceanside	0.085
0.1Q2	C	Flat	Oceanside	0.075
0.1Q2	C	Moderate	Oceanside	0.075
0.1Q2	C	Steep	Oceanside	0.075
0.1Q2	D	Flat	Oceanside	0.07
0.1Q2	D	Moderate	Oceanside	0.07
0.1Q2	D	Steep	Oceanside	0.07
0.1Q2	A	Flat	Lake Wohlford	0.285
0.1Q2	A	Moderate	Lake Wohlford	0.275
0.1Q2	A	Steep	Lake Wohlford	0.27
0.1Q2	B	Flat	Lake Wohlford	0.15
0.1Q2	B	Moderate	Lake Wohlford	0.145
0.1Q2	B	Steep	Lake Wohlford	0.145
0.1Q2	C	Flat	Lake Wohlford	0.07
0.1Q2	C	Moderate	Lake Wohlford	0.07
0.1Q2	C	Steep	Lake Wohlford	0.07
0.1Q2	D	Flat	Lake Wohlford	0.06
0.1Q2	D	Moderate	Lake Wohlford	0.06
0.1Q2	D	Steep	Lake Wohlford	0.06

Table G.2-6: Sizing Factors for Hydromodification Flow Control Cistern Facilities Designed Using Sizing Factor Method

Lower Flow Threshold	Soil Group	Slope	Rain Gauge	V
0.1Q2	A	Flat	Lindbergh	0.54
0.1Q2	A	Moderate	Lindbergh	0.51
0.1Q2	A	Steep	Lindbergh	0.49
0.1Q2	B	Flat	Lindbergh	0.19
0.1Q2	B	Moderate	Lindbergh	0.18

0.1Q2	B	Steep	Lindbergh	0.18
0.1Q2	C	Flat	Lindbergh	0.11
0.1Q2	C	Moderate	Lindbergh	0.11
0.1Q2	C	Steep	Lindbergh	0.11
0.1Q2	D	Flat	Lindbergh	0.09
0.1Q2	D	Moderate	Lindbergh	0.09
0.1Q2	D	Steep	Lindbergh	0.09
0.1Q2	A	Flat	Oceanside	0.26
0.1Q2	A	Moderate	Oceanside	0.25
0.1Q2	A	Steep	Oceanside	0.25
0.1Q2	B	Flat	Oceanside	0.16
0.1Q2	B	Moderate	Oceanside	0.16
0.1Q2	B	Steep	Oceanside	0.16
0.1Q2	C	Flat	Oceanside	0.14
0.1Q2	C	Moderate	Oceanside	0.14
0.1Q2	C	Steep	Oceanside	0.14
0.1Q2	D	Flat	Oceanside	0.12
0.1Q2	D	Moderate	Oceanside	0.12
0.1Q2	D	Steep	Oceanside	0.12
0.1Q2	A	Flat	Lake Wohlford	0.53
0.1Q2	A	Moderate	Lake Wohlford	0.49
0.1Q2	A	Steep	Lake Wohlford	0.49
0.1Q2	B	Flat	Lake Wohlford	0.28
0.1Q2	B	Moderate	Lake Wohlford	0.28
0.1Q2	B	Steep	Lake Wohlford	0.28
0.1Q2	C	Flat	Lake Wohlford	0.14
0.1Q2	C	Moderate	Lake Wohlford	0.14
0.1Q2	C	Steep	Lake Wohlford	0.14
0.1Q2	D	Flat	Lake Wohlford	0.12
0.1Q2	D	Moderate	Lake Wohlford	0.12
0.1Q2	D	Steep	Lake Wohlford	0.12

DRAWDOWN (Orifice Equation)

BMP	C	Orifice Dia., in	Area, sq. in.	G	H, ft	Q, cfs	Volume, cf	Drawdown, hrs
3	0.6	1.88	2.78	32.2	3.5	0.174	12,291	19.7

Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

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Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3	Maintenance Agreement (Form DS-3247) (when applicable)	☐ Included ☑ Not applicable

This is a preliminary SWQMP.

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

Attachment 3: For private entity operation and maintenance, Attachment 3 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).

Attachment 3 will be provided during future final engineering SWQMP submittal.

Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

Project Name: Planning Area 61 - Lot 1 VTM/SDP/MDP/NDP/CPA & Rezone

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

The plans must identify:

- [x] Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- [x] The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- [x] 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
- [x] How to access the structural BMP(s) to inspect and perform maintenance
- [x] 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)
- [x] Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- [x] 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)
- [x] 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
- [x] Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- [x] All BMPs must be fully dimensioned on the plans
- [x] When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

Attachment 5
Drainage Report

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

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PRELIMINARY DRAINAGE REPORT

FOR

PLANNING AREA 61 - LOT 1

VTM/SDP/MDP/NDP/CPA & REZONE

April 29, 2021

Wayne W. Chang, MS, PE 46548

ChangConsultants

Civil Engineering ◦ Hydrology ◦ Hydraulics ◦ Sedimentation

P.O. Box 9496
Rancho Santa Fe, CA 92067
(858) 692-0760

FOR REVIEW ONLY

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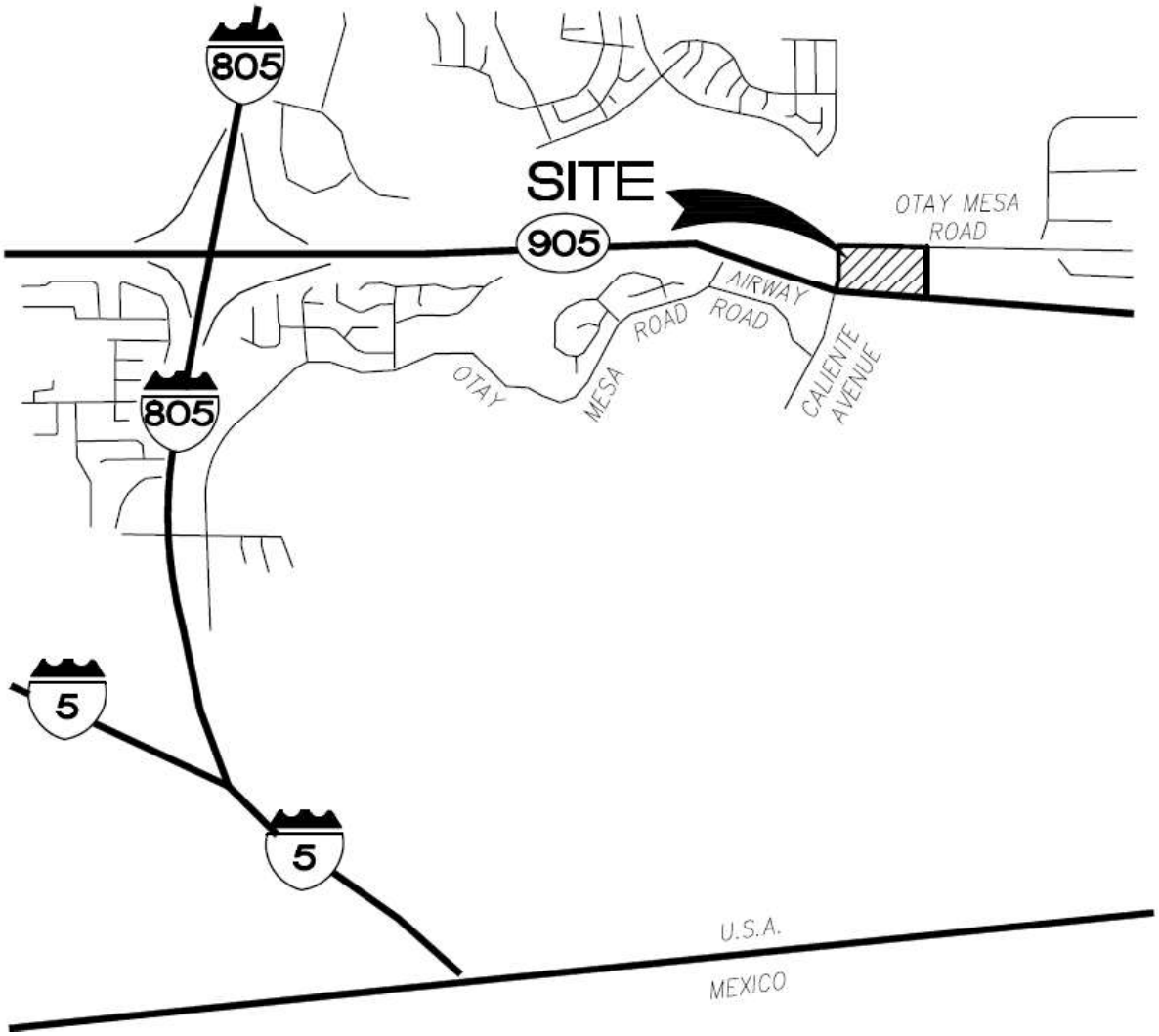
APPENDIX

INTRODUCTION

Tri Pointe Homes is proposing to develop a 4.46-acre site located southeast of the intersection of Otay Mesa Road and Caliente Avenue in the city of San Diego (see the Vicinity Map). The site is currently being mass-graded as part of their recently approved California Terraces – PA-61 project (Project No. 648290) immediately to the east. The project proposes 71 multi-family dwelling units in 11 buildings with private access driveways, surface parking, passive turf recreational space, walkways, and landscaping. The project's preliminary plans are being designed by Civil Sense, Inc.



Vicinity Map

Under existing, pre-project conditions, storm runoff is directed over the natural ground surface towards the northwest corner of the site (towards the intersection of Otay Mesa Road and Caliente Avenue) and into an existing public storm drain system. There are no other existing on-site drainage facilities and there is minimal off-site run-on.

Under proposed, post-project conditions, storm runoff will be conveyed over the ground surface and by private driveways to two on-site private storm drain systems. A Modular Wetland System Linear will treat runoff at the lower downstream (north) end of each storm drain system. The treated runoff will then enter a single vault for flow control. The runoff will be conveyed west out of the vault by a proposed pipe to the existing public storm drain system at the intersection of Otay Mesa Road and Caliente Avenue. The existing storm drain system crosses Otay Mesa Road and continues north along Ocean View Hills Parkway (Ocean View Hills Parkway is named Caliente Avenue south of Otay Mesa Road) before outletting into a natural drainage within Dennery Canyon. The natural drainage continues north within Dennery Canyon and ultimately flows into the Otay River.

This preliminary drainage report has been prepared in support of Civil Sense, Inc's entitlement package.

HYDROLOGIC RESULTS

The overall study area covers 4.90 acres so the City of San Diego's 2017, *Drainage Design Manual's* (Manual) rational method procedure was the basis for the existing and proposed condition hydrologic analyses. The Manual states that "the combination of storm drain system capacity and overflow" shall be able to carry the 100-year, while "the underground storm drain system shall be based upon a 50-year frequency storm." Since the site is so small, there will be minimal differences between the 50- and 100-year flow rates, so 100-year analyses are being performed for entitlements. The CivilDesign Rational Method Hydrology Program is based on the City criteria and was used for the analyses. The rational method input parameters are summarized below and the supporting data is included in Appendix A:

- Intensity-Duration-Frequency: The City's 50- and 100-year Intensity-Duration-Frequency curve from the *Drainage Design Manual* was used.

- Drainage area: The drainage areas are shown on the Existing and Proposed Condition Rational Method Work Maps in Appendix A. The overall existing and proposed condition drainage areas were set equal to allow a comparison of results.

- Hydrologic soil groups: The soil group within the site is entirely 'D' according to the City criteria.

- Runoff coefficients: Under existing conditions, the study area is entirely pervious. The roughness coefficient (C=0.45) was based on the rural land use category. Under proposed conditions, the multi-family development was assigned a multi-unit land use (C=0.70).

The existing and proposed condition rational method analyses are contained in Appendix A. The existing and proposed condition 100-year flow rates from the 4.90 acre study area are 6.6 and 9.6 cubic feet per second (cfs), respectively.

A preliminary detention analysis was performed to estimate the storage volume needed to attenuate the 100-year flow from 9.6 to 6.6 cfs. The proposed condition peak flow was converted to a hydrograph using the County's rational method hydrograph procedure. The hydrograph was entered into HEC-1 for the detention analysis. The HEC-1 results are included in Appendix A and show that at least 0.091 acre-feet (3,964 cubic feet) of storage is needed. The project can provide the required on-site storage in the proposed vault in order to avoid increasing the 100-year flow. Alternatively, an engineering assessment can made of the off-site storm system determine if it has capacity for the additional flow.

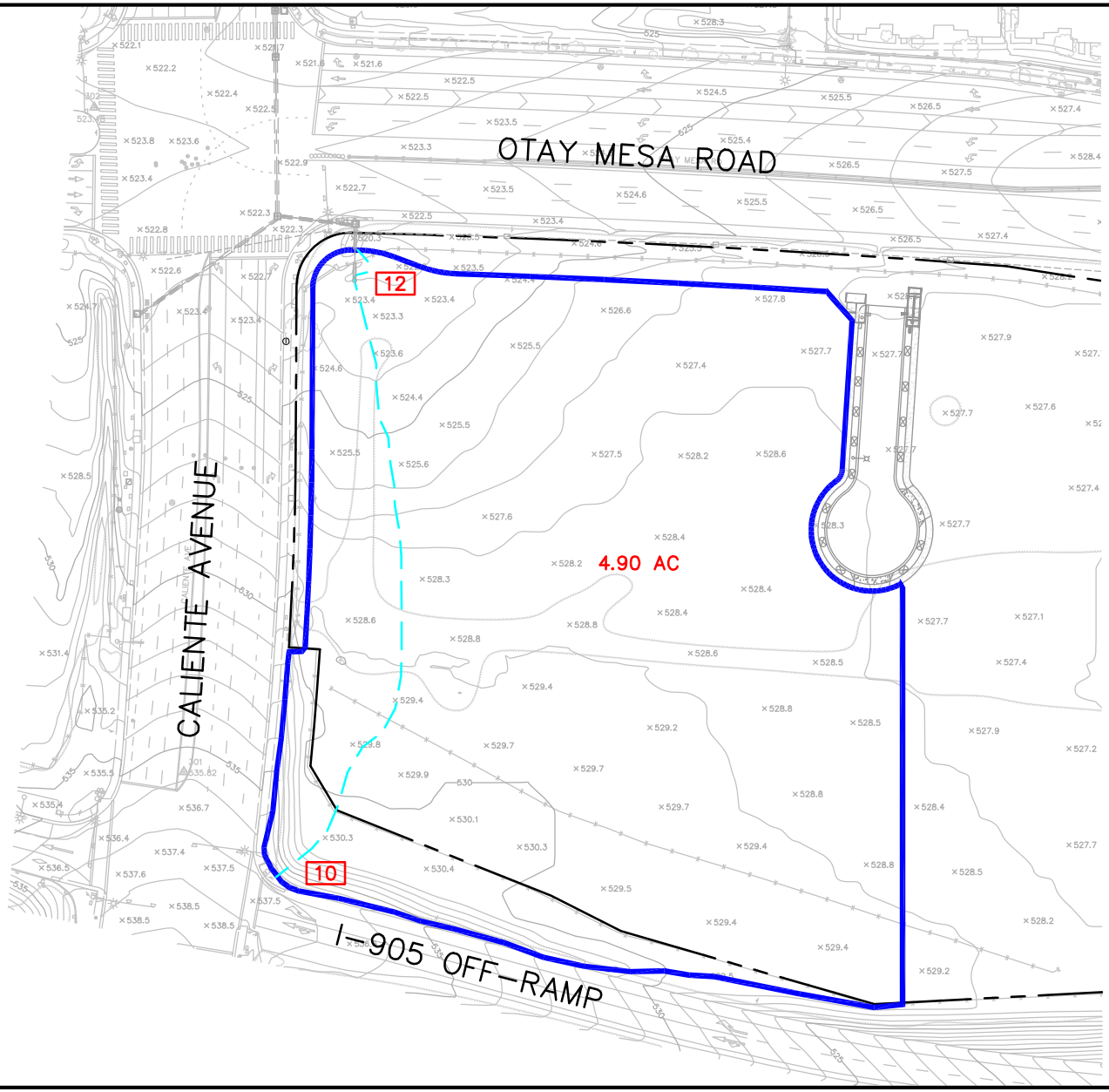
CONCLUSION

The analyses in this preliminary drainage report show that the project will increase the 100-year flow. The increase can be mitigated by on-site storage. This will avoid burdening the existing downstream storm drain facilities. The existing receiving public storm drain can also be evaluated to determine if it can convey the excess flow to Dennery Canyon.

There are no waters of the US at or in the immediate vicinity of the site. Therefore, neither a Federal Clean Water Act Section 401 (Regional Water Quality Control Board) nor 404 permit (US Army Corps of Engineers) are required.

APPENDIX A

RATIONAL METHOD ANALYSES AND BACKUP DATA



1" = 80'

0 80

LEGEND:

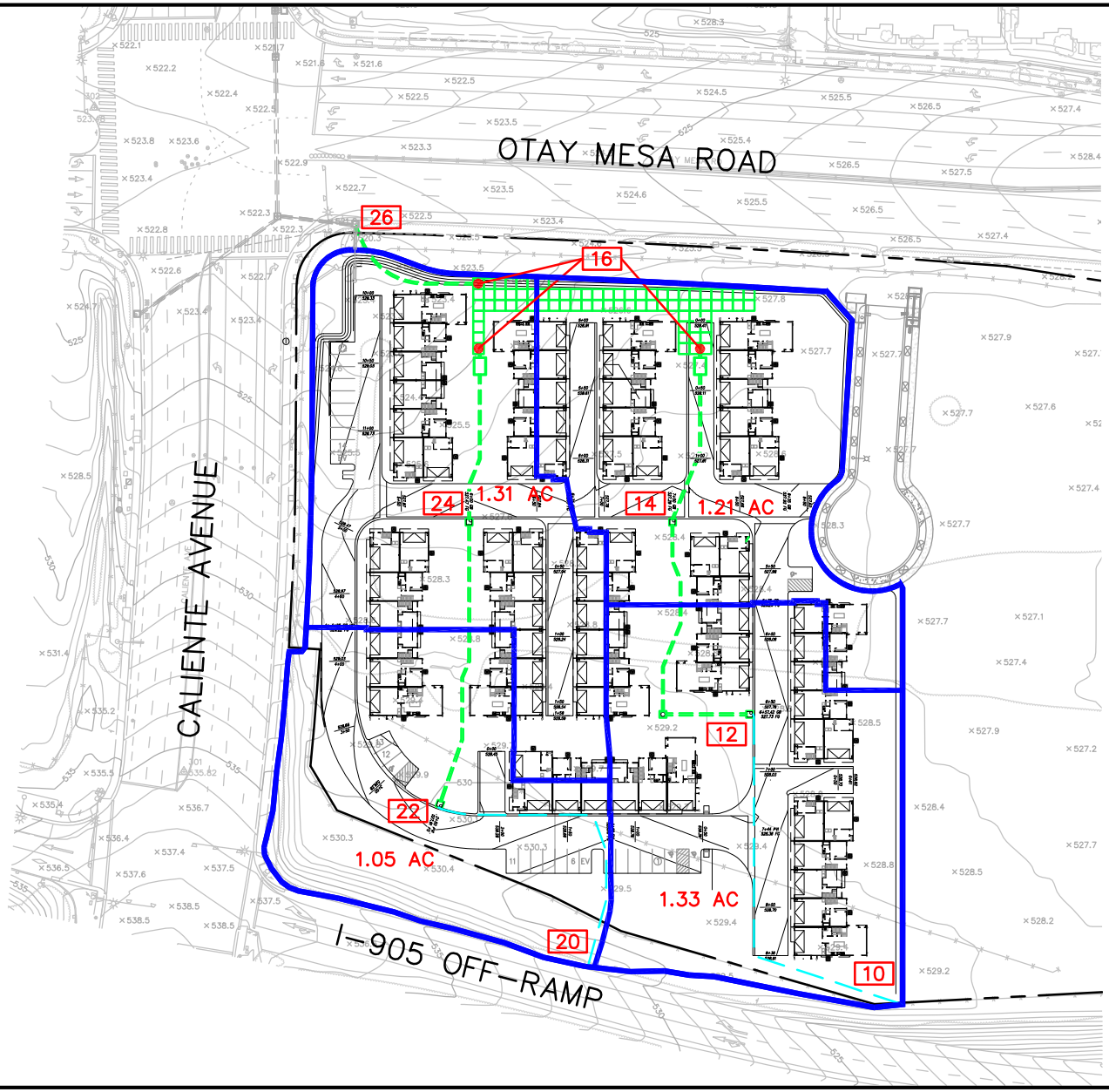
DRAINAGE BASIN BOUNDARY

OVERLAND FLOW PATH

3.62 AC DRAINAGE BASIN AREA

10 RATIONAL METHOD NODE NUMBER

EXISTING CONDITION
RATIONAL METHOD WORK MAP



1" = 80'

0 80

LEGEND:

- DRAINAGE BASIN BOUNDARY
- OVERLAND FLOW PATH
- PROPOSED DRAINAGE FACILITY
- 3.62 AC DRAINAGE BASIN AREA
- 10 RATIONAL METHOD NODE NUMBER

NOTE:
STORMWATER ENTERS A VAULT (GRID PATTERN) AT NODE 16 FOR FLOW CONTROL.

PROPOSED CONDITION
RATIONAL METHOD WORK MAP

Table A-1. Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient (C)
	Soil Type [1]
Residential:	
Single Family	0.55
Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than ½ acre)	0.45
Commercial [2]	
80% Impervious	0.85
Industrial [2]	
90% Impervious	0.95

Note:
[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 case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%
Tabulated imperviousness = 80%
Revised C = (50/80) x 0.85 = 0.53

The values in Table A–1 are typical for urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the City.

A.1.3. Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr.) for a duration equal to the T_C for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_C calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration-Frequency Design Chart (Figure A-1).

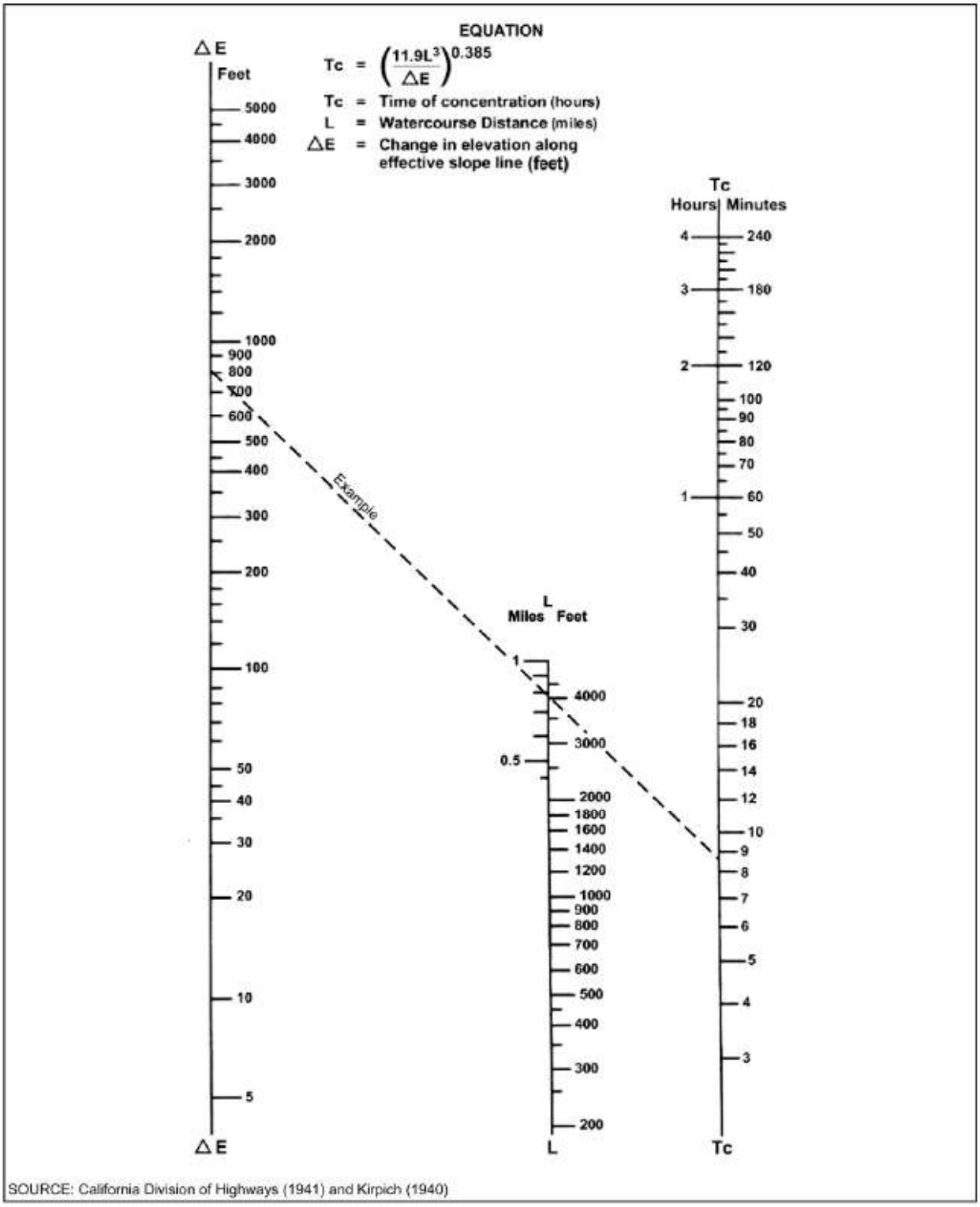


Figure A-2. Nomograph for Determination of T_c for Natural Watersheds

Note: Add ten minutes to the computed time of concentration from Figure A-2.

