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

Palm Hollister Apartments

PTS # 698277

[Insert Drawing Number (if applicable) and Internal Order Number (if applicable)]

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

REGISTERED PROFESSIONAL ENGINEER
GREGORY W. LANG
No. RCE 68075
EXP. 06-30-23
Civil
STATE OF CALIFORNIA

Engineer of Work:

Gregory W. Lang, P.E. #68075

Provide Wet Signature and Stamp Above Line

Prepared For:

Ambient Communities

179 Calle Magdelena, Suite 201

Encinitas, CA 92024

760-230-1000

Prepared By:

Pasco Laret Suiter & Associates

119 Aberdeen Dr.

Cardiff, CA 92007

858-259-8212

Date:

April 2023

Approved by: City of San Diego Date

The City of SAN DIEGO

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- Attachment 3: Structural BMP Maintenance Plan
    - Maintenance Agreement (Form DS-3247) (when applicable)
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- 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: Palm Hollister Apartments
Permit Application PTS# 698277

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.

Gregory W. Lang

Engineer of Work's Signature

68075

PE#

6/30/2023

Expiration Date

Gregory W. Lang, P.E.

Print Name

Pasco Laret Suiter & Associates

Company

April 2023

Date

Engineer's Stamp

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	Oct 2021	☑ Preliminary Design/Planning/CEQA ☐ Final Design	**Initial Submittal**
2	March 2022	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Second Submittal
3	July 2022	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Third Submittal
4	Dec 2022 April 2023	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Fourth Submittal Fifth Submittal

Project Vicinity Map

Project Name: Palm Hollister Apartments
Permit Application PTS #698277

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

Attach DS-560 form.

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Development Services

THE CITY OF SAN DIEGO

FORM
DS-560
September 2021

Stormwater Requirements Applicability Checklist

Project Address: 555 Hollister Street, San Diego, CA 92154 **Project Number:** 698277

SECTION 1: Construction Stormwater Best Management Practices (BMP) Requirements

All construction sites are required to implement construction BMPs per the performance standards in the Stormwater Standards Manual. Some sites are also required to obtain coverage under the State Construction General Permit (CGP)[1], administered by the California State Water Resources Control Board.

For all projects, complete Part A - If the project is required to submit a Stormwater Pollution Prevention Plan (SWPPP) or Water Pollution Control Plan (WPCP), continue to Part B.

PART A – Determine Construction Phase Stormwater Requirements

1. Is the project subject to California's statewide General National Pollutant Discharge Elimination System (NPDES) permit for Stormwater 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 is required; skip questions 2-4. ○ No; proceed to the 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/or contact with stormwater?

   ○ Yes, WPCP is required; skip questions 3-4. ○ No; proceed to the next question.

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

   ○ Yes, WPCP is required; skip question 4. ○ No; proceed to the 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, potholing, curb and gutter replacement, and retaining wall encroachments.

   ☐ Yes, no document is required.

Check one of the boxes below and continue to Part B

◉ **If you checked "Yes" for question 1**, an 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 check "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 http://www.sandiego.gov/stormwater/regulations/index.shtml

CLEAR FORM

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 continue to Section 2

☐ **1. ASBS**

A. Projects located in the ASBS watershed.

☑ **2. High Priority**

A. Projects that qualify as Risk Level 2 or Risk Level 3 per the Construction General Permit (CGP) and are not located in the ASBS watershed.
B. Projects that qualify as LUP Type 2 or LUP Type 3 per the CGP and are not located in the ASBS watershed.

☐ **3. Medium Priority**

A. Projects that are not located in an ASBS watershed or designated as a High priority site.
B. Projects that qualify as Risk Level 1 or LUP Type 1 per the CGP and are not located in an ASBS watershed.
C. WPCP projects (>5,000 square feet of ground disturbance) located within the Los Peñasquitos watershed management area.

☐ **4. Low Priority**

A. Projects not subject to a Medium or High site priority designation and are not located in an ASBS watershed.

Section 2: Construction Stormwater BMP Requirements

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

PART C – Determine if Not Subject to Permanent Stormwater Requirements

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

- **If "yes" is checked for any number in Part C**: Proceed to Part F and check "Not Subject to Permanent Stormwater BMP Requirements."
- **If "no" is checked for all 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 stormwater?

   ○ 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

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PART D – PDP Exempt Requirements

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

- **If "yes" is checked for any questions in Part D**, continue to Part F and check the box labeled "PDP Exempt."
- **If "no" is 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 stormwater 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 Stormwater Standards manual?

   ○ Yes, PDP exempt requirements apply ◉ No, proceed to 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 Stormwater Standards Manual?

   ○ Yes, PDP exempt requirements apply ◉ No, proceed to next question

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 Stormwater 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 beverages for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) 5812), and where the land development creates and/or replaces 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

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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 the 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 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 shop 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.** These projects are not covered in any of the categories above but involve the disturbance of one or more acres of land and are expected to generate post-construction phase pollutants, including fertilizers and pesticides. This category does not include projects creating less than 5,000 square feet of impervious area and projects containing landscaping without a requirement for the regular use of fertilizers and pesticides (such as a slope stabilization project using native plants). Impervious area calculations need not include linear pathways for infrequent vehicle use, such as emergency maintenance access or bicycle and pedestrian paths if the linear pathways are built with pervious surfaces or if runoff from the pathway sheet flows to adjacent pervious areas. ○ 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 STORMWATER REQUIREMENTS** ○ Yes ◉ No

2. The project is a **STANDARD DEVELOPMENT PROJECT**. Site design and source control BMP requirements apply. See the Stormwater Standards Manual for guidance. ○ Yes ◉ No

3. The Project is **PDP EXEMPT**. Site design and source control BMP requirements apply. Refer to the Stormwater Standards Manual for guidance. ○ Yes ◉ No

4. The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control and structural pollutant control BMP requirements apply. Refer to the Stormwater Standards Manual for guidance on determining if the project requires hydromodification plan management. ◉ Yes ○ No

Tim Worley	Project Manager
Name of Owner or Agent	**Title**
	10/07/2022
Signature	**Date**

CLEAR FORM

Applicability of Permanent, Post-Construction Storm Water BMP Requirements		Form I-1
Project Identification		
Project Name: Palm Hollister Apartments		
Permit Application Number: 698277		Date: April 2023
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 (<u>not required if prior lawful approval does not apply</u>):		
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 <u>not</u> apply: The project discharges to the Otay River downstream of Lower Otay Reservoir Dam which is a designated exempt river reach identified in the WMAA. The project will provide properly sized energy dissipation systems to mitigate outlet discharge velocity from the direct discharge to the exempt river reach for the ultimate condition peak design flow of the direct discharge and the invert elevation of the direct discharge conveyance system shall be equal to or below the 10-year floodplain elevation.		
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 <u>not</u> apply: Pursuant to the WMAA mapping of Potential Critical Coarse Sediment Yield Areas, there are no areas onsite or upstream of the project site. Refer to the exhibit located in 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.

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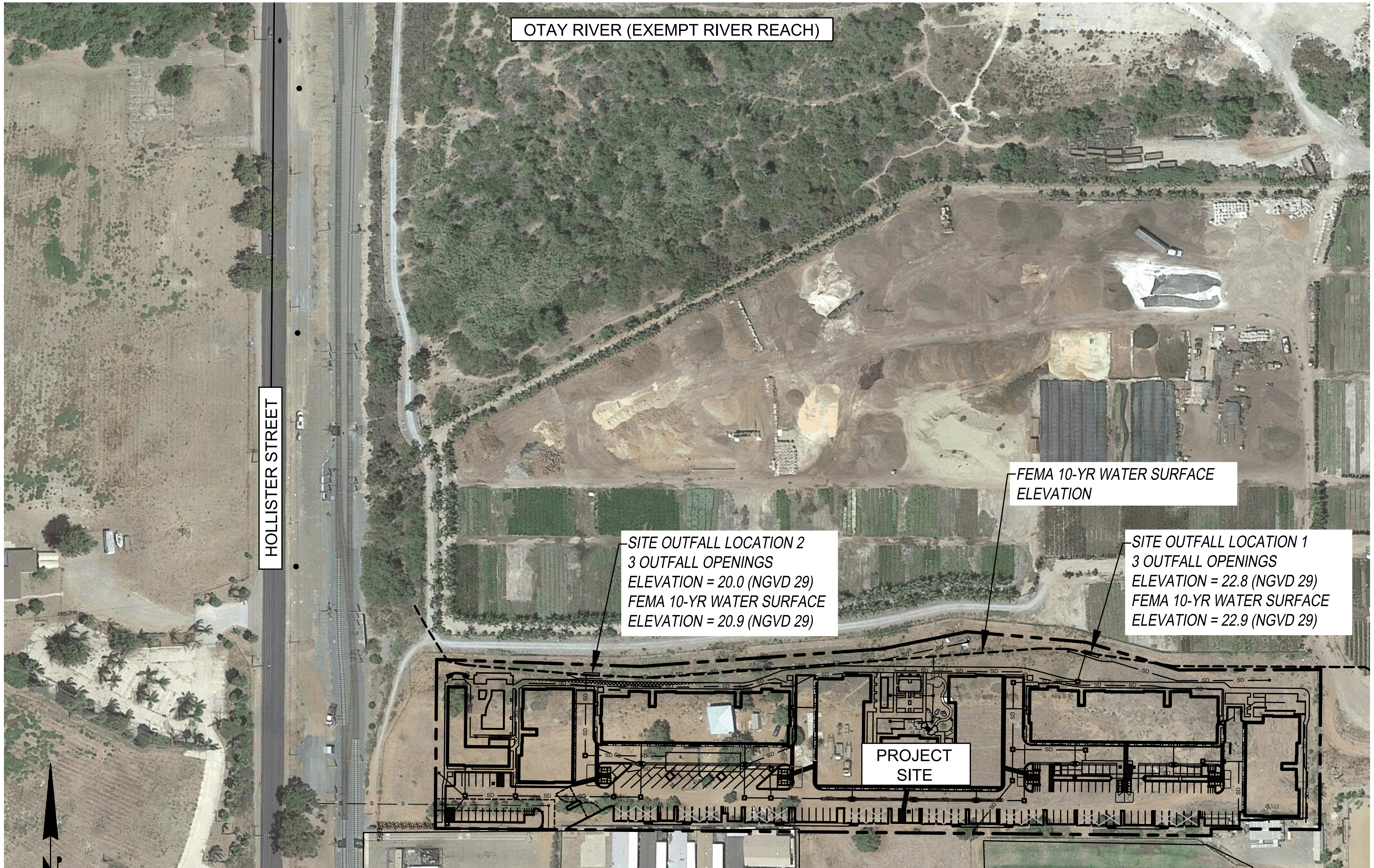
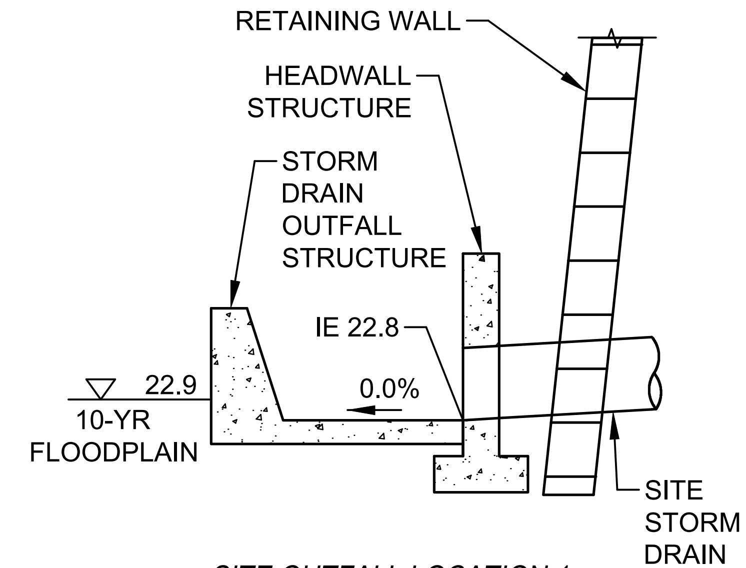
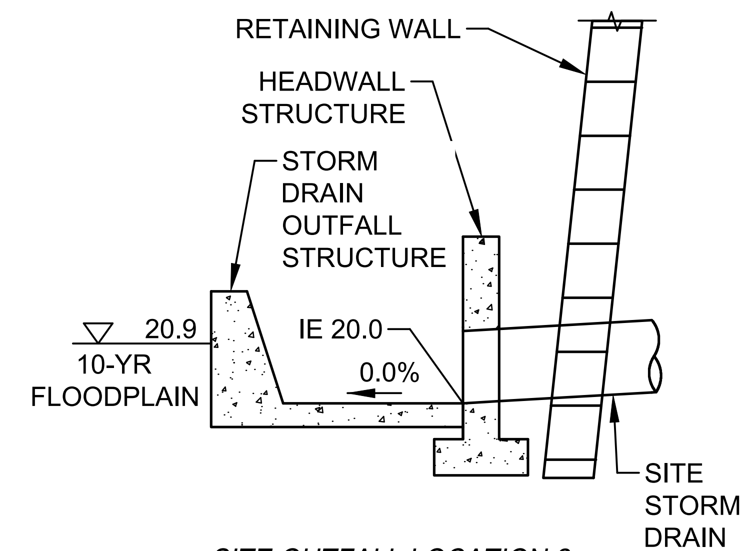




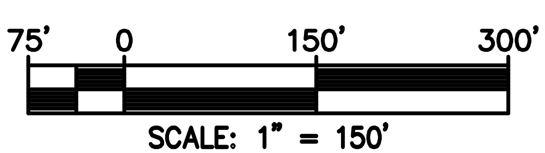
SITE OUTFALL LOCATION 1

NOT TO SCALE



SITE OUTFALL LOCATION 2

NOT TO SCALE



HMP EXEMPTION:

PER THE CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL CHAPTER 1, SECTION 1.6, FIGURE 1-2, NODE 5(b) - THE INVERT ELEVATION OF THE DIRECT DISCHARGE CONVEYANCE SYSTEM (AT THE POINT OF DISCHARGE TO THE EXEMPT RIVER REACH) SHOULD BE EQUAL OR BELOW THE 10-YEAR FLOODPLAIN ELEVATION.

DATUM CONVERSION:

EAST OUTFALL STRUCTURE:
10-YR FLOODPLAIN ELEV. = 25.0 NAVD88
NGVD29 CONVERSION = 22.917

WEST OUTFALL STRUCTURE:
10-YR FLOODPLAIN ELEV. = 23.0 NAVD88
NGVD29 CONVERSION = 20.915

DATUM CONVERSION WAS CALCULATED PER NOAA NGS COORDINATE CONVERSION AND TRANSFORMATION TOOL

PASCO LARET SUITER
& ASSOCIATES
San Diego | Encinitas | Orange County
Phone 858.259.8212 | www.plsaengineering.com

HMP EXEMPTION EXHIBIT

PALM AND HOLLISTER
555 HOLLISTER STREET
SAN DIEGO, CA 92154
PLSA JOB NO. 3272
SCALE 1"=150'
DECEMBER 2022
SHEET 1 OF 1

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Palm Hollister Apartments
Project Address	555 Hollister Street, San Diego, CA 92154
Assessor's Parcel Number(s) (APN(s))	628-050-24-00
Permit Application Number	698277
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)	910.20 Otay Valley HA
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	5.915 Acres (257,661 Square Feet)
Area to be disturbed by the project (Project Footprint)	5.59 Acres (243,404 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	4.29 Acres (186,852 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	1.3 Acres (56,552 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	429 %

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 consists of a previously graded large flat open space area composed mainly of dirt, with some vegetation and a few vacant structures. There is a steep northward facing vegetated slope along the north side of the site.
Existing Land Cover Includes (select all that apply): ☑ Vegetative Cover ☑ Non-Vegetated Pervious Areas ☑ Impervious Areas Description / Additional Information: The site includes bare dirt, vegetation, and a few impervious structures.
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:

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 consists of a previously graded large flat open space area composed mainly of dirt, with some vegetation and a few vacant structures. There is a steep northward facing vegetated slope along the north side of the site. IIn the existing condition, the site consists of two major drainage basins. Drainage Basin 100 is the smaller of the two basins and includes the eastern portion of the site. Storm water flows overland from the southeastern corner of the site in a northerly direction and discharges along the northeastern border. Drainage Basin 200 consists of the remainder of the site, the central and western portions. Stormwater flows overland from the southern border of the site in a northwesterly direction and discharges along the northern border. Offsite runoff from a small area south of the site runs onto the site along the southeastern border. For drainage exhibits and detailed hydrologic calculations refer to the Drainage Study for the project located in Attachment 5.

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 to construct multi-family housing, walkways, parking areas, drive aisles, landscaping and amenities including a pool, bbq pavilion area, fitness center, co-working spaces, nature playground, game courts and seating areas.
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features): Impervious features of the project include buildings, drive aisles, parking areas, walkways, game courts and hardscape.
List/describe proposed pervious features of the project (e.g., landscape areas): Pervious features of the project include landscape and open space.
Does the project include grading and changes to site topography? ☑ Yes ☐ No Description / Additional Information: The site will be graded to accommodate the proposed development and onsite drainage system.

Project Name: Palm Hollister Apartments

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:

The proposed project consists of the construction of multi-family housing, walkways, parking areas, drive aisles, landscaping and amenities including a pool, bbq pavilion area, fitness center, co-working spaces, nature playground, game courts and seating areas.

In the proposed condition, the site consists of two major drainage basins to mimic the existing condition. Drainage Basin 100, consisting of DMA-1a and 1b, is the smaller of the two basins and includes the eastern portion of the site. All onsite storm water from DMA-1a will be captured in proposed storm drain and conveyed to two (2) Modular Wetland Systems for pollutant control treatment prior to flowing to an open-bottom underground vault located in the central area of DMA-1a. Discharge from the vault will be conveyed northerly to outlet along the northeastern border at POC-1. The landscaped perimeter slopes, DMA-1b, are considered to be self-mitigating areas and will discharge at POC-1.

Drainage Basin 200, consisting of DMA-2a and 2b, includes the remainder of the site, the central and western portions. All onsite storm water from DMA-2a will be captured in proposed storm drain and conveyed to two (2) Modular Wetland Systems for pollutant control treatment prior to flowing to an open-bottom underground vault located in the central area of DMA-2a. Discharge from the vault will be conveyed northerly to outlet along the northern border at POC-2. The landscaped perimeter slopes, DMA-2b, are considered to be self-mitigating areas and will discharge at POC-2.

Existing offsite runoff from a small area south of the site that runs onto the site along the southeastern border will be captured in proposed storm drain and bypassed through the site and will discharge at POC-1.

For drainage exhibits and detailed hydrologic calculations refer to the Drainage Study for the project located in Attachment 5.

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:

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) Storm water discharges along the northern border of the project site, flows westerly then northerly along the eastern side of the train tracks to the Otay River which flows westerly and discharges to the San Diego Bay.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations Inland surface waters: AGR, IND, REC1, REC2, WARM, WILD, RARE Groundwater: MUN, AGR, 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 distance from the project outfall location to impaired or sensitive receiving waters is approximately 860 feet.
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 All post-construction storm water BMPs will be constructed within the project grading limits, which do not encroach into the City's MHPA areas or enviromentally sensitive lands.

Project Name: Palm Hollister Apartments

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	Mercury	TMDL expected 2027 per 303(d) list report
San Diego Bay	PAHs	TMDL expected 2025 per 303(d) list report
San Diego Bay	PCBs	TMDL expected 2019 per 303(d) list report

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): The project discharges to the Otay River downstream of Lower Otay Reservoir Dam which is a designated exempt river reach identified in the WMAA. The project will provide properly sized energy dissipation systems to mitigate outlet discharge velocity from the direct discharge to the exempt river reach for the ultimate condition peak design flow of the direct discharge and the invert elevation of the direct discharge conveyance system shall be equal to or below the 10-year floodplain elevation. 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: Refer to the exhibit located in Attachment 2b.

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. Not applicable.
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:
Discussion / Additional Information: (optional)

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.
The proposed project requires an amendment to the Otay Mesa-Nestor Community Plan to change the existing land use designation from Open Space to Residential Medium-High Density (20-35 du/nra) and a Rezone to change the existing zone from AR-1-2, RM-1-1, and RS-1-5 to RM-2-6. A Rezone requires the proposed project analyze the most intense use permitted under the new zone. Under the proposed RM-2-6 zone, the project site could be developed to construct up to 206 dwelling units. This equates to an additional eight dwelling units compared to the proposed project, which plans to construct a total of 198 dwelling units. Adding eight dwelling units would not affect the SWQMP as the total proposed pervious and impervious areas, and drainage patterns, would remain unchanged.
Optional Additional Information or Continuation of Previous Sections As Needed
This space provided for additional information or continuation of information from previous sections as needed.

Source Control BMP Checklist for 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: Palm Hollister Apartments

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 <u>all</u> "No" answers shown above.			

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:			
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:			

Project Name: Palm Hollister Apartments

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:			
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 not a feasible BMP for this project. Refer to 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:

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. DMAs 1a and 2a: Step 1A: The DMAs draining to the structural BMPs are not self-mitigating, de minimis, or self-retaining. Step 1B: There are no site design BMPs proposed for the project for which the runoff factor can be adjusted. Step 2: Harvest and use is not feasible. Refer to Attachment 1c. Step 3: Partial Infiltration is feasible. Refer to Attachment 1d. Step 3C: Modular Wetlands Systems BF-3 and open-bottom underground storage facilities have been selected and sized per the design criteria to meet pollutant control and retention requirements. (Continue on page 2 as necessary.)	

Project Name: Palm Hollister Apartments

Form I-6 Page 2 of
(Continued from page 1)

Project Name: Palm Hollister Apartments

Form I-6 Page of (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 1	
Construction Plan Sheet No.	
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	Gregory W. Lang, PE Pasco Laret Suiter & Associates 119 Aberdeen Dr. Cardiff, CA 92007
Who will be the final owner of this BMP?	Ambient Communities
Who will maintain this BMP into perpetuity?	Ambient Communities
What is the funding mechanism for maintenance?	Ambient Communities

Form I-6 Page of (Copy as many as needed)
Structural BMP ID No. 1
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): Open-bottom underground storage vault above a 26" gravel layer has been selected and sized to provide for partial infiltration.

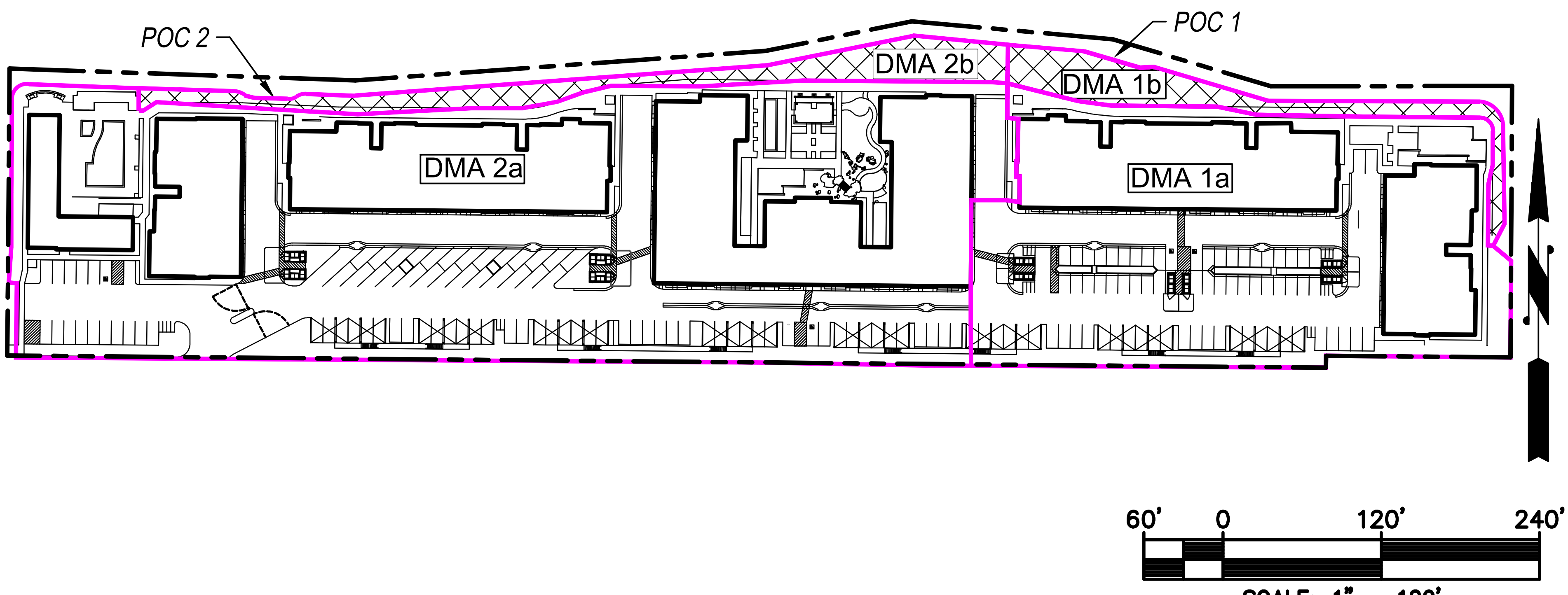
Form I-6 Page of (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 2	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by 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	Gregory W. Lang, PE Pasco Laret Suiter & Associates 119 Aberdeen Dr. Cardiff, CA 92007
Who will be the final owner of this BMP?	Ambient Communities
Who will maintain this BMP into perpetuity?	Ambient Communities
What is the funding mechanism for maintenance?	Ambient Communities

Form I-6 Page of (Copy as many as needed)
Structural BMP ID No. 2
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): Modular Wetland System BF-3 (MWS-L-8-8-6'-11"-V) has been selected and sized per the design criteria to meet pollutant control requirements.

PALM AND HOLLISTER SITE DESIGN BMP LAYOUT

LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	
DMA BOUNDARY	
SELF-MITIGATING *AREA/AMENDED SOIL/DROUGHT TOLERANT LANDSCAPING*	



Form I-6 Page of (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 3	
Construction Plan Sheet No.	
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	Gregory W. Lang, PE Pasco Laret Suiter & Associates 119 Aberdeen Dr. Cardiff, CA 92007
Who will be the final owner of this BMP?	Ambient Communities
Who will maintain this BMP into perpetuity?	Ambient Communities
What is the funding mechanism for maintenance?	Ambient Communities

Form I-6 Page of (Copy as many as needed)
Structural BMP ID No. 3
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): Modular Wetland System BF-3 (MWS-L-6-8-6'-11"-V) has been selected and sized per the design criteria to meet pollutant control requirements.

Project Name: Palm Hollister Apartments

Form I-6 Page of (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 4	
Construction Plan Sheet No.	
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	Gregory W. Lang, PE Pasco Laret Suiter & Associates 119 Aberdeen Dr. Cardiff, CA 92007
Who will be the final owner of this BMP?	Ambient Communities
Who will maintain this BMP into perpetuity?	Ambient Communities
What is the funding mechanism for maintenance?	Ambient Communities

Form I-6 Page of (Copy as many as needed)
Structural BMP ID No. 4
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): Open-bottom underground storage vault above a 23" gravel layer has been selected and sized to provide for partial infiltration.

Form I-6 Page of (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 5	
Construction Plan Sheet No.	
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	Gregory W. Lang, PE Pasco Laret Suiter & Associates 119 Aberdeen Dr. Cardiff, CA 92007
Who will be the final owner of this BMP?	Ambient Communities
Who will maintain this BMP into perpetuity?	Ambient Communities
What is the funding mechanism for maintenance?	Ambient Communities

Form I-6 Page of (Copy as many as needed)
Structural BMP ID No. 5
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): Modular Wetland System BF-3 (MWS-L-8-16-8'-5"-V) has been selected and sized per the design criteria to meet pollutant control requirements.

Project Name: Palm Hollister Apartments

Form I-6 Page of (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. 6	
Construction Plan Sheet No.	
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	Gregory W. Lang, PE Pasco Laret Suiter & Associates 119 Aberdeen Dr. Cardiff, CA 92007
Who will be the final owner of this BMP?	Ambient Communities
Who will maintain this BMP into perpetuity?	Ambient Communities
What is the funding mechanism for maintenance?	Ambient Communities

Project Name: Palm Hollister Apartments

Form I-6 Page of (Copy as many as needed)
Structural BMP ID No. 6
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): Modular Wetland System BF-3 (MWS-L-8-16-9'-6"-V) has been selected and sized per the design criteria to meet pollutant control requirements.

Attachment 1
Backup For PDP Pollutant Control BMPs

This is the cover sheet for Attachment 1.

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Project Name: Palm Hollister Apartments

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: o Infiltration Feasibility Condition Letter (*Note: must be stamped and signed by licensed geotechnical engineer*) o Form I-8A (optional) o Form I-8B (optional) • Partial Infiltration Condition: o Infiltration Feasibility Condition Letter (*Note: must be stamped and signed by licensed geotechnical engineer*) o Form I-8A o Form I-8B • Full Infiltration Condition: o Form I-8A o Form I-8B o Worksheet C.4-3 o 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)

Attachment 1a

DMA Exhibit

SUMMARY OF DRAINAGE MANAGEMENT AREAS

DMA	DRAINAGE AREA (AC)	IMPERVIOUS AREA (AC)	% IMP	DMA RUNOFF COEFFICIENT, C	DCV (CF)	STRUCTURAL BMP ID	STRUCTURAL BMP TYPE	STRUCTURAL BMP PERFORMANCE
DMA-1a	1.72	1.44	84.0%	0.80	2,592	BMP-1	CISTERN	100-YR DETENTION
						BMP-2 and 3	MWS	WQ TREATMENT
DMA-1b	0.19	0.00	0.00%	0.30			N/A	N/A - SELF-MITIGATING
DMA-2a	3.43	2.84	82.8%	0.80	5,181	BMP-4	CISTERN	100-YR DETENTION
						BMP-5 and 6	MWS	WQ TREATMENT
DMA-2b	0.25	0.00	0.00%	0.30			N/A	N/A - SELF-MITIGATING

LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	
DMA BOUNDARY	
DMA SUBAREA BOUNDARY	
DMA SUBAREA	A=1.0
PROPOSED IMPERVIOUS AREA	
PROPOSED PERVIOUS AREA	
PROPOSED VAULT	
PROPOSED MODULAR WETLAND SYSTEM (MWS)	MW
PROPOSED AMENDED SOIL AREA AREA	

STRUCTURAL BMPS

UNDERGROUND DETENTION VAULT (HU-1) — V

MODULAR WELTAND SYSTEM (BF-3) — MW

HYDROLOGIC SOIL GROUP

HYDROLOGIC SOIL TYPE: A AND D

DEPTH TO GROUNDWATER

5 FT < GROUNDWATER DEPTH > 10 FT

PROJECT CHARACTERISTICS

TOTAL SITE AREA:	5.92 AC
PROPOSED DISTURBED AREA:	5.59 AC
PROPOSED IMPERVIOUS AREA:	4.28 AC
PROPOSED LANDSCAPE AREA:	1.31 AC
PROPOSED AMENDED SOIL AREA:	0.44 AC

BASELINE SITE DESIGN BMPS

SD-G MAINTAIN & CONSERVE NATURAL FEATURES
SD-B DISPERSE IMPERVIOUS AREAS
SD-I MINIMIZE IMPERVIOUS AREAS
SD-J USE WATER EFFICIENT LANDSCAPING
SD-K INSTALL EFFICIENT IRRIGATION SYSTEMS
SD-L MINIMIZE EROSION OF SLOPES AND SURFACES

BASELINE SOURCE CONTROL BMPS

TRASH & REFUSE STORAGE
SC-B PLUMB TO SANITARY SEWER
SC-D PROVIDE CONTAMINATION FOR SPILLS AND DISCHARGES
SC-E PREVENT CONTACT WITH RAINFALL
SC-F ISOLATE FLOWS FROM ADJACENT AREAS
SD-G PREVENT WIND DISPERSAL

LOADING & UNLOADING
SC-B PLUMB TO SANITARY SEWER
SC-D PROVIDE CONTAMINATION FOR SPILLS AND DISCHARGES
SC-E PREVENT CONTACT WITH RAINFALL
SC-F ISOLATE FLOWS FROM ADJACENT AREAS

STORM DRAIN INLETS & CATCH BASINS
SC-H LABEL WITH STENCILS OR SIGNAGE

FIRE TEST SPRINKLER DISCHARGES
SC-B PLUMB TO SANITARY SEWER
SC-D PROVIDE CONTAMINATION FOR SPILLS AND DISCHARGES

20' 0 40' 80'
SCALE: 1" = 40'

PROPOSED CONDITION DMA EXHIBIT

AMBIENT – PALM AND HOLLISTER
SAN DIEGO, CALIFORNIA

PASCO LARET SUITER & ASSOCIATES
San Diego | Encinitas | Orange County
Phone 858.259.8212 | www.plsaengineering.com

PLSA JOB NO. 3272
SCALE: 1" = 40'
DATE: APRIL 2023
SHEET 1 OF 1

Attachment 1c

Form I-7, Harvest and Use Feasibility Screening Checklist

Worksheet B.3-1: Harvest and Use Feasibility Screening

<table>
<tr><th colspan="2">Harvest and Use Feasibility Screening</th><th>Worsksheet B.3-1</th></tr>
<tr><td colspan="3">1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?
☐ Toilet and urinal flushing
☒ Landscape irrigation
☐ Other:____________________</td></tr>
<tr><td colspan="3">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]

<u>Landscape Irrigation</u>
(1.3 ac irrigated) x (390 gal/ac-36hr) x (0.13368 cuft/gal) = 68 cuft/36hr</td></tr>
<tr><td colspan="3">3. Calculate the DCV using worksheet B-2.1.
[Provide a results here]

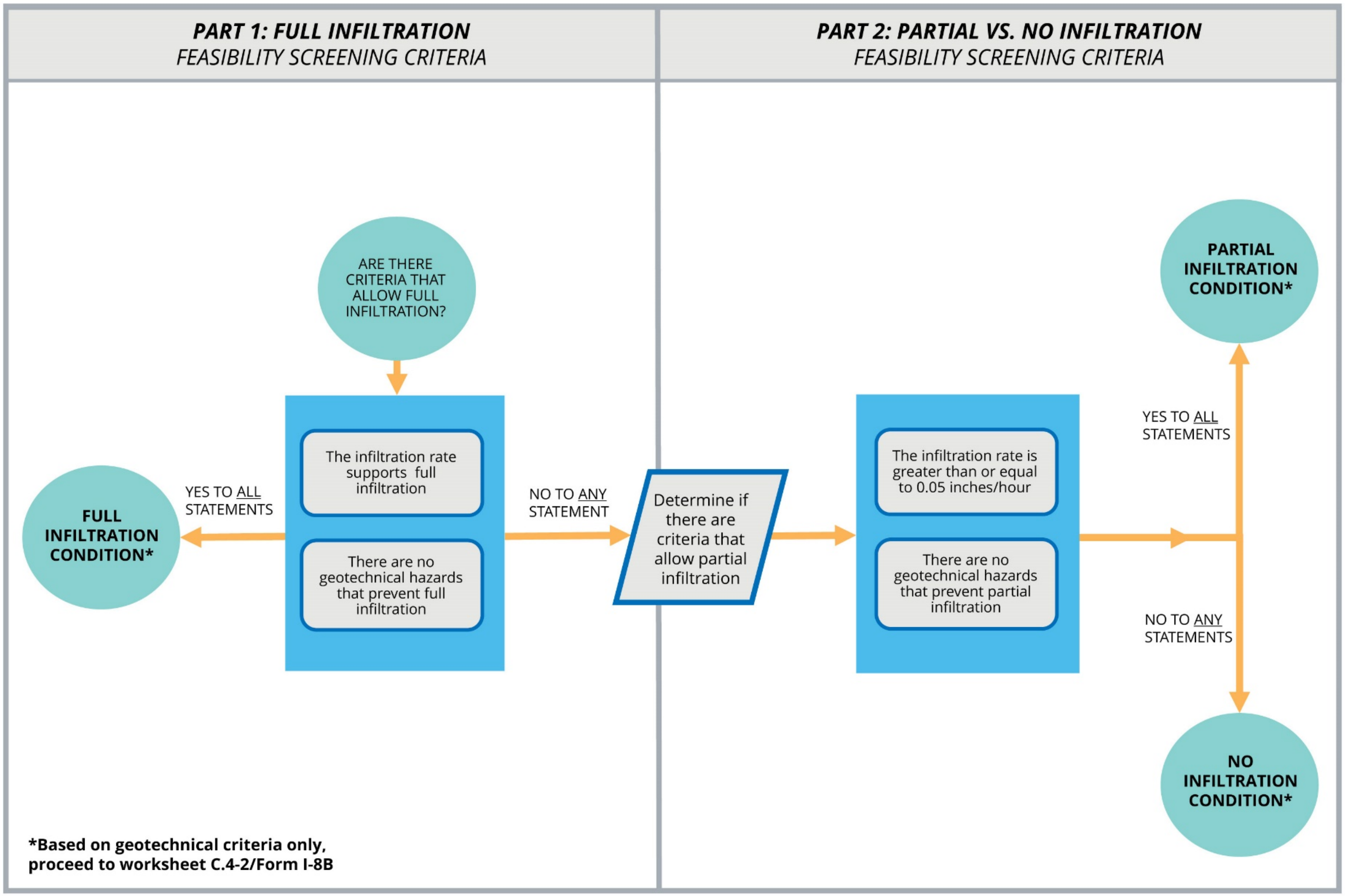
DCV = 7,773 cuft</td></tr>
<tr><td>3a. Is the 36-hour demand greater than or equal to the DCV?
Yes / No ⇨
⇩</td><td>3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV?
Yes / No ⇨
⇩</td><td>3c. Is the 36-hour demand less than 0.25DCV?
Yes
⇩</td></tr>
<tr><td>Harvest and use appears 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.</td><td>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.</td><td>Harvest and use is considered to be infeasible.</td></tr>
</table>

Note: 36-hour demand calculations are for feasibility analysis only, once the feasibility analysis is complete the applicant may be allowed to use a different drawdown time provided they meet the 80 percent of average annual (long term) runoff volume performance standard.