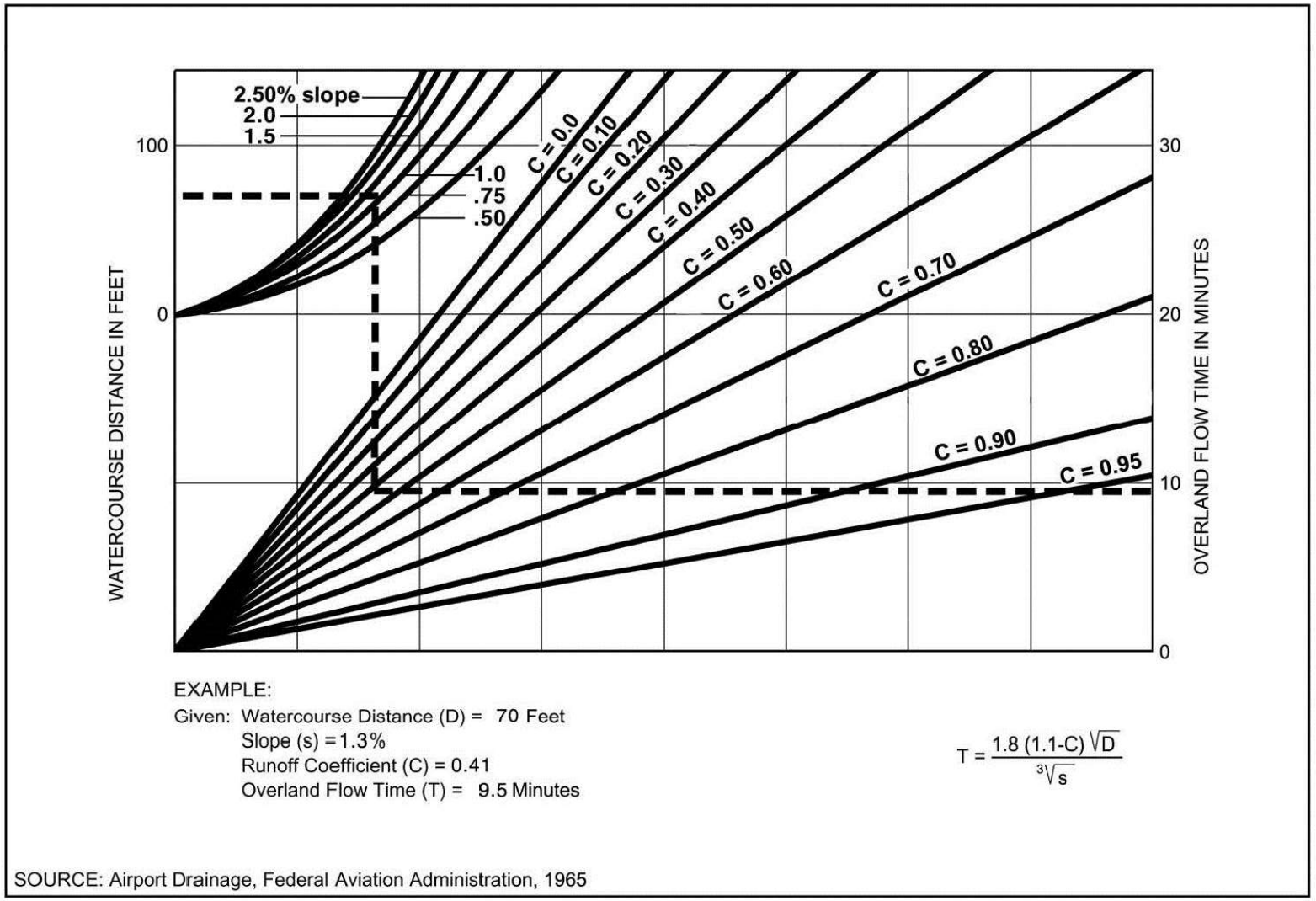


Figure A-4. Rational Formula – Overland Time of Flow Nomograph

Note: Use formula for watercourse distances in excess of 100 feet.

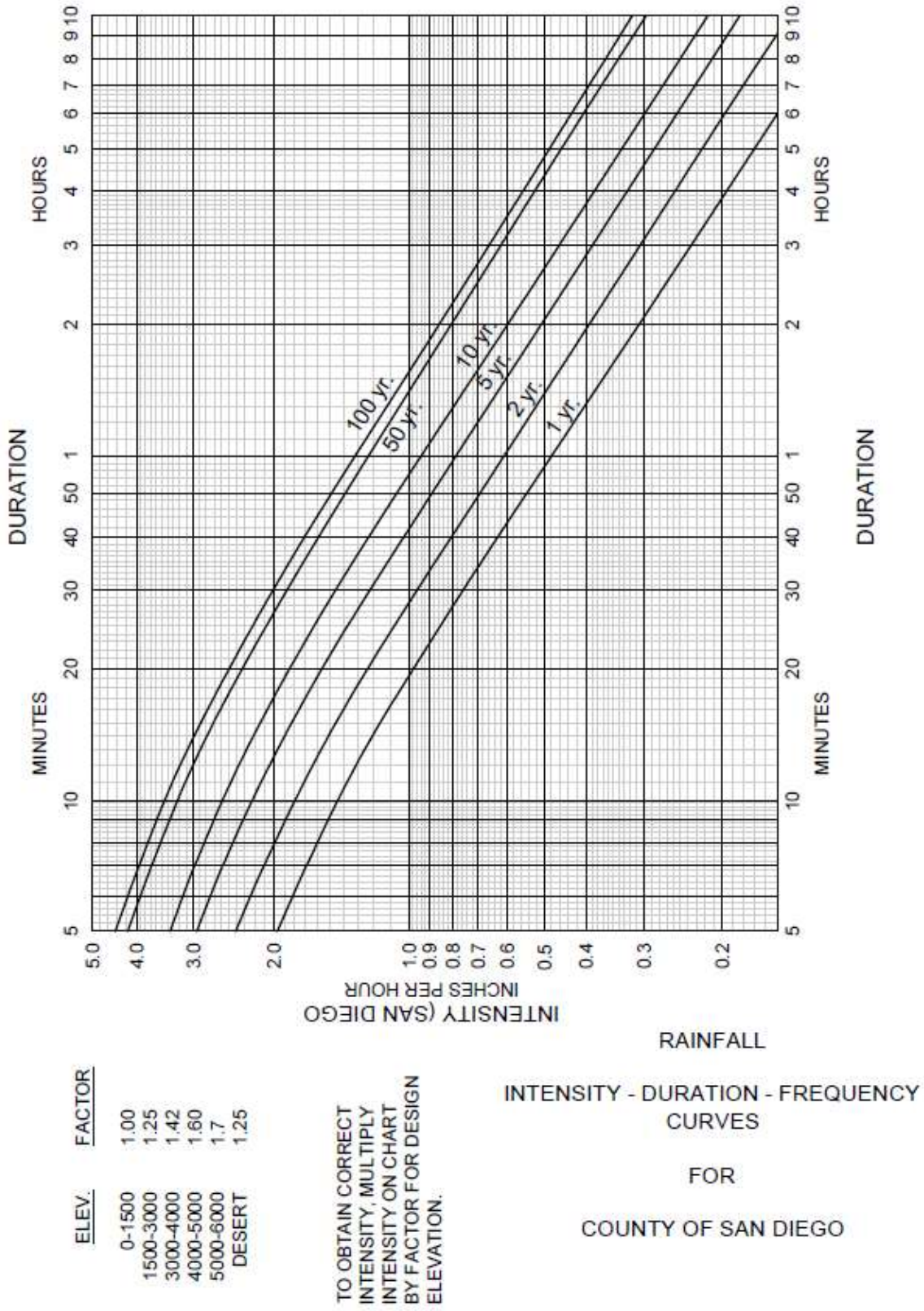


Figure A-1. Intensity-Duration-Frequency Design Chart

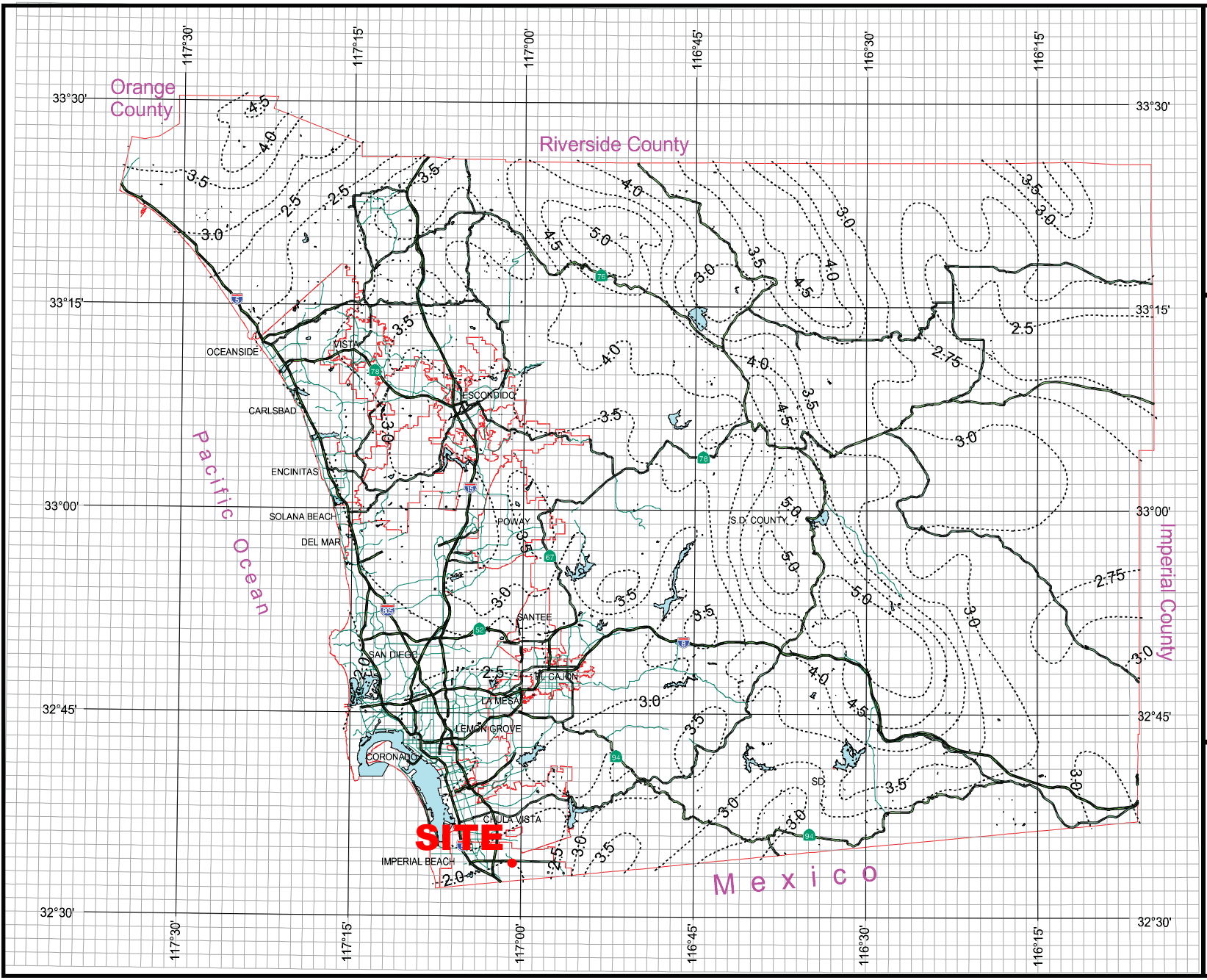
County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6=2.0



DPW GIS — Department of Public Works, Geographic Information Services

SanGIS — We Have San Diego Covered!

N W E S

3 0 3 Miles

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 04/28/21

Planning Area 61 - Lot 1 Residential
Preliminary Hydrology
Existing Conditions
100-Year Storm Event

********* Hydrology Study Control Information **********

Program License Serial Number 4028

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station 10.000 to Point/Station 12.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[RURAL(greater than 0.5 Ac, 0.2 ha) area type]
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance = 513.000(Ft.)
Highest elevation = 537.200(Ft.)
Lowest elevation = 522.000(Ft.)
Elevation difference = 15.200(Ft.)
TC=[(11.9*0.0972^3)/(15.20)]^.385= 3.70 + 10 min. = 13.70 min.
Rainfall intensity (I) = 3.007(In/Hr) for a 100.0 year storm

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff =      6.631(CFS)
Total initial stream area =        4.900(Ac.)
End of computations, total study area =          4.900 (Ac.)
```

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.4

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 04/28/21

Planning Area 61 - Lot 1 Residential
Preliminary Hydrology
Proposed Conditions
100-Year Storm Event

********* Hydrology Study Control Information **********

Program License Serial Number 4028

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station 10.000 to Point/Station 12.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MULTI - UNITS area type]
Initial subarea flow distance = 294.000(Ft.)
Highest elevation = 529.100(Ft.)
Lowest elevation = 527.730(Ft.)
Elevation difference = 1.370(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 15.92 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7000)*(294.000^.5)/(0.466^(1/3)]= 15.92
Rainfall intensity (I) = 2.838(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.700

```
Subarea runoff =      2.642(CFS)
Total initial stream area =        1.330(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   527.730(Ft.)
Downstream point/station elevation =   527.280(Ft.)
Pipe length  =   206.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.642(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.642(CFS)
Normal flow depth in pipe =   10.88(In.)
Flow top width inside pipe =   13.40(In.)
Critical Depth =    7.82(In.)
Pipe flow velocity =      2.77(Ft/s)
Travel time through pipe =    1.24 min.
Time of concentration (TC) =    17.16 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       14.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MULTI - UNITS area type                      ]
Time of concentration =    17.16 min.
Rainfall intensity =      2.754(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.700
Subarea runoff =      2.333(CFS) for    1.210(Ac.)
Total runoff =      4.975(CFS)   Total area =        2.54(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   527.280(Ft.)
Downstream point/station elevation =   526.650(Ft.)
Pipe length  =   126.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.975(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     4.975(CFS)
Normal flow depth in pipe =   10.78(In.)
Flow top width inside pipe =   17.64(In.)
Critical Depth =   10.29(In.)
Pipe flow velocity =      4.50(Ft/s)
```

```
Travel time through pipe =    0.47 min.
Time of concentration (TC) =    17.63 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       16.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.540(Ac.)
Runoff from this stream =      4.975(CFS)
Time of concentration =   17.63 min.
Rainfall intensity =     2.724(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       22.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MULTI - UNITS area type                    ]
Initial subarea flow distance  =  231.000(Ft.)
Highest elevation =  531.900(Ft.)
Lowest elevation =  527.910(Ft.)
Elevation difference =    3.990(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     9.12 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7000)*( 231.000^.5)/( 1.727^(1/3)]=   9.12
Rainfall intensity (I) =      3.489(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.700
Subarea runoff =      2.564(CFS)
Total initial stream area =        1.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       24.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   527.910(Ft.)
Downstream point/station elevation =   527.470(Ft.)
Pipe length  =   208.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.564(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.564(CFS)
Normal flow depth in pipe =   10.76(In.)
Flow top width inside pipe =   13.51(In.)
Critical Depth =    7.70(In.)
Pipe flow velocity =      2.72(Ft/s)
```

```
Travel time through pipe =    1.27 min.
Time of concentration (TC) =    10.39 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       24.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[MULTI - UNITS area type                    ]
Time of concentration =    10.39 min.
Rainfall intensity =      3.327(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.700
Subarea runoff =      3.051(CFS) for    1.310(Ac.)
Total runoff =      5.615(CFS)   Total area =        2.36(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   527.470(Ft.)
Downstream point/station elevation =   526.850(Ft.)
Pipe length  =   124.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.615(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.615(CFS)
Normal flow depth in pipe =   11.70(In.)
Flow top width inside pipe =   17.17(In.)
Critical Depth =   10.97(In.)
Pipe flow velocity =      4.62(Ft/s)
Travel time through pipe =    0.45 min.
Time of concentration (TC) =    10.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       16.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.360(Ac.)
Runoff from this stream =      5.615(CFS)
Time of concentration =   10.84 min.
Rainfall intensity =     3.277(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
```

```
1        4.975     17.63            2.724
2        5.615     10.84            3.277
Qmax(1) =
        1.000 *    1.000 *     4.975) +
        0.831 *    1.000 *     5.615) + =       9.642
Qmax(2) =
        1.000 *    0.615 *     4.975) +
        1.000 *    1.000 *     5.615) + =       8.675

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.975       5.615
Maximum flow rates at confluence using above data:
        9.642        8.675
Area of streams before confluence:
        2.540        2.360
Results of confluence:
Total flow rate =      9.642(CFS)
Time of concentration =    17.628 min.
Effective stream area after confluence =      4.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       26.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   523.500(Ft.)
Downstream point/station elevation =   521.800(Ft.)
Pipe length  =   107.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.642(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     9.642(CFS)
Normal flow depth in pipe =   11.39(In.)
Flow top width inside pipe =   17.35(In.)
Critical Depth =   14.39(In.)
Pipe flow velocity =      8.17(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =    17.85 min.
End of computations, total study area =           4.900 (Ac.)
```

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN  1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   29APR21  TIME  14:18:53   *
*                                       *
*****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*           (916) 756-1104          *
*                                   *
*************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X       X     X        XX
X     X  X       X              X
XXXXXXX  XXXX    X        XXXXX  X
X     X  X       X              X
X     X  X       X     X        X
X     X  XXXXXXX   XXXXX        XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
         LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

                       *DIAGRAM
*** FREE ***
              1        ID   PLANNING AREA 61 - LOT 1 RESIDENTIAL
              2        ID   PRELIMINARY DETENTION ANALYSIS
              3        ID   100-YEAR STORM EVENT
              4        IT       2 01JAN90    1200     200

              5        KK    SITE
              6        KM   RATIONAL METHOD HYDROGRAPH PROGRAM
              7        KM   100-YEAR, 6-HOUR RAINFALL IS 2.0 INCHES
              8        KM   RATIONAL METHOD RUNOFF COEFFICIENT IS 0.70
              9        KM   RATIONAL METHOD TIME OF CONCENTRATION IS 17.628 MINUTES
             10        BA  0.0077
             11        IN      18 01JAN90    1157
             12        QI       0     0.4     0.4     0.5     0.5     0.5     0.6     0.6     0.7     0.8
             13        QI     0.9     1.1     1.6     0.5     9.6     1.3     0.8     0.7     0.6     0.5
             14        QI     0.4       0       0       0       0       0       0       0       0       0
             15        QI       0       0

             16        KK  DETAIN
             17        RS       1    STOR      -1
             18        SV       0   0.091
             19        SQ       0     6.6
             20        SE     100     101
             21        ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    5        SITE
               V
               V
   16      DETAIN
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   29APR21  TIME  14:18:53   *
*                                       *
*****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*           (916) 756-1104          *
*                                   *
*************************************
```

PLANNING AREA 61 - LOT 1 RESIDENTIAL
PRELIMINARY DETENTION ANALYSIS
100-YEAR STORM EVENT

```
  IT          HYDROGRAPH TIME DATA
                NMIN           2  MINUTES IN COMPUTATION INTERVAL
               IDATE      1JAN90  STARTING DATE
               ITIME        1200  STARTING TIME
                  NQ         200  NUMBER OF HYDROGRAPH ORDINATES
              NDDATE      1JAN90  ENDING DATE
              NDTIME        1838  ENDING TIME
               ICENT          19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                 TOTAL TIME BASE    6.63 HOURS

       ENGLISH UNITS
            DRAINAGE AREA         SQUARE MILES
            PRECIPITATION DEPTH   INCHES
            LENGTH, ELEVATION     FEET
            FLOW                  CUBIC FEET PER SECOND
            STORAGE VOLUME        ACRE-FEET
            SURFACE AREA          ACRES
            TEMPERATURE           DEGREES FAHRENHEIT
```

*** ***

```
          **************
          *            *
  5 KK    *      SITE  *
          *            *
          **************
```

RATIONAL METHOD HYDROGRAPH PROGRAM
100-YEAR, 6-HOUR RAINFALL IS 2.0 INCHES
RATIONAL METHOD RUNOFF COEFFICIENT IS 0.70
RATIONAL METHOD TIME OF CONCENTRATION IS 17.628 MINUTES

```
 11 IN          TIME DATA FOR INPUT TIME SERIES
                 JXMIN          18  TIME INTERVAL IN MINUTES
                JXDATE      1JAN90  STARTING DATE
                JXTIME        1157  STARTING TIME

             SUBBASIN RUNOFF DATA

 10 BA          SUBBASIN CHARACTERISTICS
                 TAREA         .01  SUBBASIN AREA
```

***

****

HYDROGRAPH AT STATION SITE

****

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
1 JAN 1200	1	0.	1 JAN 1340	51	1.	1 JAN 1520	101	1.	1 JAN 1700	151	1.
1 JAN 1202	2	0.	1 JAN 1342	52	1.	1 JAN 1522	102	1.	1 JAN 1702	152	1.
1 JAN 1204	3	0.	1 JAN 1344	53	1.	1 JAN 1524	103	1.	1 JAN 1704	153	1.
1 JAN 1206	4	0.	1 JAN 1346	54	1.	1 JAN 1526	104	1.	1 JAN 1706	154	1.
1 JAN 1208	5	0.	1 JAN 1348	55	1.	1 JAN 1528	105	1.	1 JAN 1708	155	1.
1 JAN 1210	6	0.	1 JAN 1350	56	1.	1 JAN 1530	106	2.	1 JAN 1710	156	1.
1 JAN 1212	7	0.	1 JAN 1352	57	1.	1 JAN 1532	107	2.	1 JAN 1712	157	1.
1 JAN 1214	8	0.	1 JAN 1354	58	1.	1 JAN 1534	108	2.	1 JAN 1714	158	1.
1 JAN 1216	9	0.	1 JAN 1356	59	1.	1 JAN 1536	109	1.	1 JAN 1716	159	1.
1 JAN 1218	10	0.	1 JAN 1358	60	1.	1 JAN 1538	110	1.	1 JAN 1718	160	1.
1 JAN 1220	11	0.	1 JAN 1400	61	1.	1 JAN 1540	111	1.	1 JAN 1720	161	1.
1 JAN 1222	12	0.	1 JAN 1402	62	1.	1 JAN 1542	112	1.	1 JAN 1722	162	1.
1 JAN 1224	13	0.	1 JAN 1404	63	1.	1 JAN 1544	113	1.	1 JAN 1724	163	1.
1 JAN 1226	14	0.	1 JAN 1406	64	1.	1 JAN 1546	114	1.	1 JAN 1726	164	1.
1 JAN 1228	15	0.	1 JAN 1408	65	1.	1 JAN 1548	115	1.	1 JAN 1728	165	1.
1 JAN 1230	16	0.	1 JAN 1410	66	1.	1 JAN 1550	116	1.	1 JAN 1730	166	1.
1 JAN 1232	17	0.	1 JAN 1412	67	1.	1 JAN 1552	117	1.	1 JAN 1732	167	1.
1 JAN 1234	18	0.	1 JAN 1414	68	1.	1 JAN 1554	118	2.	1 JAN 1734	168	1.
1 JAN 1236	19	0.	1 JAN 1416	69	1.	1 JAN 1556	119	3.	1 JAN 1736	169	1.
1 JAN 1238	20	0.	1 JAN 1418	70	1.	1 JAN 1558	120	4.	1 JAN 1738	170	1.
1 JAN 1240	21	0.	1 JAN 1420	71	1.	1 JAN 1600	121	5.	1 JAN 1740	171	0.
1 JAN 1242	22	0.	1 JAN 1422	72	1.	1 JAN 1602	122	6.	1 JAN 1742	172	0.
1 JAN 1244	23	0.	1 JAN 1424	73	1.	1 JAN 1604	123	7.	1 JAN 1744	173	0.
1 JAN 1246	24	0.	1 JAN 1426	74	1.	1 JAN 1606	124	8.	1 JAN 1746	174	0.
1 JAN 1248	25	0.	1 JAN 1428	75	1.	1 JAN 1608	125	9.	1 JAN 1748	175	0.
1 JAN 1250	26	0.	1 JAN 1430	76	1.	1 JAN 1610	126	9.	1 JAN 1750	176	0.
1 JAN 1252	27	1.	1 JAN 1432	77	1.	1 JAN 1612	127	8.	1 JAN 1752	177	0.
1 JAN 1254	28	1.	1 JAN 1434	78	1.	1 JAN 1614	128	7.	1 JAN 1754	178	0.
1 JAN 1256	29	1.	1 JAN 1436	79	1.	1 JAN 1616	129	6.	1 JAN 1756	179	0.
1 JAN 1258	30	1.	1 JAN 1438	80	1.	1 JAN 1618	130	5.	1 JAN 1758	180	0.
1 JAN 1300	31	1.	1 JAN 1440	81	1.	1 JAN 1620	131	5.	1 JAN 1800	181	0.
1 JAN 1302	32	1.	1 JAN 1442	82	1.	1 JAN 1622	132	4.	1 JAN 1802	182	0.
1 JAN 1304	33	1.	1 JAN 1444	83	1.	1 JAN 1624	133	3.	1 JAN 1804	183	0.
1 JAN 1306	34	1.	1 JAN 1446	84	1.	1 JAN 1626	134	2.	1 JAN 1806	184	0.
1 JAN 1308	35	1.	1 JAN 1448	85	1.	1 JAN 1628	135	1.	1 JAN 1808	185	0.
1 JAN 1310	36	1.	1 JAN 1450	86	1.	1 JAN 1630	136	1.	1 JAN 1810	186	0.
1 JAN 1312	37	1.	1 JAN 1452	87	1.	1 JAN 1632	137	1.	1 JAN 1812	187	0.
1 JAN 1314	38	1.	1 JAN 1454	88	1.	1 JAN 1634	138	1.	1 JAN 1814	188	0.
1 JAN 1316	39	1.	1 JAN 1456	89	1.	1 JAN 1636	139	1.	1 JAN 1816	189	0.
1 JAN 1318	40	1.	1 JAN 1458	90	1.	1 JAN 1638	140	1.	1 JAN 1818	190	0.
1 JAN 1320	41	1.	1 JAN 1500	91	1.	1 JAN 1640	141	1.	1 JAN 1820	191	0.
1 JAN 1322	42	1.	1 JAN 1502	92	1.	1 JAN 1642	142	1.	1 JAN 1822	192	0.
1 JAN 1324	43	1.	1 JAN 1504	93	1.	1 JAN 1644	143	1.	1 JAN 1824	193	0.
1 JAN 1326	44	1.	1 JAN 1506	94	1.	1 JAN 1646	144	1.	1 JAN 1826	194	0.
1 JAN 1328	45	1.	1 JAN 1508	95	1.	1 JAN 1648	145	1.	1 JAN 1828	195	0.
1 JAN 1330	46	1.	1 JAN 1510	96	1.	1 JAN 1650	146	1.	1 JAN 1830	196	0.
1 JAN 1332	47	1.	1 JAN 1512	97	1.	1 JAN 1652	147	1.	1 JAN 1832	197	0.
1 JAN 1334	48	1.	1 JAN 1514	98	1.	1 JAN 1654	148	1.	1 JAN 1834	198	0.
1 JAN 1336	49	1.	1 JAN 1516	99	1.	1 JAN 1656	149	1.	1 JAN 1836	199	0.
1 JAN 1338	50	1.	1 JAN 1518	100	1.	1 JAN 1658	150	1.	1 JAN 1838	200	0.