Attachment 1d

Infiltration Feasibility Information

GEOTECHNICAL SUBMITTAL FOR CATEGORIZATION OF INFILTRATION FEASIBILITY CONDITION
(Worksheet C.4-1/FORM I-8A)



Worksheet C.4-1: Categorization of Infiltration Feasibility Condition Based on Geotechnical Conditions[9]

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:
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.	

[9] 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. Type text here	

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

<table>
<tr><th colspan="2">Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions</th><th colspan="2">Worksheet C.4-1: Form I-8A[10]</th></tr>
<tr><td>2C</td><td>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.</td><td>☐ Yes</td><td>☐ No</td></tr>
<tr><td>Criteria 2 Result</td><td>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?</td><td>☐ Yes</td><td>☐ No</td></tr>
<tr><td colspan="4">Summarize findings and basis; provide references to related reports or exhibits.</td></tr>
<tr><td colspan="2">Part 1 Result – Full Infiltration Geotechnical Screening [12]</td><td colspan="2">Result</td></tr>
<tr><td colspan="2">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.</td><td colspan="2">☐ Full infiltration Condition

☐ Complete Part 2</td></tr>
</table>

[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:
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). Test results are summarized in the referenced report: "Preliminary Infiltration Feasibility Study, Multifamily Residential Development, 555 Hollister Street, San Diego, California," prepared by Advanced Geotechnical Solutions, Inc., and dated August 26, 2021. Four borehole percolation tests were performed to evaluate the feasibility of storm water infiltration in general conformance with Appendix D of the City of San Diego Storm Water Standards (2018). Design infiltration test results ranged from 0 to 2.8 inches per hour. The highest rate of 2.8 inches per hour occured in a gravelly sand layer with limited thickness. DMA's should not be designed for the highest rate since infiltrating water will likely flow vertically through the gravelly sand layer until less permeable materials are encountered and the infiltrating water may flow laterally. Additional exploratory trenches and boreholes were advanced and indicate that less permeable layers are present.		

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

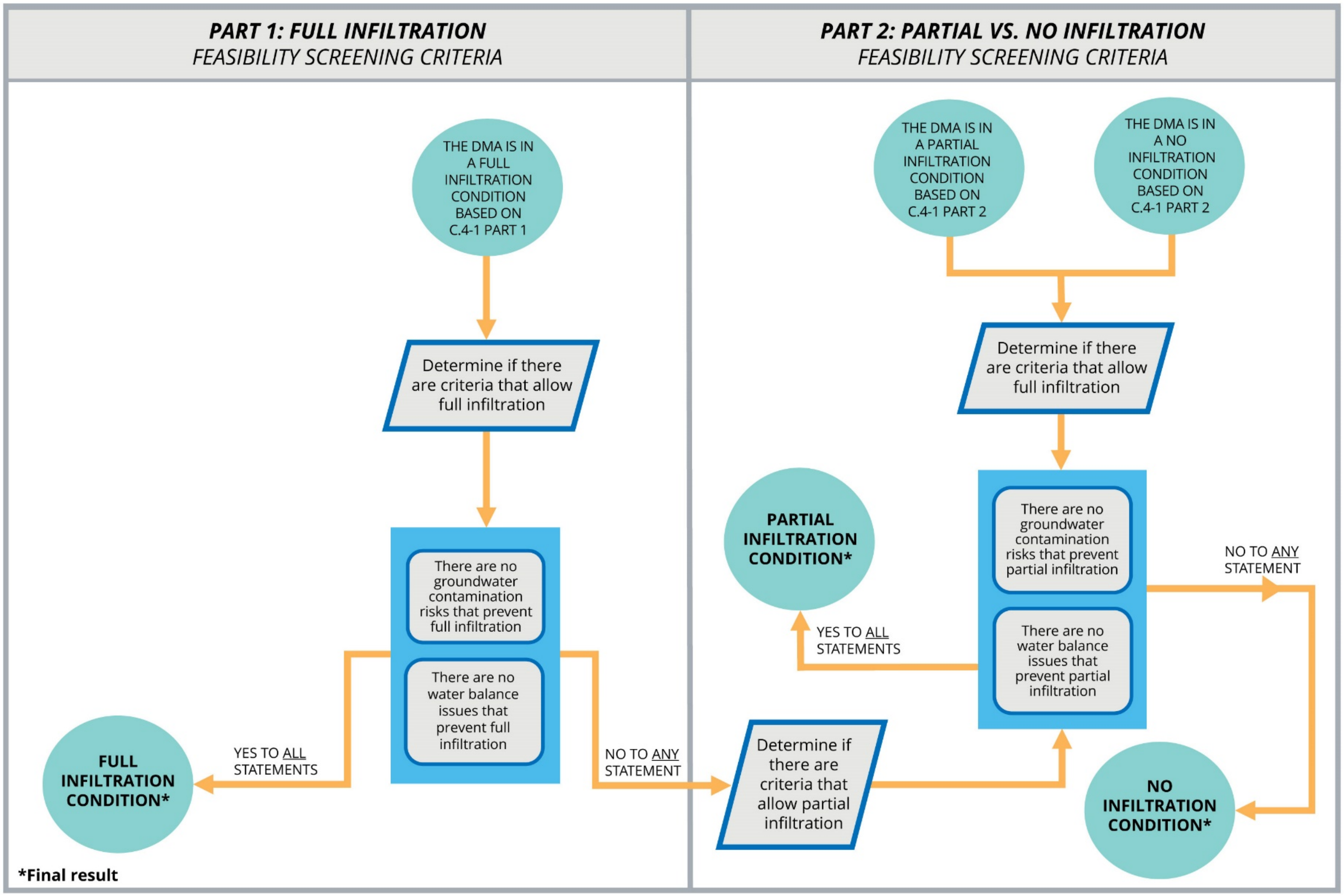
Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical 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. Infiltration at the potential BMP locations will increase the potential for geotechnical issues such as water intrusion and ground settlement. Mitigation typically includes an appropriate setback between nearby improvements and infiltration devices. A minimum setback of 25 feet to nearby structures and 75 feet to the MSE wall is recommended. An alternative mitigation can include construction of a cutoff wall, such as placement of a vertical impermeable liner or slurry filled trench, to mitigate infiltration of water below adjacent improvements. To prevent the migration of water along utility pipe bedding zones, slurry backfill should be considered in utility pipes located near infiltration devices. Preventing all water intrusion may be accomplished by installing an impermeable liner on all underground BMP improvements. It should be recognized that if infiltration is allowed, some water intrusion is possible beneath nearby existing improvements such as roadways and nearby structures. Test results, recommendations, and conclusions are summarized in the referenced report: "Preliminary Infiltration Feasibility Study, Multifamily Residential Development, 555 Hollister Street, San Diego, California," prepared by Advanced Geotechnical Solutions, Inc., and dated August 26, 2021.			

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.

SWQMP PREPARER SUBMITTAL FOR CATEGORIZATION OF INFILTRATION FEASIBILITY CONDITION
(Worksheet C.4-2/FORM I-8B)



Worksheet C.4-2: Categorization of Infiltration Feasibility Condition based on Groundwater and Water Balance Conditions[14]

Categorization of Infiltration Feasibility Condition based on Groundwater and Water Balance Conditions		Worksheet C.4-2: Form I-8B[15]
Part 1 - Full Infiltration Feasibility Screening Criteria		
DMA(s) Being Analyzed:		Project Phase:
Criteria 1: Groundwater Screening		
1A	**Groundwater Depth.** Is the depth to seasonally high groundwater tables (normal high depth during the wet season) beneath the base of any full infiltration BMP greater than 10 feet? ☐ Yes; continue to Step 1B. ☐ No; The depth to groundwater is less than or equal to 10 feet, but site layout changes or reasonable mitigation measures can be proposed to support full infiltration BMPs. Continue to step 1B. ☐ No; The depth to groundwater is less than or equal to 10 feet and site layout changes or reasonable mitigation measures cannot be proposed to support full infiltration BMPs. Answer "No" for Criteria 1 Result.	
1B	**Contaminated Soil/Groundwater.** Are proposed full infiltration BMPs at least 250 feet away from contaminated soil or groundwater sites? This can be confirmed using GeoTracker (geotracker.waterboards.ca.gov) to identify open contaminated sites. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP. ☐ Yes; continue to Step 1C. ☐ No; However, site layout changes or reasonable mitigation measures can be proposed to support full infiltration BMPs. Continue to Step 1C. ☐ No; Site layout changes or reasonable mitigation measures cannot be proposed to support full infiltration BMPs. Answer "No" to Criteria 1 Result.	

[14] 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.

[15] 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.

Categorization of Infiltration Feasibility Condition based on Groundwater and Water Balance Conditions	Worksheet C.4-2: Form I-8B[15]
1C	**Inadequate Soil Treatment Capacity.** Are full infiltration BMPs proposed in DMA soils that have adequate soil treatment capacity? The DMA has adequate soil treatment capacity if **ALL** of the following criteria (detailed in C.2.2.1) for all soil layers beneath the infiltrating surface are met: • USDA texture class is sandy loam or loam or silt loam or silt or sandy clay loam or clay loam or silty clay loam or sandy clay or silty clay or clay; and • Cation Exchange Capacity (CEC) greater than 5 milliequivalents/100g; and • Soil organic matter is greater than 1%; and • Groundwater table is equal to or greater than 10 feet beneath the base of the full infiltration BMP. ☐ Yes; continue to Step 1D. ☐ No; However, site layout changes or reasonable mitigation measures can be proposed to support full infiltration BMPs. Continue to Step 1D. ☐ No; Site layout changes or reasonable mitigation measures cannot be proposed to support full infiltration BMPs. Answer "No" to Criteria 1 Result.
1D	**Other Groundwater Contamination Hazards.** Are there site-specific groundwater contamination hazards not already mentioned (refer to Appendix C.2.2) that can be reasonably mitigated to support full infiltration BMPs? ☐ Yes; there are other contamination hazards identified that can be mitigated. Answer "Yes" to Criteria 1 Result. ☐ No; there are other contamination hazards identified that cannot be mitigated. Answer "No" to Criteria 1 Result. ☐ N/A; no contamination hazards are identified. Answer "Yes" to Criteria 1 Result.
Criteria 1 Result	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination that cannot be reasonably mitigated to an acceptable level? See Appendix C.2.2.8 for a list of typically reasonable and typically unreasonable mitigation measures. ☐ Yes; Continue to Part 1, Criteria 2. ☐ No; Continue to Part 1 Result.

Categorization of Infiltration Feasibility Condition based on Groundwater and Water Balance Conditions	Worksheet C.4-2: Form I-8B[15]
Summarize groundwater quality and any mitigation measures proposed. Documentation should focus on groundwater table, mapped soil types and contaminated site locations.	

Categorization of Infiltration Feasibility Condition based on Groundwater and Water Balance Conditions	Worksheet C.4-2: Form I-8B[15]
Criteria 2: Water Balance Screening	
2A	**Ephemeral Stream Setback.** Does the proposed full infiltration BMP meet both the following? • The full infiltration BMP is located at least 250 feet away from an ephemeral stream; **AND** • The bottom surface of the full infiltration BMP is at a depth 20 feet or greater from seasonally high groundwater tables. ☐ Yes; Answer "Yes" to Criteria 2 Result. ☐ No; Continue to Step 2B.
2B	**Mitigation Measures.** Can site layout changes be proposed to support full infiltration BMPs? ☐ Yes; the site can be reconfigured to mitigate potential water balance issues. Answer "Yes" to Criteria 2 Result. ☐ No; the site cannot be reconfigured to mitigate potential water balance issues. Continue to Step 2C and provide discussion.
2C	**Additional studies.** Do additional studies support full infiltration BMPs? In the event that water balance effects are used to reject full infiltration (anticipated to be rare), additional analysis shall be completed and documented by a qualified professional indicating the site-specific information evaluated and the technical basis for this finding. ☐ Yes; Answer "Yes" to Criteria 2 Result. ☐ No; Answer "No" to Criteria 2 Result.
Criteria 2 Result	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams? ☐ Yes; Continue to Part 1 Result. ☐ No; Continue to Part 1 Result.

Categorization of Infiltration Feasibility Condition based on Groundwater and Water Balance Conditions	Worksheet C.4-2: Form I-8B[15]
Summarize potential water balance effects. Documentation should focus on mapping and soil data regarding proximity to ephemeral streams and groundwater depth.	

Part 1 – Full Infiltration Groundwater and Water Balance Screening Result[16]	Result
If answers to Criteria 1 and 2 are "Yes", a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration based on groundwater conditions. If answer to Criteria 1 or Criteria 2 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design based on groundwater conditions. Proceed to Part 2.	☐ Full Infiltration ☐ Complete Part 2

[16] 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 Groundwater and Water Balance Conditions	Worksheet C.4-2: Form I-8B[15]
Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	Project Phase:
Criteria 3: Groundwater Screening	
Contaminated Soil/Groundwater. Are partial infiltration BMPs proposed at least 100 feet away from contaminated soil or groundwater sites? This can be confirmed using GeoTracker (geotracker.waterboards.ca.gov) to identify open contaminated sites. This criterion is intentionally a smaller radius than full infiltration, as the potential quantity of infiltration from partial infiltration BMPs is smaller. ☑ Yes; Answer "Yes" to Criteria 3 Result. ☐ No; However, site layout changes can be proposed to avoid contaminated soils or soils that lack adequate treatment capacity. Select "Yes" to Criteria 3 Result. It is a requirement for the SWQMP preparer to identify potential mitigation measures. ☐ No; Contaminated soils or soils that lack adequate treatment capacity cannot be avoided and partial infiltration BMPs are not feasible. Select "No" to Criteria 3 Result.	
Criteria 3 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 risk of groundwater contamination that cannot be reasonably mitigated to an acceptable level? ☑ Yes; Continue to Part 2, Criteria 4. ☐ No; Skip to Part 2 Result.	
Summarize findings and basis. Documentation should focus on mapped soil types and contaminated site locations.	

Categorization of Infiltration Feasibility Condition based on Groundwater and Water Balance Conditions	Worksheet C.4-2: Form I-8B[15]
Criteria 4: Water Balance Screening	
Additional studies. In the event that water balance effects are used to reject partial infiltration (anticipated to be rare), a qualified professional must provide an analysis of the incremental effects of partial infiltration BMPs on the water balance compared to incidental infiltration under a no infiltration scenario (e.g. precipitation, irrigation, etc.).	
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 causing potential water balance issues such as change of seasonality of ephemeral streams? ☑ Yes: Continue to Part 2 Result. ☐ No: Continue to Part 2 Result.	
Summarize potential water balance effects. Documentation should focus on mapping and soil data regarding proximity to ephemeral streams and groundwater depth.	

Part 2 – Partial Infiltration Groundwater and Water Balance Screening Result[17]	Result
If answers to Criteria 3 and Criteria 4 are “Yes”, a partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration based on groundwater and water balance conditions. If answer to Criteria 3 or Criteria 4 is “No”, then infiltration of any volume is considered to be infeasible within the site. The feasibility screening category is No Infiltration based on groundwater or water balance condition.	☑ Partial Infiltration Condition ☐ No Infiltration Condition

[17] 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.

Worksheet C.4-3: Infiltration and Groundwater Protection for Full Infiltration BMPs

Infiltration and Groundwater Protection		Worksheet C.4-3	
Criteria	Question	Yes	No
1	Will the storm water runoff undergo pretreatment such as sedimentation or filtration prior to infiltration?	☐	☐
2	Are pollution prevention and source control BMPs implemented at a level appropriate to protect groundwater quality for areas draining to infiltration BMPs?	☐	☐
3	Is the vertical distance from the base of the full infiltration BMP to the seasonal high groundwater mark greater than 10 feet? This vertical distance may be reduced when the groundwater basin does not support beneficial uses and the groundwater quality is maintained	☐	☐
4	Does the soil through which infiltration is to occur have physical and chemical characteristics that are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses? Refer to Appendix C.3.1.	☐	☐
5	Is the following statement true? Full infiltration BMPs are not used for areas of industrial or light industrial activity, and other high threat to water quality land uses and activities, unless source control BMPs to prevent exposure of high threat activities are implemented, or runoff from such activities is first treated or filtered to remove pollutants prior to infiltration.	☐	☐
6	Is the full infiltration BMP located at a distance greater than 100 feet horizontally from any water supply well?	☐	☐
Basis and Documentation: All the answers for Criteria 1 to 6 must be “Yes” for acceptance of a full infiltration BMP.			

Attachment 1e

Pollutant Control BMP Design Worksheets

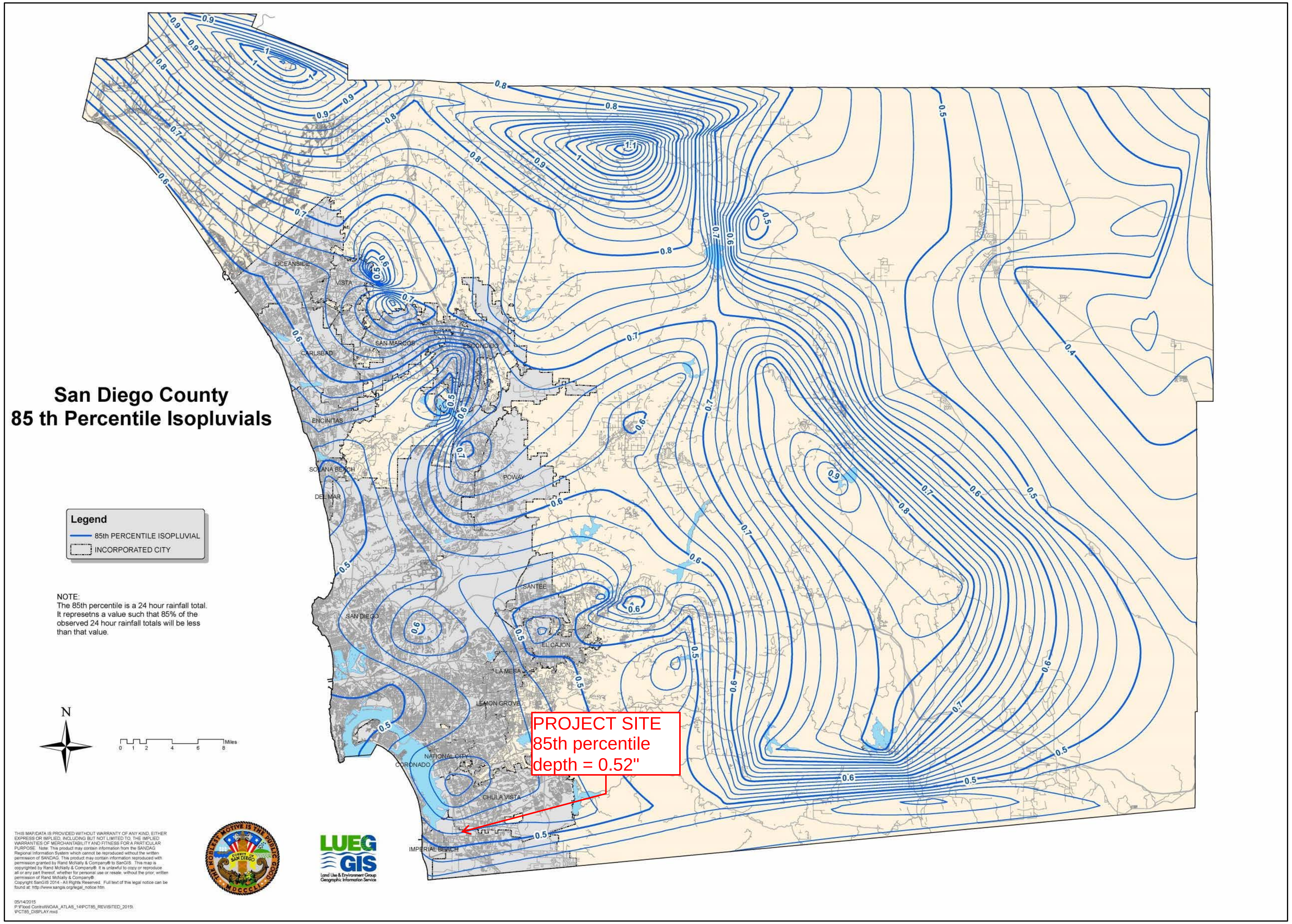


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

DMA Runoff Factor Calculation

DMA	Prop. Drainage Area (sf)	Prop. Drainage Area (ac)	Prop. Imperv. Area (sf)	DMA Runoff Factor
1a	74,758	1.72	62,809	0.80
1b	8,312	0.19	0	0.30
2a	149,466	3.43	124,044	0.80
2b	10,868	0.25	0	0.30
	253,758		189,242	

Impervious RF = 0.9

Pervious RF = 0.3

The City of SAN DIEGO	Project Name	Palm and Hollister	
	BMP ID	1a	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	

1	Area draining to the BMP	74,758	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.8	
3	85^{th} percentile 24-hour rainfall depth	0.52	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2592	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	0.36	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.18	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%	36.7	%
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	0.289	
10	Target volume retention [Line 9 x Line 4]	749	cu. ft.

The City of SAN DIEGO	Project Name	Palm and Hollister	
	BMP ID	1a	

	Volume Retention from Biofiltration with Partial Retention BMPs	Worksheet B.5-3	
1	Area draining to the BMP	74,758	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.8	
3	85^{th} percentile 24-hour rainfall depth	0.52	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2592	cu. ft.
BMP Parameters			
5	Footprint of the BMP	1100	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	0	inches
7	Media retained pore space [50% of (Field Capacity-Wilting Point)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	26	inches
9	Porosity of aggregate storage	0.4	in/in
10	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	0.36	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11]	0.18	in/hr.
Evapotranspiration: Average Annual Volume Retention			
13	Effective evapotranspiration depth [Line 6 x Line 7]	0	inches
14	Retained Pore Volume [(Line 13 x Line 5)/12]	0	cu. ft.
15	Fraction of DCV retained in pore spaces [Line 14/Line 4]	0.00	
16	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	0.0	%
Infiltration: Average Annual Volume Retention			
17	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	58	hours
18	Equivalent DCV fraction from evapotranspiration (use Line 16 and Line 17 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.00	
19	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	953	cu. ft.
20	Infiltration Storage Fraction of DCV [Line 19/Line 4]	0.37	
21	Total Equivalent Fraction of DCV [Line 18 + Line 20]	0.37	
22	Biofiltration BMP average annual capture [use Line 21 and 17 in Figure B.4-1]	37.84	%
23	Fraction of DCV retained (Figure B.5-3) $0.0000013 \times \text{Line } 22^3 - 0.000057 \times \text{Line } 22^2 + 0.0086 \times \text{Line } 22 - 0.014$	0.300	
24	Volume retention achieved by biofiltration BMP [Line 23 x Line 4]	777	cu. ft.

Volume Retention = 777 cubic feet

The City of SAN DIEGO	Project Name	Palm and Hollister	
	BMP ID	2a	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	149,466	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.8	
3	85^{th} percentile 24-hour rainfall depth	0.52	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	5181	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	0.36	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.18	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%	36.7	%
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	0.289	
10	Target volume retention [Line 9 x Line 4]	1497	cu. ft.

The City of SAN DIEGO	Project Name	Palm and Hollister	
	BMP ID	2a	

	Volume Retention from Biofiltration with Partial Retention BMPs	Worksheet B.5-3	
1	Area draining to the BMP	149,466	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.8	
3	85th percentile 24-hour rainfall depth	0.52	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	5181	cu. ft.
BMP Parameters			
5	Footprint of the BMP	2300	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	0	inches
7	Media retained pore space [50% of (Field Capacity-Wilting Point)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	23	inches
9	Porosity of aggregate storage	0.4	in/in
10	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	0.36	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11]	0.18	in/hr.
Evapotranspiration: Average Annual Volume Retention			
13	Effective evapotranspiration depth [Line 6 x Line 7]	0	inches
14	Retained Pore Volume [(Line 13 x Line 5)/12]	0	cu. ft.
15	Fraction of DCV retained in pore spaces [Line 14/Line 4]	0.00	
16	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	0.0	%
Infiltration: Average Annual Volume Retention			
17	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	51	hours
18	Equivalent DCV fraction from evapotranspiration (use Line 16 and Line 17 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.00	
19	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	1763	cu. ft.
20	Infiltration Storage Fraction of DCV [Line 19/Line 4]	0.34	
21	Total Equivalent Fraction of DCV [Line 18 + Line 20]	0.34	
22	Biofiltration BMP average annual capture [use Line 21 and 17 in Figure B.4-1]	36.67	%
23	Fraction of DCV retained (Figure B.5-3) $0.0000013 \times \text{Line } 22^3 - 0.000057 \times \text{Line } 22^2 + 0.0086 \times \text{Line } 22 - 0.014$	0.289	
24	Volume retention achieved by biofiltration BMP [Line 23 x Line 4]	1497	cu. ft.

Volume Retention = 1497 cubic feet

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DCV CALCULATIONS FOR FLOW THROUGH BMPS

DMA 1a (BMP-2)

Design Capture Volume		**Worksheet B-2.1**		
1	85_{th} percentile 24-hr storm depth from Figure B.1-1	d=	0.52	inches
2	Area tributary to BMP (s)	A=	1.0	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.8	unitless
4	Street trees volume reduction	TCV=	0	cubic-feet
5	Rain barrels volume reduction (1 cubic foot=7.48 gallons)	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	1510	cubic-feet

DMA 1a (BMP-3)

Design Capture Volume		**Worksheet B-2.1**		
1	85_{th} percentile 24-hr storm depth from Figure B.1-1	d=	0.52	inches
2	Area tributary to BMP (s)	A=	0.6	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.8	unitless
4	Street trees volume reduction	TCV=	0	cubic-feet
5	Rain barrels volume reduction (1 cubic foot=7.48 gallons)	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	906	cubic-feet

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4/5/2023

DCV CALCULATIONS FOR FLOW THROUGH BMPS

DMA 2a (BMP-5)

Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.52	inches
2	Area tributary to BMP (s)	A=	1.94	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.8	unitless
4	Street trees volume reduction	TCV=	0	cubic-feet
5	Rain barrels volume reduction (1 cubic foot=7.48 gallons)	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	2930	cubic-feet

DMA 2a (BMP-6)

Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.52	inches
2	Area tributary to BMP (s)	A=	1.5	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.8	unitless
4	Street trees volume reduction	TCV=	0	cubic-feet
5	Rain barrels volume reduction (1 cubic foot=7.48 gallons)	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	2265	cubic-feet

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BMP-2

Flow-thru Design Flows		**Worksheet B.6-1**		
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67xLine 3)	$DCV_{flow\text{-}thru}$	1510	cubic-feet
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.00	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.80	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.160	cfs
	Required Treatment Flow Rate	**1.5Q=**	**0.240**	**cfs**

BMP-3

Flow-thru Design Flows		**Worksheet B.6-1**		
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67xLine 3)	$DCV_{flow\text{-}thru}$	906	cubic-feet
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	0.60	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.80	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.096	cfs
	Required Treatment Flow Rate	**1.5Q=**	**0.144**	**cfs**

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BMP-5

Flow-thru Design Flows		Worksheet B.6-1		
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67xLine 3)	$DCV_{flow\text{-}thru}$	2930	cubic-feet
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.94	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.80	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.310	cfs
	Required Treatment Flow Rate	**1.5Q=**	**0.466**	**cfs**

BMP-6

Flow-thru Design Flows		Worksheet B.6-1		
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67xLine 3)	$DCV_{flow\text{-}thru}$	2265	cubic-feet
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.50	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.80	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.240	cfs
	Required Treatment Flow Rate	**1.5Q=**	**0.360**	**cfs**

Vault Drawdown Calculation - VAULT-1

Project Name: Palm and Hollister
Project No: 3272
Date: 10/20/2022

Vault Drawdown Time:	**2.86**	**hrs**

Note: Drawdown time is calculated assuming an initial water surface depth equal to the invert of the lowest surface discharge opening in the outlet structure.

Underdrain Orifice Diameter:	**4.5**	in
C:	**0.6**	

Surface Depth (ft)	Volume (cf)	$Q_{orifice}$ (cfs)	ΔT (hr)	Total Time (hr)
5.37	5907.00	1.210	0.00	0.00
4.00	4400.00	1.038	0.37	0.37
3.00	3300.00	0.891	0.32	0.69
2.00	2200.00	0.716	0.38	1.07
1.00	1100.00	0.479	0.51	1.58
0.00	0.00	0.000	1.28	2.86

Vault Drawdown Calculation - Vault-2

Project Name: Palm and Hollister
Project No: 3272
Date: 10/20/2022

Vault Drawdown Time:	**2.54**	**hrs**

Note: Drawdown time is calculated assuming an initial water surface depth equal to the invert of the lowest surface discharge opening in the outlet structure.

Underdrain Orifice Diameter:	**7**	in
C:	**0.6**	

Surface Depth (ft)	Volume (cf)	$Q_{orifice}$ (cfs)	ΔT (hr)	Total Time (hr)
5.17	11891.00	2.841	0.00	0.00
4.00	9200.00	2.477	0.28	0.28
3.00	6900.00	2.117	0.28	0.56
2.00	4600.00	1.681	0.34	0.90
1.00	2300.00	1.082	0.46	1.36
0.00	0.00	0.000	1.18	2.54

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.