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	6.63-HR
+ (CFS)	(HR)					
		(CFS)				
+ 9.	4.17		1.	1.	1.	1.
		(INCHES)	1.382	1.388	1.388	1.388
		(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = .01 SQ MI

```
          **************
          *            *
 16 KK    *    DETAIN  *
          *            *
          **************

             HYDROGRAPH ROUTING DATA

 17 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC      -1.00  INITIAL CONDITION
                          X        .00 WORKING R AND D COEFFICIENT

 18 SV            STORAGE          .0        .1

 19 SQ          DISCHARGE          0.        7.

 20 SE          ELEVATION      100.00    101.00

                                                        ***

WARNING --- ROUTED OUTFLOW (      7.) IS GREATER THAN MAXIMUM OUTFLOW (      7.) IN STORAGE-OUTFLOW TABLE
```

****

HYDROGRAPH AT STATION DETAIN

****

DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE
1 JAN 1200	1	0.	.0	100.0	1 JAN 1414	68	1.	.0	100.1	1 JAN 1628	135	4.	.1	100.6
1 JAN 1202	2	0.	.0	100.0	1 JAN 1416	69	1.	.0	100.1	1 JAN 1630	136	4.	.1	100.6
1 JAN 1204	3	0.	.0	100.0	1 JAN 1418	70	1.	.0	100.1	1 JAN 1632	137	3.	.0	100.5
1 JAN 1206	4	0.	.0	100.0	1 JAN 1420	71	1.	.0	100.1	1 JAN 1634	138	3.	.0	100.4
1 JAN 1208	5	0.	.0	100.0	1 JAN 1422	72	1.	.0	100.1	1 JAN 1636	139	3.	.0	100.4
1 JAN 1210	6	0.	.0	100.0	1 JAN 1424	73	1.	.0	100.1	1 JAN 1638	140	2.	.0	100.3
1 JAN 1212	7	0.	.0	100.0	1 JAN 1426	74	1.	.0	100.1	1 JAN 1640	141	2.	.0	100.3
1 JAN 1214	8	0.	.0	100.0	1 JAN 1428	75	1.	.0	100.1	1 JAN 1642	142	2.	.0	100.3
1 JAN 1216	9	0.	.0	100.0	1 JAN 1430	76	1.	.0	100.1	1 JAN 1644	143	2.	.0	100.2
1 JAN 1218	10	0.	.0	100.0	1 JAN 1432	77	1.	.0	100.1	1 JAN 1646	144	1.	.0	100.2
1 JAN 1220	11	0.	.0	100.0	1 JAN 1434	78	1.	.0	100.1	1 JAN 1648	145	1.	.0	100.2
1 JAN 1222	12	0.	.0	100.0	1 JAN 1436	79	1.	.0	100.1	1 JAN 1650	146	1.	.0	100.2
1 JAN 1224	13	0.	.0	100.0	1 JAN 1438	80	1.	.0	100.1	1 JAN 1652	147	1.	.0	100.2
1 JAN 1226	14	0.	.0	100.1	1 JAN 1440	81	1.	.0	100.1	1 JAN 1654	148	1.	.0	100.2
1 JAN 1228	15	0.	.0	100.1	1 JAN 1442	82	1.	.0	100.1	1 JAN 1656	149	1.	.0	100.2
1 JAN 1230	16	0.	.0	100.1	1 JAN 1444	83	1.	.0	100.1	1 JAN 1658	150	1.	.0	100.1
1 JAN 1232	17	0.	.0	100.1	1 JAN 1446	84	1.	.0	100.1	1 JAN 1700	151	1.	.0	100.1
1 JAN 1234	18	0.	.0	100.1	1 JAN 1448	85	1.	.0	100.1	1 JAN 1702	152	1.	.0	100.1
1 JAN 1236	19	0.	.0	100.1	1 JAN 1450	86	1.	.0	100.1	1 JAN 1704	153	1.	.0	100.1
1 JAN 1238	20	0.	.0	100.1	1 JAN 1452	87	1.	.0	100.1	1 JAN 1706	154	1.	.0	100.1
1 JAN 1240	21	0.	.0	100.1	1 JAN 1454	88	1.	.0	100.1	1 JAN 1708	155	1.	.0	100.1
1 JAN 1242	22	0.	.0	100.1	1 JAN 1456	89	1.	.0	100.1	1 JAN 1710	156	1.	.0	100.1
1 JAN 1244	23	0.	.0	100.1	1 JAN 1458	90	1.	.0	100.1	1 JAN 1712	157	1.	.0	100.1
1 JAN 1246	24	0.	.0	100.1	1 JAN 1500	91	1.	.0	100.1	1 JAN 1714	158	1.	.0	100.1
1 JAN 1248	25	0.	.0	100.1	1 JAN 1502	92	1.	.0	100.1	1 JAN 1716	159	1.	.0	100.1
1 JAN 1250	26	0.	.0	100.1	1 JAN 1504	93	1.	.0	100.1	1 JAN 1718	160	1.	.0	100.1
1 JAN 1252	27	0.	.0	100.1	1 JAN 1506	94	1.	.0	100.1	1 JAN 1720	161	1.	.0	100.1
1 JAN 1254	28	0.	.0	100.1	1 JAN 1508	95	1.	.0	100.1	1 JAN 1722	162	1.	.0	100.1
1 JAN 1256	29	0.	.0	100.1	1 JAN 1510	96	1.	.0	100.1	1 JAN 1724	163	1.	.0	100.1
1 JAN 1258	30	0.	.0	100.1	1 JAN 1512	97	1.	.0	100.1	1 JAN 1726	164	1.	.0	100.1
1 JAN 1300	31	0.	.0	100.1	1 JAN 1514	98	1.	.0	100.1	1 JAN 1728	165	1.	.0	100.1
1 JAN 1302	32	0.	.0	100.1	1 JAN 1516	99	1.	.0	100.2	1 JAN 1730	166	1.	.0	100.1
1 JAN 1304	33	0.	.0	100.1	1 JAN 1518	100	1.	.0	100.2	1 JAN 1732	167	1.	.0	100.1
1 JAN 1306	34	0.	.0	100.1	1 JAN 1520	101	1.	.0	100.2	1 JAN 1734	168	1.	.0	100.1
1 JAN 1308	35	0.	.0	100.1	1 JAN 1522	102	1.	.0	100.2	1 JAN 1736	169	1.	.0	100.1
1 JAN 1310	36	0.	.0	100.1	1 JAN 1524	103	1.	.0	100.2	1 JAN 1738	170	1.	.0	100.1
1 JAN 1312	37	0.	.0	100.1	1 JAN 1526	104	1.	.0	100.2	1 JAN 1740	171	1.	.0	100.1
1 JAN 1314	38	0.	.0	100.1	1 JAN 1528	105	1.	.0	100.2	1 JAN 1742	172	1.	.0	100.1

1	JAN	1316	39	0.	.0	100.1	*	1	JAN	1530	106	1.	.0	100.2	*	1	JAN	1744	173	1.	.0	100.1
1	JAN	1318	40	0.	.0	100.1	*	1	JAN	1532	107	1.	.0	100.2	*	1	JAN	1746	174	1.	.0	100.1
1	JAN	1320	41	0.	.0	100.1	*	1	JAN	1534	108	1.	.0	100.2	*	1	JAN	1748	175	1.	.0	100.1
1	JAN	1322	42	0.	.0	100.1	*	1	JAN	1536	109	1.	.0	100.2	*	1	JAN	1750	176	0.	.0	100.1
1	JAN	1324	43	0.	.0	100.1	*	1	JAN	1538	110	1.	.0	100.2	*	1	JAN	1752	177	0.	.0	100.1
1	JAN	1326	44	0.	.0	100.1	*	1	JAN	1540	111	1.	.0	100.2	*	1	JAN	1754	178	0.	.0	100.1
1	JAN	1328	45	0.	.0	100.1	*	1	JAN	1542	112	1.	.0	100.2	*	1	JAN	1756	179	0.	.0	100.1
1	JAN	1330	46	1.	.0	100.1	*	1	JAN	1544	113	1.	.0	100.2	*	1	JAN	1758	180	0.	.0	100.1
1	JAN	1332	47	1.	.0	100.1	*	1	JAN	1546	114	1.	.0	100.2	*	1	JAN	1800	181	0.	.0	100.1
1	JAN	1334	48	1.	.0	100.1	*	1	JAN	1548	115	1.	.0	100.2	*	1	JAN	1802	182	0.	.0	100.1
1	JAN	1336	49	1.	.0	100.1	*	1	JAN	1550	116	1.	.0	100.2	*	1	JAN	1804	183	0.	.0	100.1
1	JAN	1338	50	1.	.0	100.1	*	1	JAN	1552	117	1.	.0	100.1	*	1	JAN	1806	184	0.	.0	100.1
1	JAN	1340	51	1.	.0	100.1	*	1	JAN	1554	118	1.	.0	100.2	*	1	JAN	1808	185	0.	.0	100.0
1	JAN	1342	52	1.	.0	100.1	*	1	JAN	1556	119	1.	.0	100.2	*	1	JAN	1810	186	0.	.0	100.0
1	JAN	1344	53	1.	.0	100.1	*	1	JAN	1558	120	2.	.0	100.3	*	1	JAN	1812	187	0.	.0	100.0
1	JAN	1346	54	1.	.0	100.1	*	1	JAN	1600	121	2.	.0	100.3	*	1	JAN	1814	188	0.	.0	100.0
1	JAN	1348	55	1.	.0	100.1	*	1	JAN	1602	122	3.	.0	100.4	*	1	JAN	1816	189	0.	.0	100.0
1	JAN	1350	56	1.	.0	100.1	*	1	JAN	1604	123	4.	.0	100.5	*	1	JAN	1818	190	0.	.0	100.0
1	JAN	1352	57	1.	.0	100.1	*	1	JAN	1606	124	4.	.1	100.6	*	1	JAN	1820	191	0.	.0	100.0
1	JAN	1354	58	1.	.0	100.1	*	1	JAN	1608	125	5.	.1	100.8	*	1	JAN	1822	192	0.	.0	100.0
1	JAN	1356	59	1.	.0	100.1	*	1	JAN	1610	126	6.	.1	100.9	*	1	JAN	1824	193	0.	.0	100.0
1	JAN	1358	60	1.	.0	100.1	*	1	JAN	1612	127	6.	.1	101.0	*	1	JAN	1826	194	0.	.0	100.0
1	JAN	1400	61	1.	.0	100.1	*	1	JAN	1614	128	7.	.1	101.0	*	1	JAN	1828	195	0.	.0	100.0
1	JAN	1402	62	1.	.0	100.1	*	1	JAN	1616	129	7.	.1	101.0	*	1	JAN	1830	196	0.	.0	100.0
1	JAN	1404	63	1.	.0	100.1	*	1	JAN	1618	130	6.	.1	101.0	*	1	JAN	1832	197	0.	.0	100.0
1	JAN	1406	64	1.	.0	100.1	*	1	JAN	1620	131	6.	.1	100.9	*	1	JAN	1834	198	0.	.0	100.0
1	JAN	1408	65	1.	.0	100.1	*	1	JAN	1622	132	6.	.1	100.9	*	1	JAN	1836	199	0.	.0	100.0
1	JAN	1410	66	1.	.0	100.1	*	1	JAN	1624	133	5.	.1	100.8	*	1	JAN	1838	200	0.	.0	100.0
1	JAN	1412	67	1.	.0	100.1	*	1	JAN	1626	134	5.	.1	100.7	*							
							*								*							

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	6.63-HR
+ (CFS)	(HR)					
		(CFS)				
+ 7.	4.27		1.	1.	1.	1.
		(INCHES)	1.378	1.390	1.390	1.390
		(AC-FT)	1.	1.	1.	1.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	6.63-HR
+ (AC-FT)	(HR)				
0.	4.23	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	6.63-HR
+ (FEET)	(HR)				
101.00	4.27	100.17	100.16	100.16	100.16

CUMULATIVE AREA = .01 SQ MI

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SITE	9.6	4.17	1.	1.	1.	.01		
+	ROUTED TO	DETAIN	6.6	4.27	1.	1.	1.	.01		
+									101.00	4.27

*** NORMAL END OF HEC-1 ***

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.

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INFILTRATION FEASIBILITY CONDITION LETTER

OCEANVIEW HILLS – PA 61
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

PARDEE HOMES
SAN DIEGO, CALIFORNIA

SEPTEMBER 17, 2018
PROJECT NO. 07955-42-02

Project No. 07955-42-02
September 17, 2018

Pardee Homes
13400 Sabre Springs Parkway, Suite 200
San Diego, California 92128

Attention: Mr. Allen Kashani

Subject: INFILTRATION FEASIBILITY CONDITION LETTER
OCEANVIEW HILLS – PA 61
SAN DIEGO, CALIFORNIA

References:
1. *Update Geotechnical Investigation, Oceanview Hills – PA 61, San Diego, California,* prepared by Geocon Incorporated, dated March 15, 2018 (Project No. 07955-42-02).
2. *DMA and Hydromodification Management Exhibit,* prepared by Civil Sense, Inc., undated.

Dear Mr. Kashani:

In accordance with the request of Civil Sense, Inc., we have prepared this report regarding storm water management for the subject project. Previous recommendations specific to storm water management, as well as a summary of expected soil conditions, is provided in the Reference 1. We are recommending the site be classified as a "No Infiltration" condition.

SITE AND PROJECT DESCRIPTION

Planning Area 61 consists of a 13.7-acre, vacant lot, located southeast of the intersection of Caliente Avenue and Old Otay Mesa Road in San Diego, California. The property is currently covered with weeds and brush. The property is generally flat with site elevations ranging from 530 Mean Sea Elevation (MSL) near the southwest corner to 518 MSL in a desilting basin that was constructed previously at the northeast corner of the site. With the exception of the detention basin, the site appears to be in its natural condition.

We understand the site will be developed to accommodate 29, multi-family structures with associated utilities, streets and alleys, concrete hardscape walkways, a small park, and landscaping. A retaining

wall with a maximum height of 7 feet is planned at the southeast corner of the site. The western 4.6 acres of the site is currently planned for commercial use. Based on the grading plan, grading across the residential portion will result in fills of approximately 1 foot to 8 feet. Across the commercial area, cuts of approximately 1 to 4 feet will be made.

PREVIOUS GEOTECHNICAL STUDIES

We prepared a geotechnical investigation in March 2018 (see Reference 1). Recommendations for storm water management were included in Appendix C of the report. This information was provided as part of the discretionary review process. The site is underlain topsoil overlying very old paralic deposits. Scattered pockets of undocumented fill are also present on the property. The undocumented fill was found to be loose clayey sand. The topsoil is composed of sandy to silty clay. The very old paralic deposits were found to consist of very dense clayey sand and silty to sandy clay. The topsoil and clayey portion of the very old paralic deposits is highly expansive. A Geologic Map is provided on Figure 1 and shows the locations of borings, trench logs, and infiltration test locations.

HYDROLOGIC SOIL GROUP

The United States Department of Agriculture (USDA), Natural Resources Conservation Services, provides general information regarding soil conditions for areas within the United States. The USDA website also provides the Hydrologic Soil Group. Table 1 presents the descriptions of the hydrologic soil groups.

TABLE 1
HYDROLOGIC SOIL GROUP DEFINITIONS

Soil Group	Soil Group Definition
A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
D	Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The property falls within Hydraulic Soil Group D, which has a very slow infiltration rating. Table 2 presents the information from the USDA website for the property.

TABLE 2
USDA WEB SOIL SURVEY – HYDROLOGIC SOIL GROUP

Map Unit Name	Map Unit Symbol	Approximate Percentage of Property	Hydrologic Soil Group	k_{SAT} of Most Limiting Layer (inches/ hour)
Stockpen gravelly clay loam, 2 to 5 percent slopes	SuB	100	D	0.00 to 0.06

GROUNDWATER ELEVATIONS

Groundwater was not encountered in our field exploration. Ground water is expected to be at depths greater than 50 feet below the property.

INFILTRATION RATES

We performed 2 field-saturated, hydraulic conductivity tests at the site using a Soil Moisture Corp Aardvark Permeameter at the locations presented on the Geologic Map, Figure 1. The borings were excavated with a 4-inch-diameter hand auger. Table 3 presents the results of the saturated hydraulic conductivity testing.

We used the guidelines presented in the Riverside County Low Impact Development BMP Design Handbook which references the United States Bureau of Reclamation Well Permeameter Test Method (USBR 7300-89). Based on this widely accepted guideline, the saturated hydraulic conductivity (Ksat) is equal to the infiltration rate. Therefore, the Ksat value determined from the Aardvark Permeameter test is the unfactored infiltration rate. The Ksat (infiltration rate) equation provided in the Riverside County Handbook was used to compute the unfactored infiltration rate.

TABLE 3
UNFACTORED, FIELD-SATURATED, INFILTRATION TEST RESULTS
USING THE SOILMOISTURE CORP AARDVARK PERMEAMETER

Test No.	Depth (inches)	Geologic Unit	Field Infiltration Rate, I (in/hr)	Factored* Field Infiltration Rate, I (in/hr)
A-1	45	Terrace Deposits	0.002	0.001
A-2	48	Terrace Deposits	0.068	0.034

*Factor of Safety of 2.0 for feasibility determination.

STORM WATER DESIGN NARRATIVE

We evaluated the site for areas of potential infiltration. The site is underlain by undocumented fill, topsoil and very dense very old paralic deposits. The undocumented fill and topsoil will be removed and replaced as compacted fill during remedial grading. The very old paralic deposits will be left in-place. Based on infiltration testing and our experience in the area, the very old paralic deposits do not exhibit infiltration rates high enough to support full or partial infiltration. In addition, the upper portion of the very old paralic deposits exhibit a high expansion potential. Infiltrating into these soils will cause soil heave and potential distress to structural improvements. Also, after the completion of grading, the site will be underlain by 3 feet to 10 feet of compacted fill. Infiltrating into the compacted fill is not recommended due to the potential to cause settlement.

From a civil design perspective, the site does not allow for suitable setbacks from BMPs to structural improvements. Civil Sense Inc. has elected to use flow control values and has positioned them at the down gradient end of the DMA areas.

In our opinion, there are no areas on the site that will support full or partial infiltration considering existing soil conditions and soil conditions that will be present at the completion of grading.

DMA EXHIBIT AND GEOLOGIC MAP

We have appended to this report a copy of the DMA map, Reference 2. We have annotated it to show the expected depth of fill at each BMP location. All of the BMPs are located within or adjacent to structural improvements or utilities. We have also appended the geotechnical map. The geotechnical map shows the locations of borings, trenches, and infiltration locations, as well as the locations of utilities, proposed structures and improvements.

STORM WATER MANAGEMENT DEVICES

For flow-controlled vaults, we recommend the vaults not allow infiltration. If basins are planned, liners and subdrains are recommended. The liners should be impermeable (e.g. High-density polyethylene, HDPE, with a thickness of about 30 mil or equivalent Polyvinyl Chloride**,** PVC). The subdrains should be perforated within the liner area, installed at the base and above the liner, be at least 3 inches in diameter and consist of Schedule 40 PVC pipe. The subdrains outside of the liner should consist of solid pipe. The penetration of the liners at the subdrains should be properly waterproofed. The subdrains should be connected to a proper outlet. The devices should also be installed in accordance with the manufacturer's recommendations.

CONCLUSIONS AND RECOMMENDATIONS

Our results indicate the site has very slow infiltration characteristics due to the dense nature of the Very Old Paralic Deposits. Laboratory testing indicates the upper clayey portion of the Very Old Paralic Deposits is highly expansive. Some areas of the site will be underlain by compacted fill. Because of the slow infiltration characteristics, expansive nature of the on-site soils, and the presence of compacted fill at the completion of grading, full and partial infiltration is infeasible on this site.

In our professional opinion and based on our site-specific investigation, there are no areas of the site where any amount of storm water infiltration is feasible. The infiltration rates are too low and/or there is an un-mitigatable risk of lateral flow to adjacent rights-of-way, utility trenches, and buildings. Additionally, the upper portion of the Very Old Paralic Deposits is highly expansive, and in some locations compacted fill in excess of 5 feet will be present at the BMP locations.

If you have any questions regarding this letter, or if we may be of further service, please contact the undersigned at your convenience.

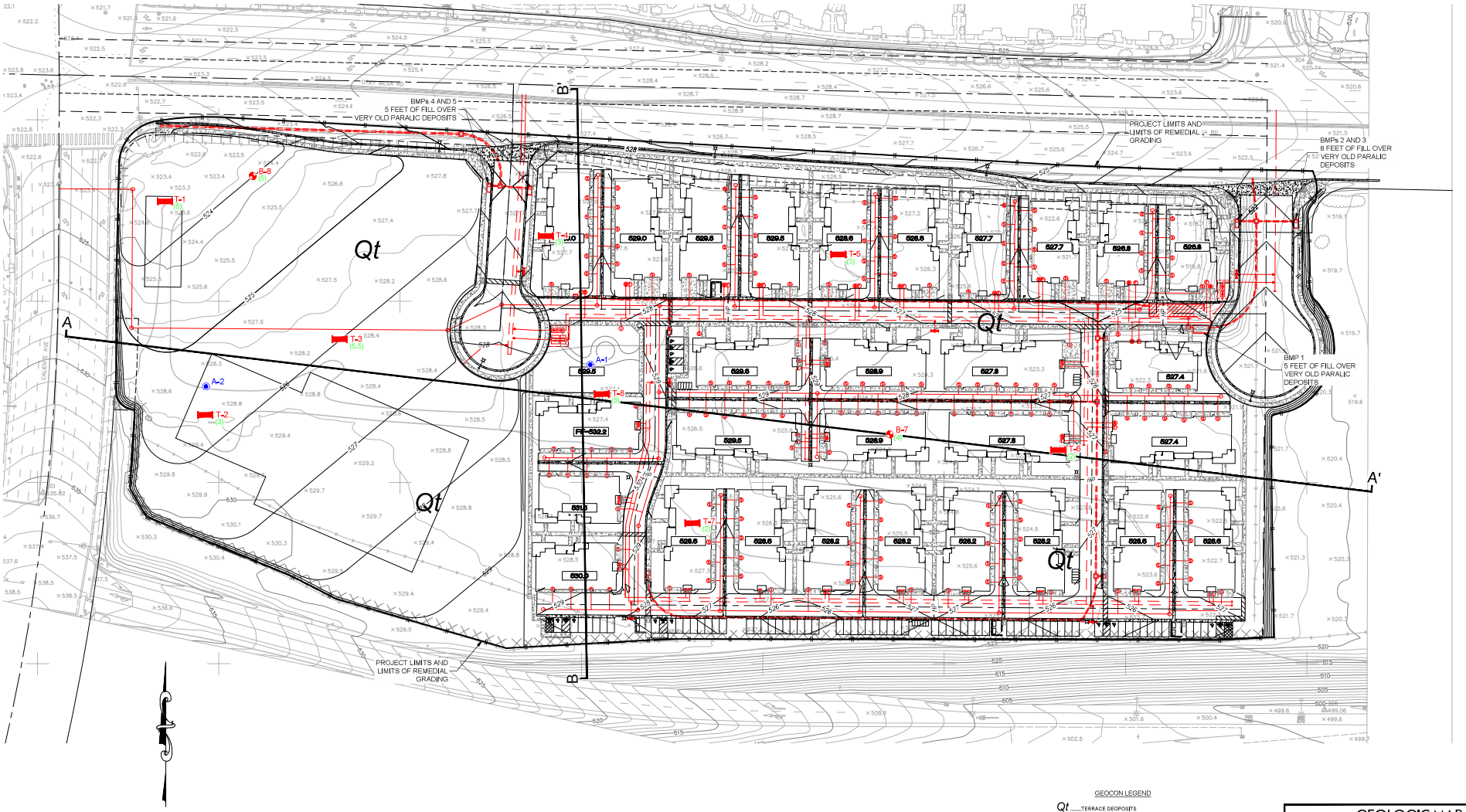
Very truly yours,

GEOCON INCORPORATED

Rodney C. Mikesell
GE 2533

RCM:dmc

(e-mail) Addressee
(2/del) Civil Sense, Inc.
Attention: Ms. Maykia Vang



GRAPHIC SCALE
0' 25' 50' 75' 100' 150' 200'
SCALE 1"=50' (on 36x24)

GEOCON LEGEND

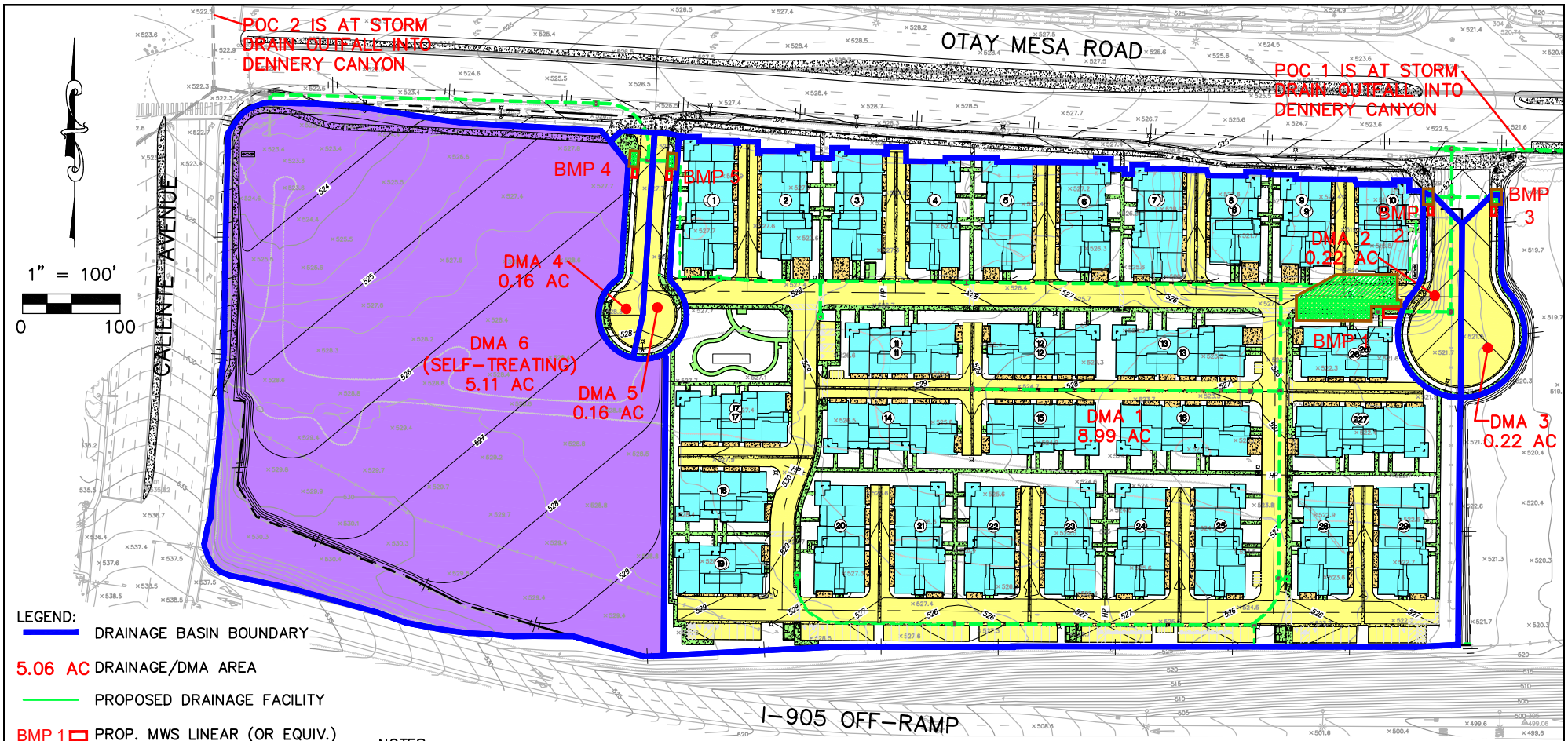
Qt .....TERRACE DEOPOSITS
T-1 .....APPROX. LOCATION OF TRENCH
A-2 .....APPROX. LOCATION OF INFILTRATION TEST
B-8 .....APPROX. LOCATON OF PREVIOUS BORING (Geocon)
(5,5) .....APPROX. THICKNESS OF SURFICIAL SOIL
A A' .....APPROX. LOCATION OF GEOLOGIC CROSS SECTION

GEOLOGIC MAP

OCEANVIEW HILLS - PA 61
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858 558-6900 - FAX 858 558-6159

SCALE	1" = 50'
DATE	09 - 17 - 2018
PROJECT NO.	07955 - 42 - 02
FIGURE	1
SHEET	1 OF 1



LEGEND:

- DRAINAGE BASIN BOUNDARY
- 5.06 AC DRAINAGE/DMA AREA
- PROPOSED DRAINAGE FACILITY
- BMP 1 PROP. MWS LINEAR (OR EQUIV.)
- PROP. FLOW CONTROL VAULT
- PROPOSED BUILDINGS
- PROPOSED STREETS
- PROPOSED DRIVEWAYS
- PROPOSED HARDSCAPE
- PROPOSED LANDSCAPING
- PROPOSED SELF-MITIGATING AREA

NOTES:

THE UNDERLYING HYDROLOGIC SOIL GROUP IS D. GROUNDWATER WAS NOT ENCOUNTERED IN BORINGS UP TO 17' DEEP. THERE ARE NO EXISTING ON-SITE NATURAL HYDROLOGIC FEATURES, CCSYA, OR IMPERVIOUS AREAS.

SELF-MITIGATING AREA SHALL MEET "STORM WATER STANDARDS" REQUIREMENTS IN SECTIONS 5.2.1 AND 5.2.3.

PROPOSED IMPROVEMENTS ALONG OTAY MESA ROAD WILL MEET GREEN STREET REQUIREMENTS.

THIS SWQMP IS PRELIMINARY AND FOR ENTITLEMENTS. AN APPROVED EQUIVALENT TO MWS LINEAR CAN BE SELECTED DURING FINAL ENGINEERING. THE VAULT VOLUMES ARE ESTIMATED IN THIS SWQMP. THE VAULT DETAILS WILL BE DESIGNED DURING FINAL ENGINEERING. THE FLOW CONTROL DISCHARGE OUT OF EACH VAULT SHALL MATCH THE HYDROMODIFICATION FLOW RATE.

Vault Dimensions

BMP	Depth, ft	Length, ft	Width, ft	Volume, ft
1	4 to 9	Varies	Varies	29,400
2	6	9	15	810
3	6	9	15	810
4	5	8	15	600
5	5	8	15	600

ATTACHMENT 1A AND 2A

DMA AND HYDROMODIFICATION MANAGEMENT EXHIBIT

UPDATE
GEOTECHNICAL INVESTIGATION

OCEANVIEW HILLS – PA 61
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

PARDEE HOMES
SAN DIEGO, CALIFORNIA

MARCH 15, 2018
PROJECT NO. 07955-42-02

Project No. 07955-42-02
March 15, 2018

Pardee Homes
13400 Sabre Springs Parkway, Suite 200
San Diego, California 92128

Attention: Mr. Allen Kashani

Subject: UPDATE GEOTECHNICAL INVESTIGATION
OCEANVIEW HILLS – PA 61
SAN DIEGO, CALIFORNIA

Dear Mr. Kashani:

In accordance with your request, we herein submit the results of our update geotechnical investigation for the subject project. We performed our investigation to evaluate the underlying soil and geologic conditions; potential geologic hazards; and to assist in the design of the proposed development. The accompanying report presents the results of our study with conclusions and recommendations pertaining to the geotechnical aspects of the proposed project. The site is suitable for the proposed development provided the recommendations of this report are incorporated into the design and construction of the planned project.

Should you have questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Noel G. Borja
Senior Staff Engineer

Rodney C. Mikesell
GE 2533

Ali Sadr
CEG 1778

NGB:RCM:AS:dmc

(e-mail) Addressee
(3/del) Civil Sense, Inc.
Attention: Ms. Maykia Vang

TABLE OF CONTENTS

TABLE OF CONTENTS (Concluded)

UPDATE GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of our geotechnical investigation for the proposed construction of several multi-family residential structures, a commercial area, private and public streets, and associated utilities on a vacant parcel of land located southeast of the intersection of Otay Mesa Road and Caliente Avenue in the Otay Mesa area of San Diego, California (see Vicinity Map, Figure 1). The purpose of this geotechnical investigation is to evaluate the surface and subsurface soil conditions, general site geology, and to identify geotechnical constraints that may impact the planned development.

To aid in the preparing of this report, we reviewed the following plans and geotechnical report:

1. *Site Plan, Ocean View Hills (PA-61), San Diego, California,* prepared by Civil Sense, undated.

2. *Conceptual Site Plan, Ocean View Hills (PA-61), San Diego, California,* prepared by Placeworks, dated January 5, 2017.

3. *Update Geotechnical Report, South Otay Mesa Corporate Center, California Terraces Planning Area 61, San Diego, California,* prepared by Geocon Incorporated, dated February 29, 2008 (Project No. 07955-42-01).

The field investigation consisted of excavating 7, exploratory trenches to evaluate the underlying geologic conditions within the area of planned development and performing 2, field-saturated hydraulic conductivity tests. Geocon Incorporated previously performed 2, small-diameter borings on May 14, 1984, which was included in the geotechnical investigation report listed as Reference 3. The locations of the exploratory trenches, previous borings, and hydraulic conductivity tests are shown on the Geologic Map, Figure 2. Civil Sense provided an AutoCAD file of the preliminary grading plan which was used as the base map to generate Figure 2. Logs of the exploratory trenches and borings and a detailed discussion of the field investigation are presented in Appendix A.

We performed laboratory tests on selected soil samples obtained during the field investigation to evaluate pertinent physical properties for engineering analyses and to assist in providing recommendations for site grading, foundation design criteria, and pavement design. Details of the laboratory testing and a summary of test results are presented in Appendix B.

The conclusions and recommendations presented herein are based on analyses of the data obtained from the field investigation, laboratory tests, and our experience with similar soil and geologic conditions.

2. SITE AND PROJECT DESCRIPTION

Planning Area 61 consists of a 13.7-acre, vacant lot, located southeast of the intersection of Caliente Avenue and Old Otay Mesa Road in San Diego, California. The property is currently covered with weeds and brush. The property is generally flat with site elevations ranging from 530 Mean Sea Elevation (MSL) near the southwest corner to 518 MSL in a desilting basin that was constructed previously at the northeast corner of the site.

We understand the site will be developed to accommodate 29, multi-family structures with associated utilities, streets and alleys, concrete hardscape walkways, a small park, and landscaping. A retaining wall with a maximum height of 7 feet is planned at the southeast corner of the site. The western 4.6 acres of the site is currently planned for commercial use.

Based on the grading plan, grading across the residential portion will result in fills of approximately 1 foot to 8 feet. The deeper fill will be in a detention basin at the northeast corner of the site. Across the commercial area, cuts of approximately 1 to 4 feet will be made. Minor fills of less than 1 foot from existing grade will be performed at the northwest corner.

The above locations, site descriptions, and proposed development are based on a site reconnaissance, review of published geologic literature, our field investigations, and discussions with you. If development plans differ from those described herein, we should be contacted to review the plans and provide revisions to this report as needed.

3. SOIL AND GEOLOGIC CONDITIONS

The site is underlain by two surficial materials, undocumented fill and topsoil and one geologic unit, Very Old Terrace Deposits. A description of these units is presented herein and also shown on the exploratory excavation logs in Appendix A. Geologic units are shown on Figure 2 and geologic cross sections are presented on Figure 3.

3.1 Undocumented Fill (Unmapped)

Scattered pockets of undocumented fills are present on the site. Undocumented fills were placed as stockpiles and berms around the perimeter of the site and also as ramps and jumps for off-road vehicles. The thickness of undocumented fills is unknown; however, we estimate that undocumented fill thickness will range between 1 to 5 feet. The lateral extent of the undocumented fill is also unknown and was not mapped due to heavy vegetation. Undocumented fill is will require removal and replacement as compacted fill.

3.2 Topsoil (Unmapped)

Topsoil blankets the entire site and are generally composed of soft to stiff, sandy to silty clay. The topsoil thickness likely varies from approximately 2 to 5 feet. Topsoils are compressible in their present condition and remedial grading will be required. Based on laboratory testing, the topsoil is highly expansive. Toposils are unsuitable for support of the project and should be removed and replaced as compacted fill. Expansive topsoil should be placed at a depth of at least 3 feet below finish pad subgrade.

3.3 Very Old Terrace Deposits (Qt)

Very Old Terrace Deposits, also known as Very Old Paralic Deposits, covers the site bellow the topsoil and undocumented fill as indicated in our exploratory borings and trenches. The Very Old Terrace Deposits in this area are generally comprised of highly expansive clay underlain by dense to very dense, silty to clayey sand with varying gravel and cobble content. The clayey portion covers almost the entire area of proposed development. Previous borings and recent exploratory trenches indicate that the clayey portion of terrace deposits transitions into topsoil with an approximate thickness of up to 5 feet. The highly expansive Terrace Deposits should be removed and replaced as compacted fill at a depth of at least 3 feet below planned finish grade.

Dense to very dense, sandy and cobbly layers underlie the clay. This portion of the terrace deposit is generally low expansive and possesses high shear strength characteristics. Based on the general geology of the area, the Very Old Paralic Deposits thickness is approximately 20 to 30 feet. These deposits unconformably rests on the Pliocene age San Diego Formation (Tsd). The sandy portion of the Terrace Deposits is suitable for support of the planned improvements.

4. GROUNDWATER

We did not encounter groundwater in our field investigation. Based on the proposed improvements, we do not expect groundwater to have an adverse impact on the project; however, it is not uncommon for groundwater or seepage conditions to develop where none previously existed. Groundwater elevations are dependent on seasonal precipitation, irrigation, land use, among other factors, and vary as a result. Proper surface drainage will be important to future performance of the project.

5. GEOLOGIC HAZARDS

5.1 Geologic Hazard Category

Based on our review of geologic literature and experience with the soil and geologic conditions in the general area, it is our opinion that known active, potentially active, or inactive faults are not located at the site. The site is not within a State of California Earthquake Fault Zone.

The *City of San Diego Seismic Safety Study Geologic Hazards and Faults, Sheet 7,* defines the site with a Hazard Category 53. Category 53 is defined as *Level or sloping terrain, unfavorable geologic structure, low to moderate risk.*

5.2 Faulting and Seismicity

According to the computer program *EZ-FRISK* (Version 7.65), six known active faults are located within a search radius of 50 miles from the property. The nearest known active fault is the Newport-Inglewood/Rose Canyon Fault Zone, located approximately 8 miles west of the site. The Newport-Inglewood/Rose Canyon Fault Zone is the dominant source of potential ground motion. Earthquakes that might occur on the Newport-Inglewood/Rose Canyon Fault Zone or other faults within the southern California and northern Baja California area are potential generators of significant ground motion at the site. The estimated deterministic maximum earthquake magnitude and peak ground acceleration for the Newport-Inglewood/Rose Canyon Fault Zone are 7.5 and 0.32g, respectively. Table 5.2.1 lists the estimated maximum earthquake magnitude and peak ground acceleration for the most dominant faults in relationship to the site location. We calculated peak ground acceleration (PGA) using Boore and Atkinson (2008), Campbell and Bozorgnia (2008), and Chiou and Youngs (2007) acceleration-attenuation relationships.

TABLE 5.2.1
DETERMINISTIC SPECTRA SITE PARAMETERS

Fault Name	Distance from Site (miles)	Maximum Earthquake Magnitude (Mw)	Peak Ground Acceleration		
			Boore-Atkinson NGA USGS 2008 (g)	Campbell-Bozorgnia NGA USGS 2008 (g)	Chiou-Youngs (2007) NGA USGS 2008 (g)
Newport-Inglewood/Rose Canyon	8	7.5	0.29	0.24	0.32
Rose Canyon	8	6.9	0.25	0.23	0.26
Coronado Bank	15	7.4	0.22	0.16	0.20
Palos Verdes Connected	15	7.7	0.24	0.17	0.22
Elsinore	44	7.85	0.13	0.09	0.11
Earthquake Valley	48	6.8	0.07	0.05	0.04

We used the computer program *EZ-FRISK* to perform a probabilistic seismic hazard analysis. The computer program *EZ-FRISK* operates under the assumption that the occurrence rate of earthquakes on each mapped Quaternary fault is proportional to the fault slip rate. The program accounts for earthquake magnitude as a function of fault rupture length. Site acceleration estimates are made using the earthquake magnitude and distance from the site to the rupture zone. The program also accounts

for uncertainty in each of following: (1) earthquake magnitude, (2) rupture length for a given magnitude, (3) location of the rupture zone, (4) maximum possible magnitude of a given earthquake, and (5) acceleration at the site from a given earthquake along each fault. By calculating the expected accelerations from considered earthquake sources, the program calculates the total average annual expected number of occurrences of site acceleration greater than a specified value. We utilized acceleration-attenuation relationships suggested by Boore and Atkinson (2008), Campbell and Bozorgnia (2008), and Chiou and Youngs (2007) in the analysis. Table 5.2.2 presents the site-specific probabilistic seismic hazard parameters including acceleration-attenuation relationships and the probability of exceedence.

TABLE 5.2.2
PROBABILISTIC SEISMIC HAZARD PARAMETERS

Probability of Exceedence	Peak Ground Acceleration		
	Boore-Atkinson NGA USGS 2008 (g)	Campbell-Bozorgnia NGA USGS 2008 (g)	Chiou-Youngs (2007) NGA USGS 2008 (g)
2% in a 50 Year Period	0.44	0.37	0.43
5% in a 50 Year Period	0.32	0.27	0.31
10% in a 50 Year Period	0.24	0.21	0.22

While listing peak accelerations is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including frequency and duration of motion and soil conditions underlying the site. Seismic design of the structures should be evaluated in accordance with the California Building Code (CBC).

5.3 Liquefaction Potential

The risk associated with liquefaction hazard is low due to the lack of shallow groundwater and dense nature of the underlying sediments.

5.4 Subsidence

Based on the subsurface soil conditions encountered during our field investigation, the risk associated with ground subsidence is low.

5.5 Flooding

The site is not located within a designated drainage or floodplain area (FEMA, 2012). The risk associated with flooding hazard is low.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 From a geotechnical engineering standpoint, it is our opinion that the site is suitable for the proposed development provided the recommendations presented herein are implemented in design and construction of the project.

6.1.2 The site is underlain by scattered pockets of undocumented fill and topsoil. Based on the exploratory borings and trenches, the surficial soils are underlain by the Very Old Terrace Deposits. The near surface materials are considered highly expansive (EI greater than 90). Remedial grading will be required for the onsite topsoil and clayey portions of the Terrace Deposits. The sandy portions of the old terrace deposits are suitable for the support the proposed loads or additional engineered fill.

6.1.3 We did not encounter groundwater during the field investigation. We expect excavations for the proposed improvements will be relatively shallow; therefore, we do not expect groundwater to have an adverse impact on the project as currently proposed.

6.1.4 The site is located approximately 8 miles west of the Newport-Inglewood/Rose Canyon fault zone. Based on our review of available literature, active, potentially active, or presumed inactive faults do not cross the site.

6.1.5 With the exception of possible strong seismic shaking, we did not observe or know of significant geologic hazards that would adversely affect the proposed development.

6.1.6 The risks associated with soil liquefaction and flooding hazards are low.

6.1.7 The proposed residential structures can be supported on a shallow foundation system founded entirely on properly compacted fill soil.

6.1.8 Geocon Incorporated should review the foundation and improvement plans prior to finalizing. If plans differ significantly from those described herein, Geocon should be contacted to check if additional analyses will be required.

6.1.9 Subdrains are not required for this project.

6.2 Excavation and Soil Characteristics

6.2.1 Excavation of the onsite soils should be possible with moderate to heavy effort using conventional, heavy-duty equipment during grading and trenching operations.

6.2.2 The soil encountered in our field investigation is considered to be both "non-expansive" (Expansion Index [EI] of 20 or less) and "expansive" (EI greater than 20) as defined by 2016 California Building Code (CBC) Section 1803.5.3. Table 6.2 presents soil classifications based on the expansion index.

TABLE 6.2
EXPANSION CLASSIFICATION BASED ON EXPANSION INDEX

Expansion Index (EI)	Expansion Classification	2016 CBC Expansion Classification
0 – 20	Very Low	Non-Expansive
21 – 50	Low	Expansive
51 – 90	Medium	
91 – 130	High	
Greater Than 130	Very High	

6.2.3 We performed laboratory tests on samples of the site materials to evaluate the percentage of water-soluble sulfate content. Appendix B presents the results from the laboratory water-soluble sulfate content tests. The test results indicate that on-site materials at the locations tested possess "Not Applicable" and "S0" sulfate exposure to concrete structures, as defined by 2016 CBC Section 1904 and ACI 318-14 Chapter 19. The presence of water-soluble sulfates is not a visually discernible characteristic. Therefore, other soil samples from the site could yield different concentrations. Additionally, over time landscaping activities (i.e. addition of fertilizers and other soil nutrients) may affect the concentration.

6.2.4 Geocon Incorporated does not practice in the field of corrosion engineering. Therefore, if improvements that could be susceptible to corrosion are planned, further evaluation by a corrosion engineer may be needed.

6.3 Grading

6.3.1 All grading should be performed in accordance with the *Recommended Grading Specifications* contained in Appendix D. Where the recommendations of Appendix D conflict with this section of the report, the recommendations of this section take precedence.

6.3.2 Prior to commencing grading, a preconstruction conference should be held at the site with the owner or developer, grading contractor, civil engineer, and geotechnical engineer in attendance. Special soil handling and/or the grading plans can be discussed at that time.

6.3.3 Grading should be performed in conjunction with the observation and compaction testing services of Geocon Incorporated. Fill soil should be observed on a full-time basis during placement and tested to check in-place dry density and moisture content.

6.3.4 Site preparation should begin with removal of all deleterious material and vegetation. The depth of removal should be such that material exposed in cut areas or soil to be used for fill is relatively free of organic matter. Deleterious material generated during stripping and/or site demolition should be exported from the site.

6.3.5 Abandoned utilities should be removed and the subsequent depressions and/or trenches backfilled with properly compacted fill as part of the remedial grading.

6.3.6 Soft soils at the base of the existing detention basin should be removed to expose dense Terrace Deposits.

6.3.7 The undocumented fill, topsoil, and the clay portion of the Very Old Terrace Deposits are considered unsuitable to receive fill and settlement sensitive structures and should be completely removed to expose the underlying competent sandy Terrace Deposits. The depth of remedial grading is estimated to be 3 to 6 feet below existing grades. The estimated depth of the surficial soils that will require remedial grading is shown on the Geologic Map, Figure 2. The actual depth should be determined in the field during grading.

6.3.8 Selective grading should be performed so that expansive soils (EI greater than 90) are placed at least 3 feet below finish subgrade elevation. Alternatively, expansive soils can be mixed with low expansive, granular soil, and used as fill material in the upper 3 feet of pad grade provided the mixed soil has an expansion index (EI) less than 90. The contractor should expect to perform significant mixing to enable a uniform compacted fill that meets the required expansion index. As pad grades for the commercial portion are not yet known, consideration should be given to keeping expansive soils to a depth of at least 5 feet below planned sheet grade elevations in the commercial area to account for future pad regrading.

6.3.9 Because of the limited fill depths, mining of the underlying sandy cobble terrace will likely be needed to generate sufficient soil for either capping building pads or generating soil for mixing with the on-site clays.

6.3.10 Prior to placing fill, the upper 12 inches at the base of removals should be scarified, moisture conditioned as necessary and recompacted. Soils derived from onsite excavations are suitable for reuse as fill if free from vegetation, debris and other deleterious material. Fill lifts should be no thicker than will allow for adequate bonding and compaction. Fill, backfill, and scarified ground surfaces, should be compacted to a dry density of at least 90 percent of maximum dry density at or slightly above optimum moisture content, as determined in accordance with ASTM D 1557. Grading should be performed so that the upper 3 feet of soil below finish pad subgrade consist of soil with a *low* to *medium* expansive potential (EI of 90 or less).

6.3.11. Oversize rock greater than 12 inches should be placed at least 5 feet below finish pad grade or 3 feet below the deepest utility, whichever is greater. Rock greater than 6 inches should not be placed in the upper 3 feet below building pad grade. Oversize rock that cannot be placed as recommended should be exported off site.

6.3.12 Imported fill should consist of granular soil with a *low* expansion potential (EI of 50 or less) that is free of deleterious material or stones larger than 3 inches and should be compacted as recommended above. Geocon Incorporated should be notified of the import soil source and should perform laboratory testing prior to its arrival at the site to evaluate its suitability as fill material.

6.4 Slopes

6.4.1 A 2:1 (horizontal:vertical) or flatter fill slope with a maximum height of approximately 7 feet is planned along the eastern boundary of Street B. The outer 15 feet (or a distance equal to the height of the slope, whichever is less) should consist of properly compacted granular soil fill to reduce the potential for surface sloughing. All fill slopes should be track-walked upon completion such that the fill soils are uniformly compacted to at least 90 percent relative compaction to the face of the finish slope.

6.4.2 Fill slopes constructed with granular materials as recommended above will have a factor of safety of at least 1.5 under static conditions with respect to both deep-seated and surficial instability for the slope heights proposed.

6.4.3 All slopes should be planted, drained, and maintained to reduce erosion.

6.5 Seismic Design Criteria

6.5.1 We used USGS (2017) to determine seismic design criteria. Table 6.5.1 summarizes site-specific design criteria obtained from the 2016 California Building Code (CBC; Based on the

2015 International Building Code [IBC] and ASCE 7-10), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The short spectral response uses a period of 0.2 second. The building structure and improvements should be designed using a Site Class D. We evaluated the Site Class in accordance with Section 1613.3.2 of the 2016 CBC and Table 20.3-1 of ASCE 7-10 based on our experience with the site subsurface soils and exploratory boring information. The values presented in Table 6.5.1 are for the risk-targeted maximum considered earthquake (MCE_R).

TABLE 6.5.1
2016 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2016 CBC Reference
Site Class	D	Table 1613.3.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	0.865g	Figure 1613..3.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.328g	Figure 1613.3.1(2)
Site Coefficient, F_A	1.154	Table 1613.3.3(1)
Site Coefficient, F_V	1.743	Table 1613.3.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	0.999g	Section 1613.3.3 (Eqn 16-37)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	0.572g	Section 1613.3.3 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.666g	Section 1613.3.4 (Eqn 16-39)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.382g	Section 1613.3.4 (Eqn 16-40)

6.5.2 Table 6.5.2 presents additional seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-10 for the mapped maximum considered geometric mean (MCE_G).

TABLE 6.5.2
2016 CBC SITE ACCELERATION DESIGN PARAMETERS

Parameter	Value	ASCE 7-10 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.348g	Figure 22-7
Site Coefficient, F_{PGA}	1.152	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.401g	Section 11.8.3 (Eqn 11.8-1)

6.5.3 Conformance to the criteria in Tables 6.5.1 and 6.5.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a maximum level earthquake occurs. The primary goal of seismic design is to protect life and not to avoid all damage, since such design may be economically prohibitive.

6.6 Foundation and Concrete Slabs-On-Grade Recommendations

6.6.1 The foundation recommendations herein are for proposed one- to three-story residential structures. The foundation recommendations have been separated into three categories based on either the maximum and differential fill thickness or Expansion Index. The foundation category criteria are presented in Table 6.6.1.

TABLE 6.6.1
FOUNDATION CATEGORY CRITERIA

Foundation Category	Maximum Fill Thickness, T (feet)	Differential Fill Thickness, D (feet)	Expansion Index (EI)
I	T<20	--	EI≤50
II	20≤T<50	10≤D<20	50<EI≤90
III	T≥50	D≥20	90<EI≤130

6.6.2 We will provide final foundation categories for each building or lot after finish pad grades have been achieved and we perform laboratory testing of the subgrade soil.

6.6.3 Table 6.6.2 presents minimum foundation and interior concrete slab design criteria for conventional foundation systems.

TABLE 6.6.2
CONVENTIONAL FOUNDATION RECOMMENDATIONS BY CATEGORY

Foundation Category	Minimum Footing Embedment Depth (inches)	Continuous Footing Reinforcement	Interior Slab Reinforcement
I	12	Two No. 4 bars, one top and one bottom	6 x 6 - 10/10 welded wire mesh at slab mid-point
II	18	Four No. 4 bars, two top and two bottom	No. 3 bars at 24 inches on center, both directions
III	24	Four No. 5 bars, two top and two bottom	No. 3 bars at 18 inches on center, both directions

6.6.4 The embedment depths presented in Table 6.6.2 should be measured from the lowest adjacent pad grade for both interior and exterior footings. The conventional foundations should have a minimum width of 12 inches and 24 inches for continuous and isolated footings, respectively. A typical footing dimension detail is provided on Figure 4.