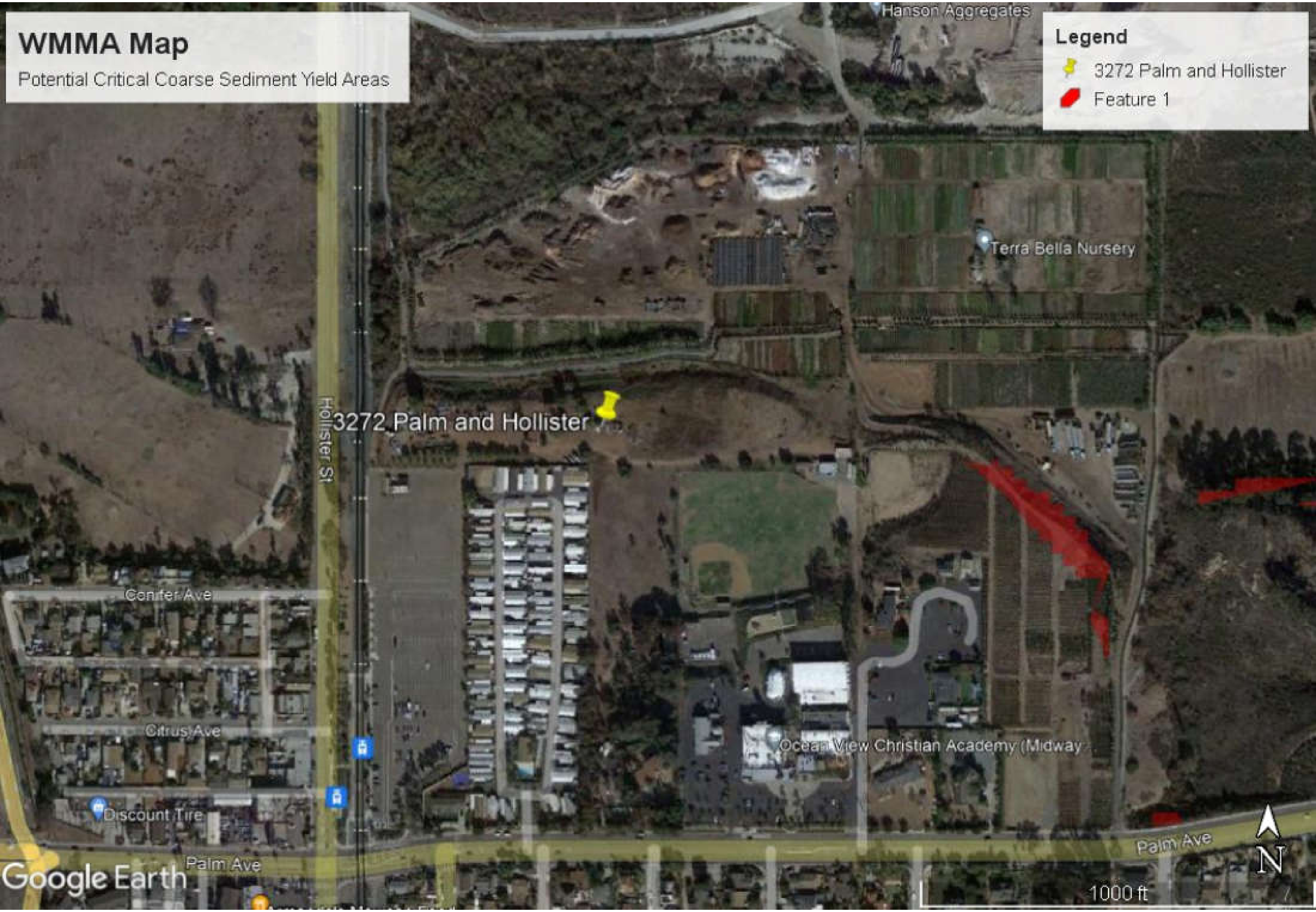
Project Name: Palm Hollister Apartments

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

Attachment 2b

Management of Critical Coarse Sediment Yield Areas



WMMA Map
Potential Critical Coarse Sediment Yield Areas
Legend
3272 Palm and Hollister
Feature 1
Hanson Aggregates
Terra Bella Nursery
3272 Palm and Hollister
Hollister St
Conifer Ave
Citrus Ave
Discount Tire
Ocean View Christian Academy (Midway
Palm Ave
Palm Ave
Google Earth
1000 ft
N

Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

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Project Name: Palm Hollister Apartments

Indicate which Items are Included:

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

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

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).

THE CITY OF SAN DIEGO

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

____

____

____

(THIS SPACE IS FOR RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:	ASSESSOR'S PARCEL NUMBER:	PROJECT NUMBER:
________________	______________________	______________

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

____;

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

____

(PROPERTY ADDRESS)

and more particularly described as:

____

(LEGAL DESCRIPTION OF PROPERTY)

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

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

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

Continued on Page 2

NOW, THEREFORE, the parties agree as follows:

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

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

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

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

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

See Attached Exhibit(s): ______________________________

____
(PROPERTY OWNER SIGNATURE)

____
(PRINT NAME AND TITLE)

____
(COMPANY/ORGANIZATION NAME)

____
(DATE)

THE CITY OF SAN DIEGO

APPROVED:

____
(DEPUTY CITY ENGINEER SIGNATURE)

____
(PRINT NAME)

____
(DATE)

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

MAINTENANCE

MWS – Linear

Hybrid Stormwater Filtration System

Modular Wetland Systems, Inc.
P.O. Box 869
Oceanside, CA 92049

www.modularwetlands.com
P 760-433-7640
F 760-433-3179

MAINTENANCE

Maintenance Summary –

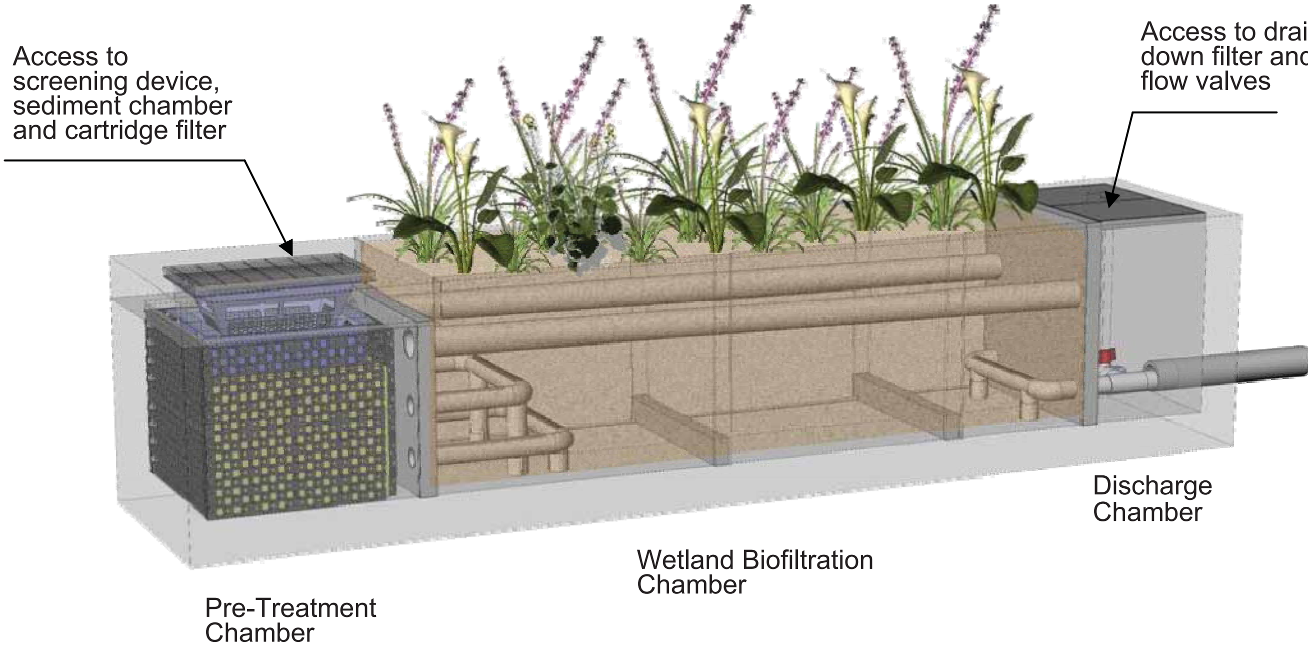
- **<u>Clean Bio Clean® Catch Basin Filter</u> – average maintenance interval is 3 to 6 months.**
    - ***(15 minute service time).***
- **<u>Clean Separation (sediment) Chamber</u> – average maintenance interval is 6 to 18 months.**
    - ***(30 minute service time).***
- **<u>Replace Cartridge Filter Media (BioMediaGREEN™)</u> – average maintenance interval 6 – 12 months.**
    - ***(45 minute service time).***
- **<u>Replace Drain Down Filter Media (BioMediaGREEN™)</u> – average maintenance interval is 6 to 12 months.**
    - ***(5 minute service time).***
- **<u>Trim Vegetations</u> – average maintenance interval is 3 to 6 months.**
    - ***(15 minute service time).***
- **<u>Evaluate Wetland Media Flow Hydraulic Conductivity</u> – average inspection interval is once per year.**
    - ***(5 minute inspection time).***
- **<u>Wetland Media Replacement</u> – average maintenance interval is 5 to 20 years.**
    - ***(6 hours).***

For more information on maintenance procedures, to order replacement media or find an authorized service company please contact:

Modular Wetland Systems, Inc
2972 San Luis Rey Road
Oceanside, CA 92058

Phone: 760-433-7640
Fax: 760-433-3176
Email: info@modularwetlands.com

System Diagram –



Maintenance Overview –

A. Every installed MWS – Linear unit is to be maintained by the Supplier, or a Supplier approved contractor. The cost of this service varies among providers.

B. The MWS – Linear is a multi-stage self-contained treatment train for stormwater treatment. Each stage protects subsequent stages from clogging. Stages include: screening, separation, cartridge media filtration, and biofiltration. The biofiltration stage contains various types of vegetation which will require annual evaluation and trimming.

> **1. <u>Clean Bio Clean® Catch Basin Filter</u> –** Screening is provided by well proven catch basin filter. The filter has a trash and sediment capacity of 2 (curb type) and 4 (grate type) cubic feet. The filter removes gross solids, including litter, and sediments greater than 200 microns. This procedure is easily done by hand or with a small industrial vacuum device. This filter is located directly under the manhole or grate access cover.
>
> **2. <u>Clean Separation (sediment) Chamber</u> –** separation occurs in the pre-treatment chamber located directly under the curb or grated inlet. This chamber has a capacity of approximately 21 cubic feet for trash, debris and sediments. This chamber targets TSS, and particulate metals and nutrients. This procedure can be performed with a standard vacuum truck. This chamber is located directly under the manhole or grate access cover.

3. **Replace Cartridge Filter Media (BioMediaGREEN™) –** Primary filtration is provided by a horizontal flow cartridge filter utilizing BioMediaGREEN blocks. Each cartridge has a media surface area of 35 square feet. The large surface area will insure long term operation without clogging. The cartridge filter with BioMediaGREEN targets fine TSS, metals, nutrients, hydrocarbons, turbidity and bacteria. Media life depends on local loading conditions and can easily be replaced and disposed of without any equipment. The filters are located in the pre-treatment chamber. Entry into chamber required to replace BioMediaGREEN blocks. Each cartridge contain 14 pieces of 20” tall BioMediaGREEN.

4. **Replace Drain Down Filter Media (BioMediaGREEN™) –** A drain down filter, similar in function to the perimeter filter is located in the discharge chamber. This filter allows standing water to be drained and filtered out of the separation chamber. This addresses any vector issues, by eliminating all standing water within this system. Replacement of media takes approximately 5 minutes and is performed without any equipment.

5. **Trim Vegetations –** The system utilizes multiple plants in the biofiltration chamber to provide enhanced treatment for dissolved pollutants including nutrients and metals. The vegetation will need to be maintained (trimmed) as needed. This can be done as part of the project normal landscape maintenance. **NO FERTILIZER SHALL BE USED IN THIS CHAMBER.**

6. **Evaluate Wetland Media Flow Hydraulic Conductivity –** The systems flow can be assessed from the discharge chamber. This should be done during a rain event. By viewing into the discharge chamber the flow out of the system can be observed. If little to know flow is observed from the lower valve or orifice plate this is a sign of potential wetland media (biofiltration) maintenance needs.

7. **Wetland Media Replacement –** biofiltration is provided by an advance horizontal flow vegetated wetland. This natural filter contains a mix of sorptive media that supports abundant plant life. This biofilter targets the finest TSS, dissolved nutrients, dissolved metals, organics, pesticides, oxygen demanding substances and bacteria. This filter provides the final polishing step of treatment. If prior treatment stages are properly maintained, the life of this media can be up to 20 years. Replacement of the media is simple. Removal of spent media can be done with a shovel of a vacuum truck.

C. The MWS – Linear catch basin filter, separation chamber, cartridge filter media and wetland media are designed to allow for the use of vacuum removal of captured pollutants and spent filter media by centrifugal compressor vacuum units without causing damage to the filter or during normal cleaning and maintenance. Filter and chambers can be cleaned from finish surface through standard manhole or grate access.

Maintenance Procedures –

1. Clean Bio Clean® Catch Basin Filter – Modular Wetland Systems, Inc. recommends the **catch basin filter** be inspected and cleaned a minimum of once every six months and replacement of hydrocarbon booms once a year. The procedure is easily done with the use of any standard vacuum truck. *This procedure takes approximately 15 minutes.*

1. Remove grate or manhole to gain access to catch basin filter insert. Remove the deflector shield (grate type only) with the hydrocarbon boom attached. Where possible the maintenance should be performed from the ground surface. Note: entry into an underground stormwater vault such as an inlet vault requires certification in confined space training.
2. Remove all trash, debris, organics, and sediments collected by the inlet filter insert. Removal of the trash and debris can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screen of the filter.
3. Evaluation of the hydrocarbon boom shall be performed at each cleaning. If the boom is filled with hydrocarbons and oils it should be replaced. Attach new boom to basket with plastic ties through pre-drilled holes in basket. Place the deflector shield (grate type only) back into the filter.
4. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.
5. The hydrocarbon boom may be classified as hazardous material and will have to be picked up and disposed of as hazardous waste. Hazardous material can only be handled by a certified hazardous waste trained person (minimum 24-hour hazwoper).

2. Clean Separation (sediment) Chamber – Modular Wetland Systems, Inc. recommends the **separation chamber** be inspected and cleaned a minimum of once a year. The procedure is easily done with the use of any standard vacuum truck. *This procedure takes approximately 30 minutes.*

1. Remove grate or manhole to gain access to the catch basin filter.
2. Remove catch basin filter. Where possible the maintenance should be performed from the ground surface. Note: entry into an underground stormwater vault such as an inlet vault requires certification in confined space training.
3. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
4. Vacuum out separation chamber and remove all accumulated debris and sediments.
5. Replace catch basin filter, replace grate or manhole cover.
6. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

3. <u>Replace Cartridge Filter Media (BioMediaGREEN™)</u> – Modular Wetland Systems, Inc. recommends the **cartridge filters** media be inspected and cleaned a minimum of once a year. The procedure will require prior maintenance of separation chamber. *Replacement of media takes approximately 45 minutes.*

1. Remove grate or manhole to gain access to the catch basin filter.
2. Remove catch basin filter. Where possible the maintenance should be performed from the ground surface. Note: entry into an underground stormwater vault such as an inlet vault requires certification in confined space training.
3. Enter separation chamber.
4. Unscrew the two ½" diameter bolts holding the lid on each cartridge filter and remove lid and place outside of unit.
5. Remove each of the 14 BioMediaGREEN filter blocks in each cartridge and remove from chamber for disposal.
6. Spray down the outside and inside of the cartridge filter to remove any accumulated sediments.
7. Replace with new BioMediaGREEN filter blocks insuring the blocks are properly lined up and seated in the bottom.
8. Replace the lid and tighten down bolts.
9. Replace catch basin filter, replace grate or manhole cover.
10. Transport all debris, trash, organics, spent media and sediments to approved facility for disposal in accordance with local and state requirements.

4. <u>Replace Drain Down Filter Media (BioMediaGREEN™)</u> – Modular Wetland Systems, Inc. recommends the **drain down filter** be inspected and maintained a minimum of once a year. *Replacement of media takes approximately 5 minutes.*

1. Open hatch of discharge chamber
2. Enter chamber, unlatch drain down filter cover.
3. Remove BioMediaGREEN filter block
4. Replace with new block, replace and latch cover.
5. Exit chamber, close and lock down the hatch.
6. Transport spent media to approved facility for disposal in accordance with local and state requirements.

5. <u>Trim Vegetations</u> – Modular Wetland Systems, Inc. recommends the plants/vegetation be inspected and maintained a minimum of once a year. It is also recommended that the plants receive the same care as other landscaped areas. **Note: No fertilizer is to be used on this area.** *Trimming of vegetation takes approximately 15 minutes.*

<u>6. Evaluate Wetland Media Flow Hydraulic Conductivity</u> – Modular Wetland Systems, Inc. recommends system flow be inspected and observed a minimum of once a year. This needs to be done during a rain event. *Inspection and Observation takes approximately 5 minutes.*

1. Open hatch of discharge chamber
2. Observe the level of flow from the bottom valve or orifice plate.
3. If flow is steady and high the system is operating normally.

4. If little or no flow is observed exiting the valve possible maintenance to the biofiltration wetland chamber may be needed. Contact Modular Wetlands for further assistance.
5. Exit chamber, close and lock down the hatch.

<u>7. Wetland Media Replacement</u> – Modular Wetland Systems, Inc. recommends the wetland media be replaced a minimum of one every 20 years. *Inspection takes approximately 15 minutes. Replacement of rock media takes approximately 6 hours and requires a vacuum truck.*

1. Remove plants from the wetland chamber.
2. Use a vacuum truck or shovel to remove all wetland media.
3. Spray down the walls and floor of the chamber and vacuum out any accumulated pollutants.
4. Spray down perforated piping and netting of flow matrix and the inflow and outflow end to remove any accumulated pollutants.
5. Vacuum out any standing water from the media removal and insure the chamber is cleaning.
6. Use a small backhoe to fill chamber with new media. Call Modular Wetland Systems, Inc. for media delivery information.
7. Install BioMediaGREEN filter blocks across over the entire filter bed. Fill with media until 9” from top. The install filter blocks which are 3” thick. Fill the top 6” inches with wetland media.
8. Plant new vegetation in the same configuration and quantity as old vegetation. Dig down until the BioMediaGREEN is exposed. Cut out a small circle of the BioMediaGREEN. Remove plant from container including soil ball and place in the whole cut out of the BioMediaGREEN. Cover up with wetland media.
9. Spray down the plants and media with water to saturate.
10. Continue supplemental irrigation (spray or drip) for at lest 90 days.

7. Other Maintenance Notes –

1. Following maintenance and/or inspection, the maintenance operator shall prepare a maintenance/inspection record. The record shall include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanism. .
2. The owner shall retain the maintenance/inspection record for a minimum of five years from the date of maintenance. These records shall be made available to the governing municipality for inspection upon request at any time.
3. Any person performing maintenance activities must have completed a minimum of OSHA 24-hour hazardous waste worker (hazwoper) training.
4. Remove access manhole lid or grate to gain access to filter screens and sediment chambers. Where possible the maintenance should be performed from the ground surface. Note: entry into an underground stormwater vault such as an inlet vault requires certification in confined space training.
5. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.
6. The hydrocarbon boom is classified as hazardous material and will have to be picked up and disposed of as hazardous waste. Hazardous material can only be handled by a certified hazardous waste trained person (minimum 24-hour hazwoper).

Maintenance Sequence –

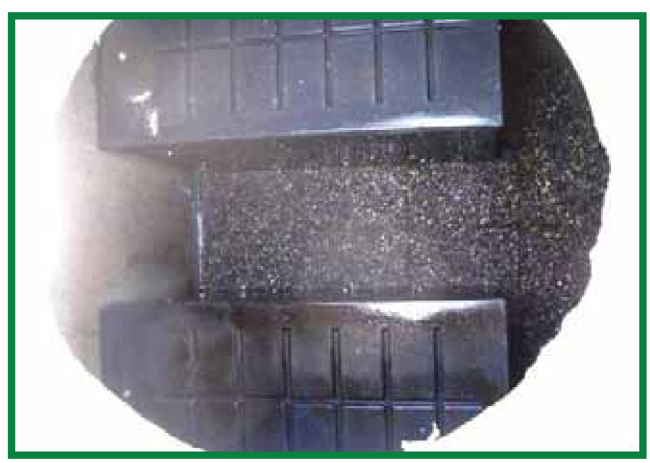
Access Pre-Treatment Chamber by Removing Manhole or Grate Cover

Assess Pollutant Loading in Catch Basin Filter and Sediment Chamber

Vacuum Catch Basin Filter

Remove Catch Basin Filter

Vacuum out the Sediment Chamber



Enter Chamber Remove Lids of Cartridge Filters

Remove Spent BioMediaGREEN Filter Blocks

Spray Down and Clean Cartridge Filter Housing

Replace with New BioMediaGREEN Filter Blocks and Replace Lid, then Catch Basin Filter and Replace Manhole or Grate

Open Discharge Chamber Lid to Asses Wetland Media Flow Rate and Replace Drain Down Filter Near Bottom

Evaluate Vegetation and Trim if Needed. Maintenance Complete.

Please Contact Modular Wetland Systems, Inc. for More Information:

760-433-7640

info@modularwetlands.com

StormTrap Maintenance Manual

1. Introduction

Regular inspections are recommended to ensure that the system is functioning as designed. Please call your Authorized StormTrap Representative if you have questions in regards to the inspection and maintenance of the StormTrap system. Prior to entry into any underground storm sewer or underground detention systems, appropriate OSHA and local safety regulations and guidelines should be followed.

2. Inspection Schedules for Municipalities

StormTrap Stormwater Management Systems are recommended for inspection whenever the upstream and downstream catch basins and stormwater pipes of the stormwater collection system are inspected or maintained. This will economize the cost of the inspection if it is done at the same time the Municipal crews are visiting the area.

3. Inspection Schedules for Private Development

StormTrap Stormwater Management Systems, for a private development, are recommended for inspection after each major storm water event. At a minimum, until a cleaning schedule can be established, an annual inspection is recommended. If inspected on an annual basis, the inspection should be conducted before the stormwater season begins to be sure that everything is functioning properly for the upcoming storm season.

4. Inspection Process

Inspections should be done such that at least 2-3 days has lapsed since the most recent rain event to allow for draining. Visually inspect the system at all manhole locations. Utilizing a sediment pole, measure and document the amount of silt at each manhole location. Inspect each pipe opening to ensure that the silt level or any foreign objects are not blocking the pipes. Be sure to inspect the outlet pipe(s) because this is typically the smallest pipe in the system. It is common that most of the larger materials will be collected upstream of the system in catch basins, and it is therefore important at time of inspections to check these structures for large trash or blockages.

Remove any blockages if you can during the inspection process only if you can do so safely from the top of the system without entering into the system**. Do not go into the system under any circumstances** without proper ventilation equipment and training. Pass any information requiring action onto the appropriate maintenance personnel if you cannot remove the blockages from above during the inspection process. Be sure to describe the location of each manhole and the type of material that needs to be removed.

The sediment level of the system should also be measured and recorded during the inspection process. Recording the sediment level at each manhole is very important in order get a history of sediment that can be graphed over time (i.e. years) in order to estimate when the system will need to be maintained next. It is also important to keep these records to verify that the inspection process was actually performed if anyone asks for your records in the future.

The sediment level in the underground detention system can be determined from the outside of the system by opening up all the manholes and using a sediment pole to measure the amount of sediment at each location. Force the stick to the bottom of the system and then remove it and measure the amount of sediment at that location. Again, do not go into the system under any circumstances without proper ventilation equipment and training.

5. When to Clean the System

Any blockages should be safely removed as soon as practical so that the Stormwater detention system will fill and drain properly before the next stormwater event.

The Dry Detention System should be completely cleaned whenever the sediment occupies more than 10% to 15% of the originally designed system's volume. The Wet Detention System should be cleaned when the sediment occupies more than 30% or 1/3rd of the originally designed system's volume. NOTE: Check with your municipality in regards to cleaning criteria, as the allowable sediment before cleaning may be more or less then described above.

6. How to Clean the StormTrap

The system should be completely cleaned back to 100% of the originally designed storage volume whenever the above sediment levels have been reached. Be sure to wait at least 3 days after a stormwater event to be sure that the system is completely drained (if it is a Dry Detention System), and all of the sediments have settled to the bottom of the system (if it is a Wet Detention System).

Do not enter the System unless you are properly trained, equipped, and qualified to enter a confined space as identified by local occupational safety and health regulations.

There are many maintenance companies that are in business to help you clean your underground stormwater detention systems and water quality units. Please call your StormTrap representative for referrals in your area.

A. Dry Detention System Cleaning

Maintenance is typically performed using a vacuum truck. Sediment should be flushed towards a vacuum hose for thorough removal. For a Dry Detention System, remove the manhole cover at the top of the system and lower a vacuum hose into one of the rows of the StormTrap system. Open up the manhole at the opposite end of the StormTrap and use sewer jetting equipment to force water in the same row from one end of the StormTrap row to the opposite side. The rows of the StormTrap are completely open in one contiguous channel from one end to the other for easy cleaning.

Place the vacuum hose and the sewer jetting equipment in the next row and repeat the process until all of the rows have been cleaned.

When finished, replace all covers that were removed and dispose of the collected material properly.

B. Wet Detention System Cleaning

If the system was designed to maintain a permanent pool of water, floatables and any oil should be removed in a separate procedure prior to the removal of all sediment.

The floatable trash is removed first by using a bucket strainer to capture and remove any floating debris.

The floatable oils are then removed off the top of the water by using the vacuum truck to suck off any floatable fluids and liquids.

The next step is to use the vacuum truck to gently remove the clarified water above the sediment layer.

The final step is to clean the sediment for each row as described above in the paragraph "A. Dry Detention System Cleaning". For smaller systems, the vacuum truck can remove all of the sediment in the basin without using the sewer jetting equipment because of the smaller space.

8. Proof of these inspections is the responsibility of the property owner. All inspection reports and data should be kept on site or at a location where they will be accessible for years in the future. Some municipalities require these inspection and cleaning reports to be forwarded to the proper governmental permitting agency on an annual basis.

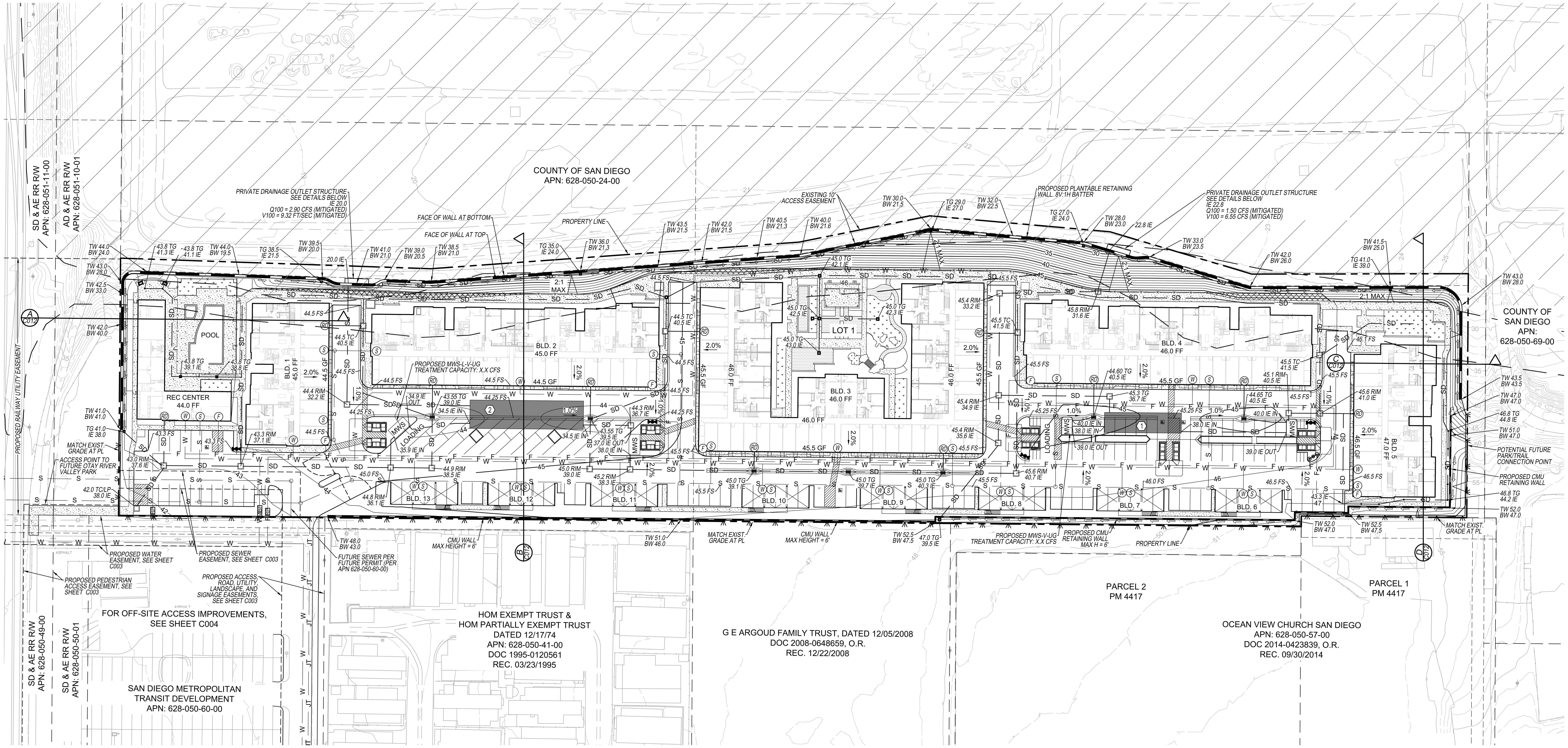
   Refer to your local and national regulations for any additional maintenance requirements and schedules not contained herein. Inspections should be a part of your standard operating procedure.

SAMPLE INSPECTION AND MAINTENANCE LOG

Date	Depth of Sediment	Accumulated Trash	Maintenance Performed	Maintenance Personnel	Comments
	3”	None	Sediment Removal/Vac	B. Johnson	

Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.



LEGEND

- PROPERTY LINE
- ADJACENT PARCEL LINE
- ROADWAY CENTERLINE
- EXISTING CONTOUR — 350
- EXISTING SEWER MANHOLE / MAIN — S
- EXISTING PUBLIC SANITARY SEWER MAIN — S
- EXISTING PUBLIC WATER MAIN — W
- EXISTING STORM DRAIN STRUCTURE
- PROPOSED CONTOUR — 350
- PROPOSED 6" PCC CURB
- PROPOSED 6" PCC CURB & GUTTER
- LIMIT OF GRADING LINE
- PROPOSED SEWER MANHOLE (SMH) — S
- PROPOSED PRIVATE FIRE MAIN — F
- PROPOSED PRIVATE WATER MAIN — W
- PROPOSED PRIVATE SANITARY SEWER MAIN — S
- PROPOSED STORM DRAIN — SD
- PROPOSED DRY UTILITY JOINT TRENCH — JT
- PROPOSED STORM DRAIN STRUCTURE / INLET
- PROPOSED UNDERGROUND STORM WATER CISTERN
- PROPOSED MODULAR WETLAND SYSTEM — MWS
- BUILDING FIRE SERVICE — F
- BUILDING WATER SERVICE — W
- BUILDING SEWER SERVICE — S
- BUILDING ROOF DRAIN — RD
- PROPOSED BROW DITCH
- PROPOSED RETAINING WALL
- PROPOSED DECK OVERHANG PER LANDSCAPE SHEETS
- PROPOSED DOMESTIC WATER METER AND BACKFLOW DEVICE — M BF
- PROPOSED FIRE SERVICE BACKFLOW — RP
- PROPOSED PRIVATE FIRE HYDRANT
- PROPOSED PRIVATE FDC/PIV
- PROPOSED CONCRETE SIDEWALK PER LANDSCAPE SHEETS
- PROPOSED DECOMPOSED GRANITE PER LANDSCAPE SHEETS
- PROPOSED ARTIFICIAL TURF PER LANDSCAPE SHEETS
- EXISTING FEMA ZONE AE PER MAP NUMBER 06073C2154H REVISED APRIL 5, 2016
- EXISTING FEMA ZONE X PER MAP NUMBER 06073C2154H REVISED APRIL 5, 2016
- SITE SECTION (SEE SHEET C012) — C / C012

GRADING QUANTITIES

TOTAL SITE AREA	5.92 ACRES
GRADED AREA	5.50 ACRES
CUT QUANTITIES	15,000 CY
FILL QUANTITIES	38,500 CY
IMPORT	23,500 CY
MAX CUT DEPTH	13 FT
MAX FILL DEPTH	25 FT
MAX SLOPE	2:1

NOTE:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THEIR OWN INDEPENDENT QUANTITY & MATERIAL TAKE-OFFS TO CONSTRUCT THE DESIGN AS INDICATED ON THESE DRAWINGS & IN CONFORMANCE WITH THE PROJECT'S GEOTECHNICAL REPORT & SUBSEQUENT UPDATE LETTERS.

REMEDIAL GRADING QUANTITIES

TOTAL VOLUME: 67,000 CY
MAX CUT: 17 FT

STORM DRAINAGE SYSTEM

1. THIS PROJECT WILL NOT DISCHARGE ANY INCREASE IN STORM WATER RUN-OFF ONTO THE EXISTING HILLSIDE AREAS.
2. AT THE STORM WATER DISCHARGE LOCATIONS, SUITABLE ENERGY DISSIPATERS ARE TO BE INSTALLED TO REDUCE THE DISCHARGE TO NON-ERODIBLE VELOCITIES.
3. MULTIPLE STORM WATER DISCHARGE LOCATIONS WILL BE USED TO MIMIC THE EXISTING DRAINAGE PATTERN.
4. RUNOFF QUALITY WILL BE MAINTAINED USING BEST MANAGEMENT PRACTICES (BMPS) IN ACCORDANCE WITH THE STORM WATER QUALITY MANAGEMENT PLAN (SWQMP). MODIFICATION OF BMP TYPE MAY BE REQUIRED DURING FINAL DESIGN OF PROJECT. MODIFICATIONS OR CHANGES SHALL BE ACCOMPLISHED BY APPROVED ADDENDUM TO THE SWQMP AT FINAL DESIGN. ALL STORM WATER BMPS SHALL BE MAINTAINED BY THE STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT EXECUTED WITH THE FINAL DESIGN.
5. ALL STORM DRAINS WILL BE 12 INCHES IN DIAMETER UNLESS OTHERWISE NOTED.
6. BIO SWALES TO BE CONSTRUCTED IN ACCORDANCE WITH EPA AND/OR CALIFORNIA STORM WATER QUALITY ASSOCIATION GUIDELINES.
7. THE DRAINAGE SYSTEM PROPOSED FOR THIS SUBDIVISION AS SHOWN ON THE VESTING TENTATIVE MAP IS SUBJECT TO FINAL APPROVAL BY THE CITY ENGINEER DURING FINAL DESIGN.
8. ALL GRATE INLETS SHALL HAVE GRATES SAFE FOR PEDESTRIAN AND ARE TRAFFIC RATED.