6.6.5 The concrete slab-on-grade should be a minimum of 4 inches thick for Foundation Categories I and II and 5 inches thick for Foundation Category III.

6.6.6 Slabs that may receive moisture-sensitive floor coverings or may be used to store moisture-sensitive materials should be underlain by a vapor retarder. The vapor retarder design should be consistent with the guidelines presented in the American Concrete Institute's (ACI) *Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials* (ACI 302.2R-06). The vapor retarder used should be specified by the project architect or developer based on the type of floor covering that will be installed and if the structure will possess a humidity-controlled environment.

6.6.7 The bedding sand thickness should be determined by the project foundation engineer, architect, and/or developer. However, we should be contacted to provide recommendations if the bedding sand is thicker than 6 inches. It is common to see 3 inches and 4 inches of sand below the concrete slab-on-grade for 5-inch and 4-inch thick slabs, respectively, in the southern California area.

6.6.8 The foundation design engineer should provide appropriate concrete mix design criteria and curing measures to assure proper curing of the slab by reducing the potential for rapid moisture loss and subsequent cracking and/or slab curl. We suggest that the foundation design engineer present the concrete mix design and proper curing methods on the foundation plans. It is critical that the foundation contractor understands and follows the recommendations presented on the foundation plans.

6.6.9 As an alternative to the conventional foundation recommendations, consideration should be given to the use of post-tensioned concrete slab and foundation systems for the support of the proposed structures. The post-tensioned systems should be designed by a structural engineer experienced in post-tensioned slab design and design criteria of the Post-Tensioning Institute (PTI) DC 10.5-12 *Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils* or *WRI/CRSI Design of Slab-on-Ground Foundations*, as required by the 2016 California Building Code (CBC Section 1808.6.2). Although this procedure was developed for expansive soil conditions, it can also be used to reduce the potential for foundation distress due to differential fill settlement. The post-tensioned design should incorporate the geotechnical parameters presented in Table 6.6.3 for

the particular Foundation Category designated. The parameters presented in Table 6.6.3 are based on the guidelines presented in the PTI DC 10.5 design manual.

TABLE 6.6.3
POST-TENSIONED FOUNDATION SYSTEM DESIGN PARAMETERS

Post-Tensioning Institute (PTI), Third Edition Design Parameters	Foundation Category		
	I	II	III
Thornthwaite Index	-20	-20	-20
Equilibrium Suction	3.9	3.9	3.9
Edge Lift Moisture Variation Distance, e_M (feet)	5.3	5.1	4.9
Edge Lift, y_M (inches)	0.61	1.10	1.58
Center Lift Moisture Variation Distance, e_M (feet)	9.0	9.0	9.0
Center Lift, y_M (inches)	0.30	0.47	0.66

6.6.10 The foundations for the post-tensioned slabs should be embedded in accordance with the recommendations of the structural engineer. If a post-tensioned mat foundation system is planned, the slab should possess a thickened edge with a minimum width of 12 inches and extend below the clean sand or crushed rock layer.

6.6.11 If the structural engineer proposes a post-tensioned foundation design method other than PTI DC 10.5:

- The deflection criteria presented in Table 6.6.3 are still applicable.
- Interior stiffener beams should be used for Foundation Categories II and III.
- The width of the perimeter foundations should be at least 12 inches.
- The perimeter footing embedment depths should be at least 12 inches, 18 inches and 24 inches for foundation categories I, II, and III, respectively. The embedment depths should be measured from the lowest adjacent pad grade.

6.6.12 Our experience indicates post-tensioned slabs may be susceptible to excessive edge lift, regardless of the underlying soil conditions. Placing reinforcing steel at the bottom of the perimeter footings and the interior stiffener beams may mitigate this potential. The structural engineer should design the foundation system to reduce the potential of edge lift occurring for the proposed structures.

6.6.13 During the construction of the post-tension foundation system, the concrete should be placed monolithically. Under no circumstances should cold joints form between the

footings/grade beams and the slab during the construction of the post-tension foundation system unless designed by the structural engineer.

6.6.14 Category I, II, or III foundations may be designed for an allowable soil bearing pressure of 2,000 pounds per square foot (psf) (dead plus live load). This bearing pressure may be increased by one-third for transient loads due to wind or seismic forces. The estimated maximum total and differential settlement for the planned structures due to foundation loads is 1 inch and ½ inch, respectively.

6.6.15 Isolated footings outside of the slab area, if present, should have the minimum embedment depth and width recommended for conventional foundations for a particular Foundation Category. The use of isolated footings, which are located beyond the perimeter of the building and support structural elements connected to the building, are not recommended for Category III. Where this condition cannot be avoided, the isolated footings should be connected to the building foundation system with grade beams. In addition, consideration should be given to connecting patio slabs, which exceed 5 feet in width, to the building foundation to reduce the potential for future separation to occur.

6.6.16 Interior stiffening beams should be incorporated into the design of the foundation system in accordance with the PTI design procedures.

6.6.17 Special subgrade presaturation is not deemed necessary prior to placing concrete; however, the exposed foundation and slab subgrade soil should be moisture conditioned, as necessary, to maintain a moist condition as would be expected in any such concrete placement.

6.6.18 Where buildings or other improvements are planned near the top of a slope 3:1 (horizontal:vertical) or steeper, special foundation and/or design considerations are recommended due to the tendency for lateral soil movement to occur.

- For fill slopes less than 20 feet high or cut slopes regardless of height, footings should be deepened such that the bottom outside edge of the footing is at least 7 feet horizontally from the face of the slope.

- When located next to a descending 3:1 (horizontal:vertical) fill slope or steeper, the foundations should be extended to a depth where the minimum horizontal distance is equal to H/3 (where H equals the vertical distance from the top of the fill slope to the base of the fill soil) with a minimum of 7 feet but need not exceed 40 feet. The horizontal distance is measured from the outer, deepest edge of the footing to the face of the slope. A post-tensioned slab and foundation system or mat foundation system can be used to reduce the potential for distress in the structures

associated with strain softening and lateral fill extension. Specific design parameters or recommendations for either of these alternatives can be provided once the building location and fill slope geometry have been determined.

- If swimming pools are planned, Geocon Incorporated should be contacted for a review of specific site conditions.

- Swimming pools located within 7 feet of the top of cut or fill slopes are not recommended. Where such a condition cannot be avoided, the portion of the swimming pool wall within 7 feet of the slope face be designed assuming that the adjacent soil provides no lateral support. This recommendation applies to fill slopes up to 30 feet in height, and cut slopes regardless of height. For swimming pools located near the top of fill slopes greater than 30 feet in height, additional recommendations may be required and Geocon Incorporated should be contacted for a review of specific site conditions.

- Although other improvements, which are relatively rigid or brittle, such as concrete flatwork or masonry walls, may experience some distress if located near the top of a slope, it is generally not economical to mitigate this potential. It may be possible, however, to incorporate design measures which would permit some lateral soil movement without causing extensive distress. Geocon Incorporated should be consulted for specific recommendations.

6.6.19 The recommendations of this report are intended to reduce the potential for cracking of slabs and foundations due to expansive soil (if present), differential settlement of fill soil with varying thicknesses. However, even with the incorporation of the recommendations presented herein, foundations, stucco walls, and slabs-on-grade placed on such conditions may still exhibit some cracking due to soil movement and/or shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

6.6.20 Concrete slabs should be provided with adequate crack-control joints, construction joints and/or expansion joints to reduce unsightly shrinkage cracking. The design of joints should consider criteria of the American Concrete Institute (ACI) when establishing crack-control spacing. Additional steel reinforcing, concrete admixtures and/or closer crack control joint spacing should be considered where concrete-exposed finished floors are planned.

6.6.21 Geocon Incorporated should be consulted to provide additional design parameters as required by the structural engineer.

6.7 Retaining Walls

6.7.1 Retaining walls that are allowed to rotate more than 0.001H (where H equals the height of the retaining portion of the wall) and having a level backfill surface should be designed for an active soil pressure equivalent to the pressure exerted by a fluid density of 35 pounds per cubic foot (pcf). Where the backfill will be inclined at 2:1 (horizontal to vertical), an active soil pressure of 50 pcf is recommended. Soil with an expansion index (EI) of greater than 50 should not be used as backfill material behind retaining walls.

6.7.2 Where walls are restrained from movement at the top, an additional uniform pressure of 7H psf should be added to the active soil pressure for walls 10 feet high or less. The active pressure should be increased to 14H for the portion of the walls higher than 12 feet. For retaining walls subject to vehicular loads within a horizontal distance equal to two-thirds the wall height, a surcharge equivalent to 2 feet of fill soil should be added. Loads from the adjacent structures should be incorporated into the design of the retaining walls, if applicable.

6.7.3 The use of drainage openings through the base of the wall (weep holes) is not recommended where the seepage could be a nuisance or otherwise adversely affect the property adjacent to the base of the wall. The recommendations herein assume a properly compacted granular (EI of 50 or less) free-draining backfill material with no hydrostatic forces or imposed surcharge load. Figure 5 presents a typical retaining wall drain detail. If conditions different than those described are expected, or if specific drainage details are desired, Geocon Incorporated should be contacted for additional recommendations.

6.7.4 The structural engineer should determine the seismic design category for the project in accordance with Section 1613 of the 2016 CBC. If the project possesses a seismic design category of D, E, or F, retaining walls that support more than 6 feet of backfill should be designed with seismic lateral pressure in accordance with Section 18.3.5.12 of the 2016 CBC. The seismic load is dependent on the retained height where H is the height of the wall, in feet, and the calculated loads result in pounds per square foot (psf) exerted at the base of the wall and zero at the top of the wall. A seismic load of 20H should be used for design. We used the peak ground acceleration adjusted for Site Class effects, PGA_M, of 0.401g calculated from ASCE 7-10 Section 11.8.3 and applied a pseudo-static coefficient of 0.33.

6.7.5 The recommendations presented herein are generally applicable to the design of rigid concrete or masonry retaining walls having a maximum height of 15 feet. In the event that walls higher than 15 feet or other types of walls (such as crib-type walls) are planned, Geocon Incorporated should be consulted for additional recommendations.

6.7.6 Unrestrained walls will move laterally when backfilled and loading is applied. The amount of lateral deflection is dependent on the wall height, the type of soil used for backfill, and loads acting on the wall. The retaining walls and improvements above the retaining walls should be designed to incorporate an appropriate amount of lateral deflection as determined by the structural engineer.

6.8 Lateral Loading

6.8.1 For resistance to lateral loads, an allowable passive earth pressure equivalent to a fluid density of 300 pcf is recommended for footings or shear keys poured neat against properly compacted granular fill soils or undisturbed formation materials. The allowable passive pressure assumes a horizontal surface extending away from the base of the wall at least 5 feet or three times the surface generating the passive pressure, whichever is greater. The upper 12 inches of material not protected by floor slabs or pavement should not be included in the design for lateral resistance. Where walls are planned adjacent to and/or on descending slopes, a passive pressure of 150 pcf should be used in design.

6.8.2 If friction is to be used to resist lateral loads, an allowable coefficient of friction between soil and concrete of 0.4 should be used for design.

6.9 Storm Water Management

6.9.1 If storm water management devices are not properly designed and constructed, there is a risk for distress to improvements and properties located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water being detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. We have not performed a hydrogeological study at the site. If infiltration of storm water runoff into the subsurface occurs, downstream improvements may be subjected to seeps, springs, slope instability, raised groundwater, movement of foundations and slabs, or other undesirable impacts as a result of water infiltration.

6.9.2 We performed an infiltration study on the property. A summary of our study and storm water management recommendations are provided in Appendix C. Based on the results of our study, infiltration is considered infeasible due to low infiltration rates.

6.10 Site Drainage and Moisture Protection

6.10.1 Adequate site drainage is critical to reduce the potential for differential soil movement, erosion and subsurface seepage. Under no circumstances should water be allowed to pond

adjacent to footings. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with 2016 CBC 1804.4 or other applicable standards. In addition, surface drainage should be directed away from the top of slopes into swales or other controlled drainage devices. Roof and pavement drainage should be directed into conduits that carry runoff away from the proposed or existing structures.

6.10.2 In the case of basement walls or building walls retaining landscaping areas, a water-proofing system should be used on the wall and joints, and a Miradrain drainage panel (or similar) should be placed over the waterproofing. The project architect or civil engineer should provide detailed specifications on the plans for all waterproofing and drainage.

6.10.3 Underground utilities should be leak free. Utility and irrigation lines should be checked periodically for leaks, and detected leaks should be repaired promptly. Detrimental soil movement could occur if water is allowed to infiltrate the soil for prolonged periods of time.

6.10.4 Landscaping planters adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. Area drains to collect excess irrigation water and transmit it to drainage structures or impervious above-grade planter boxes can be used. In addition, where landscaping is planned adjacent to the pavement, construction of a cutoff wall along the edge of the pavement that extends at least 6 inches below the bottom of the base material should be considered.

6.11 Grading and Foundation Plan Review

6.11.1 Geocon Incorporated should review the grading and foundation plans for the project prior to final design submittal to determine if additional analysis and/or recommendations are required.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

2. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Incorporated should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon Incorporated.

3. This report is issued with the understanding that it is the responsibility of the owner or his representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

4. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

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NO SCALE

VICINITY MAP

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NB / RA		DSK/GTYPD

DATE 03 - 15 - 2018	PROJECT NO. 07955 - 42 - 02	FIG. 1

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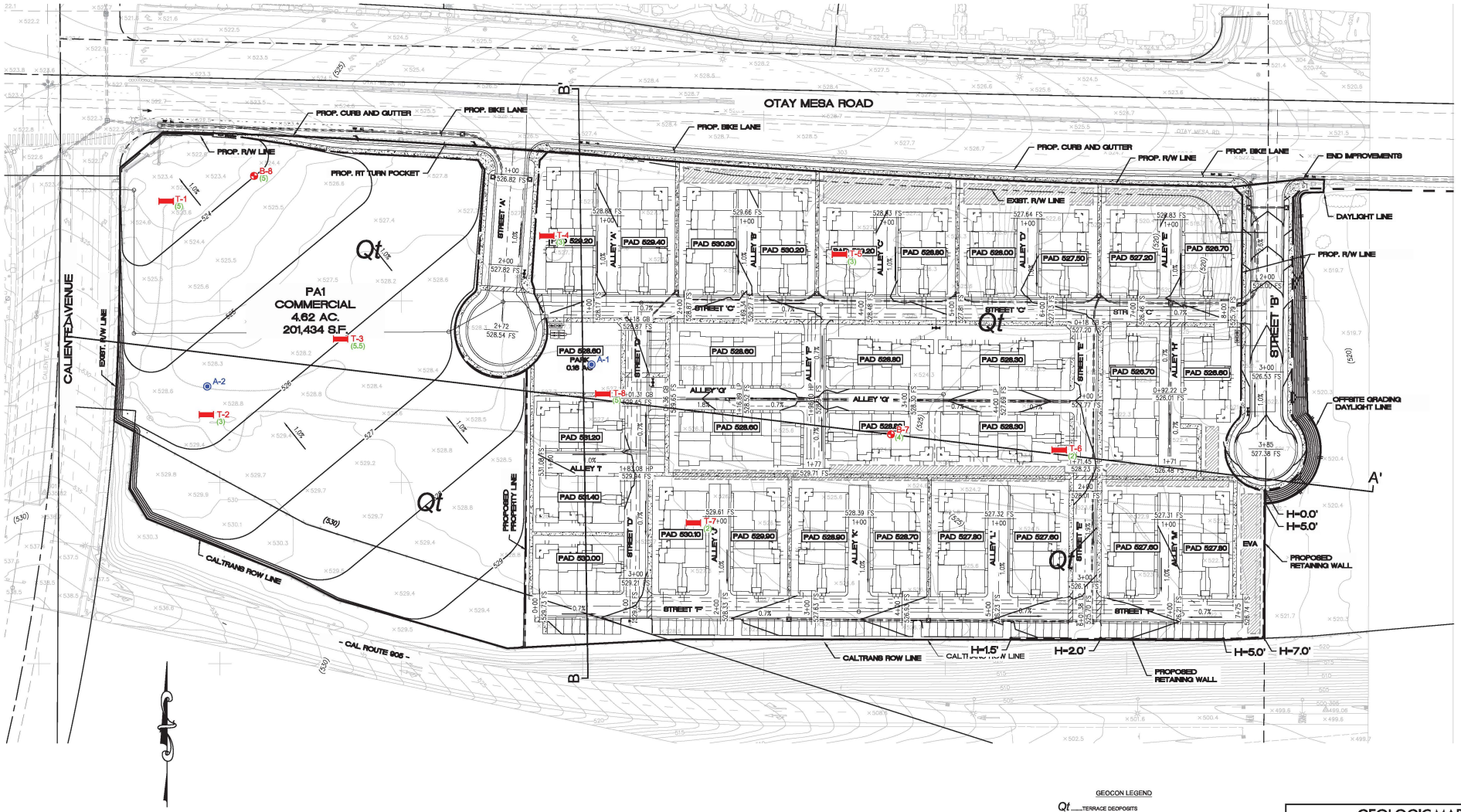

GRAPHIC SCALE
0' 25' 50' 75' 100' 150' 200'
SCALE 1"=50' (on 36x24)

GEOCON LEGEND

Qt .....TERRACE DEOPOSITS
T-8 .....APPROX. LOCATION OF TRENCH
A-2 .....APPROX. LOCATION OF INFILTRATION TEST
B-8 .....APPROX. LOCATON OF PREVIOUS BORING (Geocon)
(5.5) .....APPROX. THICKNESS OF SURFICIAL SOIL
B B' .....APPROX. LOCATION OF GEOLOGIC CROSS SECTION

GEOLOGIC MAP

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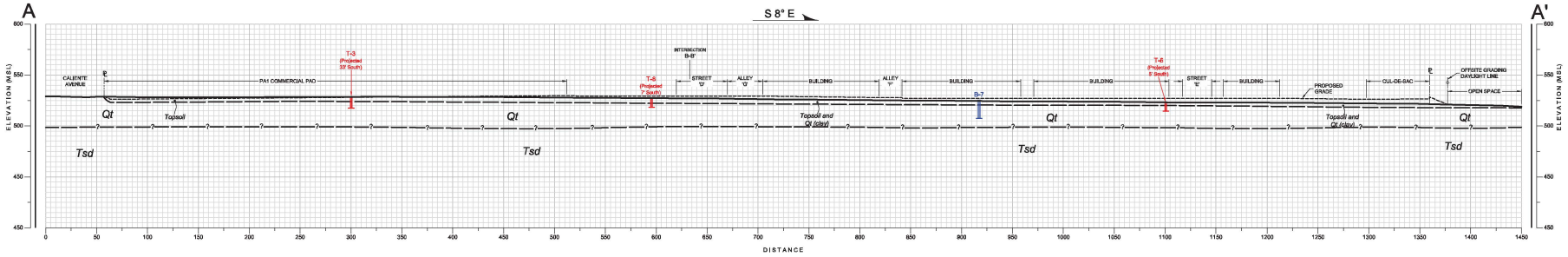
PHONE 858.558-6900 - FAX 858.558-6159

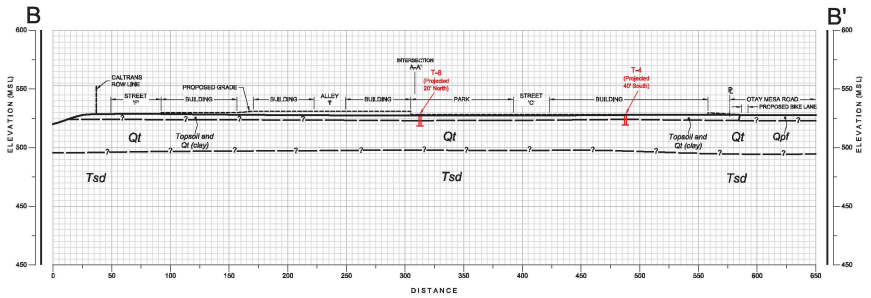
SCALE 1" = 50'
DATE 03 - 15 - 2018
PROJECT NO. 07955 - 42 - 02
FIGURE 2
SHEET 1 OF 1

Plotted:09/13/2018 8:21 AM | By:RUBEN AGUILAR | File Location:N:\PROJECTS\07955-42-02 Oceanview Hills\07955-42-02 Geologic Map.dwg



GEOLOGIC CROSS-SECTION A-A'

SCALE: 1" = 50' (Vert. = Horiz.)



GEOLOGIC CROSS-SECTION A-A'

SCALE: 1" = 50' (Vert. = Horiz.)

GEOCON LEGEND

Qpf .....PREVIOUSLY PLACED FILL

Qt .....TERRACE DEPOSITS

Tsd .....SAN DIEGO FORMATION

T-5 .....APPROX. LOCATION OF TRENCH

B-1 .....APPROX. LOCATON OF PREVIOUS BORING (Geocon)

2 .....APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)

GEOLOGIC CROSS SECTION

OCEANVIEW HILLS - PA 61
SAN DIEGO, CALIFORNIA

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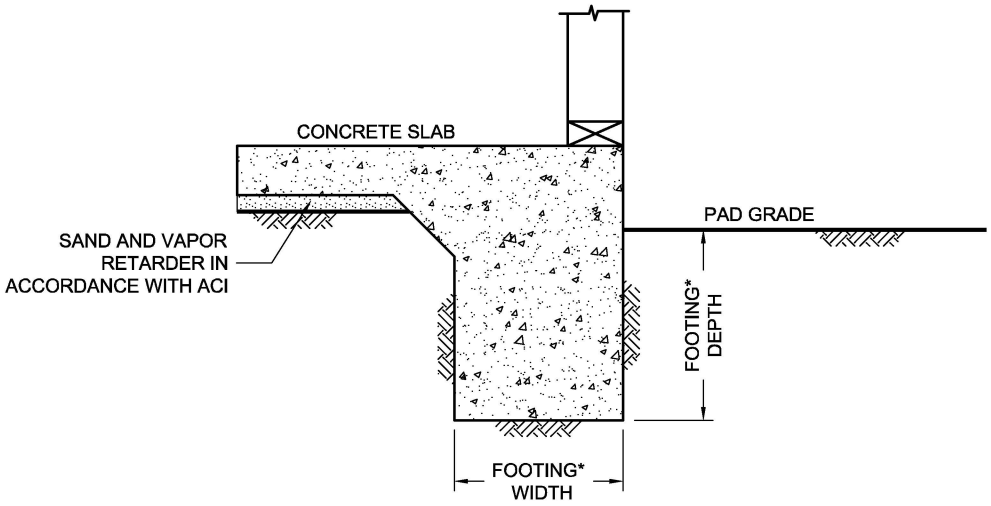
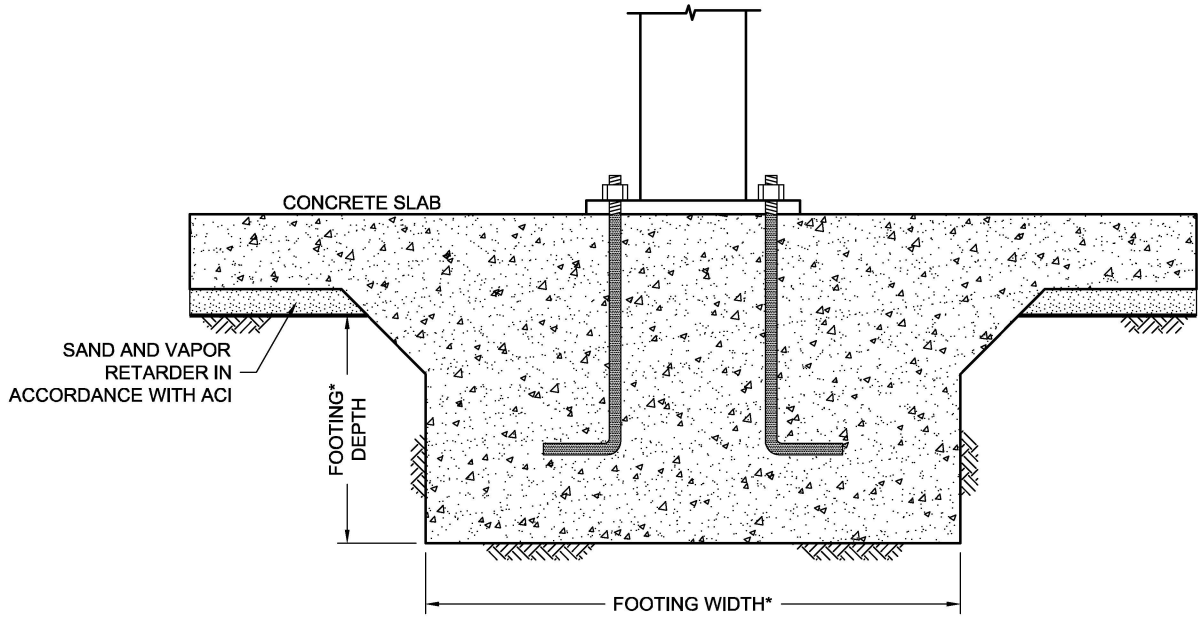
SCALE 1" = 50' | DATE 03 - 15 - 2016

PROJECT NO. 07955 - 42 - 02 | FIGURE 3

SHEET 1 OF 1

Plotted:05/15/2016 8:25 AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\07955-42-02 Oceanview Terrace\dwg\SHEETS\07955-42-02 XSections.dwg





*....SEE REPORT FOR FOUNDATION WIDTH AND DEPTH RECOMMENDATION

NO SCALE

WALL / COLUMN FOOTING DIMENSION DETAIL

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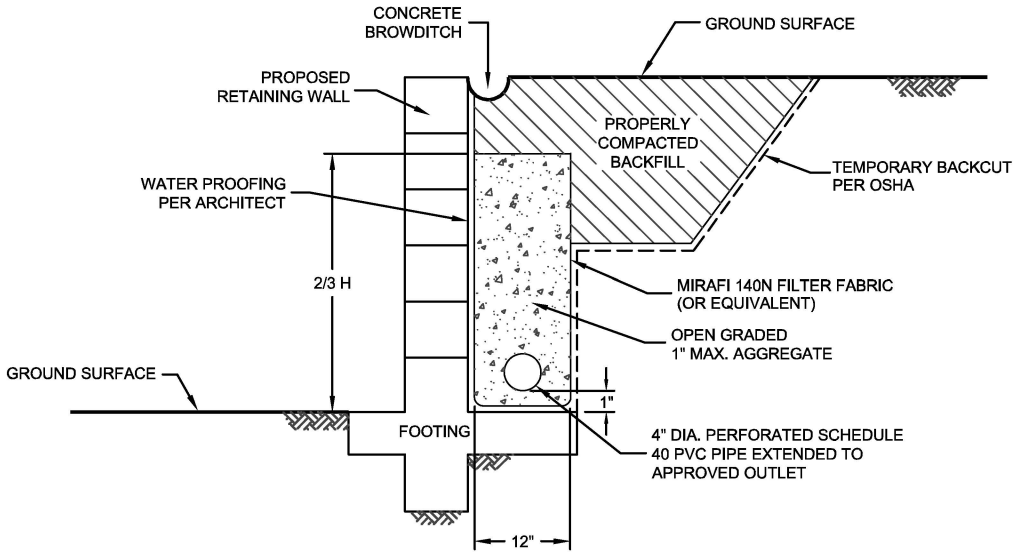
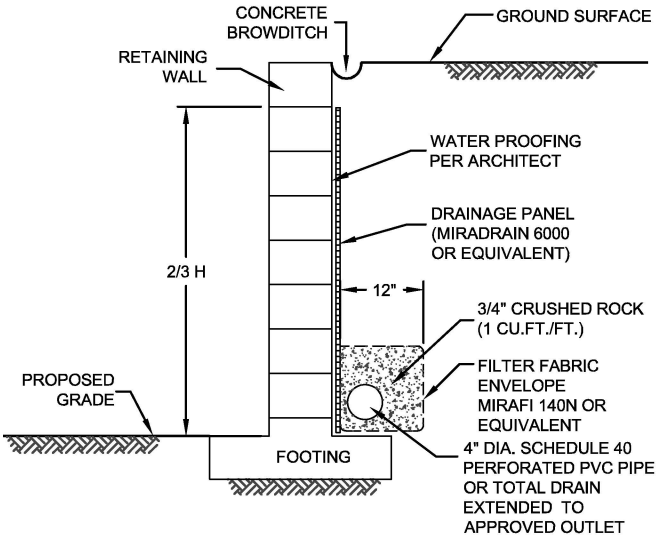
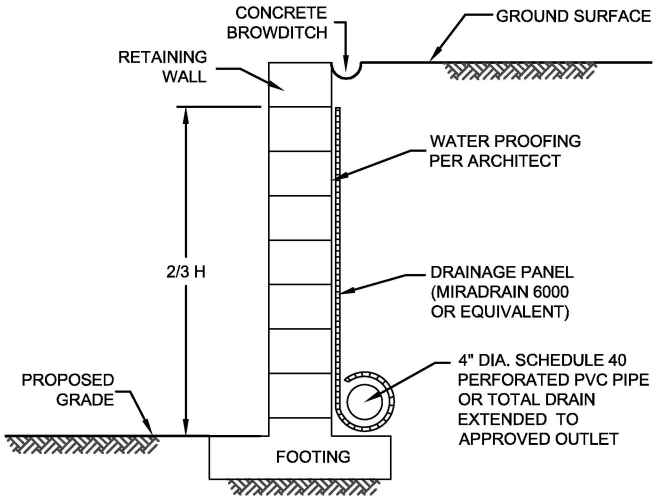
NB / RA		DSK/GTYPD

DATE 03 - 15 - 2018	PROJECT NO. 07955 - 42 - 02	FIG. 4

Plotted:03/14/2018 4:03PM | By:JONATHAN WILKINS | File Location:Y:\PROJECTS\07955-42-02 California Terraces\DETAILS\Wall-Column Footing Dimension Detail (COLFOOT2).dwg







NOTE :

DRAIN SHOULD BE UNIFORMLY SLOPED TO GRAVITY OUTLET OR TO A SUMP WHERE WATER CAN BE REMOVED BY PUMPING

NO SCALE

TYPICAL RETAINING WALL DRAIN DETAIL

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NB / RA		DSK/GTYPD

DATE 03 - 15 - 2018	PROJECT NO. 07955 - 42 - 02	FIG. 5

Plotted:03/14/2018 4:04PM | By:JONATHAN WILKINS | File Location:Y:\PROJECTS\07955-42-02 California Terraces\DETAILS\Typical Retaining Wall Drainage Detail (RWDD7A).dwg

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

Fieldwork for our geotechnical investigation included a site visit, subsurface exploration, and soil sampling. The approximate locations of the exploratory trenches and borings are shown on the Geologic Map, Figure 2. The logs of trenches and borings are presented as figures following the text in this appendix. In addition, we performed 2, preliminary field-saturated infiltration tests.

We performed our exploratory trenching on December 22, 2017, and included excavating a with a John Deere rubber tire backhoe. We collected bulk samples of select soils and returned to the laboratory for testing. Borings were performed in 1984 for a previous investigation.

The soil conditions encountered in the borings were visually examined, classified and logged. Figures A-1 through A-8 present the logs of the exploratory trenches. The boring logs from our previous investigation are provided on Figures A-9 and A-10. The logs depict the various soil types encountered. The elevations shown on the logs are approximate elevations.

PROJECT NO. 07955-42-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 1 ELEV. (MSL.) 523' DATE COMPLETED 12-22-2017 EQUIPMENT JD 410 BACKHOE BY: N. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	T1-1			SC	**TOPSOIL** Loose, dry, dark brown, Clayey, fine to medium SAND; trace gravel			
2	T1-2			CL/CH	**VERY OLD TERRACE DEPOSITS (Qt)** Soft, damp, dark brown, Sandy to Silty CLAY; some white specs			
4	T1-3			SM	Dense, dry, mottled light brown and olive brown, Silty, fine to medium SANDSTONE			
6								
8					TRENCH TERMINATED AT 8 FEET No groundwater encountered			

Figure A-1,
Log of Trench T 1, Page 1 of 1

07955-42-02.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. 07955-42-02

TRENCH T 2

ELEV. (MSL.) **529'** DATE COMPLETED **12-22-2017**

EQUIPMENT **JD 410 BACKHOE** BY: **N. BORJA**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**TOPSOIL** Soft, moist, dark brown, Sandy CLAY			
2								
4				SM/SC	**VERY OLD TERRACE DEPOSITS (Qt)** Medium dense to dense, damp, mottled light brown and olive brown, Silty to Clayey, fine to medium SAND			
6				SM	Very dense, damp, olive brown, Silty, fine to medium SANDSTONE			
8								
					TRENCH TERMINATED AT 9.5 FEET No groundwater encountered			

Figure A-2,
Log of Trench T 2, Page 1 of 1

07955-42-02.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. 07955-42-02

TRENCH T 3

ELEV. (MSL.) **528'** DATE COMPLETED **12-22-2017**

EQUIPMENT **JD 410 BACKHOE** BY: **N. BORJA**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**TOPSOIL** Soft, moist, dark brown, Sandy CLAY			
2				CH	**VERY OLD TERRACE DEPOSITS (Qt)** Firm to stiff, moist, dark brown, Silty to Sandy CLAY; some white specs			
4				CL	Firm, damp, light brown and white, Sandy CLAY; porous			
6				SM	Dense, damp, light brown to olive brown, Silty, fine to medium SANDSTONE			
8					TRENCH TERMINATED AT 9.5 FEET No groundwater encountered			

Figure A-3,
Log of Trench T 3, Page 1 of 1

07955-42-02.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. 07955-42-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 4 ELEV. (MSL.) 527' DATE COMPLETED 12-22-2017 EQUIPMENT JD 410 BACKHOE BY: N. BORJA MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**TOPSOIL** Firm, damp, dark brown, Sandy CLAY; some white specs			
2								
4	T4-1			SM	**VERY OLD TERRACE DEPOSITS (Qt)** Dense to very dense, damp, light brown to olive brown, Silty, fine to medium SANDSTONE			
6								
					TRENCH TERMINATED AT 7 FEET No groundwater encountered			

Figure A-4,
Log of Trench T 4, Page 1 of 1

07955-42-02.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. 07955-42-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 5 ELEV. (MSL.) 527' DATE COMPLETED 12-22-2017 EQUIPMENT JD 410 BACKHOE BY: N. BORJA MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SC/CL	**TOPSOIL** Loose, damp to moist, dark brown, fine to medium SAND to Sandy CLAY; little white specs			
2	T5-1			CL	**VERY OLD TERRACE DEPOSITS (Qt)** Medium dense, dry, mottled tan brown, light brown and white, Sandy CLAY			
4								
6				SM	Dense, dry to damp, light brown and olive brown, Silty, fine to medium SANDSTONE			
					TRENCH TERMINATED AT 7 FEET No groundwater encountered			

Figure A-5,
Log of Trench T 5, Page 1 of 1

07955-42-02.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. 07955-42-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 6 ELEV. (MSL.) 523' DATE COMPLETED 12-22-2017 EQUIPMENT JD 410 BACKHOE BY: N. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Firm, dry, dark brown, Sandy CLAY; little rootlets			
2				SM	**VERY OLD TERRACE DEPOSITS (Qt)** Dense, dry, yellowish brown, Silty, fine to medium SANDSTONE			
4					-Becomes gravelly with cobble up to 8" diameter below 4 feet			
6								
					TRENCH TERMINATED AT 7 FEET No groundwater encountered			

Figure A-6,
Log of Trench T 6, Page 1 of 1

07955-42-02.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. 07955-42-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 7 ELEV. (MSL.) 524' DATE COMPLETED 12-22-2017 EQUIPMENT JD 410 BACKHOE BY: N. BORJA MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**TOPSOIL** Soft, damp, dark brown, Sandy CLAY; some white specs			
2				SM	**VERY OLD TERRACE DEPOSITS (Qt)** Dense, damp, olive brown to brown, Silty, fine to medium SANDSTONE			
4					-Becomes tan brown			
6					-Becomes light yellowish brown to light gray			
					TRENCH TERMINATED AT 7 FEET No groundwater encountered			

Figure A-7,
Log of Trench T 7, Page 1 of 1

07955-42-02.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL ... STANDARD PENETRATION TEST ... DRIVE SAMPLE (UNDISTURBED)

... DISTURBED OR BAG SAMPLE ... CHUNK SAMPLE ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. 07955-42-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 8 ELEV. (MSL.) 527' DATE COMPLETED 12-22-2017 EQUIPMENT JD 410 BACKHOE BY: N. BORJA	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				CL	**TOPSOIL** Soft to firm, moist, dark brown, Sandy CLAY			
2				CH	**VERY OLD TERRACE DEPOSITS (Qt)** Soft, damp, dark brown, CLAY			
4				SM	Dense, damp, brown to olive brown, Silty, fine to medium SANDSTONE			
6				SM/SP-SM	Medium dense to dense, moist, mottled reddish brown to brown, fine to coarse SAND; some silt			
8					TRENCH TERMINATED AT 9 FEET No groundwater encountered			

Figure A-8,
Log of Trench T 8, Page 1 of 1

07955-42-02.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

File No. D-3117-J01
May 14, 1984

DEPTH IN FEET	SAMPLE NUMBER	LOG & LOCATION OF SAMPLE	Penetration Resistance Blows/ft	DESCRIPTION	IN-PLACE DRY DENSITY p.c.f	IN-PLACE MOISTURE CONTENT % dry wt
				BORING 7		
0				TOPSOIL Stiff, very moist, dark gray-brown, Sandy CLAY with occasional cobbles		
2	7-1		3			
4				TERRACE DEPOSITS Medium dense, moist, light yellow-brown/ orange mottled, slightly Clayey, very fine to fine SAND/SILT		
6	7-2 7-3		13			
8						
10				Medium dense, moist, yellow-brown, slightly Clayey Sandy GRAVEL to 12" diameter		
12						
14				difficult drilling		
16						
18				BORING TERMINATED AT 17.0 FEET		

Figure A-9, Log of Test Boring 7

File No. D-3117-J01
May 14, 1984

DEPTH IN FEET	SAMPLE NUMBER	LOG & LOCATION OF SAMPLE	Penetration Resistance Blows/ft	DESCRIPTION	IN-PLACE DRY DENSITY p.c.f	IN-PLACE MOISTURE CONTENT % dry wt
				BORING 8		
0				TOPSOIL Stiff, very moist, dark red-brown, Sandy CLAY with minor caliche		
2				TERRACE DEPOSITS Medium dense, humid, light brown, slightly Clayey, very fine to fine SAND/ SILT with caliche nodules to 2" dia.		
4						
6						
8				Medium loose, moist, light yellow-brown, Silty Sandy GRAVEL to 6" diameter, very friable		
10				becomes light brown, humid		
12				hole caving		
14						
16				BORING TERMINATED AT 15.0 FEET SEVERE CAVING		

Figure A-10, Log of Test Boring 8

APPENDIX B

APPENDIX B

LABORATORY TESTING

We performed laboratory tests in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. We tested selected samples for maximum dry density and optimum moisture content, direct shear, expansion, water-soluble sulfate characteristics, and gradation. The results of our laboratory tests are presented on the following tables and graph.

TABLE B-I
SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D 1557

Proctor Curve No.	Source and Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
T1-2	Dark brown, silty CLAY	115.6	15.1
T4-1	Light brown, Clayey, fine to coarse SAND; trace gravel	118.4	13.8

TABLE B-II
SUMMARY OF LABORATORY DIRECT SHEAR TEST RESULTS
ASTM D 3080

Sample No.	Dry Density (pcf)	Moisture Content (%)		Unit Cohesion (psf)	Angle of Shear Resistance (degrees)
		Initial	Final		
*T4-1	106.8	13.4	21.3	450	28

*Sample remolded to 90% of the maximum dry density and optimum moisture content.

TABLE B-III
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829

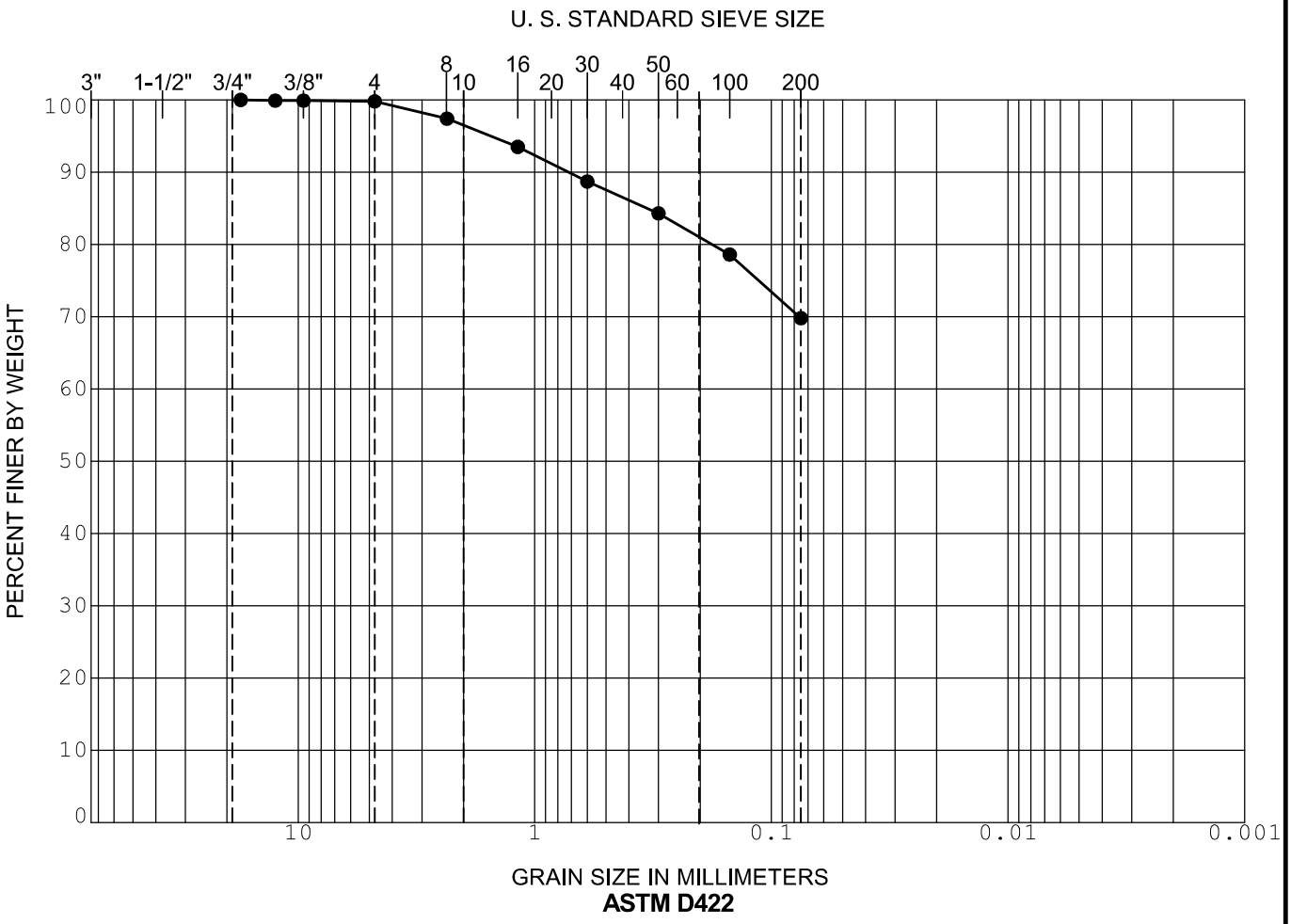
Sample No.	Moisture Content (%)		Dry Density (pcf)	Expansion Index	Expansion Classification
	Before Test	After Test			
T1-2	13.7	34.1	95.5	99	High
T4-1	10.6	23.3	107.7	52	Medium
T5-1	16.5	27.5	89.7	7	Very Low

TABLE B-IV
SUMMARY OF LABORATORY WATER-SOLUBLE SULFATE TEST RESULTS
CALIFORNIA TEST NO. 417

Sample No.	Water-Soluble Sulfate (%)	Classification
T1-2	0.040	Not Applicable (S0)
T4-1	0.058	Not Applicable (S0)
T5-1	0.079	Not Applicable (S0)

PROJECT NO. 07955-42-02

GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



	SAMPLE	DEPTH (ft)	CLASSIFICATION	NAT WC	LL	PL	PI
●	T5-1	2.5	CL - Sandy, lean CLAY				
⊠							
▲							

GRADATION CURVE

OCEANVIEW HILLS PA 61

SAN DIEGO, CALIFORNIA

07955-42-02.GPJ

Figure B-1

GEOCON

APPENDIX C

APPENDIX C

STORM WATER MANAGEMENT INVESTIGATION

We expect storm water management devices will be utilized on the project in accordance with the *2017 City of San Diego Storm Water Standards* (SWS). If not properly constructed, there is a potential for distress to improvements and properties located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water to be detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. We have not performed a hydrogeological study at the site. If infiltration of storm water runoff occurs, downstream properties may be subjected to seeps, springs, slope instability, raised groundwater, movement of foundations and slabs, or other undesirable impacts as a result of water infiltration.

Hydrologic Soil Group

The United States Department of Agriculture (USDA), Natural Resources Conservation Services, possesses general information regarding the existing soil conditions for areas within the United States. The USDA website also provides the Hydrologic Soil Group. Table C-1 presents the descriptions of the hydrologic soil groups.

TABLE C-1
HYDROLOGIC SOIL GROUP DEFINITIONS

Soil Group	Soil Group Definition
A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
D	Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high-water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The property is classified as Soil Group D. Table C-2 presents the information from the USDA website for the subject property.

TABLE C-2
USDA WEB SOIL SURVEY – HYDROLOGIC SOIL GROUP

Map Unit Name	Map Unit Symbol	Approximate Percentage of Property	Hydrologic Soil Group	k_{SAT} of Most Limiting Layer (inches/ hour)
Stockpen gravelly clay loam, 2 to 5 percent slopes	SuB	100	D	0.00 to 0.06

In-Situ Testing

We performed 2 field-saturated, hydraulic conductivity tests at the site using a Soil Moisture Corp Aardvark Permeameter at the locations presented on the Geologic Map, Figure 2. The borings were excavated with a 4-inch-diameter hand auger. Table C-3 presents the results of the saturated hydraulic conductivity testing. Test data is presented on the attached figures in this Appendix.

We used the guidelines presented in the Riverside County Low Impact Development BMP Design Handbook which references the United States Bureau of Reclamation Well Permeameter Test Method (USBR 7300-89). Based on this widely accepted guideline, the saturated hydraulic conductivity (Ksat) is equal to the infiltration rate. Therefore, the Ksat value determined from the Aardvark Permeameter test is the unfactored infiltration rate. The Ksat (infiltration rate) equation provided in the Riverside County Handbook was used to compute the unfactored infiltration rate.

TABLE C-3
UNFACTORED, FIELD-SATURATED, INFILTRATION TEST RESULTS
USING THE SOILMOISTURE CORP AARDVARK PERMEAMETER

Test No.	Depth (inches)	Geologic Unit	Field Infiltration Rate, I (in/hr)	Factored* Field Infiltration Rate, I (in/hr)
A-1	45	Terrace Deposits	0.002	0.001
A-2	48	Terrace Deposits	0.068	0.034

*Factor of Safety of 2.0 for feasibility determination.

Soil permeability values from in-situ tests can vary significantly from one location to another due to the non-homogeneous characteristics inherent to most soil. However, if a sufficient amount of field and laboratory test data is obtained, a general trend of soil permeability can usually be evaluated. For this project and for storm water purposes, the test results presented herein should be considered approximate values.

Infiltration categories include full infiltration, partial infiltration and no infiltration. Table C-4 presents the commonly accepted definitions of the potential infiltration categories based on the infiltration rates.

TABLE C-4
INFILTRATION CATEGORIES

Infiltration Category	Field Infiltration Rate, I (inches/hour)	Factored Infiltration Rate*, I (inches/hour)
Full Infiltration	$I > 1.0$	$I > 0.5$
Partial Infiltration	$0.10 < I \leq 1.0$	$0.05 < I \leq 0.5$
No Infiltration (Infeasible)	$I < 0.10$	$I < 0.05$

*Using a Factor of Safety of 2.

STORM WATER MANAGEMENT CONCLUSIONS

Soil Types

Very Old Terrace Deposits (Qt) – Very Old Terrace Deposits underlies the topsoils. The Terrace Deposits consist of an upper clay layer and a lower sandy cobbly layer. Infiltration tests within this unit typically exhibit very slow infiltration characteristics due to its dense condition. Therefore, full and partial infiltration should be considered infeasible.

Groundwater Elevations

We did not encounter groundwater during our field exploration. The site is at an elevation of about 520 to 530 feet MSL. We expect groundwater to be at elevations greater than 50 feet below the existing ground surface.

Soil or Groundwater Contamination

We are unaware of contaminated soil or groundwater contamination on the property. Therefore, infiltration associated with this risk is considered feasible.

New or Existing Utilities

Utilities are located adjacent to the property within the existing streets. However, we don't expect infiltration will impact existing utilities based on the location of the proposed basins. The location of BMPs to proposed new utilities is unknown.

Existing and Planned Structures

Water should not be allowed to infiltrate in areas where it could affect the neighboring properties and existing adjacent structures, improvements and roadway. Mitigation for existing structures consists of not allowing water infiltration within a lateral distance of at least 15 feet from the new or existing foundations.

Storm Water Conclusions

The planned development will consist of the construction a multi-family apartment buildings and commercial buildings and improvements. The property is underlain by dense very old Terrace Deposits. We expect 2 to 7 feet of fill will be placed across the site. In addition, remedial removals of 2 to 6 feet are expected. At the completion of grading, we expect the site will be underlain by approximately 5 to 10 feet of compacted fill overlying Very Old Terrace Deposits.

Due to the very slow infiltration characteristics of the Very Old Terrace Deposits and the presence of compacted fill, infiltration is considered infeasible.

Storm Water Management Devices

Liners and subdrains should be incorporated into the design and construction of the planned storm water devices. The liners should be impermeable (e.g. High-density polyethylene, HDPE, with a thickness of about 30 mil or equivalent Polyvinyl Chloride**,** PVC) to prevent water migration. The subdrains should be perforated within the liner area, installed at the base and above the liner, be at least 3 inches in diameter and consist of Schedule 40 PVC pipe. The subdrains outside of the liner should consist of solid pipe. The penetration of the liners at the subdrains should be properly waterproofed. The subdrains should be connected to a proper outlet. The devices should also be installed in accordance with the manufacturer's recommendations.

Storm Water Standard Worksheets

The SWS requests the geotechnical engineer complete the *Categorization of Infiltration Feasibility Condition* (Worksheet C.4-1 or I-8) worksheet information to help evaluate the potential for infiltration on the property. The attached Worksheet C.4-1 presents the completed information for the submittal process.

The regional storm water standards also have a worksheet (Worksheet D.5-1 or Form I-9) that helps the project civil engineer estimate the factor of safety based on several factors. Table C-5 describes the suitability assessment input parameters related to the geotechnical engineering aspects for the factor of safety determination.

TABLE C-5
SUITABILITY ASSESSMENT RELATED CONSIDERATIONS FOR INFILTRATION FACILITY SAFETY FACTORS

Consideration	High Concern – 3 Points	Medium Concern – 2 Points	Low Concern – 1 Point
Assessment Methods	Use of soil survey maps or simple texture analysis to estimate short-term infiltration rates. Use of well permeameter or borehole methods without accompanying continuous boring log. Relatively sparse testing with direct infiltration methods	Use of well permeameter or borehole methods with accompanying continuous boring log. Direct measurement of infiltration area with localized infiltration measurement methods (e.g., infiltrometer). Moderate spatial resolution	Direct measurement with localized (i.e. small-scale) infiltration testing methods at relatively high resolution or use of extensive test pit infiltration measurement methods.
Predominant Soil Texture	Silty and clayey soils with significant fines	Loamy soils	Granular to slightly loamy soils
Site Soil Variability	Highly variable soils indicated from site assessment or unknown variability	Soil boring/test pits indicate moderately homogenous soils	Soil boring/test pits indicate relatively homogenous soils
Depth to Groundwater/ Impervious Layer	<5 feet below facility bottom	5-15 feet below facility bottom	>15 feet below facility bottom

Based on our geotechnical investigation and the previous table, Table C-6 presents the estimated factor values for the evaluation of the factor of safety. This table only presents the suitability assessment safety factor (Part A) of the worksheet. The project civil engineer should evaluate the safety factor for design (Part B) and use the combined safety factor for the design infiltration rate.