STORM WATER CISTERN TABLE

BMP ID	BMP TYPE	STRUCTURAL BMP ID	OWNERSHIP	BMP VOLUME REQUIRED*	BMP VOLUME PROVIDED*	VAULT FLOOR ELEV.	PONDING ELEV.	VAULT SOFFIT	VAULT IE IN	VAULT IE OUT	LOW FLOW ORIFICE SIZE (IN)	OVERFLOW WEIR LENGTH (FT)	OVERFLOW WEIR HEIGHT (FT)	OVERFLOW WEIR ELEV.
1	CISTERN (HU-1)	BMP 1	AMBIENT COMMUNITIES	7,192 CF	7,192 CF	37.00	42.37	42.67	38.00	37.00	4"	14	0.3	42.37
2	CISTERN (HU-1)	BMP 2	AMBIENT COMMUNITIES	14,807 CF	14,807 CF	33.50	38.67	38.17	34.50	33.50	6"	13	0.5	38.67

* BMP VOLUMES INCLUDE A 26" GRAVEL LAYER FOR BMP 1 AND AN 23" GRAVEL LAYER FOR BMP 2, BELOW THE VAULT.

ONSITE UTILITY TABLE

UTILITY TYPE	UTILITY STATUS	UTILITY NOTES
WATER	UNDERGROUND	PROPOSED
SEWER	UNDERGROUND	PROPOSED
STORM DRAIN	UNDERGROUND	PROPOSED
FIRE	UNDERGROUND	PROPOSED
ELECTRICAL	UNDERGROUND	EXISTING OVERHEAD UTILITY TO BE UNDERGROUNDED PER SDGE WORK ORDER NO.
GAS	UNDERGROUND	PROPOSED

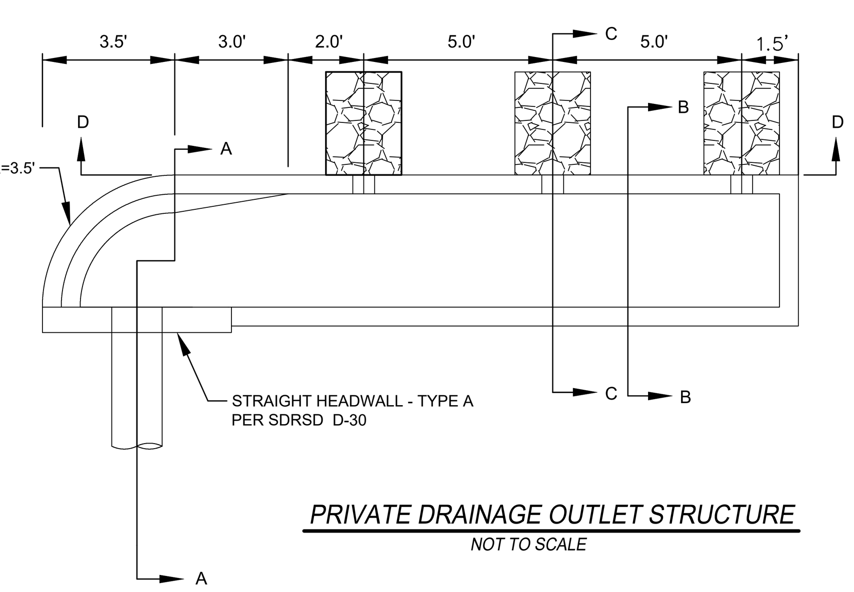
NOTE: THE SUBDIVIDER SHALL ENSURE THAT ALL ONSITE UTILITIES SERVING THE SUBDIVISION SHALL BE UNDERGROUNDED WITH THE APPROPRIATE PERMITS

IMPERVIOUS AREAS

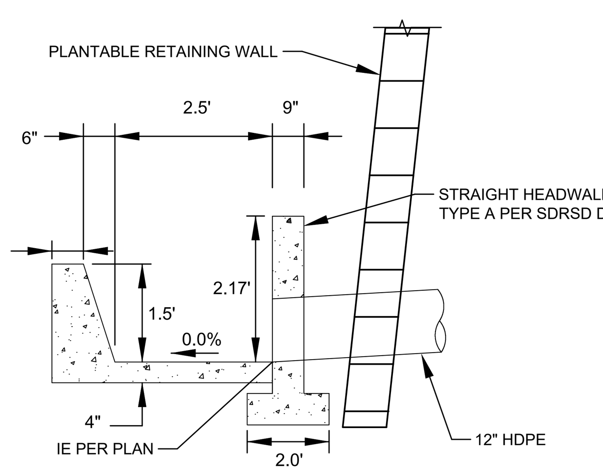
TOTAL DISTURBANCE AREA:	5.59 ACRES
EXISTING AMOUNT OF IMPERVIOUS AREA:	0.07 ACRES
PROPOSED AMOUNT OF IMPERVIOUS AREA:	4.28 ACRES
AMOUNT OF REPLACED IMPERVIOUS AREA:	0.07 CY
EXISTING AMOUNT OF PERVIOUS AREA:	5.85 CY
PROPOSED AMOUNT OF PERVIOUS AREA:	1.31 ACRES
TOTAL IMPERVIOUS AREA:	4.28 ACRES
IMPERVIOUS % INCREASE:	6114%

STORM WATER BMP NOTE:

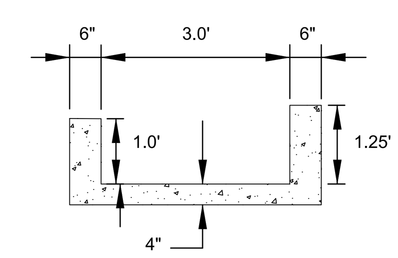
THE PROPOSED PROJECT WILL COMPLY WITH ALL THE REQUIREMENTS OF THE CURRENT CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL BEFORE A GRADING OR BUILDING PERMIT IS ISSUED. IT IS THE RESPONSIBILITY OF THE OWNER/DESIGNER/ APPLICANT TO ENSURE THAT THE CURRENT STORM WATER PERMANENT BMP DESIGN STANDARDS ARE INCORPORATED INTO THE PROJECT.



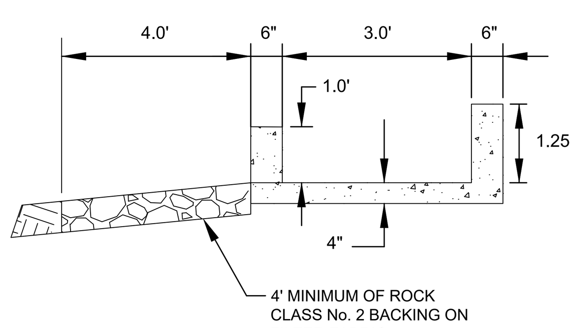
PRIVATE DRAINAGE OUTLET STRUCTURE
NOT TO SCALE



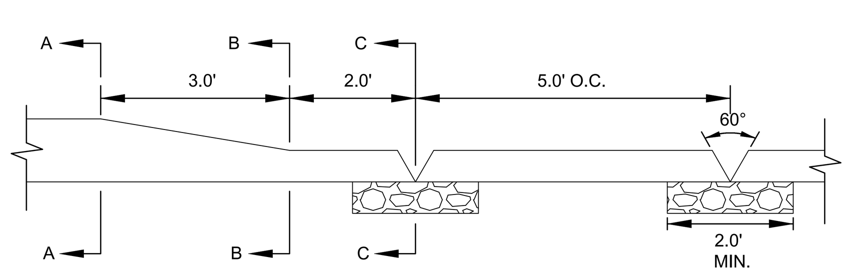
SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE



SECTION C-C
NOT TO SCALE



SECTION D-D
NOT TO SCALE

GRAPHIC SCALE: 1" = 40'
40 20 0 40 80 120

APPROVAL NUMBERS:

VESTING TENTATIVE MAP APPROVAL NO. 2587526
SDP APPROVAL NO. 2587528
NDP APPROVAL NO. 2596225
REZONE NO. 2587530

VESTING TENTATIVE MAP 2587526
PLANNED DEVELOPMENT PERMIT/SITE DEVELOPMENT PERMIT/REZONE
PALM HOLLISTER APARTMENTS
CITY OF SAN DIEGO, CALIFORNIA
THIS IS A PLANNED RESIDENTIAL DEVELOPMENT PROJECT AS DEFINED IN THE SAN DIEGO LAND DEVELOPMENT CODE

REGISTERED PROFESSIONAL ENGINEER
GREGORY W. LANG
RCE No. C68075
EXP. 06-30-23
CIVIL
STATE OF CALIFORNIA

PREPARED BY:
PASCO LARET SUITER & ASSOCIATES
San Diego | Encinitas | Orange County
Phone 858.259.8212 | www.plsaengineering.com

PROJECT ADDRESS:
555 HOLLISTER STREET
SAN DIEGO, CA 92154

SHEET No. / TITLE:
GRADING AND DRAINAGE
SHEET C005

PROJECT NO: 698277

REVISION 10:
REVISION 9:
REVISION 8:
REVISION 7:
REVISION 6:
REVISION 5:
REVISION 4:
REVISION 3: 12/02/22
REVISION 2: 07/08/22
REVISION 1: 03/22/22

ORIGINAL DATE: 11/11/21

Project Name: Palm Hollister Apartments

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

The plans must identify:

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

Attachment 5
Drainage Report

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

DRAINAGE STUDY
For:

Palm Hollister Apartments

PTS#:698277

APN 628-050-24-00
555 Hollister Street
San Diego, CA 92154

REGISTERED PROFESSIONAL ENGINEER
GREGORY W. LANG
No. RCE 68075
EXP. 06-30-23
Civil
STATE OF CALIFORNIA

Prepared By:

Gregory W. Lang, P.E. RCE 68075 EXP: 06-30-23
Pasco Laret Suiter & Associates, Inc.
119 Aberdeen Dr.
Cardiff, CA 92007

PASCO LARET SUITER
& ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING

Prepared for:
Ambient Communities
179 Calle Magdelena, Suite 201
Encinitas, CA 92024

October 2021
Revised July 2022
Revised December 2022
Revised April 2023

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Project Description

The project is located on a 5.92-acre site in the Otay Mesa-Nestor Community Plan area, north of Palm Avenue and east of Hollister Street in San Diego, California.

The project proposes to construct multi-family housing, walkways, parking areas, drive aisles, landscaping and amenities including a pool, bbq pavilion area, fitness center, co-working spaces, nature playground, game courts and seating areas.

Vicinity Map
Not to Scale

1.2 Existing Conditions

The project site consists of a previously graded large flat open space area composed mainly of dirt, with some vegetation and a few vacant structures. There is a steep northward facing vegetated slope along the north side of the site.

In the existing condition, the site consists of two major drainage basins. Drainage Basin 100 is the smaller of the two basins and includes the eastern portion of the site. Storm water flows overland from the southeastern corner of the site in a northerly direction and discharges along the northeastern border.

Drainage Basin 200 consists of the remainder of the site, the central and western portion. Stormwater flows overland from the southern border of the site in a northwesterly direction and discharges along the northern border.

Offsite runoff from a small area south of the site runs onto the site along the southeastern border.

For the locations of the existing drainage basins and discharge points refer to the Existing Condition Hydrology Exhibit located in Appendix 1.

Per the United States Department of Agriculture Web Soil Survey, the project site is underlain with Hydrologic Soil Group A and D soils. Refer to Appendix 2 for soil information.

Using the Rational Method procedure outlined in the 2017 City of San Diego Drainage Design Manual, a peak flow rate was calculated for the existing condition 100-year, 6-hour storm event. The table below summarizes the existing condition hydrologic data.

Summary of Existing Condition 100-yr Peak Discharge Rates

Discharge Node	Area (ac)	Q100 (cfs)
115	1.5	1.76
215	4.0	3.55

Refer to the existing condition hydrologic calculations included in Appendix 2 for detailed analysis.

1.3 Proposed Conditions

The proposed project consists of the construction of multi-family housing, walkways, parking areas, drive aisles, landscaping and amenities including a pool, bbq pavilion area, fitness center, co-working spaces, nature playground, game courts and seating areas.

In the proposed condition, the site consists of two major drainage basins to mimic the existing condition. Drainage Basin 100 is the smaller of the two basins and includes the eastern portion of the site. All onsite storm water from Drainage Basin 100, except for landscaped perimeter slopes, will be captured in proposed storm drain and conveyed to an open-bottom underground vault located in the central area of Drainage Basin 100. The underground vault will provide storage to mitigate the 100-year storm event. Flow from the vault will be conveyed northerly and discharge along the northeastern border as in the existing condition. Runoff from the landscaped perimeter slopes will not be conveyed to the vault and will discharge along the northeastern border.

Drainage Basin 200 consists of the remainder of the site, the central and western portions. Onsite storm water from Drainage Basin 200, except for landscaped perimeter slopes, will be captured in proposed storm drain and conveyed to an open-bottom underground vault located in the central area of Drainage Basin 200. The underground vault will provide storage to mitigate the 100-year storm event. Flow from the vault will be conveyed northerly and discharge along the northern border as in the existing condition. Runoff from the landscaped perimeter slopes will not be conveyed to the vault and will discharge along the northern border.

Existing offsite runoff from a small area south of the site that runs onto the site along the southeastern border will be captured in proposed storm drain and bypassed through the site and will discharge at the Drainage Basin 100 discharge location.

The proposed underground storage vaults provide mitigation for the 100-year storm event peak discharge. The vaults are sized to provide additional detention to mitigate for flow from the areas that bypass the vaults so that the final discharge is less than the existing condition. Each vault will be open-bottom above a gravel layer to provide partial infiltration per the Geotechnical Report recommendation. For the locations of the proposed drainage basins and discharge points refer to the Proposed Condition Hydrology Exhibit located in Appendix 1.

Using the Rational Method procedure outlined in the 2017 City of San Diego Drainage Design Manual, a peak flow rate was calculated for the proposed condition 100-year, 6-hour storm event. The table below summarizes the proposed condition hydrologic data.

Summary of Proposed Condition 100-yr Peak Discharge Rates

Discharge Node	Area (ac)	Q100 (cfs)	Q100 (cfs) Detained
150	1.9	6.94	1.55
265	3.7	13.44	3.24

Refer to the proposed condition hydrologic calculations included in Appendix 2 for detailed analysis.

1.4 Most Intense Use Conditions

The proposed project requires an amendment to the Otay Mesa-Nestor Community Plan to change the existing land use designation from Open Space to Residential Medium-High Density (20-35 du/nra) and a Rezone to change the existing zone from AR-1-2, RM-1-1, and RS-1-5 to RM-2-6. A Rezone requires the proposed project analyze the most intense use permitted under the new zone. Under the proposed RM-2-6 zone, the project site could be developed to construct up to 206 dwelling units. This equates to an additional eight dwelling units compared to the proposed project, which plans to construct a total of 198 dwelling units. Adding eight dwelling units would not affect the drainage study as the total proposed pervious and impervious areas would remain unchanged.

1.5 100-Year Floodplain Analysis

The project is along the southerly edge of the Otay River. The effective 100-year floodplain width varies from approximately 2,300 to 3,100 feet along the site. The maximum floodplain encroachment from the project is approximately 20 feet or less than 1 percent. The project does not encroach into the floodway, so it meets floodway regulations. Existing and proposed condition 100-year HEC-RAS analyses were performed and are included in Appendix 4. The results showed that the 100-year water surface elevations remained unchanged in many locations and did not vary more than 0.01 feet. The variation is well within the FEMA tie-in tolerance of 0.5 feet. Since the project has such a minor effect on the water surface elevations and the plan view floodplain, we do not believe it is necessary to process a CLOMR and LOMR. A CLOMR and LOMR would essentially preserve the existing elevations and the only alteration to the floodplain plotting will be a very minor realignment along the proposed wall. Such realignment would not be noticeable at the scale of the FIRM.

2. **METHODOLOGY**

Pursuant to the 2017 City of San Diego Drainage Design Manual, the Rational Method is recommended for analyzing the runoff response from drainage areas less than 0.5 square mile, therefore the Rational Method was used to analyze this project's hydrologic characteristics.

2.1 Rational Method

Runoff was calculated for the 100-year, 6-hour storm event using the Rational Method which is calculated using the following equation:

$Q = C \times I \times A$ Equation A-1 of 2017 City of SD Drainage Design Manual

Where:

Q = Flow rate in cubic feet per second (cfs)
C = Runoff coefficient (Table A-1 of City of SD Drainage Design Manual)
I = Rainfall Intensity in inches per hour (in/hr)
A = Drainage basin area in acres (ac)

2.2 Runoff Coefficient

The runoff coefficients for the project are based on Table A-1 and Footnote 2 from the 2017 City of San Diego Drainage Design Manual.

2.3 Rainfall Intensity

Rainfall intensity was determined using the Rainfall Intensity-Duration-Frequency Curves shown in Section A.1.3 of the 2017 City of San Diego Drainage Design Manual. Based on Figure A-1 and a 5-minute time of concentration, the 100-year intensity is 4.4 inches per hour.

2.4 Detention

The underground storage vaults provide mitigation for the 100-year storm event peak flow rate. The 100-year storm event detention analysis was performed using HydroCAD Stormwater Modeling software. The inflow runoff hydrographs to the vaults were modeled using RatHydro which is a Rational Method Design Storm Hydrograph software that creates a hydrograph using the results of the Rational Method calculations. HydroCAD has the ability to route the 100-year 6-hour storm event inflow hydrograph through the facilities considering dynamic tailwater effects. Based on the facility cross sectional geometry, stage storage and outlet structure data, HydroCAD calculates the detained peak flow rate and detained time to peak.

Based on the results of the HydroCAD analysis, mitigation for the 100-year storm event peak flow rate is provided, detaining the peak flow rate in the proposed condition to below the existing condition. Vault 1, located on the east half of the site is 1,100 square feet, 5.67 feet high, and includes a 26" deep gravel layer below the vault discharge pipe, providing a total storage volume of 7,192 cubic feet. Vault 2, located on the west half of the site, is 2,300 square feet, 5.67 feet high and includes a 23" gravel layer below the vault discharge pipe, providing a total storage volume of 14,807 cubic feet. Refer to Appendix 3 for the HydroCAD detention calculations and the plans for details of each facility.

2.5 Section 401/404 Water Quality Certification

This project does not have any waters of the United States (e.g., creek, drainage, wetland) on the property and does not require Federal permitting or approval.

3. CALCULATIONS / RESULTS

3.1 Existing and Proposed Peak Flow Comparison

The table below summarizes the 100-year 6-hour peak flow rate calculations for the project.

Summary of 100-yr Peak Discharge Rates

Existing					Proposed					Detained	
Discharge Node	Area (ac)	Runoff Coeff. C	Q100 (cfs)	V100 (ft/sec)	Discharge Node	Area (ac)	Runoff Coeff. C	Q100 (cfs)	V100 (ft/sec)	Q100 (cfs)	V100 (ft/sec)
115	1.5	0.35	1.76	1.71	150	1.9	0.95	6.94	10.94	1.55	6.99
215	4.0	0.35	3.55	1.39	265	3.7	0.95	13.44	14.77	3.24	10.19

In the proposed detained condition, the 100-year storm event peak discharge rates are lower than the existing flow rates. The proposed detained 100-year velocity will be dissipated below existing condition rates with large outfall structures and riprap pads as detailed on the grading plans so that no adverse impacts will occur downstream.

4. CONCLUSION

Based upon the analyses included in this report, the proposed underground vaults adequately mitigate the increase in peak runoff in the proposed condition to below the existing condition. The proposed project is designed to honor the existing condition discharge locations and flow rates so that there are no negative impacts to the downstream system or adjacent properties.

Appendix 1

Existing and Proposed Hydrology Exhibits

LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	
BASIN BOUNDARY	
BASIN SUBAREA BOUNDARY	
FLOW PATH	
BASIN SUBAREA	A=1.56
BASIN SUMMARY Q100 EXISTING (PRE MITIGATION)	(XX) X.XX AC X.XX CFS

HYDROLOGIC SOIL GROUP

HYDROLOGIC SOIL TYPE: A & D

DEPTH TO GROUNDWATER

5 FT <GROUNDWATER DEPTH > 10 FT

PROJECT CHARACTERISTICS

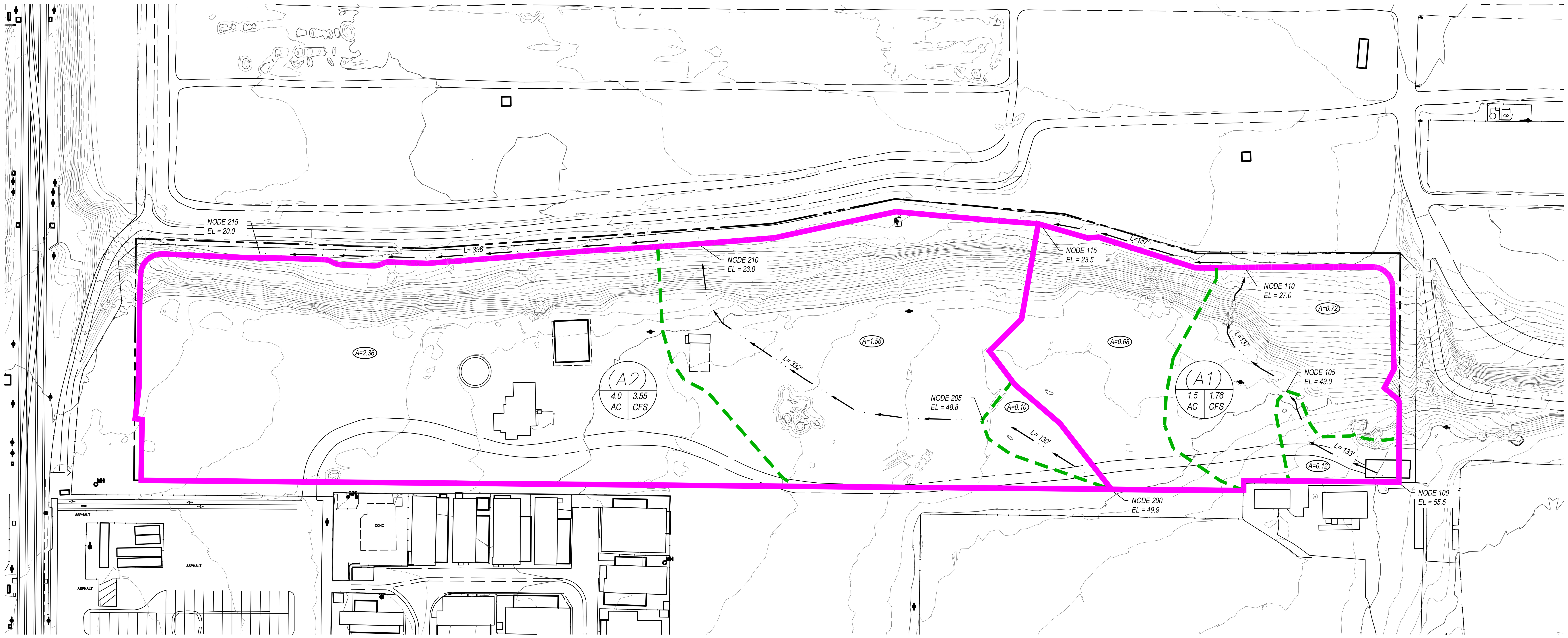
TOTAL SITE AREA: 5.92 AC

EXISTING IMPERVIOUS AREA: 0.07 AC

EXISTING LANDSCAPE AREA: 5.85 AC

SUMMARY OF EXISTING CONDITIONS

EXIST. DRAINAGE BASIN	EXIST. DRAINAGE AREA (AC)	RUNOFF COEFFICIENT, C	Q100 (CFS)
(A1)	1.5	0.35	1.76
(A2)	4.0	0.35	3.55



50' 25' 0 50' 100' 150'

GRAPHIC SCALE: 1" = 50'

PASCO LARET SUITER
& ASSOCIATES
San Diego | Encinitas | Orange County
Phone 858.259.8212 | www.plsaengineering.com

EXISTING CONDITION
DRAINAGE EXHIBIT
PALM AND HOLLISTER
SAN DIEGO, CA
PLSA JOB # 3272
SCALE 1"=50'
OCTOBER 2021
SHEET 1 OF 1

LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	
BASIN BOUNDARY	
BASIN SUBAREA BOUNDARY	
FLOW DIRECTION	
PROPOSED IMPERVIOUS AREA	
BASIN SUBAREA	A=1.56
BASIN SUMMARY Q100	XX X.XX AC X.XX CFS

HYDROLOGIC SOIL GROUP

HYDROLOGIC SOIL TYPE: A & D

DEPTH TO GROUNDWATER

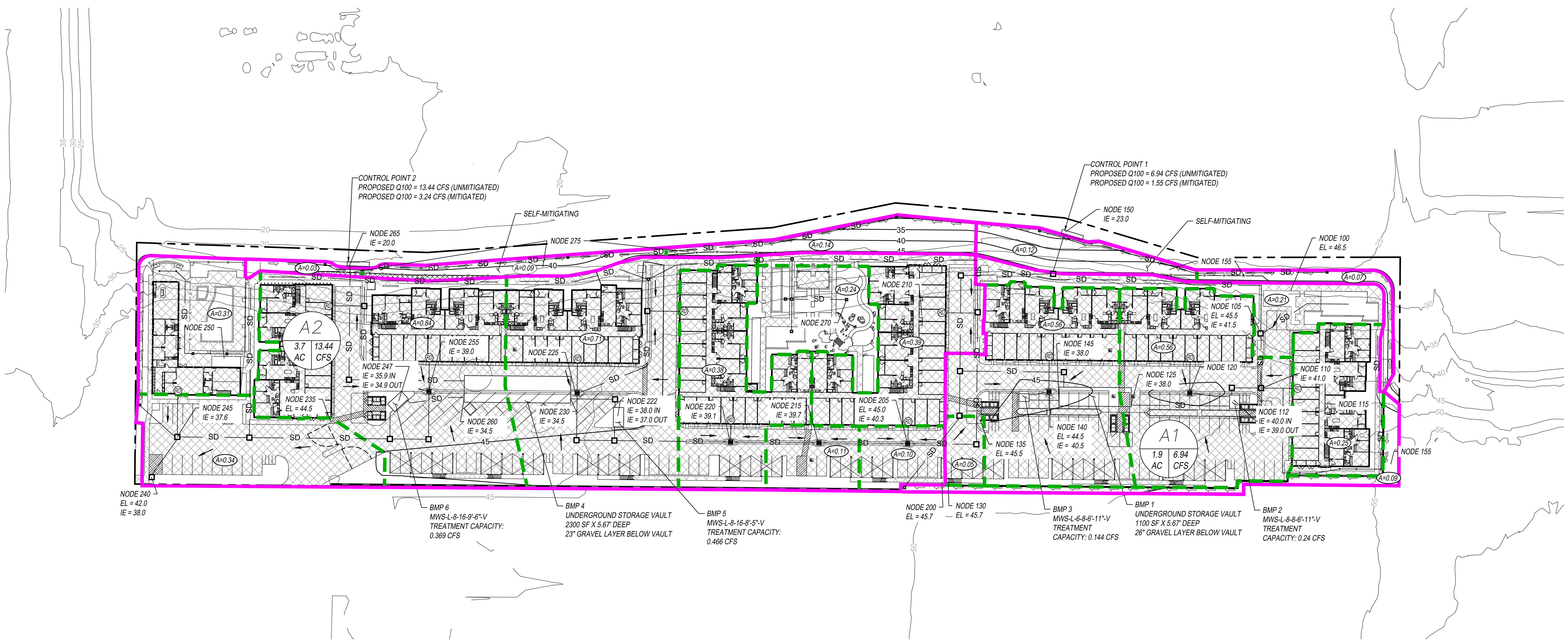
5 FT <GROUNDWATER DEPTH > 10 FT

PROJECT CHARACTERISTICS

TOTAL SITE AREA:	5.92 AC
PROPOSED DISTURBED AREA:	5.59 AC
PROPOSED IMPERVIOUS AREA:	4.28 AC
PROPOSED LANDSCAPE AREA:	1.31 AC

SUMMARY OF PROPOSED CONDITIONS

DRAINAGE BASIN	DRAINAGE AREA (AC)	RUNOFF COEFFICIENT, C	Q100 (CFS)	Q100 DETAINED (CFS)
A1	1.9	0.95	6.94	1.55
A2	3.7	0.95	13.44	3.24



50' 25' 0 50' 100' 150'

GRAPHIC SCALE: 1" = 50'

PASCO LARET SUITER & ASSOCIATES
San Diego | Encinitas | Orange County
Phone 858.259.8212 | www.plsaengineering.com

PROPOSED CONDITION DRAINAGE EXHIBIT

PALM AND HOLLISTER
SAN DIEGO, CA
PLSA JOB # 3272
SCALE 1"=50'
APRIL 2023
SHEET 1 OF 1

Appendix 2

Hydrology Support Material and Calculations

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).

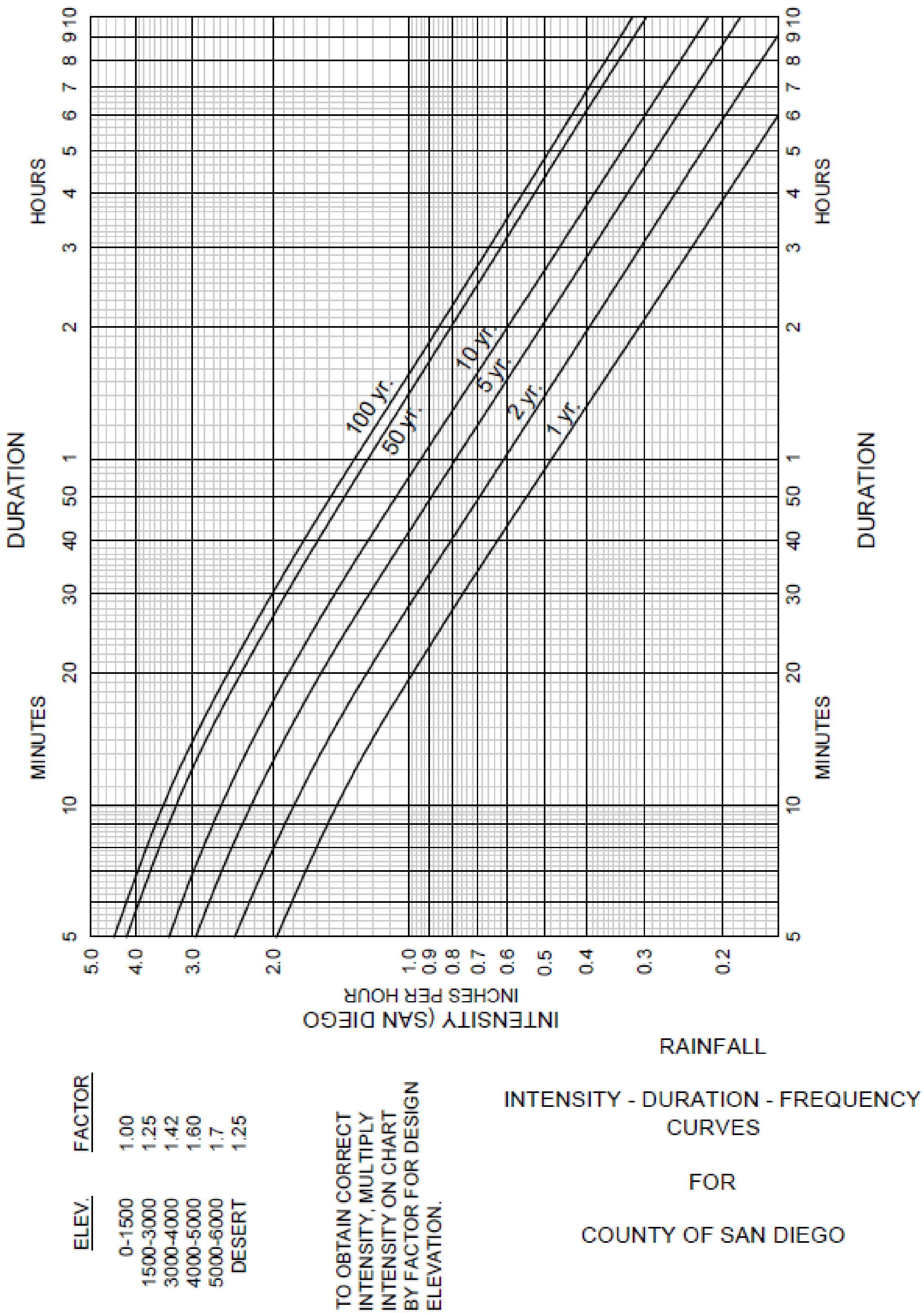
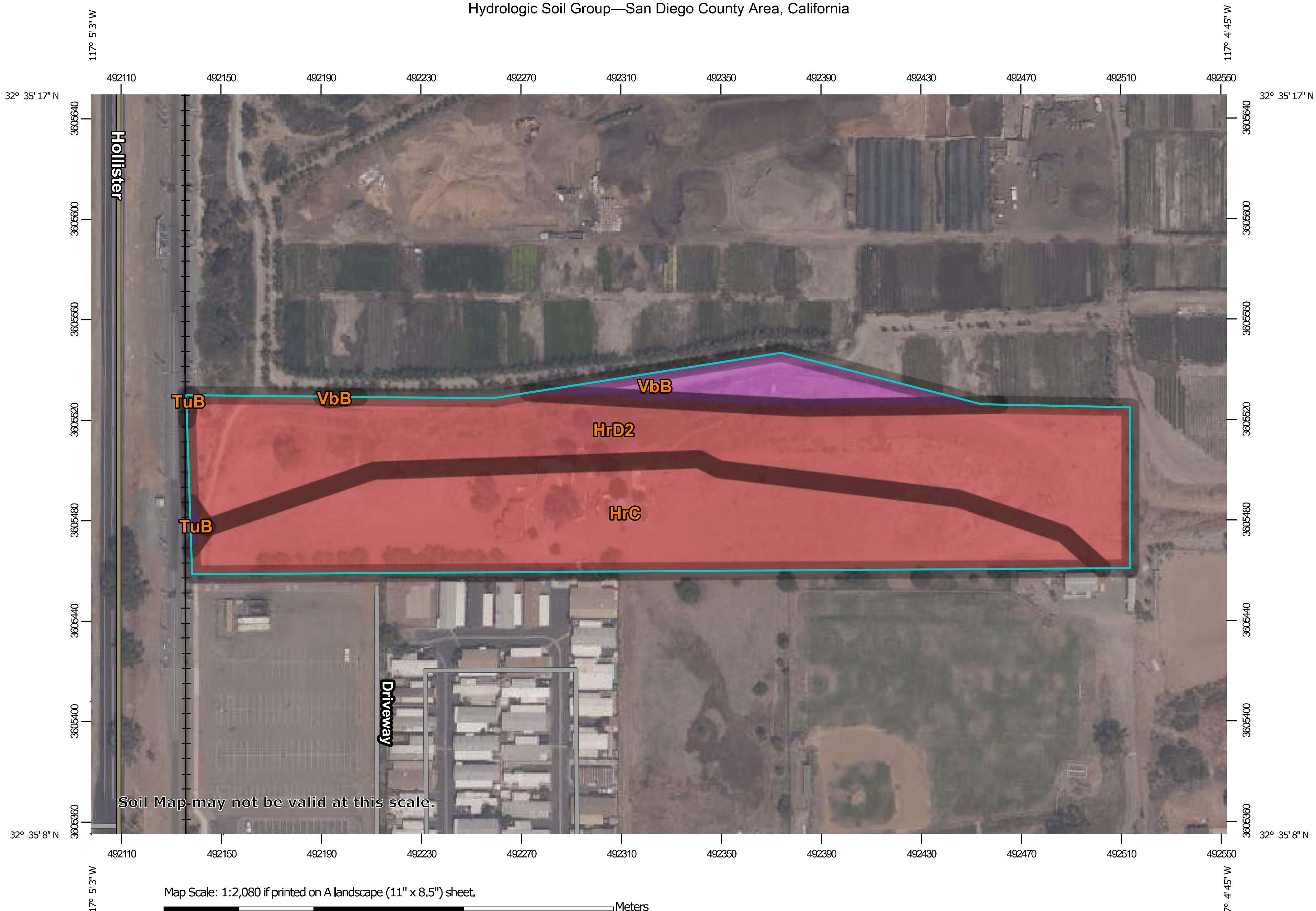
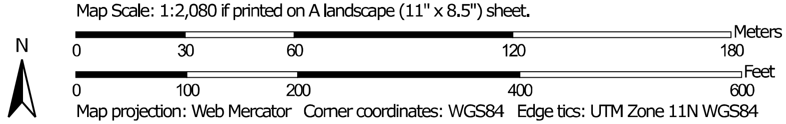