TABLE C-6
FACTOR OF SAFETY WORKSHEET DESIGN VALUES – PART A[1]

Suitability Assessment Factor Category	Assigned Weight (w)	Factor Value (v)	Product (p = w x v)
Assessment Methods	0.25	2	0.50
Predominant Soil Texture	0.25	3	0.75
Site Soil Variability	0.25	2	0.50
Depth to Groundwater/ Impervious Layer	0.25	1	0.25
Suitability Assessment Safety Factor, $S_A = \Sigma p$			2.00

[1]The project civil engineer should complete Worksheet D.5-1 or Form I-9 using the data on this table. Additional information is required to evaluate the design factor of safety.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
Part 1 - Full Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	Project Phase:
Project Site	
Criteria 1: Infiltration Rate Screening	
1A	Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[11]? ☐Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing. ☐No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B). ☐No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result. ☑No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B).
1B	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1? ☐Yes; Continue to Step 1C. ☐No; Skip to Step 1D.
1C	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour? ☐Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result. ☐No; full infiltration is not required. Answer "No" to Criteria 1 Result.
1D	**Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation. ☐Yes; continue to Step 1E. ☐No; select an appropriate infiltration testing method.

Note that it is not required to investigate each and every criterion in the worksheet, a single "no" answer in Part 1, Part 2, Part 3, or Part 4 determines a full, partial, or no infiltration condition.

[10] This form must be completed each time there is a change to the site layout that would affect the infiltration feasibility condition. Previously completed forms shall be retained to document the evolution of the site storm water design.

[11] Available data includes site-specific sampling or observation of soil types or texture classes, such as obtained from borings or test pits necessary to support other design elements.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
1E	**Number of Percolation/Infiltration Tests.** Does the infiltration testing method performed satisfy the minimum number of tests specified in Table D.3-2? ☐Yes; continue to Step 1F. ☐No; conduct appropriate number of tests.
IF	**Factor of Safety.** Is the suitable Factor of Safety selected for full infiltration design? See guidance in D.5; Tables D.5-1 and D.5-2; and Worksheet D.5-1 (Form I-9). ☐Yes; continue to Step 1G. ☐No; select appropriate factor of safety.
1G	**Full Infiltration Feasibility.** Is the average measured infiltration rate divided by the Factor of Safety greater than 0.5 inches per hour? ☐Yes; answer "Yes" to Criteria 1 Result. ☐No; answer "No" to Criteria 1 Result.
Criteria 1 Result	Is the estimated reliable infiltration rate greater than 0.5 inches per hour within the DMA where runoff can reasonably be routed to a BMP? ☐Yes; the DMA may feasibly support full infiltration. Continue to Criteria 2. ☐No; full infiltration is not required. Skip to Part 1 Result.

Summarize infiltration testing methods, testing locations, replicates, and results and summarize estimates of reliable infiltration rates according to procedures outlined in D.5. Documentation should be included in project geotechnical report.

We performed field-saturated, hydraulic conductivity tests, A-1 and A-2, using a Soil Moisture Corp Aardvark Permeameter (see Geologic Map, Figure 2). The test holes were hand excavated using 4-inch diameter hand augers. The unfactored test results of the saturated hydraulic conductivity testing for A-1 is 0.002 in/hr and 0.068 in/hr for A-2. Factored rates are 0.001 and 0.034 in/hr using a factor of 2.0.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 2: Geologic/Geotechnical Screening			
2A	If all questions in Step 2A are answered "Yes," continue to Step 2B. For any "No" answer in Step 2A answer "No" to Criteria 2, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
2A-1	Can the proposed full infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick below the infiltrating surface?	☐Yes	☐No
2A-2	Can the proposed full infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐Yes	☐No
2A-3	Can the proposed full infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐Yes	☐No
2B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 2B are answered "Yes," then answer "Yes" to Criteria 2 Result. If there are "No" answers continue to Step 2C.		
2B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can full infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐Yes	☐No
2B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can full infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐Yes	☐No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
2B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐Yes	☐No
2B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐Yes	☐No
2B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐Yes	☐No
2B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
2C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered "Yes," then answer "Yes" to Criteria 2 Result. If the question in Step 2C is answered "No," then answer "No" to Criteria 2 Result.	☐Yes	☐No
Criteria 2 Result	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐Yes	☐No
Summarize findings and basis; provide references to related reports or exhibits.			

Part 1 Result – Full Infiltration Geotechnical Screening [12]	Result
If answers to both Criteria 1 and Criteria 2 are "Yes", a full infiltration design is potentially feasible based on Geotechnical conditions only. If either answer to Criteria 1 or Criteria 2 is "No", a full infiltration design is not required.	☐Full infiltration Condition ☐Complete Part 2

[12] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]
Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria		
DMA(s) Being Analyzed:		Project Phase:
Project Site		
Criteria 3 : Infiltration Rate Screening		
3A	**NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data? ☐ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☐ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☑ No; infiltration testing is conducted (refer to Table D.3-1), continue to Step 3B.	
3B	**Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr? ☐ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result. ☐ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result.	
Criteria 3 Result	Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP? ☐ Yes; Continue to Criteria 4. ☐ No: Skip to Part 2 Result.	

Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate).

We performed field-saturated, hydraulic conductivity tests, A-1 and A-2, using a Soil Moisture Corp Aardvark Permeameter (see Geologic Map, Figure 2). The test holes were hand excavated using 4-inch diameter hand augers. The unfactored test results of the saturated hydraulic conductivity testing for A-1 is 0.002 in/hr and 0.068 in/hr for A-2. Factored rates are 0.001 and 0.034 in/hr using a factor of 2.0.

Test results indicate infiltration rates less than 0.05 in/hr and are not high enough to support infiltration.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 4: Geologic/Geotechnical Screening			
4A	If all questions in Step 4A are answered "Yes," continue to Step 2B. For any "No" answer in Step 4A answer "No" to Criteria 4 Result, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
4A-1	Can the proposed partial infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick?	☐Yes	☐No
4A-2	Can the proposed partial infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐Yes	☐No
4A-3	Can the proposed partial infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐Yes	☐No
4B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1 If all questions in Step 4B are answered "Yes," then answer "Yes" to Criteria 4 Result. If there are any "No" answers continue to Step 4C.		
4B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can partial infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐Yes	☐No
4B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can partial infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐Yes	☐No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐Yes	☐No
4B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐Yes	☐No
4B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐Yes	☐No
4B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls?	☐Yes	☐No
4C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result. If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result.	☐Yes	☐No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 4 Result	Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐Yes	☐No

Summarize findings and basis; provide references to related reports or exhibits.

Part 2 – Partial Infiltration Geotechnical Screening Result[13]	Result
If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only. If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site.	☐Partial Infiltration Condition ☑No Infiltration Condition

[13] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

GEOCON

Aardvark Permeameter Data Analysis

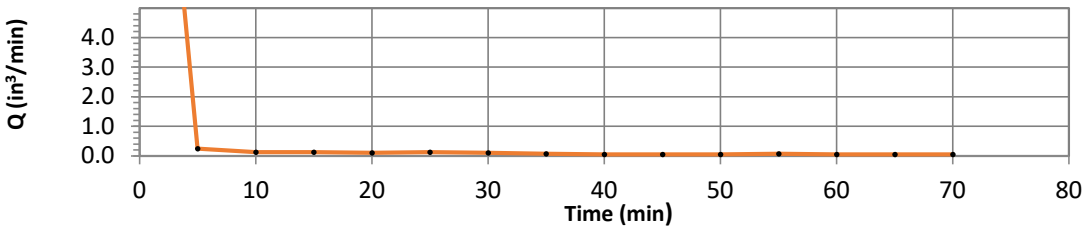
Project Name: CAL TERRACES - PA 61
Project Number: 07955-42-02
Test Number: A-1

Date: 12/22/2017
By: N. BORJA

Borehole Diameter, d (in.): 4.00
Borehole Depth, **H** (in): 45.00

Ref. EL (feet, MSL): 528.5
Bottom EL (feet, MSL): 524.8
Head Height Measured, **h** (in.): 5.50

Reading	Time Elapsed (min)	Water Weight Consummed (lbs)	Water Volume Consummed (in^3)	Q (in^3/min)
1	0.00	0.000	0.00	0.00
2	5.00	3.785	104.82	20.963
3	5.00	0.045	1.25	0.249
4	5.00	0.025	0.69	0.138
5	5.00	0.025	0.69	0.138
6	5.00	0.020	0.55	0.111
7	5.00	0.025	0.69	0.138
8	5.00	0.020	0.55	0.111
9	5.00	0.015	0.42	0.083
10	5.00	0.010	0.28	0.055
11	5.00	0.010	0.28	0.055
12	5.00	0.010	0.28	0.055
13	5.00	0.015	0.42	0.083
14	5.00	0.010	0.28	0.055
15	5.00	0.010	0.28	0.055
16	5.00	0.010	0.28	0.055
			Steady Flow Rate, Q (in^3/min):	0.055



Field-Saturated Hydraulic Conductivity (Infiltration Rate)

K_{sat} = 3.86E-05 in/min 0.002 in/hr

GEOCON

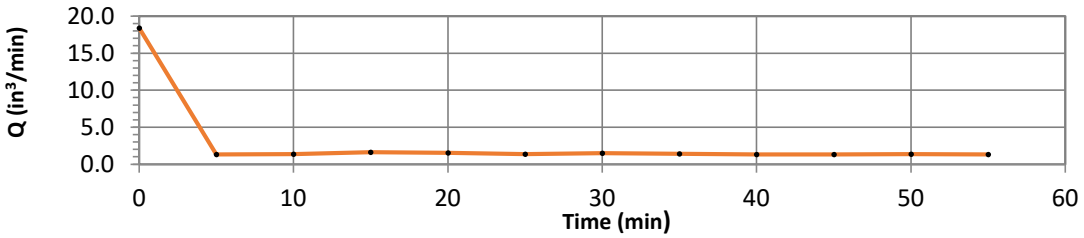
Aardvark Permeameter Data Analysis

Project Name: CAL TERRACES - PA 61
Project Number: 07955-42-02
Test Number: A-2

Date: 12/22/2017
By: N. BORJA
Ref. EL (feet, MSL): 529.5
Bottom EL (feet, MSL): 525.5

Borehole Diameter, d (in.): 4.00
Borehole Depth, **H** (in): 48.00
Head Height Measured, **h** (in.): 3.75

Reading	Time Elapsed (min)	Water Weight Consummed (lbs)	Water Volume Consummed (in^3)	Q (in^3/min)
1	0.00	0.000	0.00	0.00
2	5.00	3.320	91.94	18.388
3	5.00	0.235	6.51	1.302
4	5.00	0.245	6.78	1.357
5	5.00	0.290	8.03	1.606
6	5.00	0.275	7.62	1.523
7	5.00	0.245	6.78	1.357
8	5.00	0.270	7.48	1.495
9	5.00	0.255	7.06	1.412
10	5.00	0.240	6.65	1.329
11	5.00	0.240	6.65	1.329
12	5.00	0.245	6.78	1.356
13	5.00	0.240	6.65	1.330
			Steady Flow Rate, Q (in^3/min):	1.338



Field-Saturated Hydraulic Conductivity (Infiltration Rate)

K_{sat} = 1.13E-03 in/min 0.068 in/hr

APPENDIX D

APPENDIX D

RECOMMENDED GRADING SPECIFICATIONS

FOR

OCEANVIEW HILLS PA-61
SAN DIEGO, CALIFORNIA

PROJECT NO. 07955-42-02

RECOMMENDED GRADING SPECIFICATIONS

1. GENERAL

1.1 These Recommended Grading Specifications shall be used in conjunction with the Geotechnical Report for the project prepared by Geocon. The recommendations contained in the text of the Geotechnical Report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict.

1.2 Prior to the commencement of grading, a geotechnical consultant (Consultant) shall be employed for the purpose of observing earthwork procedures and testing the fills for substantial conformance with the recommendations of the Geotechnical Report and these specifications. The Consultant should provide adequate testing and observation services so that they may assess whether, in their opinion, the work was performed in substantial conformance with these specifications. It shall be the responsibility of the Contractor to assist the Consultant and keep them apprised of work schedules and changes so that personnel may be scheduled accordingly.

1.3 It shall be the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and the approved grading plans. If, in the opinion of the Consultant, unsatisfactory conditions such as questionable soil materials, poor moisture condition, inadequate compaction, and/or adverse weather result in a quality of work not in conformance with these specifications, the Consultant will be empowered to reject the work and recommend to the Owner that grading be stopped until the unacceptable conditions are corrected.

2. DEFINITIONS

2.1 **Owner** shall refer to the owner of the property or the entity on whose behalf the grading work is being performed and who has contracted with the Contractor to have grading performed.

2.2 **Contractor** shall refer to the Contractor performing the site grading work.

2.3 **Civil Engineer** or **Engineer of Work** shall refer to the California licensed Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying and verifying as-graded topography.

2.4 **Consultant** shall refer to the soil engineering and engineering geology consulting firm retained to provide geotechnical services for the project.

2.5 **Soil Engineer** shall refer to a California licensed Civil Engineer retained by the Owner, who is experienced in the practice of geotechnical engineering. The Soil Engineer shall be responsible for having qualified representatives on-site to observe and test the Contractor's work for conformance with these specifications.

2.6 **Engineering Geologist** shall refer to a California licensed Engineering Geologist retained by the Owner to provide geologic observations and recommendations during the site grading.

2.7 **Geotechnical Report** shall refer to a soil report (including all addenda) which may include a geologic reconnaissance or geologic investigation that was prepared specifically for the development of the project for which these Recommended Grading Specifications are intended to apply.

3. MATERIALS

3.1 Materials for compacted fill shall consist of any soil excavated from the cut areas or imported to the site that, in the opinion of the Consultant, is suitable for use in construction of fills. In general, fill materials can be classified as *soil* fills, *soil-rock* fills or *rock* fills, as defined below.

3.1.1 **Soil fills** are defined as fills containing no rocks or hard lumps greater than 12 inches in maximum dimension and containing at least 40 percent by weight of material smaller than ¾ inch in size.

3.1.2 **Soil-rock fills** are defined as fills containing no rocks or hard lumps larger than 4 feet in maximum dimension and containing a sufficient matrix of soil fill to allow for proper compaction of soil fill around the rock fragments or hard lumps as specified in Paragraph 6.2. **Oversize rock** is defined as material greater than 12 inches.

3.1.3 **Rock fills** are defined as fills containing no rocks or hard lumps larger than 3 feet in maximum dimension and containing little or no fines. Fines are defined as material smaller than ¾ inch in maximum dimension. The quantity of fines shall be less than approximately 20 percent of the rock fill quantity.

3.2 Material of a perishable, spongy, or otherwise unsuitable nature as determined by the Consultant shall not be used in fills.

3.3 Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9

and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

3.4 The outer 15 feet of *soil-rock* fill slopes, measured horizontally, should be composed of properly compacted *soil* fill materials approved by the Consultant. *Rock* fill may extend to the slope face, provided that the slope is not steeper than 2:1 (horizontal:vertical) and a soil layer no thicker than 12 inches is track-walked onto the face for landscaping purposes. This procedure may be utilized provided it is acceptable to the governing agency, Owner and Consultant.

3.5 Samples of soil materials to be used for fill should be tested in the laboratory by the Consultant to determine the maximum density, optimum moisture content, and, where appropriate, shear strength, expansion, and gradation characteristics of the soil.

3.6 During grading, soil or groundwater conditions other than those identified in the Geotechnical Report may be encountered by the Contractor. The Consultant shall be notified immediately to evaluate the significance of the unanticipated condition

4. CLEARING AND PREPARING AREAS TO BE FILLED

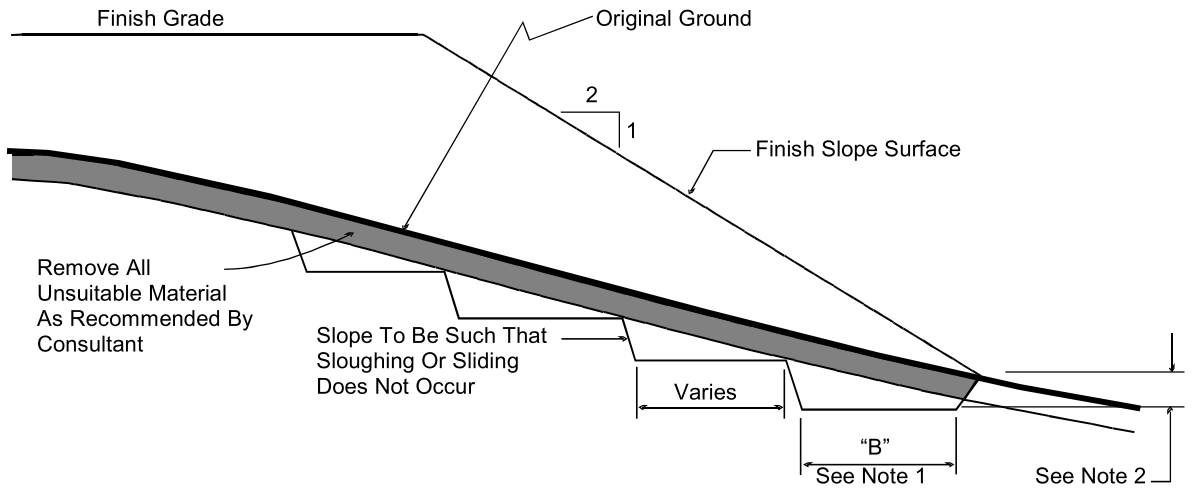
4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures, and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material and shall be performed in areas to be graded. Roots and other projections exceeding 1½ inches in diameter shall be removed to a depth of 3 feet below the surface of the ground. Borrow areas shall be grubbed to the extent necessary to provide suitable fill materials.

4.2 Asphalt pavement material removed during clearing operations should be properly disposed at an approved off-site facility or in an acceptable area of the project evaluated by Geocon and the property owner. Concrete fragments that are free of reinforcing steel may be placed in fills, provided they are placed in accordance with Section 6.2 or 6.3 of this document.

4.3 After clearing and grubbing of organic matter and other unsuitable material, loose or porous soils shall be removed to the depth recommended in the Geotechnical Report. The depth of removal and compaction should be observed and approved by a representative of the Consultant. The exposed surface shall then be plowed or scarified to a minimum depth of 6 inches and until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.

4.4 Where the slope ratio of the original ground is steeper than 5:1 (horizontal:vertical), or where recommended by the Consultant, the original ground should be benched in accordance with the following illustration.

TYPICAL BENCHING DETAIL



No Scale

DETAIL NOTES: (1) Key width "B" should be a minimum of 10 feet, or sufficiently wide to permit complete coverage with the compaction equipment used. The base of the key should be graded horizontal, or inclined slightly into the natural slope.

(2) The outside of the key should be below the topsoil or unsuitable surficial material and at least 2 feet into dense formational material. Where hard rock is exposed in the bottom of the key, the depth and configuration of the key may be modified as approved by the Consultant.

4.5 After areas to receive fill have been cleared and scarified, the surface should be moisture conditioned to achieve the proper moisture content, and compacted as recommended in Section 6 of these specifications.

5. COMPACTION EQUIPMENT

5.1 Compaction of *soil* or *soil-rock* fill shall be accomplished by sheepsfoot or segmented-steel wheeled rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers, or other types of acceptable compaction equipment. Equipment shall be of such a design that it will be capable of compacting the *soil* or *soil-rock* fill to the specified relative compaction at the specified moisture content.

5.2 Compaction of *rock* fills shall be performed in accordance with Section 6.3.

6. PLACING, SPREADING AND COMPACTION OF FILL MATERIAL

6.1 *Soil* fill, as defined in Paragraph 3.1.1, shall be placed by the Contractor in accordance with the following recommendations:

6.1.1 *Soil* fill shall be placed by the Contractor in layers that, when compacted, should generally not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to obtain uniformity of material and moisture in each layer. The entire fill shall be constructed as a unit in nearly level lifts. Rock materials greater than 12 inches in maximum dimension shall be placed in accordance with Section 6.2 or 6.3 of these specifications.

6.1.2 In general, the *soil* fill shall be compacted at a moisture content at or above the optimum moisture content as determined by ASTM D 1557.

6.1.3 When the moisture content of *soil* fill is below that specified by the Consultant, water shall be added by the Contractor until the moisture content is in the range specified.

6.1.4 When the moisture content of the *soil* fill is above the range specified by the Consultant or too wet to achieve proper compaction, the *soil* fill shall be aerated by the Contractor by blading/mixing, or other satisfactory methods until the moisture content is within the range specified.

6.1.5 After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent. Relative compaction is defined as the ratio (expressed in percent) of the in-place dry density of the compacted fill to the maximum laboratory dry density as determined in accordance with ASTM D 1557. Compaction shall be continuous over the entire area, and compaction equipment shall make sufficient passes so that the specified minimum relative compaction has been achieved throughout the entire fill.

6.1.6 Where practical, soils having an Expansion Index greater than 50 should be placed at least 3 feet below finish pad grade and should be compacted at a moisture content generally 2 to 4 percent greater than the optimum moisture content for the material.

6.1.7 Properly compacted *soil* fill shall extend to the design surface of fill slopes. To achieve proper compaction, it is recommended that fill slopes be over-built by at least 3 feet and then cut to the design grade. This procedure is considered preferable to track-walking of slopes, as described in the following paragraph.

6.1.8 As an alternative to over-building of slopes, slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Upon completion, slopes should then be track-walked with a D-8 dozer or similar equipment, such that a dozer track covers all slope surfaces at least twice.

6.2 *Soil-rock* fill, as defined in Paragraph 3.1.2, shall be placed by the Contractor in accordance with the following recommendations:

6.2.1 Rocks larger than 12 inches but less than 4 feet in maximum dimension may be incorporated into the compacted *soil* fill, but shall be limited to the area measured 15 feet minimum horizontally from the slope face and 5 feet below finish grade or 3 feet below the deepest utility, whichever is deeper.

6.2.2 Rocks or rock fragments up to 4 feet in maximum dimension may either be individually placed or placed in windrows. Under certain conditions, rocks or rock fragments up to 10 feet in maximum dimension may be placed using similar methods. The acceptability of placing rock materials greater than 4 feet in maximum dimension shall be evaluated during grading as specific cases arise and shall be approved by the Consultant prior to placement.

6.2.3 For individual placement, sufficient space shall be provided between rocks to allow for passage of compaction equipment.

6.2.4 For windrow placement, the rocks should be placed in trenches excavated in properly compacted *soil* fill. Trenches should be approximately 5 feet wide and 4 feet deep in maximum dimension. The voids around and beneath rocks should be filled with approved granular soil having a Sand Equivalent of 30 or greater and should be compacted by flooding. Windrows may also be placed utilizing an "open-face" method in lieu of the trench procedure, however, this method should first be approved by the Consultant.

6.2.5 Windrows should generally be parallel to each other and may be placed either parallel to or perpendicular to the face of the slope depending on the site geometry. The minimum horizontal spacing for windrows shall be 12 feet center-to-center with a 5-foot stagger or offset from lower courses to next overlying course. The minimum vertical spacing between windrow courses shall be 2 feet from the top of a lower windrow to the bottom of the next higher windrow.

6.2.6 Rock placement, fill placement and flooding of approved granular soil in the windrows should be continuously observed by the Consultant.

6.3 *Rock* fills, as defined in Section 3.1.3, shall be placed by the Contractor in accordance with the following recommendations:

6.3.1 The base of the *rock* fill shall be placed on a sloping surface (minimum slope of 2 percent). The surface shall slope toward suitable subdrainage outlet facilities. The *rock* fills shall be provided with subdrains during construction so that a hydrostatic pressure buildup does not develop. The subdrains shall be permanently connected to controlled drainage facilities to control post-construction infiltration of water.

6.3.2 *Rock* fills shall be placed in lifts not exceeding 3 feet. Placement shall be by rock trucks traversing previously placed lifts and dumping at the edge of the currently placed lift. Spreading of the *rock* fill shall be by dozer to facilitate *seating* of the rock. The *rock* fill shall be watered heavily during placement. Watering shall consist of water trucks traversing in front of the current rock lift face and spraying water continuously during rock placement. Compaction equipment with compactive energy comparable to or greater than that of a 20-ton steel vibratory roller or other compaction equipment providing suitable energy to achieve the required compaction or deflection as recommended in Paragraph 6.3.3 shall be utilized. The number of passes to be made should be determined as described in Paragraph 6.3.3. Once a *rock* fill lift has been covered with *soil* fill, no additional *rock* fill lifts will be permitted over the *soil* fill.

6.3.3 Plate bearing tests, in accordance with ASTM D 1196, may be performed in both the compacted *soil* fill and in the *rock* fill to aid in determining the required minimum number of passes of the compaction equipment. If performed, a minimum of three plate bearing tests should be performed in the properly compacted *soil* fill (minimum relative compaction of 90 percent). Plate bearing tests shall then be performed on areas of *rock* fill having two passes, four passes and six passes of the compaction equipment, respectively. The number of passes required for the *rock* fill shall be determined by comparing the results of the plate bearing tests for the *soil* fill and the *rock* fill and by evaluating the deflection

variation with number of passes. The required number of passes of the compaction equipment will be performed as necessary until the plate bearing deflections are equal to or less than that determined for the properly compacted *soil* fill. In no case will the required number of passes be less than two.

6.3.4 A representative of the Consultant should be present during *rock* fill operations to observe that the minimum number of "passes" have been obtained, that water is being properly applied and that specified procedures are being followed. The actual number of plate bearing tests will be determined by the Consultant during grading.

6.3.5 Test pits shall be excavated by the Contractor so that the Consultant can state that, in their opinion, sufficient water is present and that voids between large rocks are properly filled with smaller rock material. In-place density testing will not be required in the *rock* fills.