Figure A-1. Intensity-Duration-Frequency Design Chart



Map Scale: 1:2,080 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

Streams and Canals

Transportation

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

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 15, May 27, 2020

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

Date(s) aerial images were photographed: Aug 22, 2018—Aug 31, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
HrC	Huerhuero loam, 2 to 9 percent slopes	D	3.0	44.4%
HrD2	Huerhuero loam, 9 to 15 percent slopes, eroded	D	3.3	48.1%
TuB	Tujunga sand, 0 to 5 percent slopes	A	0.0	0.2%
VbB	Visalia gravelly sandy loam, 2 to 5 percent slopes	A	0.5	7.2%
Totals for Area of Interest			**6.8**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Existing Condition

```
____________________________________________________________________________
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                           Analysis prepared by:

                      PASCO LARET SUITER & ASSOCIATES
                        535 NORTH HIGHWAY 101, STE A
                           SOLANA BEACH, CA 92075
                                858-259-8212

 ************************* DESCRIPTION OF STUDY *************************
 * 3272  PALM AND HOLLISTER                                               *
 * EXISTING CONDITION                                                     *
 * 100-YR                                                                 *
 **************************************************************************

  FILE NAME: 3272E00.DAT
  TIME/DATE OF STUDY: 11:56 09/14/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   133.00
  UPSTREAM ELEVATION(FEET) =     55.50
  DOWNSTREAM ELEVATION(FEET) =     49.00
  ELEVATION DIFFERENCE(FEET) =      6.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.956
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
```

```
         (Reference: Table 3-1B of Hydrology Manual)
         THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.838
 SUBAREA RUNOFF(CFS) =      0.16
 TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     49.00  DOWNSTREAM(FEET) =     27.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   137.00   CHANNEL SLOPE =  0.1606
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR = 20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.587
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.61
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.73
 AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.32
 Tc(MIN.) =    9.28
 SUBAREA AREA(ACRES) =     0.72       SUBAREA RUNOFF(CFS) =    0.90
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
 TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       1.05

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.26
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =     270.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     27.00  DOWNSTREAM(FEET) =     23.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0187
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR = 10.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.317
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.45
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.62
 AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   1.93
 Tc(MIN.) =   11.21
 SUBAREA AREA(ACRES) =     0.68       SUBAREA RUNOFF(CFS) =    0.79
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
 TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.76

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   1.71
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =     457.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   130.00
 UPSTREAM ELEVATION(FEET) =     49.90
 DOWNSTREAM ELEVATION(FEET) =     48.80
 ELEVATION DIFFERENCE(FEET) =      1.10
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.405
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
         THE MAXIMUM OVERLAND FLOW LENGTH =    63.85
```

```
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.295
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     48.80  DOWNSTREAM(FEET) =     23.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   332.00   CHANNEL SLOPE =  0.0777
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.961
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.93
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.82
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   3.04
  Tc(MIN.) =   14.45
  SUBAREA AREA(ACRES) =     1.56       SUBAREA RUNOFF(CFS) =    1.62
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        1.7         PEAK FLOW RATE(CFS) =       1.72

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   2.24
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =     462.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     23.00  DOWNSTREAM(FEET) =     20.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.0076
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.523
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.25
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   5.26
  Tc(MIN.) =   19.71
  SUBAREA AREA(ACRES) =     2.36       SUBAREA RUNOFF(CFS) =    2.08
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        4.0         PEAK FLOW RATE(CFS) =       3.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   1.39
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     858.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        4.0  TC(MIN.) =     19.71
  PEAK FLOW RATE(CFS)    =       3.55
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Proposed Condition

```
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                           Analysis prepared by:

                      Pasco Laret Suiter & Associates
                             119 Aberdeen Drive
                         Cardiff, California 92007
                               858-259-8212

 ************************** DESCRIPTION OF STUDY **************************
 * 3272  PALM AND HOLLISTER                                                 *
 * PROPOSED CONDITION                                                       *
 * 100-YR                                                                   *
 **************************************************************************

  FILE NAME: 3272P00.DAT
  TIME/DATE OF STUDY: 10:34 04/03/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   12.0      7.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    46.00
  UPSTREAM ELEVATION(FEET) =     46.50
  DOWNSTREAM ELEVATION(FEET) =     45.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.414
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.50  DOWNSTREAM(FEET) =    41.00
  FLOW LENGTH(FEET) =    45.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.79
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.88
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    5.20
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =      91.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.362
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    1.04
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =      1.91
  TC(MIN.) =    5.20

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.00  DOWNSTREAM(FEET) =    40.00
  FLOW LENGTH(FEET) =    26.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.24
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.91
```

```
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    5.26
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =     118.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.350
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.56   SUBAREA RUNOFF(CFS) =    2.31
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       4.22
  TC(MIN.) =    5.26

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    39.00  DOWNSTREAM(FEET) =    38.00
  FLOW LENGTH(FEET) =    89.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.62
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.22
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    5.53
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =     207.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.53
  RAINFALL INTENSITY(INCH/HR) =   4.30
  TOTAL STREAM AREA(ACRES) =     1.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.22

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    63.00
  UPSTREAM ELEVATION(FEET) =     45.70
  DOWNSTREAM ELEVATION(FEET) =     45.50
  ELEVATION DIFFERENCE(FEET) =      0.20
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.405
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.21
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   45.50  DOWNSTREAM ELEVATION(FEET) =   44.50
  STREET LENGTH(FEET) =    86.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.34
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    8.14
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.79
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
  STREET FLOW TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =    5.80
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.248
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.950
  SUBAREA AREA(ACRES) =    0.56      SUBAREA RUNOFF(CFS) =    2.26
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       2.46

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.55
  FLOW VELOCITY(FEET/SEC.) =  2.05   DEPTH*VELOCITY(FT*FT/SEC.) =   0.65
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    140.00 =     149.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    40.50  DOWNSTREAM(FEET) =    38.00
  FLOW LENGTH(FEET) =    45.10   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  8.96
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.46
```

```
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    5.89
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    145.00 =     194.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    125.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.89
  RAINFALL INTENSITY(INCH/HR) =   4.23
  TOTAL STREAM AREA(ACRES) =     0.61
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.46

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.22     5.53        4.300         1.02
      2        2.46     5.89        4.232         0.61

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        6.53     5.53       4.300
      2        6.61     5.89       4.232

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.61   Tc(MIN.) =    5.89
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =     207.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    38.00  DOWNSTREAM(FEET) =    23.00
  FLOW LENGTH(FEET) =   294.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.94
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.61
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    6.33
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =     501.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.147
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8767
  SUBAREA AREA(ACRES) =    0.28   SUBAREA RUNOFF(CFS) =    0.52
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       6.94
  TC(MIN.) =    6.33
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
  UPSTREAM ELEVATION(FEET) =     45.70
  DOWNSTREAM ELEVATION(FEET) =     45.00
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.563
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    1.63
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       2.05
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    40.30  DOWNSTREAM(FEET) =    39.70
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.09
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.05
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    5.31
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     122.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.340
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
 SUBAREA AREA(ACRES) =    0.11   SUBAREA RUNOFF(CFS) =    0.45
 TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.47
 TC(MIN.) =    5.31

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    39.70  DOWNSTREAM(FEET) =    39.10
 FLOW LENGTH(FEET) =    76.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.26
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.47
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    5.61
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =     198.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.283
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
 SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    1.55
 TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       3.99
 TC(MIN.) =    5.61

****************************************************************************
 FLOW PROCESS FROM NODE    220.00 TO NODE    222.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    39.10  DOWNSTREAM(FEET) =    38.00
 FLOW LENGTH(FEET) =   114.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.24
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.99
 PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    5.98
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    222.00 =     313.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    225.00 TO NODE    222.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.214
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
 SUBAREA AREA(ACRES) =    0.71   SUBAREA RUNOFF(CFS) =    2.84
 TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       6.77
```

```
  TC(MIN.) =    5.98

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    222.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.214
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8940
  SUBAREA AREA(ACRES) =    0.24   SUBAREA RUNOFF(CFS) =    0.51
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       7.27
  TC(MIN.) =    5.98

****************************************************************************
  FLOW PROCESS FROM NODE    222.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.00  DOWNSTREAM(FEET) =    34.50
  FLOW LENGTH(FEET) =    45.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.41
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.27
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.05
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =     359.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.05
  RAINFALL INTENSITY(INCH/HR) =   4.20
  TOTAL STREAM AREA(ACRES) =     1.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.27

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   165.00
  UPSTREAM ELEVATION(FEET) =     44.50
  DOWNSTREAM ELEVATION(FEET) =     42.00
  ELEVATION DIFFERENCE(FEET) =      2.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.897
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.15
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.42
  TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      1.42
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      1.42
  TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      1.42

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    245.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    38.00  DOWNSTREAM(FEET) =    37.60
  FLOW LENGTH(FEET) =    39.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.04
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.42
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    5.16
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    245.00 =     204.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    245.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.369
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.31   SUBAREA RUNOFF(CFS) =    1.29
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.70
  TC(MIN.) =    5.16

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    247.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.60  DOWNSTREAM(FEET) =    35.90
  FLOW LENGTH(FEET) =   217.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.31
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.70
  PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =    6.01
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    247.00 =     422.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    247.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.209
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.84   SUBAREA RUNOFF(CFS) =    3.36
  TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       5.96
  TC(MIN.) =    6.01

****************************************************************************
  FLOW PROCESS FROM NODE    247.00 TO NODE    260.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.90  DOWNSTREAM(FEET) =    34.50
  FLOW LENGTH(FEET) =    60.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.01
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.96
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    6.21
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    260.00 =     483.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    230.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.21
  RAINFALL INTENSITY(INCH/HR) =   4.17
  TOTAL STREAM AREA(ACRES) =     1.49
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.96

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.27     6.05        4.201          1.93
      2        5.96     6.21        4.171          1.49

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       13.07     6.05       4.201
      2       13.18     6.21       4.171

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.18   Tc(MIN.) =    6.21
  TOTAL AREA(ACRES) =        3.4
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    230.00 =     483.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    265.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.50  DOWNSTREAM(FEET) =    20.00
  FLOW LENGTH(FEET) =   205.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.77
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      13.18
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    6.44
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    265.00 =     688.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    265.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.127
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8853
  SUBAREA AREA(ACRES) =    0.26   SUBAREA RUNOFF(CFS) =    0.48
  TOTAL AREA(ACRES) =        3.7   TOTAL RUNOFF(CFS) =      13.44
  TC(MIN.) =    6.44
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.7  TC(MIN.) =      6.44
  PEAK FLOW RATE(CFS)   =      13.44
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Proposed Mitigated Condition

```
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                              Analysis prepared by:

                         Pasco Laret Suiter & Associates
                               119 Aberdeen Drive
                            Cardiff, California 92007
                                  858-259-8212

 ************************** DESCRIPTION OF STUDY **************************
* 3272  PALM AND HOLLISTER                                                 *
* PROPOSED CONDITION  MITIGATED                                            *
* 100-YR                                                                   *
 **************************************************************************

  FILE NAME: 3272PD00.DAT
  TIME/DATE OF STUDY: 11:32 04/04/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   12.0      7.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    46.00
  UPSTREAM ELEVATION(FEET) =     46.50
  DOWNSTREAM ELEVATION(FEET) =     45.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.414
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.50  DOWNSTREAM(FEET) =    41.00
  FLOW LENGTH(FEET) =    45.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.79
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.88
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    5.20
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =      91.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.362
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    1.04
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =      1.91
  TC(MIN.) =    5.20

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.00  DOWNSTREAM(FEET) =    40.00
  FLOW LENGTH(FEET) =    26.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.24
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.91
```

```
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    5.26
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =     118.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.350
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.56   SUBAREA RUNOFF(CFS) =    2.31
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       4.22
  TC(MIN.) =    5.26

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    39.00  DOWNSTREAM(FEET) =    38.00
  FLOW LENGTH(FEET) =    89.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.62
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.22
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    5.53
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =     207.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    125.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.53
  RAINFALL INTENSITY(INCH/HR) =   4.30
  TOTAL STREAM AREA(ACRES) =     1.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.22

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    63.00
  UPSTREAM ELEVATION(FEET) =     45.70
  DOWNSTREAM ELEVATION(FEET) =     45.50
  ELEVATION DIFFERENCE(FEET) =      0.20
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.405
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.21
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.21
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.21

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   45.50  DOWNSTREAM ELEVATION(FEET) =   44.50
  STREET LENGTH(FEET) =    86.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 12.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.34
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    8.14
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.79
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
  STREET FLOW TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =    5.80
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.248
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.950
  SUBAREA AREA(ACRES) =    0.56      SUBAREA RUNOFF(CFS) =    2.26
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       2.46

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.55
  FLOW VELOCITY(FEET/SEC.) =  2.05   DEPTH*VELOCITY(FT*FT/SEC.) =   0.65
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    140.00 =     149.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    40.50  DOWNSTREAM(FEET) =    38.00
  FLOW LENGTH(FEET) =    45.10   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.96
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.46
```

```
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    5.89
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    145.00 =     194.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    125.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.89
  RAINFALL INTENSITY(INCH/HR) =   4.23
  TOTAL STREAM AREA(ACRES) =     0.61
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.46

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.22     5.53        4.300         1.02
      2        2.46     5.89        4.232         0.61

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        6.53     5.53       4.300
      2        6.61     5.89       4.232

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.61   Tc(MIN.) =    5.89
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =     207.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    125.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  15.59   RAIN INTENSITY(INCH/HOUR) =  2.85
  TOTAL AREA(ACRES) =     1.60   TOTAL RUNOFF(CFS) =      1.20

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    38.00  DOWNSTREAM(FEET) =    23.00
  FLOW LENGTH(FEET) =   294.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.99
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.20
  PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   16.29
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =     501.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    16.29
  RAINFALL INTENSITY(INCH/HR) =   2.80
  TOTAL STREAM AREA(ACRES) =     1.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.20

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    150.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =    6.33   RAIN INTENSITY(INCH/HOUR) =  4.15
  TOTAL AREA(ACRES) =     0.28   TOTAL RUNOFF(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.33
  RAINFALL INTENSITY(INCH/HR) =   4.15
  TOTAL STREAM AREA(ACRES) =     0.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.52

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        1.20    16.29        2.797          1.60
     2        0.52     6.33        4.147          0.28

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        0.99     6.33       4.147
     2        1.55    16.29       2.797

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.55   Tc(MIN.) =   16.29
  TOTAL AREA(ACRES) =        1.9
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =     501.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
  UPSTREAM ELEVATION(FEET) =     45.70
  DOWNSTREAM ELEVATION(FEET) =     45.00
  ELEVATION DIFFERENCE(FEET) =      0.70
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.563
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.42
```

```
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    1.63
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       2.05
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    40.30  DOWNSTREAM(FEET) =    39.70
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.09
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.05
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    5.31
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     122.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.340
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.11   SUBAREA RUNOFF(CFS) =    0.45
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.47
  TC(MIN.) =    5.31

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    39.70  DOWNSTREAM(FEET) =    39.10
```

```
  FLOW LENGTH(FEET) =    76.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.26
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.47
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    5.61
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =     198.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.283
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    1.55
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       3.99
  TC(MIN.) =    5.61

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    222.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    39.10  DOWNSTREAM(FEET) =    38.00
  FLOW LENGTH(FEET) =   114.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.24
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.99
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    5.98
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    222.00 =     313.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    222.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.214
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.71   SUBAREA RUNOFF(CFS) =    2.84
  TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       6.77
  TC(MIN.) =    5.98

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    222.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.214
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8940
  SUBAREA AREA(ACRES) =    0.24   SUBAREA RUNOFF(CFS) =    0.51
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       7.27
  TC(MIN.) =    5.98
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    222.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.00  DOWNSTREAM(FEET) =    34.50
  FLOW LENGTH(FEET) =    45.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.41
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.27
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.05
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =     359.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.05
  RAINFALL INTENSITY(INCH/HR) =   4.20
  TOTAL STREAM AREA(ACRES) =     1.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.27

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   165.00
  UPSTREAM ELEVATION(FEET) =     44.50
  DOWNSTREAM ELEVATION(FEET) =     42.00
  ELEVATION DIFFERENCE(FEET) =      2.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.897
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.15
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.42
  TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      1.42

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      1.42
  TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      1.42

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    245.00 IS CODE =  31
----------------------------------------------------------------------------
```

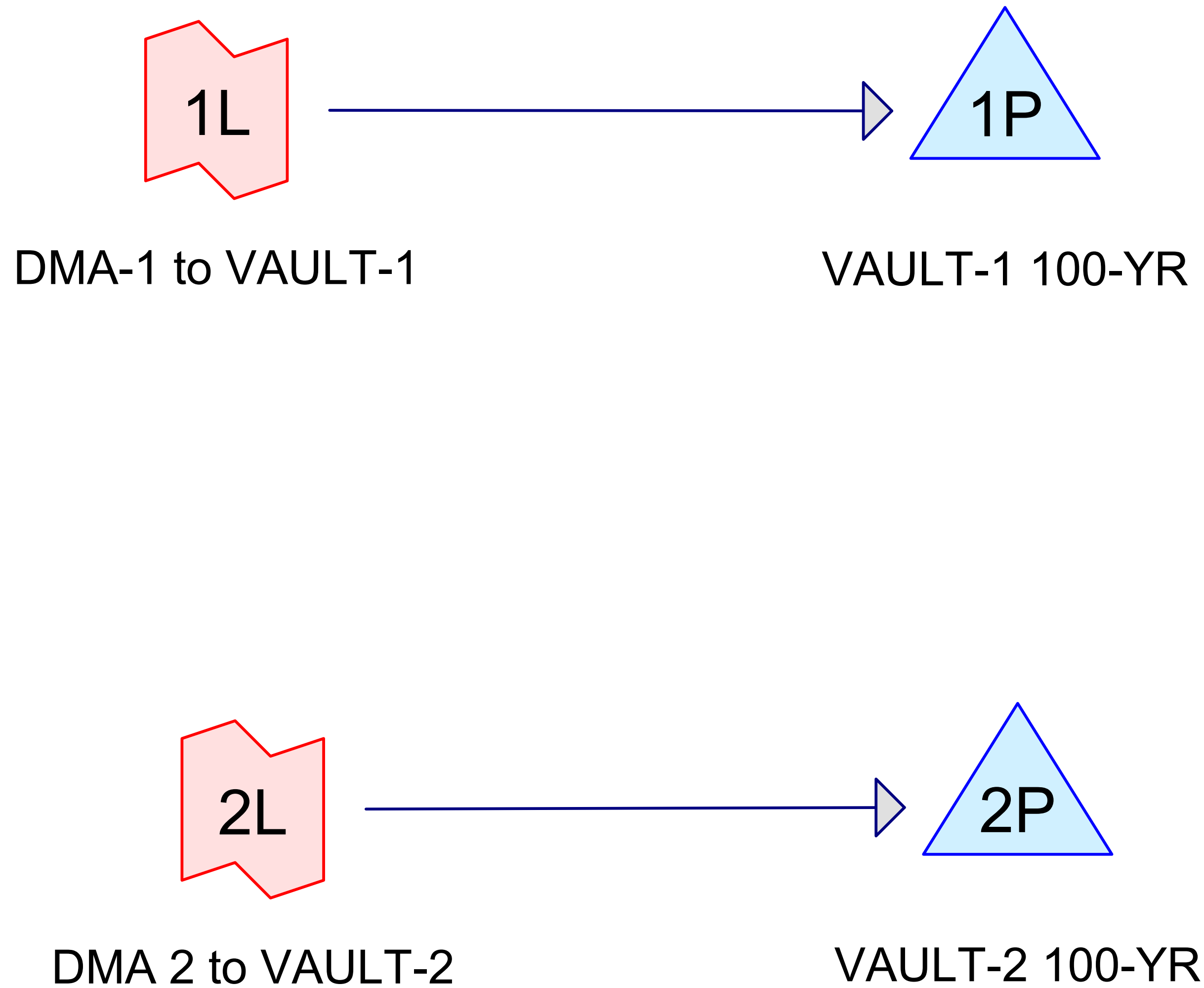
```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    38.00  DOWNSTREAM(FEET) =    37.60
  FLOW LENGTH(FEET) =    39.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.04
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.42
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    5.16
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    245.00 =     204.60 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    245.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.369
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.31   SUBAREA RUNOFF(CFS) =    1.29
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.70
  TC(MIN.) =    5.16

******************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    247.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    37.60  DOWNSTREAM(FEET) =    35.90
  FLOW LENGTH(FEET) =   217.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.31
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.70
  PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =    6.01
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    247.00 =     422.50 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    247.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.209
   *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9500
  SUBAREA AREA(ACRES) =    0.84   SUBAREA RUNOFF(CFS) =    3.36
  TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       5.96
  TC(MIN.) =    6.01

******************************************************************************
  FLOW PROCESS FROM NODE    247.00 TO NODE    260.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    34.90  DOWNSTREAM(FEET) =    34.50
  FLOW LENGTH(FEET) =    60.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.01
```

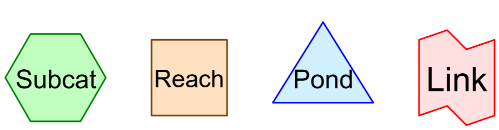
```
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.96
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    6.21
 LONGEST FLOWPATH FROM NODE    235.00 TO NODE    260.00 =     483.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    260.00 TO NODE    230.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.21
 RAINFALL INTENSITY(INCH/HR) =   4.17
 TOTAL STREAM AREA(ACRES) =     1.49
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.96

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        7.27     6.05        4.201         1.93
     2        5.96     6.21        4.171         1.49

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       13.07     6.05       4.201
     2       13.18     6.21       4.171

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      13.18   Tc(MIN.) =    6.21
 TOTAL AREA(ACRES) =         3.4
 LONGEST FLOWPATH FROM NODE    235.00 TO NODE    230.00 =     483.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    260.00 TO NODE    230.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  13.61   RAIN INTENSITY(INCH/HOUR) =  3.05
 TOTAL AREA(ACRES) =     3.40   TOTAL RUNOFF(CFS) =      2.89

****************************************************************************
 FLOW PROCESS FROM NODE    260.00 TO NODE    265.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    34.50  DOWNSTREAM(FEET) =    20.00
 FLOW LENGTH(FEET) =   205.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS    5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.19
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.89
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   13.95
 LONGEST FLOWPATH FROM NODE    235.00 TO NODE    265.00 =     688.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    265.00 TO NODE    265.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.95
  RAINFALL INTENSITY(INCH/HR) =   3.02
  TOTAL STREAM AREA(ACRES) =     3.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.89

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    265.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =    6.44   RAIN INTENSITY(INCH/HOUR) =  4.13
  TOTAL AREA(ACRES) =     0.26   TOTAL RUNOFF(CFS) =      0.48

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    275.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.44
  RAINFALL INTENSITY(INCH/HR) =   4.13
  TOTAL STREAM AREA(ACRES) =     0.26
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.48

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.89    13.95        3.016          3.40
      2        0.48     6.44        4.126          0.26

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        1.81     6.44       4.126
      2        3.24    13.95       3.016

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.24   Tc(MIN.) =   13.95
  TOTAL AREA(ACRES) =        3.7
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    275.00 =     688.50 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.7  TC(MIN.) =     13.95
  PEAK FLOW RATE(CFS)   =       3.24
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix 3

Detention Output





Routing Diagram for 3272
Prepared by Pasco Laret Suiter & Assoc, Printed 4/3/2023
HydroCAD® 10.20-2f s/n 10097 © 2022 HydroCAD Software Solutions LLC

Summary for Link 1L: DMA-1 to VAULT-1

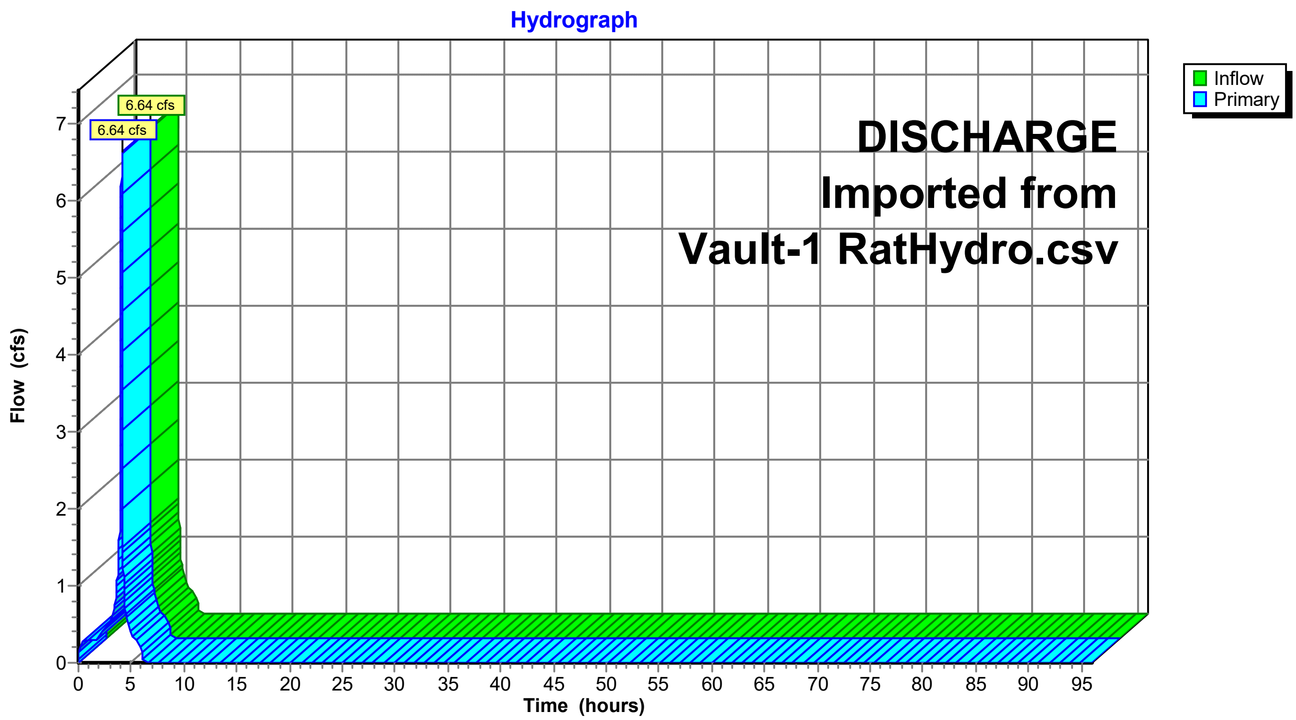
Inflow	=	6.64 cfs @	4.10 hrs,	Volume=	0.327 af
Primary	=	6.64 cfs @	4.10 hrs,	Volume=	0.327 af, Atten= 0%, Lag= 0.0 min

Routed to Pond 1P : VAULT-1 100-YR

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

DISCHARGE Imported from Vault-1 RatHydro.csv

Link 1L: DMA-1 to VAULT-1



Summary for Pond 1P: VAULT-1 100-YR

Inflow	=	6.64 cfs @	4.10 hrs, Volume=	0.327 af	
Outflow	=	1.21 cfs @	4.26 hrs, Volume=	0.327 af,	Atten= 82%, Lag= 9.7 min
Discarded	=	0.00 cfs @	0.11 hrs, Volume=	0.026 af	
Primary	=	1.20 cfs @	4.26 hrs, Volume=	0.300 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 105.28' @ 4.26 hrs Surf.Area= 1,100 sf Storage= 6,767 cf

Plug-Flow detention time= 210.8 min calculated for 0.326 af (100% of inflow)
Center-of-Mass det. time= 211.2 min (423.9 - 212.7)

Volume	Invert	Avail.Storage	Storage Description
#1	97.83'	7,192 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

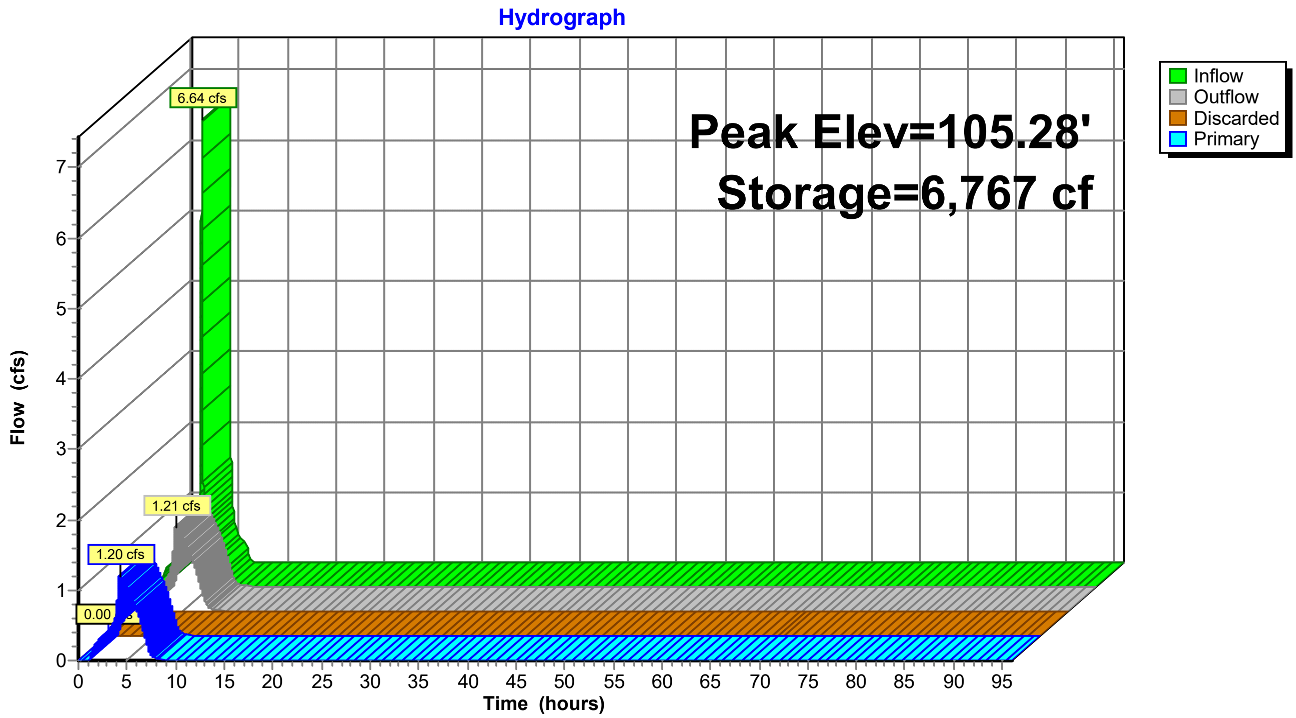
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
97.83	1,100	0.0	0	0	1,100
100.00	1,100	40.0	955	955	1,355
101.00	1,100	100.0	1,100	2,055	1,473
102.00	1,100	100.0	1,100	3,155	1,590
103.00	1,100	100.0	1,100	4,255	1,708
104.00	1,100	100.0	1,100	5,355	1,825
105.37	1,100	100.0	1,507	6,862	1,986
105.67	1,100	100.0	330	7,192	2,022

Device	Routing	Invert	Outlet Devices
#1	Primary	100.00'	**24.00" Round Culvert** L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 100.00' / 99.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	100.00'	**4.50" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	105.37'	**Custom Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.30 0.30 Width (feet) 14.00 14.00 0.00
#4	Discarded	97.83'	**0.180 in/hr Exfiltration over Surface area below 100.00'**

Discarded OutFlow Max=0.00 cfs @ 0.11 hrs HW=97.92' (Free Discharge)
└─**4=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.20 cfs @ 4.26 hrs HW=105.28' (Free Discharge)
└─**1=Culvert** (Passes 1.20 cfs of 39.13 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 1.20 cfs @ 10.87 fps)
  └─**3=Custom Weir** (Controls 0.00 cfs)

Pond 1P: VAULT-1 100-YR



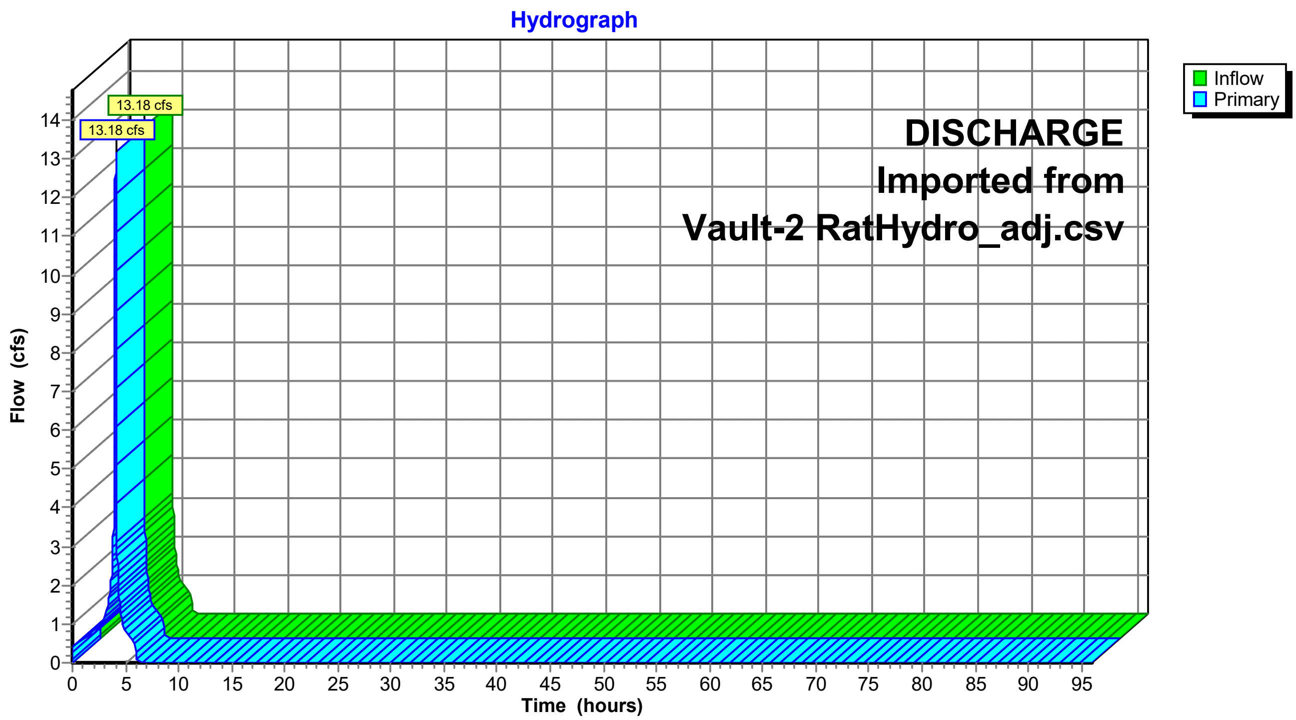
Summary for Link 2L: DMA 2 to VAULT-2

Inflow = 13.18 cfs @ 4.10 hrs, Volume= 0.694 af
Primary = 13.18 cfs @ 4.10 hrs, Volume= 0.694 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 2P : VAULT-2 100-YR

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

DISCHARGE Imported from Vault-2 RatHydro_adj.csv

Link 2L: DMA 2 to VAULT-2



Summary for Pond 2P: VAULT-2 100-YR

Inflow	=	13.18 cfs @	4.10 hrs,	Volume=	0.694 af
Outflow	=	2.90 cfs @	4.22 hrs,	Volume=	0.694 af, Atten= 78%, Lag= 7.4 min
Discarded	=	0.01 cfs @	0.09 hrs,	Volume=	0.050 af
Primary	=	2.89 cfs @	4.22 hrs,	Volume=	0.644 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 105.18' @ 4.22 hrs Surf.Area= 2,300 sf Storage= 13,682 cf

Plug-Flow detention time= 176.7 min calculated for 0.694 af (100% of inflow)
Center-of-Mass det. time= 177.1 min (389.9 - 212.8)

Volume	Invert	Avail.Storage	Storage Description
#1	98.08'	14,807 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

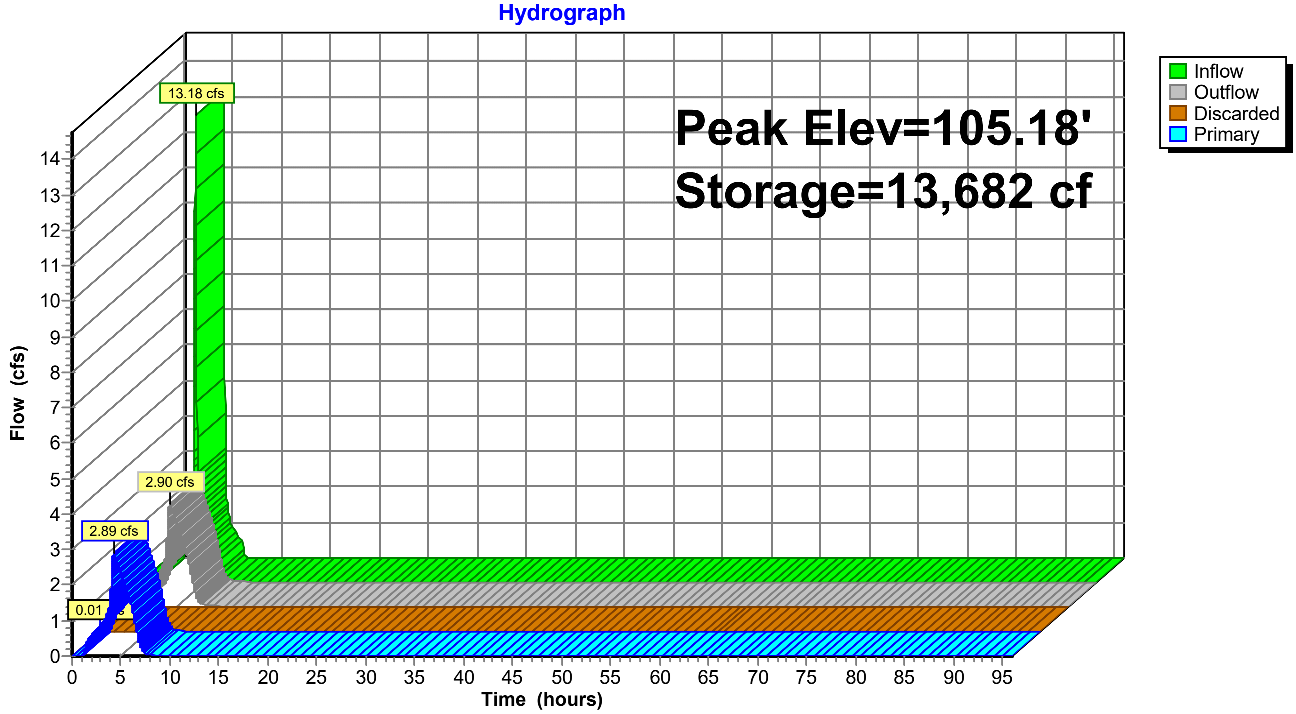
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
98.08	2,300	0.0	0	0	2,300
100.00	2,300	40.0	1,766	1,766	2,626
101.00	2,300	100.0	2,300	4,066	2,796
102.00	2,300	100.0	2,300	6,366	2,966
103.00	2,300	100.0	2,300	8,666	3,136
104.00	2,300	100.0	2,300	10,966	3,306
105.17	2,300	100.0	2,691	13,657	3,505
105.67	2,300	100.0	1,150	14,807	3,590

Device	Routing	Invert	Outlet Devices
#1	Primary	100.00'	**24.00" Round Culvert** L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 100.00' / 99.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	100.00'	**7.00" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	105.17'	**Custom Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 0.50 Width (feet) 13.00 13.00 0.00
#4	Discarded	98.08'	**0.180 in/hr Exfiltration over Surface area below 100.00'**

Discarded OutFlow Max=0.01 cfs @ 0.09 hrs HW=98.16' (Free Discharge)
└─**4=Exfiltration** (Exfiltration Controls 0.01 cfs)

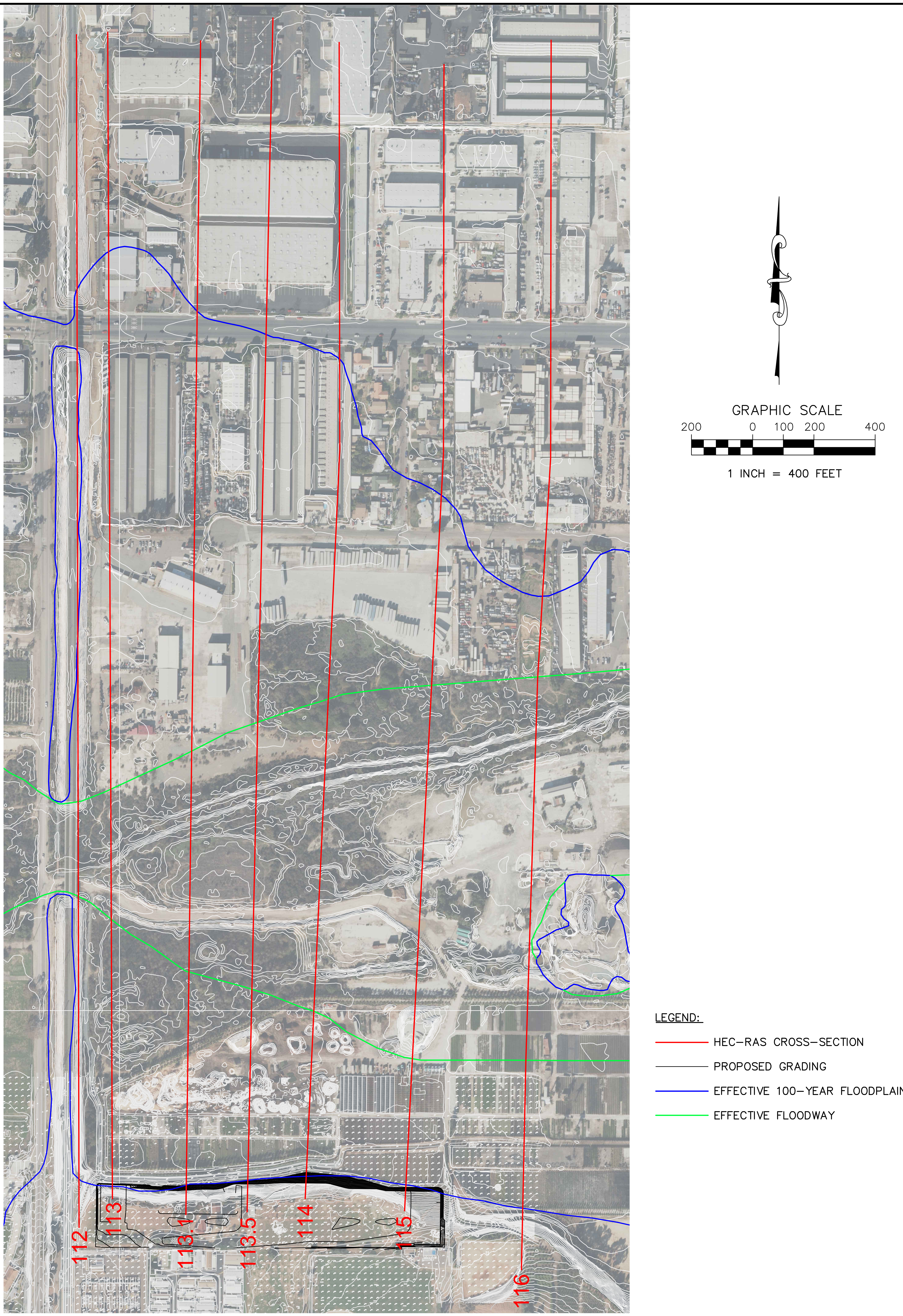
Primary OutFlow Max=2.89 cfs @ 4.22 hrs HW=105.18' (Free Discharge)
└─**1=Culvert** (Passes 2.89 cfs of 38.66 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 2.85 cfs @ 10.65 fps)
  └─**3=Custom Weir** (Weir Controls 0.05 cfs @ 0.34 fps)

Pond 2P: VAULT-2 100-YR



Appendix 4

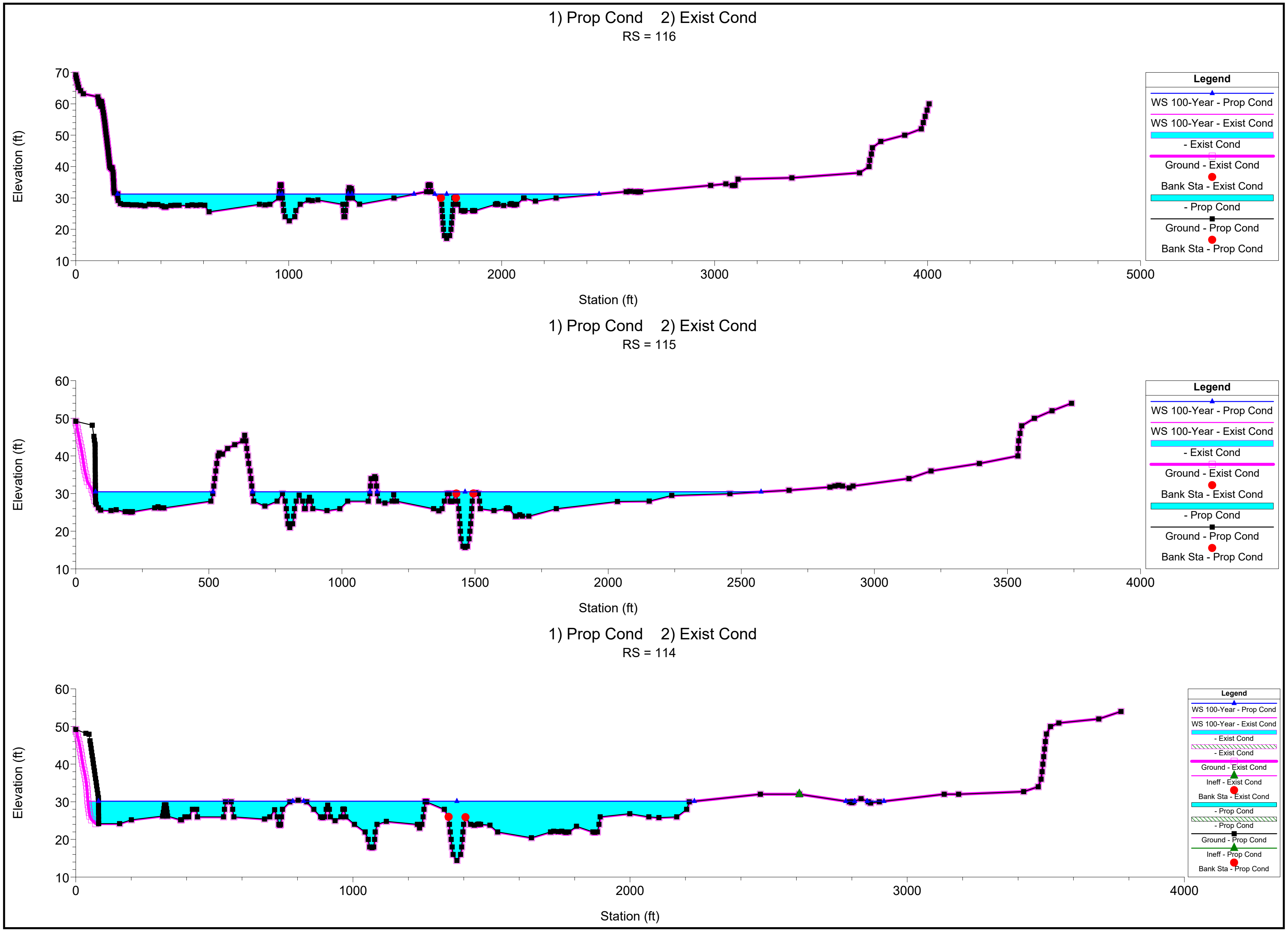
100-Year HEC-RAS Output



HEC-RAS WORK MAP

HEC-RAS River: RIVER-1 Reach: Reach-1 Profile: 100-Year

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	116	100-Year	Exist Cond	22000.00	17.09	31.22		31.42	0.002518	3.98	6680.49	2129.71	0.24
Reach-1	116	100-Year	Prop Cond	22000.00	17.09	31.23		31.42	0.002504	3.97	6694.10	2131.57	0.23
Reach-1	115	100-Year	Exist Cond	22000.00	15.70	30.45		30.61	0.001965	3.67	7841.84	2332.63	0.21
Reach-1	115	100-Year	Prop Cond	22000.00	15.70	30.46		30.62	0.001947	3.66	7854.36	2325.15	0.21
Reach-1	114	100-Year	Exist Cond	22000.00	14.40	30.14	25.55	30.20	0.000711	2.54	11167.88	2241.24	0.13
Reach-1	114	100-Year	Prop Cond	22000.00	14.40	30.14	25.55	30.21	0.000739	2.59	10988.04	2204.50	0.13
Reach-1	113.5	100-Year	Exist Cond	22000.00	14.00	30.00	24.95	30.06	0.000561	2.42	11597.53	1998.52	0.12
Reach-1	113.5	100-Year	Prop Cond	22000.00	14.00	30.00	24.94	30.06	0.000564	2.43	11549.72	1982.84	0.12
Reach-1	113.1	100-Year	Exist Cond	22000.00	13.80	29.92		29.96	0.000343	1.80	14867.52	2494.45	0.09
Reach-1	113.1	100-Year	Prop Cond	22000.00	13.80	29.92		29.96	0.000347	1.81	14750.65	2465.36	0.09
Reach-1	113	100-Year	Exist Cond	22000.00	13.00	29.87		29.90	0.000162	1.30	18645.40	2605.11	0.07
Reach-1	113	100-Year	Prop Cond	22000.00	13.00	29.87		29.90	0.000161	1.29	18603.13	2586.23	0.07
Reach-1	112	100-Year	Exist Cond	22000.00	18.00	28.91	26.04	29.76	0.008928	7.63	3107.82	465.08	0.47
Reach-1	112	100-Year	Prop Cond	22000.00	18.00	28.91	26.04	29.76	0.008928	7.63	3107.82	465.08	0.47



1) Prop Cond 2) Exist Cond
RS = 116
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Prop Cond
WS 100-Year - Exist Cond
- Exist Cond
Ground - Exist Cond
Bank Sta - Exist Cond
- Prop Cond
Ground - Prop Cond
Bank Sta - Prop Cond
1) Prop Cond 2) Exist Cond
RS = 115
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Prop Cond
WS 100-Year - Exist Cond
- Exist Cond
Ground - Exist Cond
Bank Sta - Exist Cond
- Prop Cond
Ground - Prop Cond
Bank Sta - Prop Cond
1) Prop Cond 2) Exist Cond
RS = 114
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Prop Cond
WS 100-Year - Exist Cond
- Exist Cond
- Exist Cond
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Bank Sta - Exist Cond
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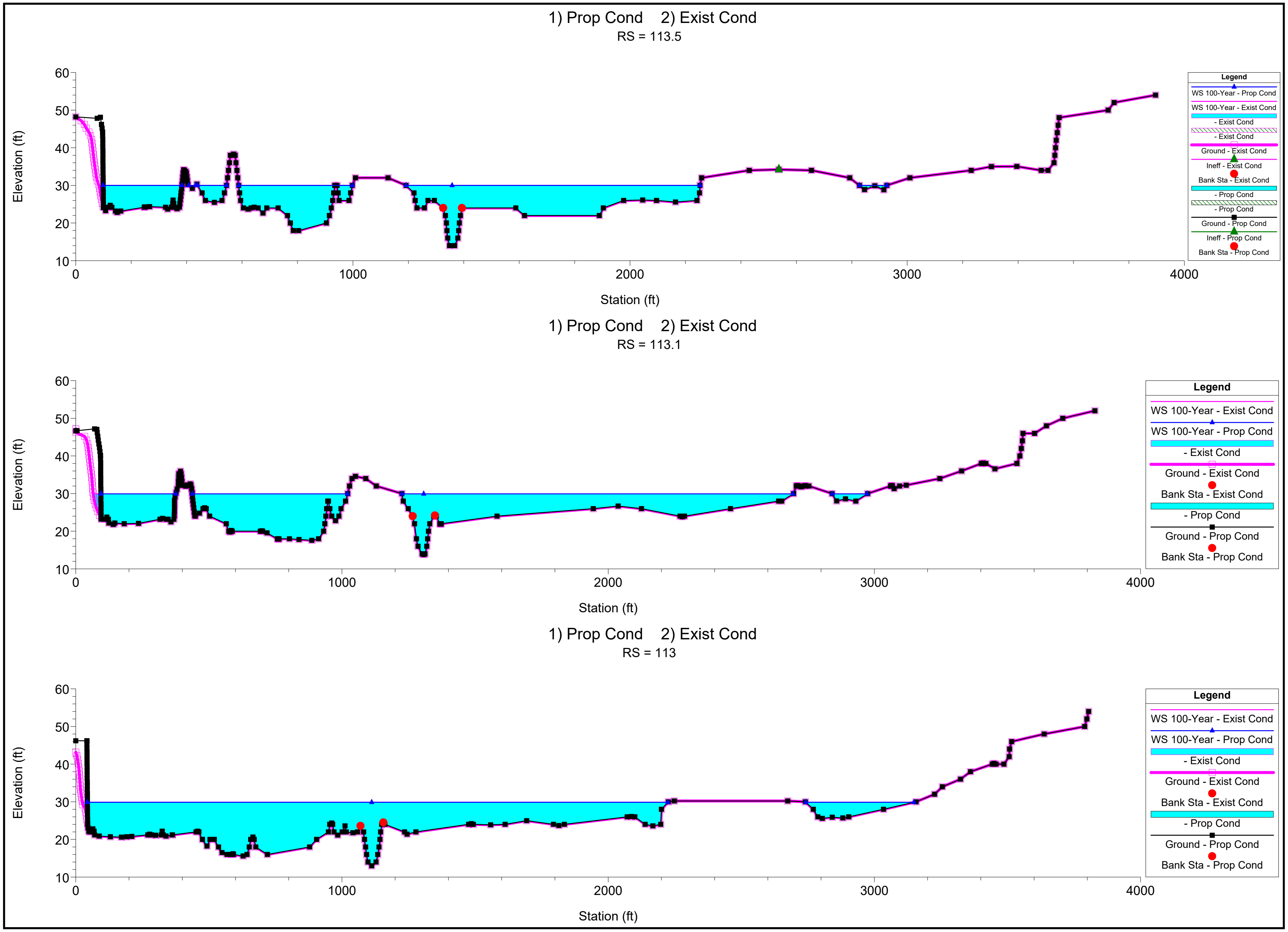
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Bank Sta - Prop Cond
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Elevation (ft)
Station (ft)
Legend
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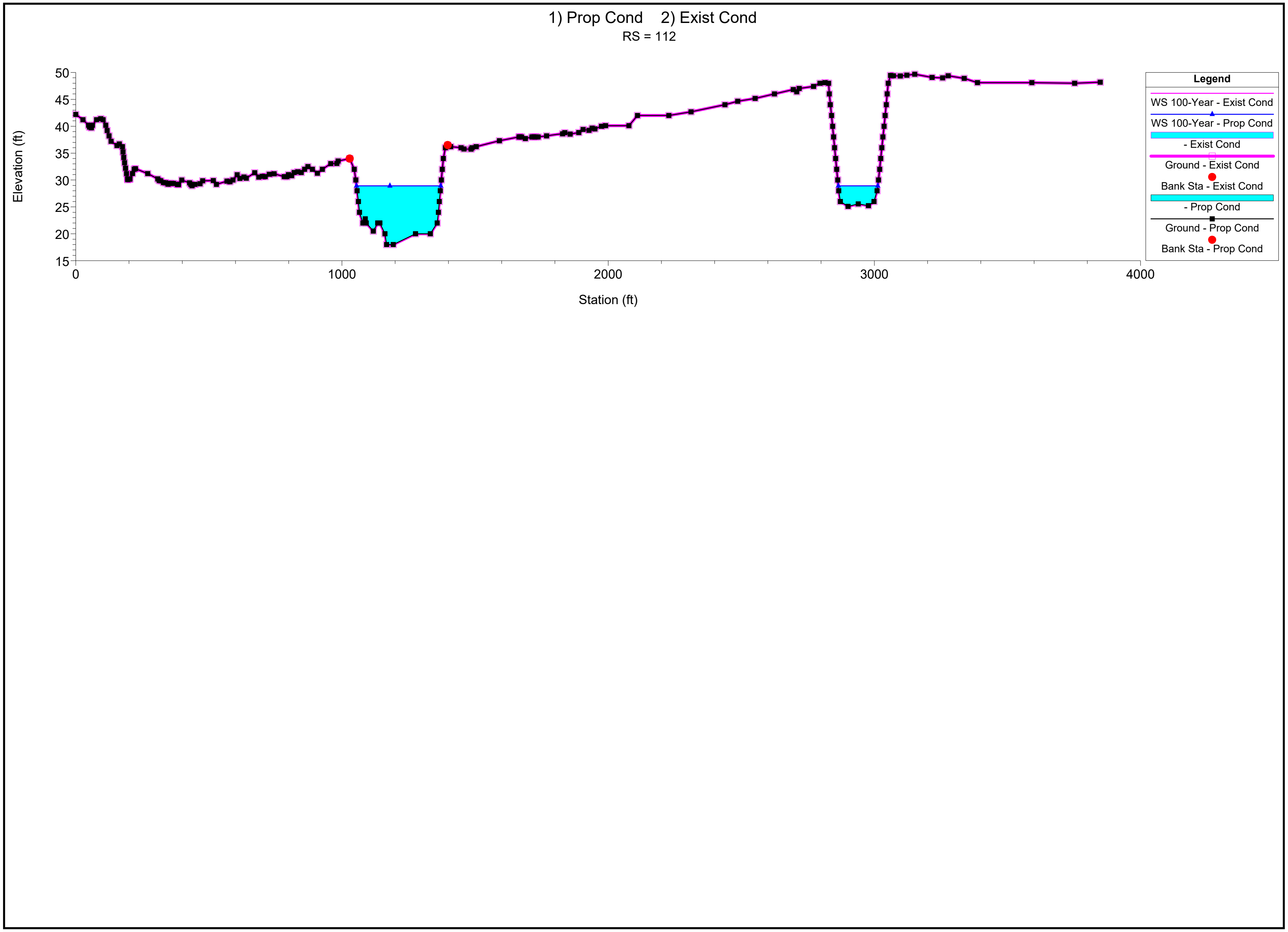
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Elevation (ft)
Station (ft)
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40
35
30
25
20
15
0
1000
2000
3000
4000
Legend
WS 100-Year - Exist Cond
WS 100-Year - Prop Cond
- Exist Cond
Ground - Exist Cond
Bank Sta - Exist Cond
- Prop Cond
Ground - Prop Cond
Bank Sta - Prop Cond

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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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ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (619) 867-0487 Fax: (714) 409-3287

AMBIENT COMMUNITIES
179 Calle Magdalena Suite #201
Encinitas, Ca. 92024

August 26, 2021
PW 1912-01
Report No. 1912-01-B-4

Attention: **Duncan Budinger**
Director of Retail Development

Subject: **Supplemental Geotechnical Investigation and Design Recommendations, Multifamily Residential Development, 555 Hollister Street, San Diego, California**

References: See Appendix A

Gentlemen:

Pursuant to your request, presented herein are the results of Advanced Geotechnical Solutions, Inc.'s (AGS) supplemental geotechnical investigation and design recommendations for the proposed multi-family residential development located at 555 Hollister Street in the City of San Diego, California.

The purpose of this supplemental geotechnical investigation is to evaluate the proposed development as depicted in the preliminary grading exhibit relative to the near-site and on-site geologic and geotechnical conditions, as well as to provide conclusions and recommendation to aid in the design and construction of the proposed multi-family residential development and associated improvements.

Advanced Geotechnical Solutions, Inc., appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.

ANDRES BERNAL, Sr. Geotechnical Engineer
RCE 62366, RGE 2715, Reg. Exp. 9-30-21

PAUL J. DERISI, Principal Geologist
CEG 2536, Reg. Exp. 5-31-23

REGISTERED PROFESSIONAL ENGINEER
ANDRES BERNAL
No. 2715
Exp. 9/30/21
GEOTECHNICAL
STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST
PAUL J. DERISI
No. 2536
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

Distribution: (1) Addressee

TABLE OF CONTENTS

ATTACHMENTS:

Supplemental Geotechnical Investigation and Design Recommendations
Proposed Multi-Family Residential Development
555 Hollister Street, City of San Diego, California

1.0 INTRODUCTION

This study is aimed at providing geologic and geotechnical information and recommendations for the development of the proposed multi-family residential structures relative to: 1) existing site soil and geologic conditions; 2) engineering characteristics of the onsite earth materials; 3) earthwork recommendations; 4) seismic design parameters for use in the geotechnical analysis; and, 5) preliminary foundation design parameters.

1.1. Scope of Work

The scope of our study included the following tasks:

- Review of pertinent published and unpublished geologic and geotechnical literature, maps, and aerial photographs readily available to this firm (Appendix A, References).
- Review the previous geotechnical investigation report by AGS (2020) for the site which included thirteen test pit excavations within the limits of the project. The test pit logs are included in Appendix B.
- Excavate, log, and sample seven exploratory borings extending to a maximum depth of 31.5 feet below ground surface. The boring logs are presented in Appendix B.
- Perform four borehole percolation tests onsite and prepare a site-specific infiltration feasibility report presented in Appendix D.
- Conduct laboratory testing of samples of the onsite soils obtained during the subsurface investigation. Results of laboratory testing are presented in Appendix C.
- Utilize the preliminary grading exhibit by Pasco Laret Suiter (2021) to prepare Plate 1, Geologic Map and Exploration Location Plan which depicts the proposed project limits, exploratory locations, abbreviated logs, and approximate geologic contacts.
- Prepare geologic cross sections for the project site as shown in Plate 1.
- Conduct a geotechnical engineering and geologic hazard analysis of the site.
- Conduct a limited seismic hazards evaluation including a liquefaction potential and dynamic settlement analysis.
- Evaluate the excavation characteristics of the onsite materials.
- Determine design parameters for foundations.
- Provide a preliminary corrosivity evaluation of the onsite soils.
- Prepare this report with exhibits summarizing our findings. This report would be suitable for design, construction, and regulatory review.

1.2. Geotechnical Study Limitations

The conclusions and recommendations in this report are professional opinions based on the data developed during our investigation. Detailed development plans were not available at the time of this report. The conclusions presented herein are based upon the current proposed development as depicted on the 40-scale preliminary grading exhibit by Pasco Laret Suiter (2021). When detailed plans become available, further review by AGS will be necessary.

The materials immediately adjacent to or beneath those observed may have different characteristics than those observed. No representations are made as to the quality or extent of materials not observed. Any evaluation regarding the presence or absence of hazardous material is beyond the scope of this firm's services.

2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The rectangular shaped property covers approximately 6.3 acres and currently supports a residential structure on the central portion of the site along with several outbuildings. The site is bounded on the north and east by active nursery facilities, on the west by Metropolitan Transit System trolley tracks on an embankment fill, and to the south by an asphalt paved parking lot, a mobile home park, unimproved property, and a playing field (see Figure 1, Site Location Map). Elevations onsite ranges from a high of 54 feet above mean sea level (msl) at the southeast corner to a low of 22 feet msl in the northwest corner. An approximately 20-foot high descending slope is located along the northern portion of the site. The southern portion of the site is flat, has been cleared of vegetation and is currently being used as a storage yard by a general contractor. The descending slope to the north is covered by grass, weeds and isolated trees. Drainage across the site generally flows to the north and west.

It is our understanding that the residential development will consist of five 3- to 4-story wood-frame apartment buildings, a two-story carport with a residential structure above, and a 1-story recreation/leasing building all of which will be supported by conventional slab-on-grade foundations. The apartment buildings will be located on the northern portion of the property and will require construction of ~22-foot high retaining wall. Parking areas and an access driveway will be located along the south central portion of the property. At this time detailed grading plans are not available; however, it is our understanding that design cuts will likely be up to roughly 8 feet with design fills of up to 26 feet. It is anticipated that cut-fill grading techniques will be utilized and approximately 7,000 cu. yd. of import soil will be required to develop the site. A preliminary grading plan exhibit has been provided and used herein; however, the plan is subject to change.

3.0 FIELD AND LABORATORY INVESTIGATION

3.1. Previous Study

AGS performed a previous subsurface investigation at the site on December 19, 2019, and consisted of excavating, logging and sampling thirteen exploratory test pits (TP-1 through TP-13) with a rubber tire backhoe to a maximum depth of 15.0 feet below existing ground surface (bgs). The samples were transported to AGS's laboratory for testing. Our findings and recommendations were summarized in a geotechnical report (AGS, 2020)

3.2. Current Investigation

A supplemental subsurface investigation was performed on June 7 through 9, 2021, and consisted of seven borings (B-1 through B-7) extending to depths ranging between 8.25 and 31.5 feet bgs advanced with a truck-mounted drill rig equipped with hollow-stem augers. The borings were logged by a representative of AGS and both bulk and relatively undisturbed samples were collected for laboratory testing. The approximate exploratory locations are shown on Plate 1, Geologic Map and

SITE LOCATION MAP
555 HOLLISTER STREET,
SAN DIEGO, CALIFORNIA

P/W 1912-01

FIGURE 1

SOURCE MAP - U.S.G.S. TOPOGRAPHIC MAP OF THE IMPERIAL BEACH 7.5 MINUTE QUADRANGLE, SAN DIEGO COUNTY, CALIFORNIA (2018)

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Escondido, CA 92029
Telephone: (619) 867-0487 Fax: (714) 409-3287

Exploratory Location Plan which is based on the 40-scale preliminary grading exhibit by Pasco Laret Suiter & Associates (2021). Logs of the test pits, borings and percolation tests are presented in Appendix B.

The samples were transported to AGS's approved laboratory for testing. Laboratory testing included: sieve and hydrometer analysis, Atterberg limits, expansion index, consolidation, undisturbed and remolded direct shear, maximum density and optimum moisture content, and corrosivity analyses. The laboratory test results are presented in Appendix C.

3.3. Infiltration Testing

As part of the current geotechnical investigation, four borings (P-1 through P-4) were advanced in the south central portion of the site to depths of 4.5 to 5.5 feet below existing grade to perform borehole percolation tests. Percolation test results and an evaluation of onsite infiltration feasibility are presented in Appendix D.

4.0 ENGINEERING GEOLOGY

4.1. Regional Geologic and Geomorphic Setting

The subject site is situated within the western portion of the Peninsular Ranges Geomorphic Province. The Peninsular Ranges province occupies the southwestern portion of California, extending southward from the Transverse Ranges and Los Angeles Basin to the southern tip of Baja California. In general, the province consists of young, steeply sloped, northwest trending mountain ranges underlain by metamorphosed Late Jurassic to Early Cretaceous-aged extrusive volcanic rock and Cretaceous-aged igneous plutonic rock of the Peninsular Ranges Batholith.

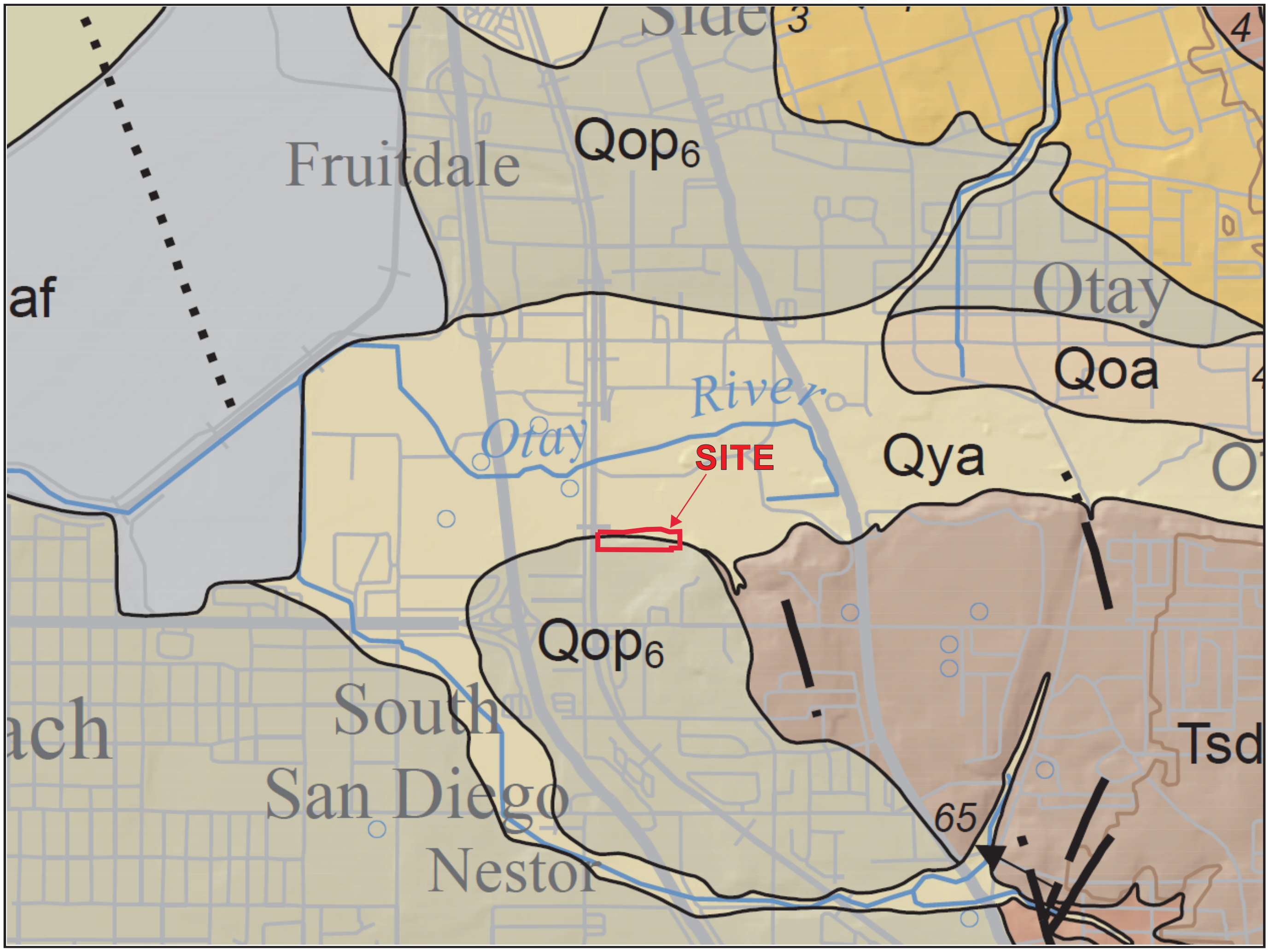
The project site is situated within the coastal plain zone. The regional geology is controlled by both alluvial and marine influences. Quaternary aged alluvial deposits interbedded with marine embayment deposits underlie the area. The westernmost portion of the province is predominantly underlain by younger marine and non-marine sedimentary rocks. The Peninsular Ranges dominant structural feature is northwest-southeast trending crustal blocks bounded by active faults of the San Andreas transform system.

4.2. Site Geology

The site has been mapped as being underlain by Young Alluvial Flood-Plain Deposits and Old Paralic Deposits as shown in Figure 2, Regional Geologic Map. A brief description of the earth materials encountered onsite is presented in the following sections. More detailed description of these materials is provided in the subsurface logs included in Appendix B.

4.2.1. Topsoil (No map symbol)

A relatively thin veneer of topsoil ranging in thickness from 1 to 4 feet was observed within several test pits and borings. As encountered, the topsoil generally consisted of brown to dark red brown silty to clayey fine-grained sand in a moist and loose condition with roots and organic content.



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REGIONAL GEOLOGIC MAP
555 HOLLISTER STREET,
SAN DIEGO, CALIFORNIA

LEGEND

af	Artificial Fill
Qya	Young Alluvial Flood-plain Deposits
Qop_6	Old Paralic Deposits, Unit 6
Tsd	San Diego Formation

P/W 1912-01

FIGURE 2

SOURCE MAP - GEOLOGIC MAP OF THE SAN DIEGO 30'X60' QUADRANGLE, CALIFORNIA. KENNEDY & TAN 2008.

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Escondido, CA 92029
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4.2.2. Artificial Fill - Undocumented (Map symbol afu)

Artificial fill was encountered in the majority of test pits and borings. Generally, the fill extended to depths of 2 to 6 feet below existing ground surface (bgs). Thicker deposits of undocumented fill were encountered within the northeasterly portion of the site where it extended to depths of at least 13 feet and may be locally deeper. The approximate limits of the suspected deep fill area are shown on Figure 2. As encountered, the fill materials can generally be described as orange to red brown and gray brown sandy clay and clayey sand with gravel and cobble in a moist and loose to medium dense condition. Abundant trash and construction debris were encountered in some of the fill including piping, plastic, glass, metal, wood, and concrete fragments.

4.2.3. Young Alluvial Flood-Plain Deposits (Map symbol Qya)

Holocene and late Pleistocene young alluvial flood-plain deposits were encountered primarily within the northern portion of the site. The young alluvium was found to underlie the fill or topsoil and extended to depths ranging from 6 feet to more than 15 feet. As encountered, the young alluvial deposits can generally be described as dark yellow brown to gray brown silty to clayey fine- to coarse-grained sand with abundant sub-rounded gravel and cobble in a moist to very moist and loose to medium dense condition. Caving within these materials was observed in several trench excavations.

4.2.4. Old Paralic Deposits (Map symbol Qop6)

Late to middle Pleistocene aged old paralic deposits (Unit 6), formerly known as the Baypoint Formation, were generally encountered underlying the surficial deposits at depths ranging from 1.5 feet to 9 feet except where the excavations ended in young alluvium. The old paralic deposits predominantly consist of slightly moist to moist silty fine-grained micaceous sand interbedded with coarse-grained gravel and cobble-rich lenses. These materials were generally orange, yellow brown and dark gray brown with common iron oxide development in a medium dense to dense and weakly to moderately cemented condition. Carbonate nodules and stringers were commonly observed.

4.3. Geologic Structure

Old paralic deposits underlie the project site at depth. Young alluvial deposits unconformably overlie old paralic deposits in the lower, northerly portion of the site. The old paralic deposits consist of thinly to thickly bedded, marine terrace deposits that are flat lying to very shallowly dipping to the southwest. The geologic structure is considered neutral to favorable with respect to the proposed development.

4.4. Groundwater

Groundwater was encountered at depths of 10 and 6.5 feet bgs in borings B-5 and B-7 drilled at the toe of the northerly descending slope. Based on these observations, the groundwater level was at approximate elevation 12.5 feet msl during our subsurface exploration. According to our review, no natural groundwater condition is known to exist at the site that would preclude the proposed development; however, groundwater will be encountered during remedial grading activities extending into the lower, northern portion of the site. It should be noted that localized perched groundwater may develop at a later date, most likely at or near fill/bedrock contacts, due to fluctuations in precipitation, irrigation practices, or factors not evident at the time of our field exploration.

An existing water supply well is located in the vicinity of Boring B-5. It is anticipated that this well will be abandoned during earthwork activities.

4.5. Seismic Hazards

The site is located in the tectonically active Southern California area and will therefore likely experience shaking effects from earthquakes. The type and severity of seismic hazards affecting the site are to a large degree dependent upon the distance to the causative fault, the intensity of the seismic event, and the underlying soil characteristics. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction or dynamic settlement. The following is a site-specific discussion of ground motion parameters, earthquake-induced landslide hazards, settlement, and liquefaction. The purpose of this analysis is to identify potential seismic hazards and propose mitigations, if necessary, to reduce the hazard to an acceptable level of risk. The following seismic hazards discussion is guided by the California Building Code (2019), CDMG (2008), and Martin and Lew (1998).

4.5.1. Surface Fault Rupture

No known active faults have been mapped within the project site. The nearest known active surface fault is the Silver Strand section of Newport-Inglewood-Rose Canyon fault zone which is approximately 3.9 miles west of the project site. Accordingly, the potential for surface fault rupture on the subject site is very low. This conclusion is based on literature review and aerial photographic analysis.

4.5.2. Seismicity

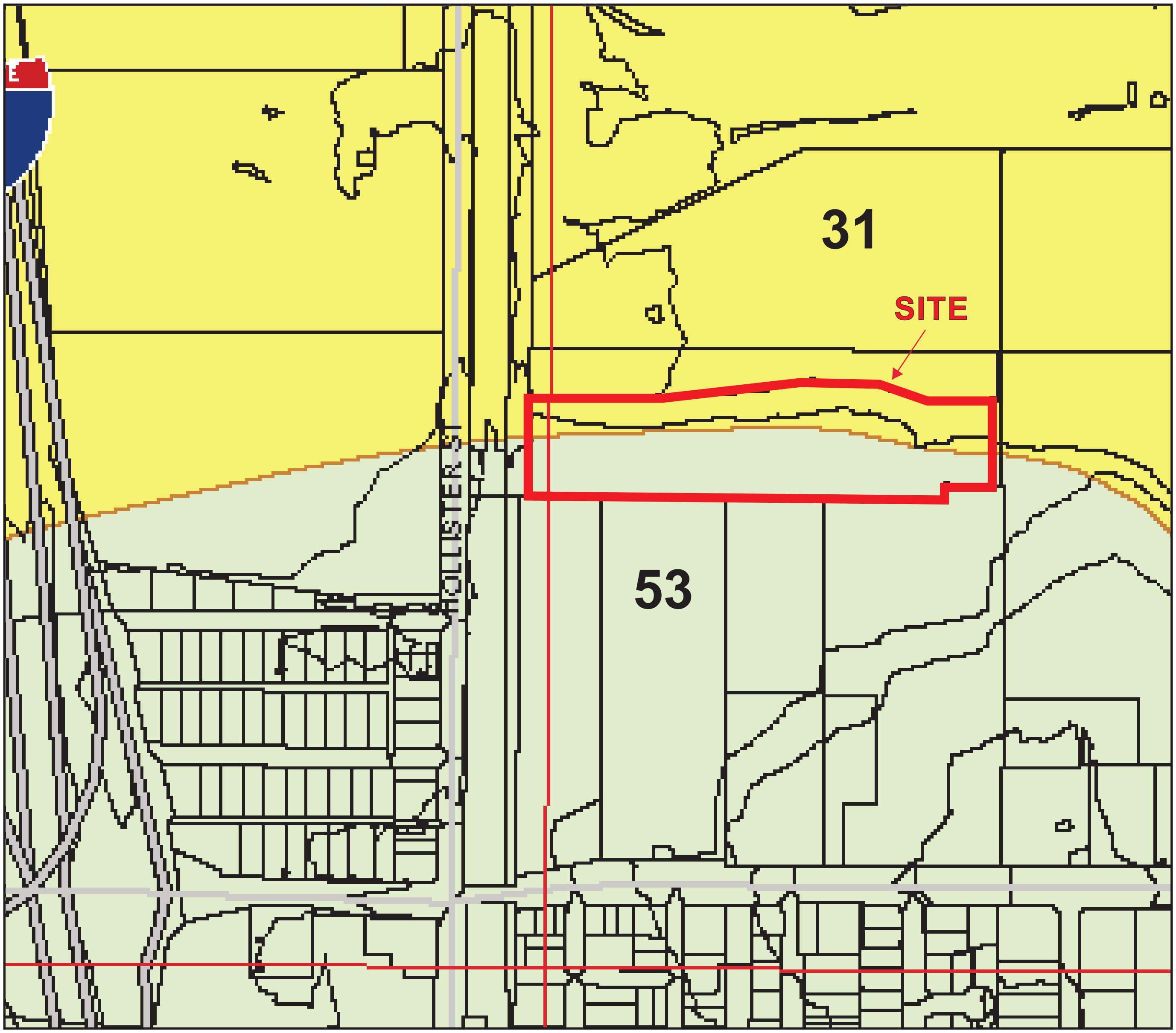
As noted, the site is within the tectonically active southern California area with the active Newport-Inglewood-Rose Canyon fault zone located approximately 3.9 miles west from the site. The potential exists for strong ground motion that may affect future improvements.

4.5.3. City of San Diego Seismic Safety Study

The project site is located within Grid Tile 6 of the San Diego Seismic Safety Study and is mapped as Geologic Hazard Category 53 on the southern portion of the site and as Geologic Hazard Category 31 for the northern portion. Geologic Hazard Category 53 is identified as ‘Level or sloping terrain, unfavorable geologic structure, low to moderate risk’. Geologic Hazard Category 31 is identified as ‘High Liquefaction Potential – shallow groundwater, major drainages, hydraulic fill’ as shown in Figure 3, Seismic Hazard Map.

4.5.4. Liquefaction

Liquefaction is the phenomenon where seismic agitation of loose, saturated sands and silty sands can result in a buildup of pore pressures that, if sufficient to overcome overburden stresses, can produce a temporary quick condition. City of San Diego has mapped the northern portion of the site as having “high liquefaction potential”. Due to the shallow depth to dense old paralic deposits and the recommended removal and recompaction of loose



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CITY OF SAN DIEGO
SEISMIC SAFETY STUDY
555 HOLLISTER STREET,
SAN DIEGO, CALIFORNIA