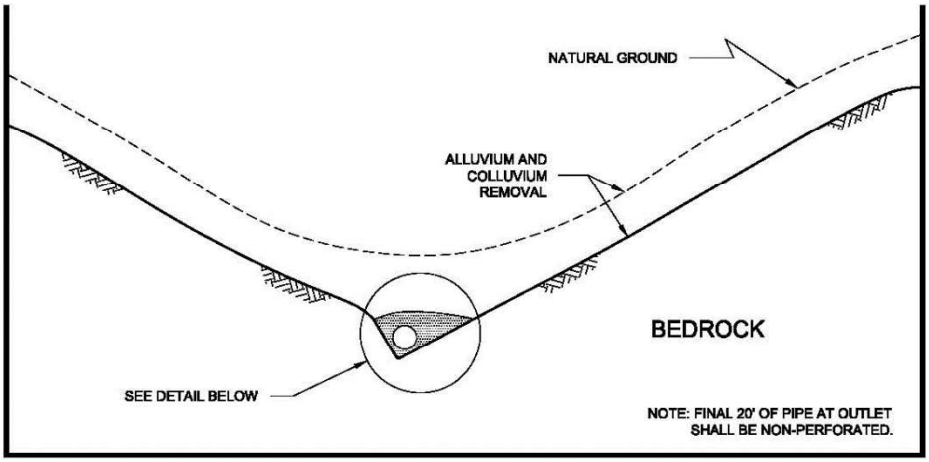
6.3.6 To reduce the potential for "piping" of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant prior to commencing grading. The gradation of the graded filter material will be determined at the time the *rock* fill is being excavated. Materials typical of the *rock* fill should be submitted to the Consultant in a timely manner, to allow design of the graded filter prior to the commencement of *rock* fill placement.

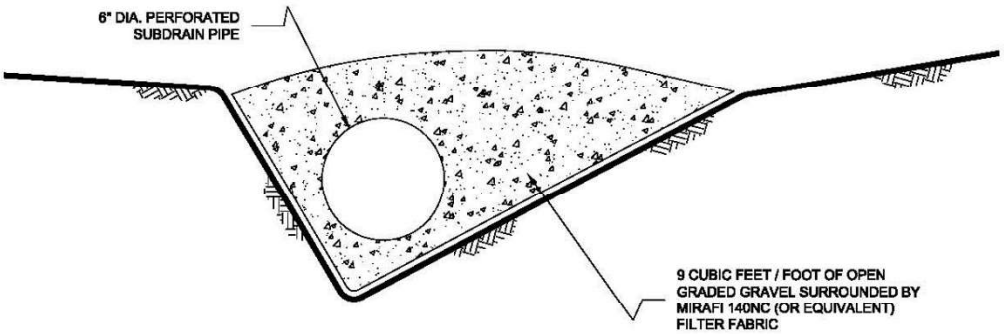
6.3.7 *Rock* fill placement should be continuously observed during placement by the Consultant.

7. SUBDRAINS

7.1 The geologic units on the site may have permeability characteristics and/or fracture systems that could be susceptible under certain conditions to seepage. The use of canyon subdrains may be necessary to mitigate the potential for adverse impacts associated with seepage conditions. Canyon subdrains with lengths in excess of 500 feet or extensions of existing offsite subdrains should use 8-inch-diameter pipes. Canyon subdrains less than 500 feet in length should use 6-inch-diameter pipes.

TYPICAL CANYON DRAIN DETAIL





NOTES:

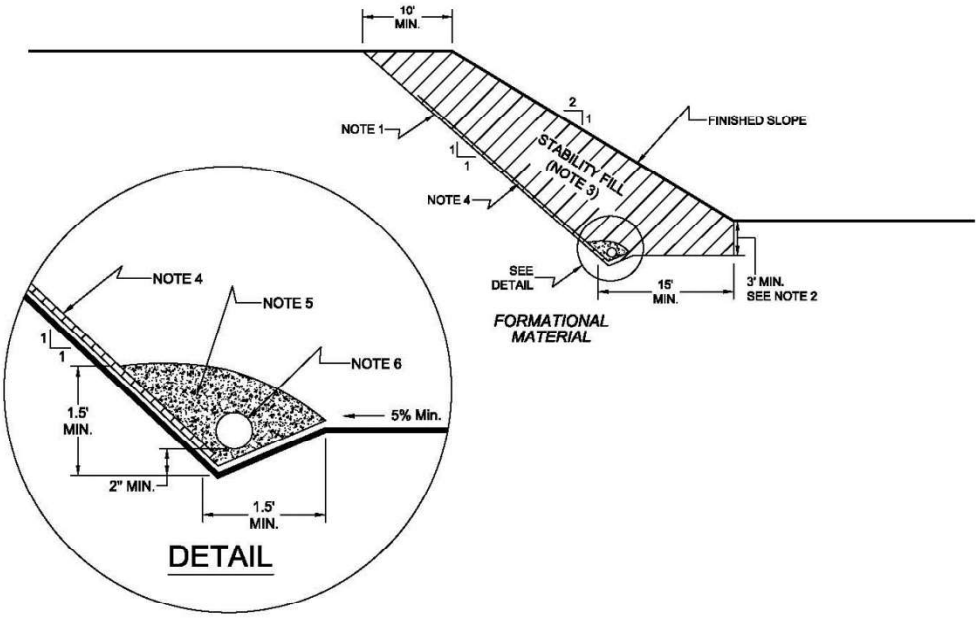
1.....6-INCH DIAMETER, SCHEDULE 80 PVC PERFORATED PIPE FOR FILLS
IN EXCESS OF 100-FEET IN DEPTH OR A PIPE LENGTH OF LONGER THAN 500 FEET.

2.....6-INCH DIAMETER, SCHEDULE 40 PVC PERFORATED PIPE FOR FILLS
LESS THAN 100-FEET IN DEPTH OR A PIPE LENGTH SHORTER THAN 500 FEET.

NO SCALE

7.2 Slope drains within stability fill keyways should use 4-inch-diameter (or lager) pipes.

TYPICAL STABILITY FILL DETAIL



NOTES:

1.....EXCAVATE BACKCUT AT 1:1 INCLINATION (UNLESS OTHERWISE NOTED).

2.....BASE OF STABILITY FILL TO BE 3 FEET INTO FORMATIONAL MATERIAL, SLOPING A MINIMUM 5% INTO SLOPE.

3.....STABILITY FILL TO BE COMPOSED OF PROPERLY COMPACTED GRANULAR SOIL.

4.....CHIMNEY DRAINS TO BE APPROVED PREFABRICATED CHIMNEY DRAIN PANELS (MIRADRAIN G200N OR EQUIVALENT) SPACED APPROXIMATELY 20 FEET CENTER TO CENTER AND 4 FEET WIDE. CLOSER SPACING MAY BE REQUIRED IF SEEPAGE IS ENCOUNTERED.

5.....FILTER MATERIAL TO BE 3/4-INCH, OPEN-GRADED CRUSHED ROCK ENCLOSED IN APPROVED FILTER FABRIC (MIRAFI 140NC).

6.....COLLECTOR PIPE TO BE 4-INCH MINIMUM DIAMETER, PERFORATED, THICK-WALLED PVC SCHEDULE 40 OR EQUIVALENT, AND SLOPED TO DRAIN AT 1 PERCENT MINIMUM TO APPROVED OUTLET.

NO SCALE

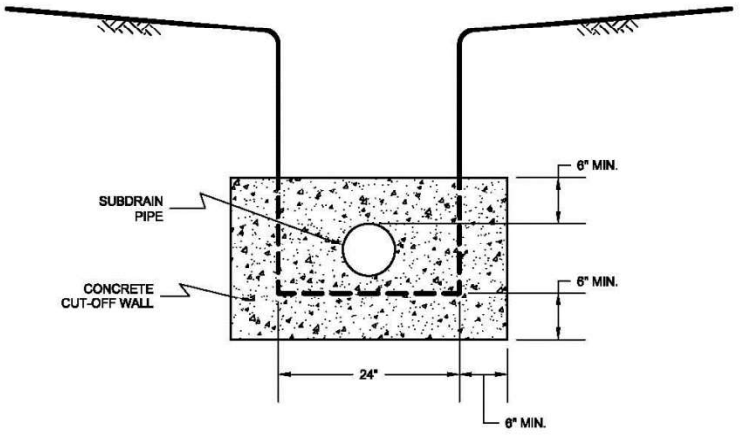
7.3 The actual subdrain locations will be evaluated in the field during the remedial grading operations. Additional drains may be necessary depending on the conditions observed and the requirements of the local regulatory agencies. Appropriate subdrain outlets should be evaluated prior to finalizing 40-scale grading plans.

7.4 *Rock* fill or *soil-rock* fill areas may require subdrains along their down-slope perimeters to mitigate the potential for buildup of water from construction or landscape irrigation. The subdrains should be at least 6-inch-diameter pipes encapsulated in gravel and filter fabric. *Rock* fill drains should be constructed using the same requirements as canyon subdrains.

7.5 Prior to outletting, the final 20-foot segment of a subdrain that will not be extended during future development should consist of non-perforated drainpipe. At the non-perforated/ perforated interface, a seepage cutoff wall should be constructed on the downslope side of the pipe.

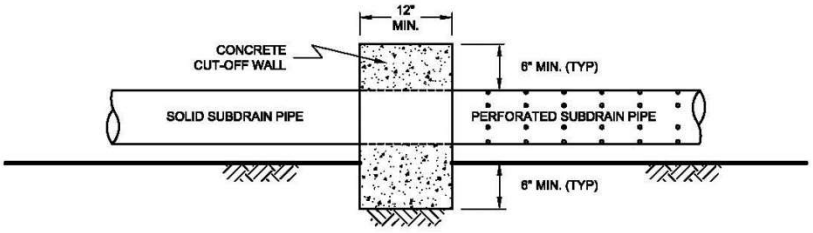
TYPICAL CUT OFF WALL DETAIL

FRONT VIEW



NO SCALE

SIDE VIEW

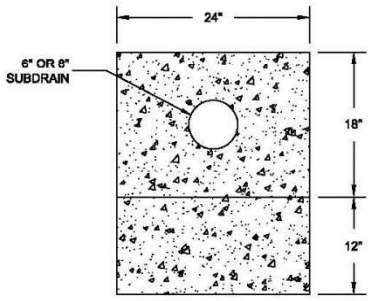


NO SCALE

7.6 Subdrains that discharge into a natural drainage course or open space area should be provided with a permanent headwall structure.

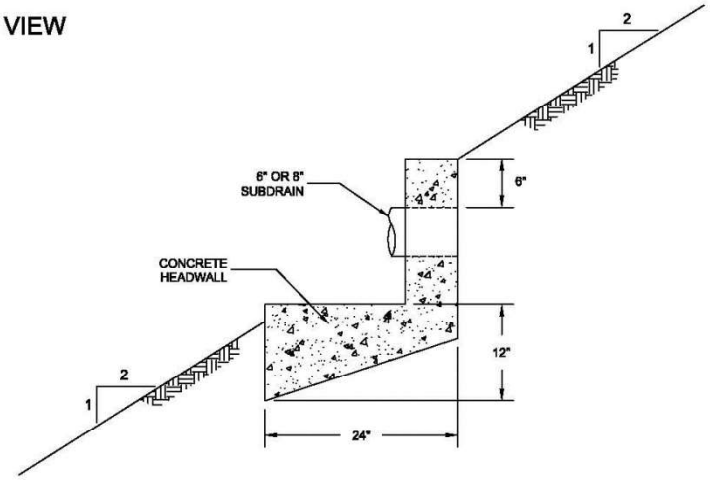
TYPICAL HEADWALL DETAIL

FRONT VIEW



NO SCALE

SIDE VIEW



NOTE: HEADWALL SHOULD OUTLET AT TOE OF FILL SLOPE OR INTO CONTROLLED SURFACE DRAINAGE

NO SCALE

7.7 The final grading plans should show the location of the proposed subdrains. After completion of remedial excavations and subdrain installation, the project civil engineer should survey the drain locations and prepare an "as-built" map showing the drain locations. The final outlet and connection locations should be determined during grading operations. Subdrains that will be extended on adjacent projects after grading can be placed on formational material and a vertical riser should be placed at the end of the subdrain. The grading contractor should consider videoing the subdrains shortly after burial to check proper installation and functionality. The contractor is responsible for the performance of the drains.

8. OBSERVATION AND TESTING

8.1 The Consultant shall be the Owner's representative to observe and perform tests during clearing, grubbing, filling, and compaction operations. In general, no more than 2 feet in vertical elevation of *soil* or *soil-rock* fill should be placed without at least one field density test being performed within that interval. In addition, a minimum of one field density test should be performed for every 2,000 cubic yards of *soil* or *soil-rock* fill placed and compacted.

8.2 The Consultant should perform a sufficient distribution of field density tests of the compacted *soil* or *soil-rock* fill to provide a basis for expressing an opinion whether the fill material is compacted as specified. Density tests shall be performed in the compacted materials below any disturbed surface. When these tests indicate that the density of any layer of fill or portion thereof is below that specified, the particular layer or areas represented by the test shall be reworked until the specified density has been achieved.

8.3 During placement of *rock* fill, the Consultant should observe that the minimum number of passes have been obtained per the criteria discussed in Section 6.3.3. The Consultant should request the excavation of observation pits and may perform plate bearing tests on the placed *rock* fills. The observation pits will be excavated to provide a basis for expressing an opinion as to whether the *rock* fill is properly seated and sufficient moisture has been applied to the material. When observations indicate that a layer of *rock* fill or any portion thereof is below that specified, the affected layer or area shall be reworked until the *rock* fill has been adequately seated and sufficient moisture applied.

8.4 A settlement monitoring program designed by the Consultant may be conducted in areas of *rock* fill placement. The specific design of the monitoring program shall be as recommended in the Conclusions and Recommendations section of the project Geotechnical Report or in the final report of testing and observation services performed during grading.

8.5 We should observe the placement of subdrains, to check that the drainage devices have been placed and constructed in substantial conformance with project specifications.

8.6 Testing procedures shall conform to the following Standards as appropriate:

8.6.1 Soil and Soil-Rock Fills:

8.6.1.1 Field Density Test, ASTM D 1556, *Density of Soil In-Place By the Sand-Cone Method.*

8.6.1.2 Field Density Test, Nuclear Method, ASTM D 6938, *Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth)*.

8.6.1.3 Laboratory Compaction Test, ASTM D 1557, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Pound Hammer and 18-Inch Drop*.

8.6.1.4. Expansion Index Test, ASTM D 4829, *Expansion Index Test*.

9. PROTECTION OF WORK

9.1 During construction, the Contractor shall properly grade all excavated surfaces to provide positive drainage and prevent ponding of water. Drainage of surface water shall be controlled to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control features have been installed. Areas subjected to erosion or sedimentation shall be properly prepared in accordance with the Specifications prior to placing additional fill or structures.

9.2 After completion of grading as observed and tested by the Consultant, no further excavation or filling shall be conducted except in conjunction with the services of the Consultant.

10. CERTIFICATIONS AND FINAL REPORTS

10.1 Upon completion of the work, Contractor shall furnish Owner a certification by the Civil Engineer stating that the lots and/or building pads are graded to within 0.1 foot vertically of elevations shown on the grading plan and that all tops and toes of slopes are within 0.5 foot horizontally of the positions shown on the grading plans. After installation of a section of subdrain, the project Civil Engineer should survey its location and prepare an *as-built* plan of the subdrain location. The project Civil Engineer should verify the proper outlet for the subdrains and the Contractor should ensure that the drain system is free of obstructions.

10.2 The Owner is responsible for furnishing a final as-graded soil and geologic report satisfactory to the appropriate governing or accepting agencies. The as-graded report should be prepared and signed by a California licensed Civil Engineer experienced in geotechnical engineering and by a California Certified Engineering Geologist, indicating that the geotechnical aspects of the grading were performed in substantial conformance with the Specifications or approved changes to the Specifications.

LIST OF REFERENCES

Boore, D. M., and G. M Atkinson (2006), *Boore-Atkinson NGA Ground Motion Relations for the Geometric Mean Horizontal Component of Peak and Spectral Ground Motion Parameters*, Report Number PEER 2007/01, May 2007;

Campbell, K. W., Y. Bozorgnia, *NGA Ground Motion Model for the Geometric Mean Horizontal Component of PGA, PGV, PGD and 5% Damped Linear Elastic Response Spectra for Periods Ranging from 0.01 to 10 s*, Preprint of version submitted for publication in the NGA Special Volume of Earthquake Spectra, Volume 24, Issue 1, pages 139-171, February 2008;

Chiou, Brian S. J. and Robert R. Youngs, Robert R, *A NGA Model for the Average Horizontal Component of Peak Ground Motion and Response Spectra,* preprint for article to be published in NGA Special Edition for Earthquake Spectra, Spring 2008;

Geocon Incorporated, *Update Geotechnical Report, South Otay Mesa Corporate Center, California Terraces Planning Area 61, San Diego, California,* February 29, 2008 (Project No. 07955-42-01);

Kennedy, M. P., and Tan, S. S., (2008), *Geologic Map of the San Diego 30' x 60' Quadrangle, California*, USGS Regional Geologic Map Series, 1:100,000 Scale, Map No. 3;

Risk Engineering, *EZ-FRISK*, 2015;

City of San Diego (2008), *Seismic Safety Study, Geologic Hazards and Faults, Map Sheet 7*;

USGS (2016), *Quaternary Fault and Fold Database of the United States*: U.S. Geological Survey website, http://earthquakes,usgs.gov/hazards/qfaults, accessed May 2, 2017;

USGS (2017), U.S. Seismic Design Maps; USGS Earthquake Hazards Program website, https://earthquake.usgs.gov/designmaps/us/application.php, accessed May 2, 2017;

Unpublished Geotechnical Reports and Information, Geocon Incorporated.

UPDATED GEOLOGIC MAP

OCEANVIEW HILLS – PA 61
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

PARDEE HOMES
SAN DIEGO, CALIFORNIA

JULY 11, 2018
PROJECT NO. 07955-42-02

Project No. 07955-42-02
July 11, 2018

Pardee Homes
13400 Sabre Springs Parkway, Suite 200
San Diego, California 92128

Attention: Mr. Allen Kashani

Subject: UPDATED GEOLOGIC MAP
OCEANVIEW HILLS – PA 61
SAN DIEGO, CALIFORNIA

Reference: *Update Geotechnical Investigation, Oceanview Hills – PA 61, San Diego, California,* prepared by Geocon Incorporated dated March 15, 2018 (Project No. 07955-42-02).

Dear Mr. Kashani:

In accordance with the request of Civil Sense, Inc., we have prepared this letter to provide an updated geologic map using the latest grading plan. Civil Sense provided an AutoCAD file of the grading plan which was used as the base map to generate the Geologic Map (Figure 1) and the Cross Sections (Figure 2). Based on our review of the grading plan, the recommendations contained in the referenced geotechnical investigation remain applicable to the project.

Should you have any questions regarding this letter, or if we may be of further service, please contact the undersigned at your convenience.

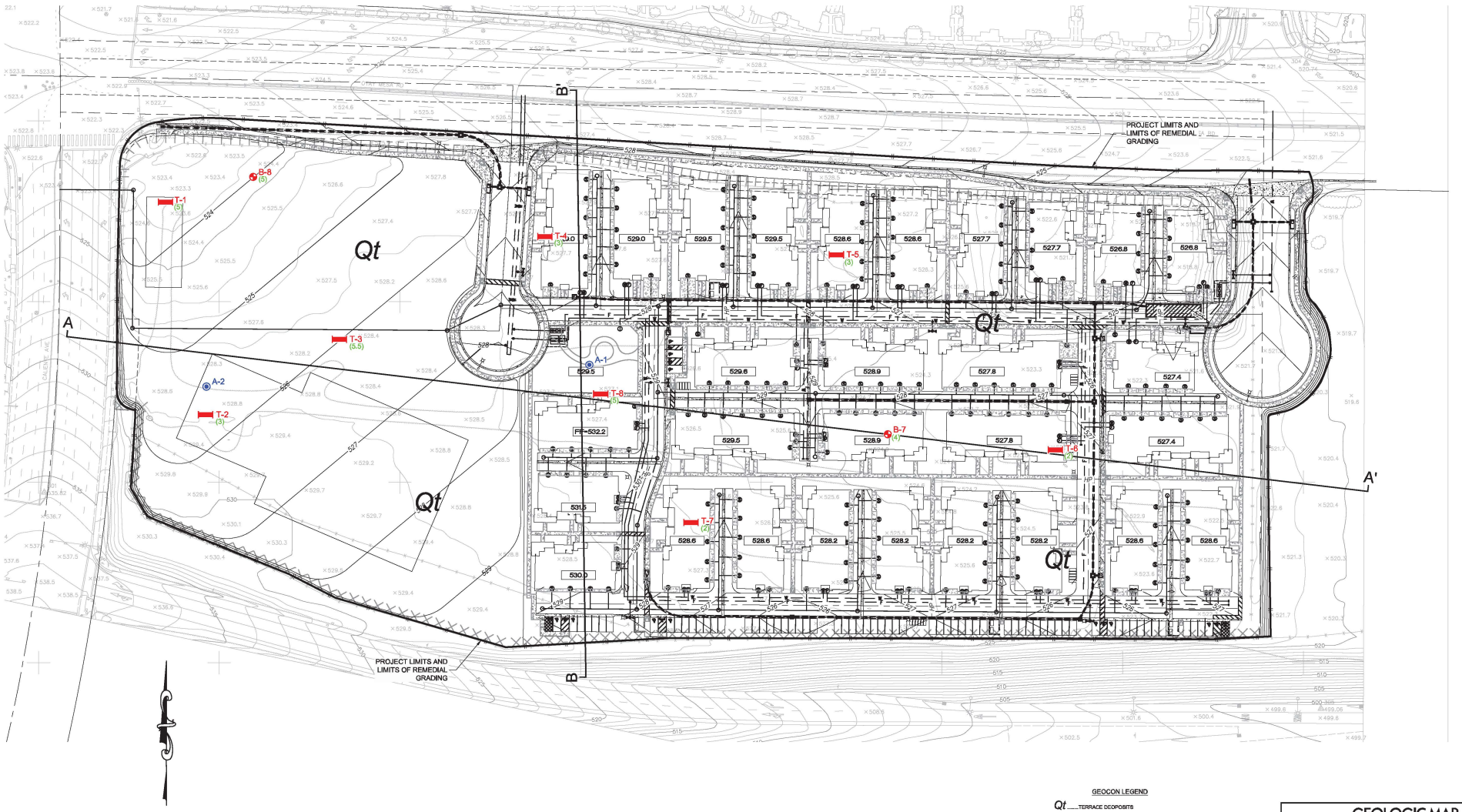
Very truly yours,

GEOCON INCORPORATED

Rodney C. Mikesell
GE 2533

RCM:dmc

(e-mail) Addressee
(3/del) Civil Sense, Inc.
Attention: Ms. Maykia Vang



GRAPHIC SCALE
0' 25' 50' 75' 100' 150' 200'
SCALE 1"=50' (on 36x24)

GEOCON LEGEND

Qt .....TERRACE DEOPOSITS
T-8 .....APPROX. LOCATION OF TRENCH
A-2 .....APPROX. LOCATION OF INFILTRATION TEST
B-8 .....APPROX. LOCATON OF PREVIOUS BORING (Geocon)
(5.5) .....APPROX. THICKNESS OF SURFICIAL SOIL
B' .....APPROX. LOCATION OF GEOLOGIC CROSS SECTION

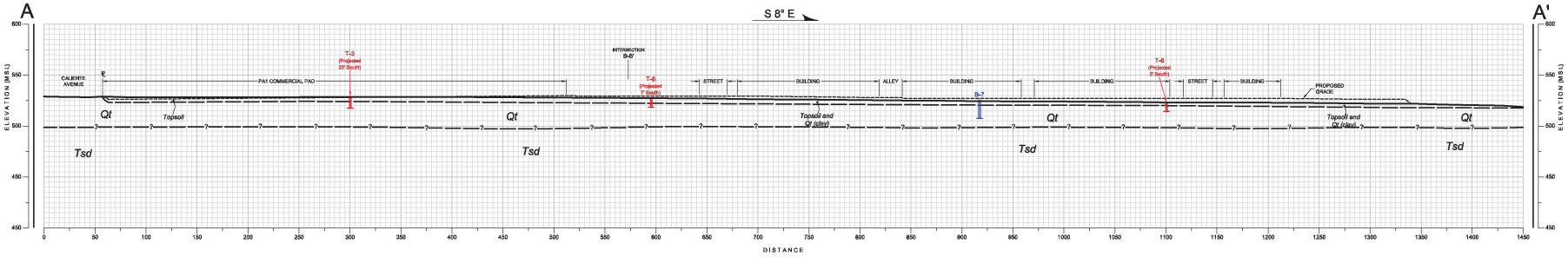
GEOLOGIC MAP

OCEANVIEW HILLS - PA 61
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858 558-6900 - FAX 858 558-6159

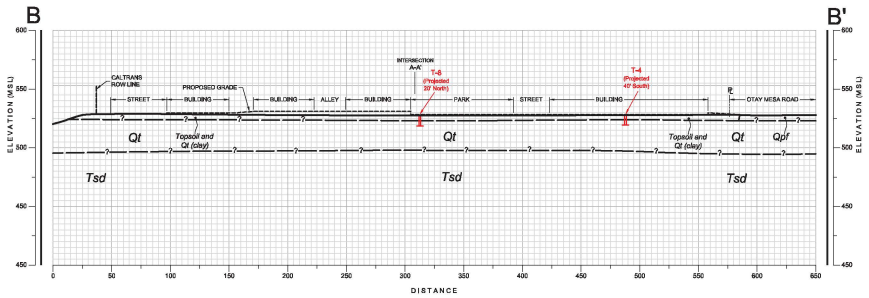
SCALE 1" = 50'
DATE 07 - 11 - 2018
PROJECT NO. 07955 - 42 - 02
FIGURE 1
SHEET 1 OF 1

Plotted:07/11/2018 12:58PM | By:KLVIN LACABLLORO | File Location:N:\PROJECTS\07955-42-02 California Terrace\SHEET\07955-42-02 Geo Map Update.dwg



GEOLOGIC CROSS-SECTION A-A'

SCALE: 1" = 50' (Vert. = Horiz.)



GEOLOGIC CROSS-SECTION A-A'

SCALE: 1" = 50' (Vert. = Horiz.)

GEOCON LEGEND

Qpf .....PREVIOUSLY PLACED FILL

Qt .....TERRACE DEPOSITS

Tsd .....SAN DIEGO FORMATION

T-9 .....APPROX. LOCATION OF TRENCH

B-1 .....APPROX. LOCATON OF PREVIOUS BORING (Geocon)

.....APPROX. LOCATION OF GEOLOGIC CONTACT (Queried Where Uncertain)

GEOLOGIC CROSS SECTION

OCEANVIEW HILLS - PA 61
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858 558-6900 - FAX 858 558-6159

SCALE 1" = 50' | DATE 07 - 11 - 2018

PROJECT NO. 07955 - 42 - 02 | FIGURE 2

SHEET 1 OF 1