- 31 High Liquefaction Potential – shallow groundwater major drainages, hydraulic fills
- 53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk.

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FIGURE 3

SOURCE MAP - CITY OF SAN DIEGO
SEISMIC SAFETY STUDY
GRID TILE 6, 2008.

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485 Corporate Drive, Suite B
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Telephone: (619) 867-0487 Fax: (714) 409-3287

surficial deposits within the northern portion of the site, where development is planned, the potential for liquefaction to affect the proposed development is considered “low”.

4.5.5. Dynamic Settlement

Dynamic settlement occurs in loose sandy earth materials in response to an earthquake event. Loose alluvial soils were encountered within the northern portion of the site and are considered potentially susceptible to dynamic settlement, however, the recommended removal and recompaction of loose surficial deposits will mitigate this potential

4.5.6. Seismically Induced Landsliding

Seismically induced landsliding is considered very low due to the remedial grading proposed herein to mitigate this hazard to an acceptable level of risk.

4.5.7. Seismic Design Parameters

Based on the results of our field investigation and the proposed removal and recompaction of loose deposits, the site may be classified as Site Class D, consisting of a stiff soil profile with average SPT (N) blowcount between 15 and 50 blows per foot. Table 4.5.7 presents ASCE 7-16 seismic design parameters in accordance with 2019 CBC and USGS mapped spectral acceleration parameters (SEAOC/OSHPD, 2021) utilizing site coordinates of Latitude 32.5870˚N and Longitude 117.0835˚W.

TABLE 4.5.7
2019 CALIFORNIA BUILDING CODE DESIGN PARAMETERS

Design Parameter	Value
Site Class	D
Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	1.157g
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.389g
Site Coefficient, F_a	1.200
Site Coefficient, F_v	N/A[3]
Adjusted MCE_R[1] Spectral Response Acceleration Parameter at Short Period, S_{MS}	1.388g
1-Second Period Adjusted MCE_R[1] Spectral Response Acceleration Parameter, S_{M1}	N/A[3]
Short Period Design Spectral Response Acceleration Parameter, S_{DS}	0.926g
1-Second Period Design Spectral Response Acceleration Parameter, S_{D1}	N/A[3]
Peak Ground Acceleration, PGA_M[2]	0.623g
Seismic Design Category	N/A[3]

Notes: [1] Risk-Targeted Maximum Considered Earthquake
[2] Peak Ground Acceleration adjusted for site effects
[3] Requires Site Specific Ground Motion Hazard Analysis per ASCE 7-16 Section 11.4.8

As indicated in Note 3 above, ASCE 7-16 Section 11.4.8 requires a site specific ground motion hazard analysis unless, per Exception 2, the value of the seismic response coefficient, C_S, is determined by Equation (12.8-2) for values of $T \leq 1.5T_S$ and taken as equal to 1.5 times the values computed with either Equation (12.8-3) for $T_L \geq T > 1.5T_S$ or Equation (12.8-4) for $T > T_L$.

4.6. Non-seismic Geologic Hazards

4.6.1. Mass Wasting

No evidence of mass wasting was observed onsite nor was any noted on the reviewed maps.

4.6.2. Flooding

According to available FEMA maps, the northern edge of the site is within the 1% annual chance flood area with average water surface elevations ranging from 29 to 31 feet msl. The southern portion of the site is not in a FEMA identified flood hazard area.

5.0 GEOTECHNICAL ENGINEERING

Presented herein is a general discussion of the geotechnical properties of the various soil types and the analytic methods used in this report.

5.1. Material Properties

5.1.1. Excavation Characteristics

Based on our previous experience near the subject site and the information gathered during our investigation, it is our opinion that the topsoil, artificial fill and young alluvial flood-plain deposit materials are readily excavatable with conventional earthmoving equipment. Portions of the old paralic deposits may be cemented and contain cobble lenses that could be difficult to excavate with conventional equipment and may require specialized grading equipment (large excavators and/or bull dozers) to efficiently excavate. Excavation into young alluvial deposits on the northern portion of the site will encounter groundwater and may require top loading.

5.1.2. Compressibility

The existing topsoil, fill and young alluvial flood-plain deposit materials are considered moderately compressible in their present condition. Compressibility of topsoil, undocumented fill and young alluvial deposit materials will be mitigated by removal and recompaction.

5.1.3. Expansion Potential

The expansion potential of the upper topsoil and fill soils is “very low” to “low” when classified in accordance with ASTM D 4829. It is anticipated that the majority of the fills derived primarily from onsite materials will exhibit “very low” to “low” expansion potential. Excavations extending into old paralic deposits may encounter “low” to “medium” expansion potential materials depending on the amount of clay present in the deposits.

5.1.4. Shear Strength Characteristics

Based upon the results of shear strength testing conducted on the onsite soils and our previous experience in the general area with similar soils the following are assumed shear strengths for young alluvial flood-plain deposits, compacted fill soils, old paralic deposits.

TABLE 5.1.4
SHEAR STRENGTH

Material	Cohesion (psf)	Friction Angle (degrees)
Young Alluvial Flood-Plain Deposits (Qya)	100	29
Compacted Fill (afc)	150	30
Old Paralic Deposits (Qop)	200	32

5.1.5. Earthwork Adjustments

It is anticipated that the onsite undocumented fill and young alluvial flood plain deposits will shrink on the order of 5 to 15 percent when recompacted. The unweathered old paralic deposits are anticipated to bulk on the order of 0 to 5 percent when used to make compacted fill. These values may be used in an effort to balance the earthwork quantities. As is the case with every project, contingencies should be made to adjust the earthwork balance when grading is in progress and actual conditions are better defined.

5.2. Analytical Methods

5.2.1. Bearing Capacity and Lateral Earth Pressures

Ultimate bearing capacity values were obtained using the graphs and formulas presented in NAVFAC DM-7.1. Allowable bearing was determined by applying a factor of safety of at least three (3) to the ultimate bearing capacity.

Static lateral earth pressures were calculated using Rankine methods for active and passive cases. If it is desired to use Coulomb forces, a separate analysis specific to the application can be conducted.

6.0 GRADING RECOMMENDATIONS

Construction of the proposed multi-family residential structures and associated improvements is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are specific issues identified by this study as possibly affecting site development. Recommendations to mitigate these issues are presented in the text of this report.

6.1. Earthwork Recommendations

All grading should be accomplished under the observation and testing of the project soils engineer and engineering geologist or their authorized representative in accordance with the recommendations contained in the approved geotechnical reports, the current grading ordinance of the City of San Diego, and AGS's Earthwork Specifications (Appendix F). Prior to fill placement, the bottoms of all removal areas should be observed and approved by the engineering geologist/soils engineer or their authorized representative.

6.1.1. Site Preparation

Existing vegetation, trash, debris, and other deleterious materials should be removed and wasted from the site prior to commencing removal of unsuitable soils and placement of compacted fill materials. Additionally, all pre-existing utility conduits and foundations should be removed and wasted off-site. Concrete can be placed in the fill provided is it broken down into pieces smaller than 12 inches (largest dimension) and placed in accordance with the oversize materials recommendations. Alternatively, the concrete can be used to stabilize saturated removal bottoms. Abandoned utilities should be removed and/or abandoned in accordance with local regulations. Wells, cesspools and septic systems should be properly removed and/or backfilled in accordance with the local governing agency.

6.1.2. Removals

Topsoil, undocumented fill, young alluvial deposits and highly weathered formational material should be removed in areas planned to receive fill or where exposed at final grade. If encountered, any existing utility lines and/or subterranean structures should be removed prior to fill placement. Removals should expose competent formational materials and be observed and mapped by the engineering geologist prior to fill placement. It is anticipated that the upper 2 to 15 feet of the onsite soils will require removal and recompaction for the support of settlement sensitive structures. Localized areas may require deeper removals. The resulting undercuts should be replaced with engineered fill. The extent of removals can best be determined in the field during grading when observation and evaluation can be performed by the soil engineer and/or engineering geologist. In general, soils removed during remedial grading will be suitable for reuse in compacted fills, provided they are properly mixed and moisture conditioned and do not contain deleterious materials.

6.1.3. Removals Along Grading Limits and Adjacent to Property Lines

Removals of unsuitable soils will be required prior to fill placement along the grading limit. A 1:1 projection, from toe of slope or grading limit, outward to competent materials should be established, when possible. Where removals are not possible due to grading limits, property line or easement restrictions, removals should be initiated at the grading boundary (property line, easement, grading limit or outside the improvement) at a 1:1 ratio (1.5:1 where seepage is encountered) inward to competent materials. This reduced removal criteria should not be implemented prior to review by the Geotechnical Consultant and approval by the Owner. Where this reduced removal criteria is implemented, special maintenance zones may be necessary. These areas, if present, will need to be identified during grading. Alternatively, grading limits can be initiated offsite.

6.1.4. Overexcavation

Overexcavation of building pad areas should be accomplished where cut-fill transitions occur and to provide a more uniform blanket of fill below the buildings. It is recommended that backcut ratios below buildings be laid back to a gradient of 2:1 (H:V) or shallower. Additionally, the cut portions of the building pad should be overexcavated to provide a minimum of 5 to 7 feet of fill below the building pad. Deeper overexcavations may be necessary based on conditions exposed during grading and the final building locations and elevations.

6.1.5. Dewatering and Stabilization of Saturated Removal Bottoms

Due to the presence of shallow groundwater and the saturated soils that were encountered during our field exploration along the toe of the existing slope, it should be anticipated that the bottoms of the overexcavations will be soft/wet and unstable. Dewatering may also be necessary. Unstable bottoms encountered should be mitigated by placing at least two (2) feet of angular rock wrapped in geotextile over a relatively undisturbed bottom. Angular rock or concrete debris can also be considered. The recommended depth of stabilization (i.e. approximately 2 feet) could be greater depending on the condition encountered. Use of a stronger geotextile (such as Mirafi PET high strength geotextile) may allow the thickness of rock to be reduced. The contractor should evaluate the most cost effective solution for stabilizing yielding removal bottoms. Consideration should be given to constructing test sections during grading to evaluate the effectiveness of different options.

The bottoms of the excavation should be kept in an undisturbed state to the maximum extent possible. If it is necessary to operate equipment within excavations, we note that the use of track-mounted excavation equipment will be required as rubber-tired vehicles will likely sink into the subgrade and cause unwanted disturbance of the excavated surface. All exposed bottoms should be observed by a representative of AGS prior to placement of any materials so that we can evaluate the suitability of the exposed soils. After the excavated bottoms have been approved by an engineer from AGS, they should be backfilled with engineered fill to the elevations necessary to achieve the proposed grades.

We note that the intent of subgrade stabilization is to achieve a non-yielding subgrade when subjected to relatively heavy, rubber tired construction equipment loading such as a loaded water truck or loader with full bucket. The stabilized subgrade should be proof-rolled with this type of equipment after remediation to confirm that it is unyielding.

6.1.6. Materials for Fill

On-site soils with an organic content of less than 3 percent by volume (or 1 percent by weight) are suitable for use as fill. Soil material to be used as fill should not contain contaminated materials. Oversize materials (greater than 8 inches), if generated during excavation, may be broken into acceptably sized pieces, may be disposed offsite, or placed in deeper fills in accordance with the recommendations in Section 6.1.7 below. Imported fill material should consist of granular soil with “low” expansion potential (i.e. expansion index of 50 or less). Import material should also have low corrosion potential. Materials to be used as fill should be evaluated by AGS prior to importing or filling.

6.1.7. Oversize Materials

Oversized rock material [i.e., rock fragments greater than eight (8) inches] will be produced during the excavation of the design cuts and recommended overexcavation. Provided that the procedure is acceptable to the developer and governing agency, this rock may be incorporated into the compacted fill section to within three (3) feet of finish grade within residential areas and to two (2) foot below the deepest utility in street and utility connection areas. Maximum rock size in the upper portion of the hold-down zone is restricted to eight (8) inches. The upper five (5) feet in driveways and parking areas should have a maximum particle size of six (6) inches or less. Excavations to accommodate swimming pools, spas, and other appurtenances will likely encounter oversize rock [i.e., rocks greater than eight (8) inches] below three (3) feet. Rock disposal details are presented on Detail 10, Appendix F. Rocks in excess of eight (8) inches in maximum dimension may be placed within the deeper fills, provided rock fills are handled in a manner described below. In order to separate oversized materials from the rock hold-down zones, the use of a rock rake may be necessary.

6.1.7.1. Rock Blankets

Rock blankets consisting of a mixture of gravel, sand and rock to a maximum dimension of two (2) feet may be constructed. The rocks should be placed on prepared grade, mixed with sand and gravel, watered and worked forward with bulldozers and pneumatic compaction equipment such that the resulting fill is comprised of a mixture of the various particle sizes, contains no significant voids, and forms a dense, compact, fill matrix.

Rock blankets may be extended to the slope face provided the following additional conditions are met: 1) no rocks greater than twelve (12) inches in diameter are allowed within six (6) horizontal feet of the slope face; 2) 50 percent (by volume) of the material is three-quarter- (3/4) inch minus; and 3) back rolling of the slope face is conducted at four- (4) foot vertical intervals and satisfies project compaction specifications.

6.1.7.2. Rock Windrows

Rocks to maximum dimension of four (4) feet may be placed in windrows in deeper fill areas in accordance with the details on Detail 10 (Appendix F). The base of the windrow should be excavated an equipment-width into the compacted fill core with rocks placed in single file within the excavation. Sands and gravels should be added and thoroughly flooded and tracked until voids are filled. Windrows should be separated horizontally by at least fifteen (15) feet of compacted fill, be staggered vertically, and separated by at least four (4) vertical feet of compacted fill. Windrows should not be placed within ten (10) feet of finish grade, within two (2) vertical feet of the lowest buried utility conduit in structural fills, or within fifteen (15) feet of the finish slope surface unless specifically approved by the developer, geotechnical consultant, and governing agency.

6.1.7.3. Individual Rock Burial

Rocks in excess of four (4) feet, but no greater than eight (8) feet may be buried in the compacted fill mass on an individual basis. Rocks of this size may be buried separately within the compacted fill by excavating a trench and covering the rock with sand/gravel and compacting the fines surrounding the rock. Distances from slope face, utilities, and building pad areas (i.e., hold-down depth) should be the same as windrows.

6.1.7.4. Rock Disposal Logistics

The grading contractor should consider the amount of available rock disposal volume afforded by the design when excavation techniques and grading logistics are formulated. Rock disposal techniques should be discussed and approved by the geotechnical consultant and developer prior to implementation.

6.2. Compacted Fill

Fill and processed natural ground shall be compacted to at least 90 percent of the maximum dry density determined by ASTM D 1557. All fill to be placed below twenty (20) feet from ultimate grade should be compacted to at least 93 percent of maximum dry density. Compaction shall be achieved at or slightly above the optimum moisture content and as generally discussed in the attached Earthwork Specifications (Appendix F).

At the completion of unsuitable soil removals, the exposed bottom should be scarified to a minimum depth of eight inches, moisture conditioned to above optimum moisture and compacted in-place to the standards set forth in this report.

Fill should be placed in thin lifts (eight-inch bulk), moisture conditioned to at or slightly above the optimum moisture content, uniformly mixed, and compacted by the use of wheel rolling or kneading type (sheep’s foot) compaction equipment until the designed grades are achieved.

6.3. Settlement Monitoring

Fills are subject to post-grading settlement. It is recommended that all fills overlying saturated old paralic deposits be monitored prior to release for construction. The monitoring can be accomplished by installation of surface monuments as shown on Detail 12 (Appendix F). Monuments should be placed near the toe of the wall and near the top of the wall.

Surface monuments should be surveyed every week for two months and monthly thereafter until data warrants release of the area for utility or residential construction. It is likely that infrastructure development can be initiated in advance of completion of the primary settlement process, depending upon the sensitivity of improvements to the anticipated settlement.

6.4. Utility Trench Excavation and Backfill

All utility trenches should be shored or laid back in accordance with applicable Cal/OSHA standards. For trenches or other temporary excavations, OSHA requirements regarding personnel safety should be met by laying back the slopes to a gradient no steeper than 1.5:1 (horizontal:vertical) for fill materials and 1:1 (H:V) for old paralic deposit materials. Onsite soils will not be suitable for use as bedding material but will be suitable for use as trench backfill provided oversized materials are removed. Utility trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D 1557. Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

No surcharge loads should be imposed above excavations. This includes spoil piles, lumber, concrete trucks or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils.

6.5. Flatwork Subgrade Preparation

If native soils are used, the upper one foot of subgrade below exterior slabs, sidewalks, patios, etc. should be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557. The subgrade below exterior slabs, sidewalks, driveways, patios, etc. should be moisture conditioned to a minimum of optimum moisture content prior to concrete placement.

7.0 DESIGN RECOMMENDATIONS

Construction of the proposed multi-family structures is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project.

7.1. Foundation Design Recommendations

Detailed foundation plans are not currently available; however, it is our understanding that the proposed multi-family three- and four-story residential structures will be wood framed and supported by a conventional shallow foundation system. The proposed foundation for the proposed carport and overlying building is not know at this time. For preliminary design of shallow foundations supported on compacted fill or undisturbed formational materials, the values presented below may be used. It is recommended that the building and wall foundations be supported entirely in compacted fill or competent formational materials.

7.1.1. Foundation Design

Residential structures can be supported on conventional shallow foundations and slab-on-grade or post-tensioned slab/foundation systems, as discussed above. The design of foundation systems should be based on as-graded conditions as determined after grading completion. The following values may be used in preliminary foundation design:

Allowable Bearing: 2,500 psf. Bearing capacity can increase 250 psf for each additional foot of width, and 500 psf for each additional foot of depth to a maximum allowable capacity of 3,000 psf.

Sliding Coefficient: 0.35

Lateral Bearing: 250 psf/foot of depth to a maximum of 2,500 psf

The above values may be increased as allowed by Code to resist transient loads such as wind or seismic. Building code and structural design considerations may govern. Depth and reinforcement requirements and should be evaluated by a qualified engineer.

7.1.2. Conventional Foundation Design Recommendations

Based upon the onsite soil conditions and information supplied by the 2019 CBC, conventional foundation systems for “Low to Medium” expansion potential should be designed by the Structural Engineer in accordance with Section 7.1.1 and the following recommendations:

- **Three- to Four-story -** Interior and exterior footings should be a minimum of 18 inches wide and extend to a minimum depth of 18 inches below lowest adjacent grade. Footing reinforcement should minimally consist of four No. 5 reinforcing bars, two top and two bottom.

- **Slab -** Conventional, slab-on-grade floors or parking garage slabs, underlain by "very low" to "low" expansive compacted fill, should be five or more inches thick and be reinforced with No. 4 or larger reinforcing bars spaced 15 inches on center each way. The slab reinforcement and expansion joint spacing should be designed by the Structural Engineer.
- **Embedment -** If exterior footings adjacent to drainage swales are to exist within five feet horizontally of the swale, the footing should be embedded sufficiently to assure embedment below the swale bottom is maintained. Footings adjacent to slopes should be embedded such that a least seven feet are provided horizontally from edge of the footing to the face of the slope.
- **Garage -** A grade beam reinforced continuously with the garage footings shall be constructed across the garage entrance, tying together the ends of the perimeter footings and between individual spread footings. This grade beam should be embedded at the same depth as the adjacent perimeter footings. A thickened slab, separated by a cold joint from the garage beam, should be provided at the garage entrance. Minimum dimensions of the thickened edge shall be six (6) inches deep. Footing depth, width and reinforcement should be the same as the structure. Slab thickness, reinforcement and under-slab treatment should be the same as the structure.
- **Isolated Spread Footings -** Isolated spread footings should be embedded a minimum of 18 inches below lowest adjacent finish grade and should at least 24 inches wide. A grade beam should also be constructed for interior and exterior spread footings and should be tied into the structure in two orthogonal directions footing dimensions and reinforcement should be similar to the aforementioned continuous footing recommendations. Final depth, width and reinforcement should be determined by the structural engineer.
- **Presaturation -** Prior to concrete placement the subgrade soils should be moisture conditioned to a minimum of optimum moisture prior to concrete placement.

7.1.3. Footing Excavations

Footing excavations should be observed by the geotechnical consultant. Footings should be excavated into either competent engineered fill or undisturbed formational deposits. Excavations should be free of all loose and sloughed materials, be neatly trimmed, and moisture conditioned at the time of concrete placement.

7.1.4. Moisture and Vapor Barrier

A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive. The retarder should be of suitable composition, thickness, strength and low permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as Visqueen, placed between one to four inches of clean sand, has been used for this purpose. More recently, 15-mil polyolefin membrane underlayments (Stego® Wrap or similar material) have been used to lower permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. The use of this system or other systems, materials or techniques can be considered, at the discretion of the designer.

7.2. Conventional Retaining Walls

The following earth pressures are recommended for the design of conventional retaining walls onsite. These earth pressures assume that a select backfill will be used behind the walls:

Static Case

Level Backfill	Rankine Coefficients	Equivalent Fluid Pressure (psf/lin.ft.)
Coefficient of Active Pressure:	$K_a = 0.33$	42
Coefficient of Passive Pressure:	$K_p = 3.00$	375
Coefficient of at Rest Pressure:	$K_o = 0.50$	63

2 : 1 Backfill	Rankine Coefficients	Equivalent Fluid Pressure (psf/lin.ft.)
Coefficient of Active Pressure:	$K_a = 0.54$	67
Coefficient of At Rest Pressure:	$K_o = 0.90$	113

Seismic Case

In addition to the above static pressures, unrestrained retaining walls located should be designed to resist seismic loading as required by the 2019 CBC. The seismic load can be modeled as a thrust load applied at a point 0.6H above the base of the wall, where H is equal to the height of the wall. This seismic load (in pounds per lineal foot of wall) is represented by the following equation:

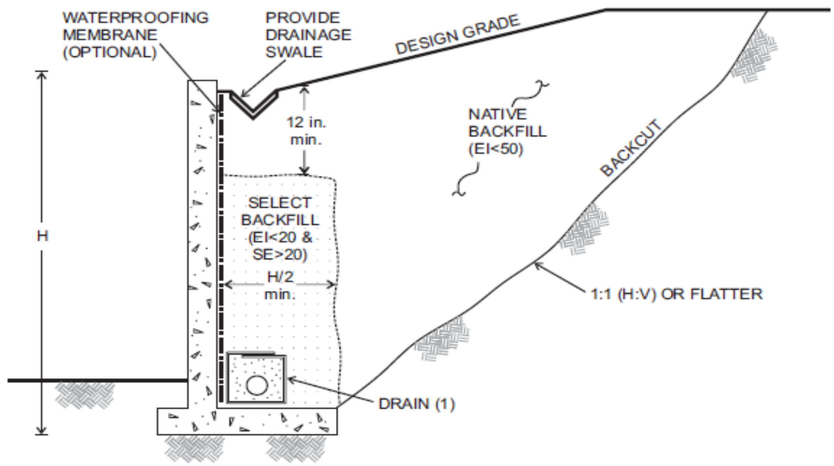
$$Pe = \frac{3}{8} * \gamma * H^2 * k_h$$

Where:
- Pe = Seismic thrust load
- H = Height of the wall (feet)
- γ = soil density = 125 pounds per cubic foot (pcf)
- k_h = seismic pseudostatic coefficient = 0.5 * PGA_M

The peak horizontal ground acceleration (PGA_M) is provided in Section 4.5.7. Walls should be designed to resist the combined effects of static pressures and the above seismic thrust load.

The foundations for retaining walls of appurtenant structures structurally separated from the building structures, may bear on properly compacted fill or competent formational deposits. Retaining wall footings should be designed to resist the lateral forces by passive soil resistance and/or base friction as recommended for foundation lateral resistance. To relieve the potential for hydrostatic pressure wall backfill should consist of a free draining backfill (sand equivalent "SE" >20) and a heel drain should be constructed. The heel drain should be placed at the heel of the wall and should consist of a 4-inch diameter perforated pipe (SDR35 or SCHD 40) surrounded by 4 cubic feet of crushed rock (3/4-inch) per lineal foot, wrapped in filter fabric (Mirafi® 140N or equivalent) as shown in Figure 4.

FIGURE 4
Retaining Wall Backfill and Drainage



NOTES: (1) DRAIN: 4-INCH PERFORATED ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE PLACED PERFORATIONS DOWN AND SURROUNDED BY A MINIMUM OF 1 CUBIC FEET OF 3/4 INCH ROCK OR APPROVED EQUIVALENT SUBSTITUTE AND WRAPPED IN MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

Proper drainage devices should be installed along the top of the wall backfill, which should be properly sloped to prevent surface water ponding adjacent to the wall. In addition to the wall drainage system, for building perimeter walls extending below the finished grade, the wall should be waterproofed and/or damp-proofed to effectively seal the wall from moisture infiltration through the wall section to the interior wall face.

The wall should be backfilled with granular soils placed in loose lifts no greater than 8-inches thick, at or near optimum moisture content, and mechanically compacted to a minimum 90 percent relative compaction as determined by ASTM Test Method D1557. Flooding or jetting of backfill materials generally do not result in the required degree and uniformity of compaction and, therefore, is not recommended. The soils engineer or his representative should observe the retaining wall footings, backdrain installation and be present during placement of the wall backfill to confirm that the walls are properly backfilled and compacted.

7.3. Mechanically Stabilized Earth (MSE) Retaining Wall

Based on our review of the preliminary grading exhibit, the proposed wall on the northern limit of the site may consist of a mechanically stabilized earth (MSE) retaining wall. According to our subsurface investigation and laboratory testing, the following soil parameters for MSE wall design are presented in Table 7.3. AGS assumes that for the MSE wall, the reinforced and foundation zones will consist of compacted fill and the retained zone will consist of old paralic deposits or compacted fill.

TABLE 7.3
PRELIMINARY MSE RETAINING WALL DESIGN PARAMETERS

	Ultimate Strength Parameters		
Material	**Cohesion (psf)**	**Friction Angle (degrees)**	**Density (pcf)**
Reinforced Zone and Foundation Zone (Compacted Artificial Fill)	200	30	120
Retained Zone (Compacted Fill)	200	30	120
Retained Zone (Old Paralic Deposits)	500	30	130

The global stability of the MSE retaining wall was analyzed for both static and seismic (pseudo-static) conditions using GStabl7 slope stability software and an assumed geogrid reinforcement geometry. The Modified Bishop method was used to analyze circular type failures. It is anticipated that MSE walls will be globally stable to the proposed heights. Stability analyses supporting this conclusion are presented on Plates E-1 and E-2 (Appendix E). These analyses should be reevaluated after the MSE wall design is finalized.

7.4. Corrosivity

Laboratory testing was performed on a representative sample of onsite earth materials to evaluate pH and electrical resistivity, as well as chloride and sulfate contents. electrical resistivity The pH and tests were performed in accordance with California Test (CT) 643 and the sulfate and chloride content tests were performed in accordance with CT 417 and CT 422, respectively. These laboratory test results are presented in Appendix C.

The results of the corrosivity testing indicated an electrical resistivity value of 3,800 ohm-cm, soil pH value of 8.4, chloride content of 76 parts per million (ppm) and sulfate content of 0.02 percent (i.e., 209 ppm). Based on Caltrans (2018) corrosion criteria, the onsite soils would be classified as non-corrosive, which is defined as soils with less than 500 ppm chlorides, less than 0.2 percent sulfates, and pH higher than 5.5.

The onsite soils are expected to be “mildly corrosive” to buried metallic materials. AGS recommends minimally that the current standard of care be employed for protection of metallic construction materials in contact with onsite soils or that consultation with an engineer specializing in corrosion to determine specifications for protection of construction materials. Additional corrosivity testing is recommended during site grading

7.5. Concrete Design

Testing by AGS indicates that the onsite soils have low concentrations of soluble sulfate, corresponding to an S0 exposure class when classified in accordance with ACI 318-14. Sulfate resistant concrete is not required per code; however, additional sulfate content testing is recommended dung site grading..

7.6. Civil Design Recommendations

7.6.1. Drainage

Roof and pad drainage should be collected and directed away from structures and slopes and toward approved disposal areas. Design fine-grade elevations should be maintained through the life of the structure or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water, away from structures and slopes. Residents should be made aware that they are responsible for maintenance and cleaning of all drainage terraces, down drains and other devices that have been installed to promote structure and slope stability

7.6.2. Exterior Flatwork

7.6.2.1. Slab Thickness

Concrete flatwork should be designed utilizing 4-inch minimum thickness.

7.6.2.2. Control Joints

Weakened plane joints should be installed on walkways at intervals of approximately 6 to 8 feet. Exterior slabs should be designed to withstand shrinkage of the concrete.

7.6.2.3. Flatwork Reinforcement

Consideration should be given to reinforcing any exterior flatwork.

7.6.2.4. Thickened Edge

Consideration should be given to construct a thickened edge (scoop footing) at the perimeter of slabs and walkways adjacent to landscape areas to minimize moisture variation below these improvements. The thickened edge (scoop footing) should extend approximately 8 inches below concrete slabs and should be a minimum of 6 inches wide.

7.7. Preliminary Pavement Design

For preliminary pavement design, we have assumed an “R” Value of 30 for the onsite subgrade soils. Utilizing City of San Diego Pavement Design Standards Schedule “J” and assuming the subject site is classified equivalent to “Local Residential” (max ADT=1200) which equates to a Traffic Index TI=6.0 the following pavement section is presented below. Additional pavement design recommendations will be provided during grading based on as-graded conditions and R-value testing.

Standard Pavement Section

3-inches Asphalt Concrete
over
8.5-inches Aggregate Base

Pavement subgrade soils should be at or near optimum moisture content and should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D1557. Aggregate base should be compacted to a minimum of 95 percent relative compaction and should conform with the specifications in Section 26 of the Standard Specifications for the State of California Department of Transportation (Caltrans) or Section 200-2 of the Standard Specifications for Public Works Construction (Green Book). The asphalt concrete should conform to Section 26 of the Caltrans Standard Specifications or Section 203-6 of the Green Book.

8.0 FUTURE STUDY NEEDS

8.1. Construction Plans

Construction plans have not yet been developed. The recommendations provided herein are considered preliminary and subject to change based on the actual design. When available, the geotechnical engineer should review detailed construction plans. The following plans should be reviewed:

- Grading and improvement plans
- Structural plans including foundation and wall plans and calculations.

If the project description or final design varies from that described in this report, AGS must be consulted regarding the applicability of, and the necessity for, any revisions to the recommendations presented herein. AGS accepts no liability for any use of its recommendations if the project description or final design varies and AGS is not consulted regarding the changes.

9.0 CLOSURE

9.1. Geotechnical Review

AGS should review the final project plans and project specifications to evaluate conformance with the intent of the recommendations contained in this report. Our recommendations may be modified if conditions encountered in the field differ significantly from those assumed in this report.

Continuous geologic and geotechnical observations, testing, and mapping should be provided throughout site development. Additional soil samples should be collected by the geotechnical consultant during grading and subjected to laboratory testing. Final design recommendations should be provided in a grading report based on the observation and test results collected during grading.

9.2. Limitations

The findings and recommendations in this report are based on the specific excavations, observations, and tests results obtained during this and prior investigations. The findings are based on the review and interpretation of the field and laboratory data combined with an interpolation and extrapolation of conditions between and beyond the exploratory excavations. Services performed by AGS have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by geotechnical engineers and engineering geologists who are familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report. If the project description varies from what is described in this report, AGS must be consulted regarding the applicability of, and the necessity for, any revisions to the recommendations presented herein. AGS accepts no liability for use of its recommendations if AGS is not consulted regarding any project changes.

The data, opinions, and recommendations of this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of AGS.

AGS has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the CONTRACTOR, or any other person performing any of the construction, or for failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

Advanced Geotechnical Solutions, Inc., 2020, “Preliminary Geotechnical Investigation and Design Recommendations, 6.3 Acre Site Located at 555 Hollister Street, City of San Diego, California”, dated January 29, 2020, Report No. 1912-01-B-2.

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Pasco Laret Suiter & Associates, 2021, 40-scale Preliminary Grading Exhibit, Palm and Hollister, dated August 18, 2021.

SEAOC/OSHPD, 2021, USGS Seismic Design Maps, https://seismicmaps.org/

United States Geological Survey, 2021, Unified Hazards Tool, https://earthquake.usgs.gov/hazards/interactive/

APPENDIX B

SUBSURFACE EXPLORATION

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-1

CLIENT AMBIENT COMMUNITIES
PROJECT NAME Hollister Apartments
PROJECT NUMBER 1912-01
PROJECT LOCATION 555 Hollister Street, San Diego
DATE STARTED 6/7/21 **COMPLETED** 6/7/21
GROUND ELEVATION 41 ft **HOLE SIZE** 8 inch
DRILLING CONTRACTOR Pacific Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES Auto-trip hammer
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SC	**Topsoil** Clayey SAND, dark red brown, moist, loose to medium dense, fine- to coarse-grained; with gravel; roots on top 6 inches.										
			@2.5 ft., red brown.	SPT	4-8-9 (17)								
		SM	**Old Paralic Deposits (Qop6)** Silty SAND, red brown, damp to moist, medium dense, fine- to coarse-grained; with gravel and cobbles; few carbonate stringers.										
5				MC	12-17-18 (35)	130	2.3	21					
10		SP	@10 ft., abundant gravel and cobbles; difficult drilling, grinding on rock.	MC	25-36-33 (69)								
		ML	@14 ft., SILT, gray and orange brown, damp to moist, very dense, trace sand.										
15				SPT	8-18-43 (61)								
		SM	@16.3 ft., Silty SAND, gray and orange, damp, very dense, fine- to coarse-grained; with gravel.										
20			@20 ft., red brown.	SPT	13-26-33 (59)								

Terminated at 21.5 feet.
No groundwater. Caving in gravel and cobbles.
Backfilled in accordance with SDCDEH requirements.

BORING NUMBER B-2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT AMBIENT COMMUNITIES
PROJECT NAME Hollister Apartments
PROJECT NUMBER 1912-01
PROJECT LOCATION 555 Hollister Street, San Diego
DATE STARTED 6/7/21 **COMPLETED** 6/7/21
GROUND ELEVATION 42 ft **HOLE SIZE** 8 inch
DRILLING CONTRACTOR Pacific Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES Auto-trip hammer
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SC	**Artficial Fill (afu)** Clayey SAND, red brown, moist, medium dense, fine- to coarse-grained; with gravel; trace cobbles.										
			@2.5 ft., damp to moist, dense.	SPT	8-13-14 (27)								
		SM	@3.5 ft., Silty SAND, red brown, damp to moist, medium dense, fine- to coarse-grained; few carbonate stringers; with gravel and cobbles.										
5			@5 ft., damp, medium dense.	SPT	4-5-14 (19)								
		SP	**Old Paralic Deposits (Qop6)** SAND, red brown, damp to moist, medium dense, fine- to coarse-grained; with gravel and cobbles.										
			@8 ft., abundant gravel and cobbles; difficult drilling, grinding on rock.										
10		GP	@14 ft., Gravelly SAND to Sandy GRAVEL, light red brown, damp, very dense, partial recovery, 3-inch gravel in tip.	SPT	21-33-44 (77)								
15			@15 ft., same.	SPT	27-39-28 (67)								
20		SM	@19 ft., Silty SAND, red brown, damp, dense, fine- to coarse-grained.	SPT	3-4-27 (31)								
		SP	@14 ft., Gravelly SAND to Sandy GRAVEL, gray brown to red brown, damp, dense.										

Terminated at 21.5 feet.
No groundwater. Caving in gravel and cobbles.
Backfilled in accordance with SDCDEH requirements.

BORING NUMBER B-3

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT AMBIENT COMMUNITIES
PROJECT NAME Hollister Apartments
PROJECT NUMBER 1912-01
PROJECT LOCATION 555 Hollister Street, San Diego
DATE STARTED 6/7/21 **COMPLETED** 6/7/21
GROUND ELEVATION 48 ft **HOLE SIZE** 8 inch
DRILLING CONTRACTOR Pacific Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES Auto-trip hammer
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SC	**Artficial Fill (afu)** Clayey SAND, orange, moist, loose to medium dense, fine- to coarse-grained; with gravel; trace cobbles.	BU					Sieve EI MAX RDS	24	15	9	40
		CL	@2.5 ft., sandy to silty CLAY, moist, red brown, very stiff, with gravel.	SPT	8-8-7 (15)								
5				SPT	15-24-39 (63)								
		SM	**Old Paralic Deposits (Qop6)** Silty SAND, red brown, damp to moist, very dense, fine- to coarse-grained; with gravel and cobbles.										
		GP	@7 ft. to 17 ft., Sandy GRAVEL, gray and red brown, dry to damp, very dense; difficult drilling, grinding on rock.										
10			@10 ft., medium dense, partial recovery, 2-inch gravel in tip.	SPT	9-8-12 (20)								
			@12 ft., difficult drilling, grinding on rock.										
15			@15 ft., very dense, partial recovery.	SPT	15-32-45 (77)								
			@17 ft., abundant gravel and cobbles; difficult drilling, grinding on rock.										
20			@20 ft., dry to damp.	SPT	21-35-50/3"								

Terminated at 21.5 feet.
No groundwater. Caving in gravel and cobbles.
Backfilled in accordance with SDCDEH requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-4

CLIENT AMBIENT COMMUNITIES
PROJECT NAME Hollister Apartments
PROJECT NUMBER 1912-01
PROJECT LOCATION 555 Hollister Street, San Diego
DATE STARTED 6/8/21 **COMPLETED** 6/8/21
GROUND ELEVATION 47 ft **HOLE SIZE** 8 inch
DRILLING CONTRACTOR Pacific Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES Auto-trip hammer
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SC	**Artficial Fill (afu)** Clayey SAND to sandy CLAY, orange, damp, loose to medium dense, fine- to coarse-grained; some gravel; few roots.										
			@2.5 ft., same.	SPT	7-10-23 (33)								
		GP	**Old Paralic Deposits (Qop6)** Sandy GRAVEL, gray and red brown, dry to damp, dense; difficult drilling, grinding on rock; with cobbles.										
5			@5 ft., very dense, no recovery.	SPT	15-25-23 (48)								
			@6 ft. difficult drilling, grinding on rock.										
10		GP	@10 ft., GRAVEL, medium dense, few cobble to 4-inch size.	SPT	11-7-9 (16)								
			@11 to 19 ft. difficult drilling, grinding on rock.										
15													
20				SPT	12-31-39 (70)								
		GP	@21 ft., Sandy GRAVEL with clay, gray and red brown, damp to moist, very dense; carbonate stringers; with cobbles.										
25													

(Continued Next Page)

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-4

CLIENT AMBIENT COMMUNITIES

PROJECT NAME Hollister Apartments

PROJECT NUMBER 1912-01

PROJECT LOCATION 555 Hollister Street, San Diego

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
25		GP	**Old Paralic Deposits (Qop6)** (continued) Sandy GRAVEL with clay, gray and red brown, damp to moist, very dense; carbonate stringers; with cobbles. Difficult drilling, grinding on rock. @28 ft., refusal to further drilling.										

Terminated at 28 feet (Refusal)
No groundwater. Caving in gravel and cobbles.
Backfilled in accordance with SDCDEH requirements.

BORING NUMBER B-5

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT AMBIENT COMMUNITIES
PROJECT NAME Hollister Apartments
PROJECT NUMBER 1912-01
PROJECT LOCATION 555 Hollister Street, San Diego
DATE STARTED 6/9/21 **COMPLETED** 6/9/21
GROUND ELEVATION 22.5 ft **HOLE SIZE** 8 inch
DRILLING CONTRACTOR Pacific Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING 10.00 ft / Elev 12.50 ft
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING 10.00 ft / Elev 12.50 ft
NOTES Auto-trip hammer
AFTER DRILLING 10.00 ft / Elev 12.50 ft

DEPTH (ft)	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0	SC	**Artificial Fill (afu)** Clayey SAND, red brown, moist, loose to medium dense, fine- to coarse-grained; some gravel and cobbles; with roots and organic content to 6 inches.										
	SC	**Young Alluvium (Qya?)** Clayey SAND, red brown, moist, medium dense; with gravel and cobbles; grinding on rock. @2.5 ft., dense, no recovery.	SPT	7-7-12 (19)								
		@4 ft., difficult drilling, grinding on rock; with cobbles.										
5			SPT	23-9-13 (22)								
	GP	**Old Paralic Deposits (Qop6)** Sandy GRAVEL with clay, gray and red brown, damp to moist, dense; carbonate stringers. @6.5 ft., difficult drilling, grinding on gravel and cobbles.										
	ML	@8 ft., Sandy CLAY to sandy SILT, gray to gray brown, moist to wet, dense; carbonate stringers.										
10		▼ @10 ft., Groundwater.	MC	8-12-26 (38)	102	22.1	91	Sieve Cons DS	45	27	18	63
15												
20	SP	@20 ft., SAND, gray to red brown, saturated, dense, fine- to medium-grained; some silt.	SPT	10-10-14 (24)				Hydro	NP	NP	NP	17
	SM	@21 ft., Silty SAND, gray to red brown, saturated, dense, fine- to medium-grained; micaceous, iron oxide; laminated.						Sieve				31
25												

(Continued Next Page)

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-5

CLIENT AMBIENT COMMUNITIES

PROJECT NAME Hollister Apartments

PROJECT NUMBER 1912-01

PROJECT LOCATION 555 Hollister Street, San Diego

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
25		SM	**Old Paralic Deposits (Qop6)** (continued) Silty SAND, gray to red brown, saturated, dense, fine- to medium-grained; micaceous, iron oxide; laminated.										
30		ML	30 ft., SILT, gray brown, saturated, medium dense, some fine-grained sand; micaceous.	MC	2-5-10 (15)	101	20.3	81	Hydro Cons	49	29	20	84

Terminated at 31.5 feet.
Groundwater at 10 ft. at end of drilling.
Caving in gravel and cobbles.
Backfilled in accordance with SDCDEH requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-6

CLIENT AMBIENT COMMUNITIES
PROJECT NAME Hollister Apartments
PROJECT NUMBER 1912-01
PROJECT LOCATION 555 Hollister Street, San Diego
DATE STARTED 6/9/21 **COMPLETED** 6/9/21
GROUND ELEVATION 26 ft **HOLE SIZE** 8 inch
DRILLING CONTRACTOR Pacific Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES Auto-trip hammer
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SC	**Topsoil** Clayey SAND, red brown to dark brown, moist, loose, fine- to coarse-grained; with roots and organic content.										
				SPT	2-1-1 (2)								
5		SC	**Young Alluvium (Qya)** Silty SAND, red brown, moist, medium dense; manganese nodules.										
				SPT	3-3-3 (6)								
		SM	**Old Paralic Deposits (Qop6)** Silty SAND, red brown, moist, medium dense; manganese nodules; with gravel and cobbles. @8 ft., difficult drilling, grinding on cobbles. Refusal.										

Terminated at 8.25 feet (Refusal).
No groundwater. No caving.
Backfilled in accordance with SDCDEH requirements.

BORING NUMBER B-7

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT AMBIENT COMMUNITIES
PROJECT NAME Hollister Apartments
PROJECT NUMBER 1912-01
PROJECT LOCATION 555 Hollister Street, San Diego
DATE STARTED 6/9/21 **COMPLETED** 6/9/21
GROUND ELEVATION 19 ft **HOLE SIZE** 8 inch
DRILLING CONTRACTOR Pacific Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 10.00 ft / Elev 9.00 ft
LOGGED BY AB **CHECKED BY** PJD
▼ **AT END OF DRILLING** 6.50 ft / Elev 12.50 ft
NOTES Auto-trip hammer
▼ **AFTER DRILLING** 6.50 ft / Elev 12.50 ft

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SC	**Topsoil** Clayey SAND, light gray brown, dry to damp, loose, fine- to coarse-grained; with fine gravel; abundant roots and organic content.										
		SM	@1.0 ft., Silty SAND to sandy SILT, dark brown to black, moist, loose, fine-grained; urea odor, micaceous, organic content and fine roots.										
		SM	**Young Alluvium (Qya)** Silty SAND, dark red brown, moist to wet, loose; manganese nodules.	SPT	2-2-3 (5)								
5			▼	SPT	3-3-2 (5)								
10			▽ @10 ft., wet to saturated. Groundwater.	SPT	4-8-15 (23)								
		GP	**Old Paralic Deposits (Qop6)** Sandy GRAVEL, gray and red brown, wet to saturated, dense; difficult drilling, grinding on rock; with cobbles.										
15			@15 ft., grinding on cobbles. Refusal to further drilling.										

Terminated at 15 feet (Refusal).
Groundwater at 6.5 ft. at end of drilling.
Caving in gravel and cobbles.
Backfilled in accordance with SDCDEH requirements.

BORING NUMBER P-1

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT AMBIENT COMMUNITIES		**PROJECT NAME** Hollister Apartments	
PROJECT NUMBER 1912-01		**PROJECT LOCATION** 555 Hollister Street, San Diego	
DATE STARTED 6/7/21	**COMPLETED** 6/7/21	**GROUND ELEVATION** 42.5 ft	**HOLE SIZE** 8 inch
DRILLING CONTRACTOR Pacific Drilling		**GROUND WATER LEVELS:**	
DRILLING METHOD Hollow Stem Auger		**AT TIME OF DRILLING** ---	
LOGGED BY AB	**CHECKED BY** PJD	**AT END OF DRILLING** ---	
NOTES		**AFTER DRILLING** ---	

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		SM	**Artificial Fill (afu)** Sandy CLAY, red brown, moist, stiff, sand is fine- to coarse-grained; with gravel.										
2.5		CL	@3 ft., Gravelly CLAY, red brown, with fine- to medium-grained sand, moist, sitff.										
5.0		GC	@4.5 ft., abundant gravel and cobbles.										

Terminated at 5.5 feet.
No groundwater. Caving on gravel and cobbles.
Pipe set to 4.5 ft. Backfilled with gravel.

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER P-2

CLIENT AMBIENT COMMUNITIES
PROJECT NAME Hollister Apartments
PROJECT NUMBER 1912-01
PROJECT LOCATION 555 Hollister Street, San Diego
DATE STARTED 6/7/21 **COMPLETED** 6/7/21
GROUND ELEVATION 45.5 ft **HOLE SIZE** 8 inch
DRILLING CONTRACTOR Pacific Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		SM	**Artificial Fill (afu)** Silty to clayey SAND, red brown, moist, loose to medium dense, fine- to coarse-grained; with gravel.										
2.5			**Old Paralic Deposits (Qop6)** Gravelly SAND, red brown, fine- to medium-grained, damp, loose to medium dense; abundant cobbles.										

Terminated at 4.5 feet.
No groundwater. Caving on gravel and cobbles.
Pipe set to 4.5 ft. Backfilled with gravel.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER P-3

CLIENT AMBIENT COMMUNITIES
PROJECT NAME Hollister Apartments
PROJECT NUMBER 1912-01
PROJECT LOCATION 555 Hollister Street, San Diego
DATE STARTED 6/7/21 **COMPLETED** 6/7/21
GROUND ELEVATION 49 ft **HOLE SIZE** 8 inch
DRILLING CONTRACTOR Pacific Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		SM	**Artificial Fill (afu)** Silty to clayey SAND, orange, moist, loose to medium dense, fine- to coarse-grained; with gravel.										
2.5													
			Old Paralic Deposits (Qop6) Gravelly SAND, red brown, fine- to medium-grained, damp, loose to medium dense; abundant cobbles.										
5.0		SM	Silty to clayey SAND, red brown, moist, loose to medium dense, fine- to coarse-grained; with gravel.										

Terminated at 5 feet.
No groundwater. Caving on gravel and cobbles.
Pipe set to 5 ft. Backfilled with gravel.

BORING NUMBER P-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT	AMBIENT COMMUNITIES	**PROJECT NAME**	Hollister Apartments
PROJECT NUMBER	1912-01	**PROJECT LOCATION**	555 Hollister Street, San Diego
DATE STARTED	6/7/21 **COMPLETED** 6/7/21	**GROUND ELEVATION**	49 ft **HOLE SIZE** 8 inch
DRILLING CONTRACTOR	Pacific Drilling	**GROUND WATER LEVELS:**	
DRILLING METHOD	Hollow Stem Auger	**AT TIME OF DRILLING**	---
LOGGED BY	AB **CHECKED BY** PJD	**AT END OF DRILLING**	---
NOTES		**AFTER DRILLING**	---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		SC	**Topsoil** Silty to clayey SAND, red brown to dark brown, moist, loose, fine- to coarse-grained; with roots and organic content.										
2.5		CL	**Artificial Fill (afu)** Sandy CLAY, yellow brown, moist, very stiff; some gravel.										
5.0													

Terminated at 5 feet.
No groundwater.
Pipe set to 5 ft. Backfilled with gravel.

Project: 555 Hollister Street
Date Excavated: 12/19/2019
Logged by: SS
Equipment: Cat 420F/24” Bucket

LOG OF TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
TP-1	0.0 – 4.5	SC	**Artificial Fill – Undocumented (afu):** Clayey SAND with sub-rounded Gravel to Cobble, red brown, moist, loose; construction debris: asphalt and concrete
	4.5 – 7.0	SM	**Young Alluvial Flood-Plain Deposits (Qya)** Silty fine- to coarse-grained SAND with abundant sub-rounded Gravel to Cobble, yellow brown, slightly moist, loose
			TOTAL DEPTH 7.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-2	0.0 – 3.5	SC/CL	**Topsoil:** Clayey SAND to Sandy Clay, red brown, moist, loose
	3.5 – 5.0	SM	**Old Paralic Deposits (Qop_6)** Silty fine-grained SAND with abundant sub-rounded Gravel to Cobble, yellow brown to gray brown, dense; weakly cemented, minor iron oxide staining
			TOTAL DEPTH 5.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-3	0.0 – 4.0	SC	**Artificial Fill – Undocumented (afu):** Clayey SAND with sub-rounded Gravel to Cobble, red brown, very moist; mixed with some light gray brown Clayey SAND
	4.0 – 9.0	SP	**Young Alluvial Flood-Plain Deposits (Qya)** Coarse-grained SAND with abundant Gravel to Cobble, moist, loose; trace Silt and Clay (CAVING from 4' – 9')
	9.0 – 11.0	SC	**Old Paralic Deposits (Qop_6)** Clayey fine- to coarse-grained SAND with common Gravel, dark gray brown to red brown, moist, dense; weakly cemented

TOTAL DEPTH 11.0 FT.
NO WATER, CAVING SOILS

Test Pit No.	Depth (ft.)	USCS	Description
TP-4	0.0 – 2.5	SC/SM	**Artificial Fill – Undocumented (afu):** Silty to Clayey fine- to medium-grained SAND with some Gravel to Cobble, very moist, loose
	2.5 – 4.0	SM	**Old Paralic Deposits (Qop_6)** Silty fine- to coarse-grained SAND with some sub-rounded Gravel to Cobble, dark gray brown to dark red brown, dense; weakly cemented
			TOTAL DEPTH 4.0 FT. NO WATER, NO CAVING
TP-5	0.0 – 2.5	SC	**Artificial Fill – Undocumented (afu):** Clayey fine-grained SAND with some Gravel to Cobble, red brown, very moist, loose
	2.5 – 7.5	SM	**Old Paralic Deposits (Qop_6)** Silty fine-grained SAND with small rounded Gravel, dark gray brown to dark orange brown, moist, dense; trace Clay, weakly cemented, carbonate stringers, slightly micaceous @ 6.5 ft., yellow brown to dark yellow brown, slightly moist, dense; moderately cemented, carbonate nodules, minor iron oxide staining
			TOTAL DEPTH 7.5 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-6	0.0 – 2.0	SC	**Artificial Fill – Undocumented (afu):** Clayey fine- to coarse-grained SAND with some Gravel to Cobble, red brown, loose; abundance of organics @ 1.0 ft., encountered a 2" steel pipe (moved trench 5' north)
	2.0 – 15.0	SP	**Young Alluvial Flood-Plain Deposits (Qya)** Coarse-grained SAND with abundant sub-rounded Gravel to Cobble, dark yellow brown to dark orange brown, very moist to wet, loose (CAVING from 2' – 15') @ 3.5 ft., moist, occasional boulders @ 10.0 ft., becomes slightly moist
			TOTAL DEPTH 15.0 FT. NO WATER, CAVING SOILS

Test Pit No.	Depth (ft.)	USCS	Description
TP-7	0.0 – 3.5	SC	**Artificial Fill – Undocumented (afu):** Clayey fine- to coarse-grained SAND with some Gravel to Cobble, red brown, very moist, loose
	3.5 – 13.0	SM	**Old Paralic Deposits (Qop6)** Silty fine- to medium-grained SAND, dark gray brown to red brown, moist, dense; weakly cemented, slightly micaceous
		SP	@ 5.5 ft., Coarse-grained SAND with abundant sub-rounded Gravel to Cobble, dark yellow brown, moist
			@ 7.0 ft., slightly moist
			TOTAL DEPTH 13.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-8	0.0 – 4.0	SC/CL	**Topsoil:** Clayey SAND to Sandy CLAY, fine- to coarse-grained, dark red brown, very moist to wet, loose to soft; occasional sub-rounded Gravel to Cobble
	4.0 – 13.0	SM	**Old Paralic Deposits (Qop_6)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist to moist, dense; moderately cemented, carbonate nodules, slightly micaceous, minor porosity
		SW	@ 7.0 ft., Fine- to coarse SAND with sub-rounded Gravel to Cobble, light yellow brown, slightly moist
		SP	@ 10.0 ft., Coarse-grained SAND with abundant sub-rounded Gravel to Cobble
			TOTAL DEPTH 13.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-9	0.0 – 11.0	SC	**Artificial Fill – Undocumented (afu):** Clayey SAND with Gravel to Cobble, yellow brown to gray brown, very moist, loose; trash debris: PVC pipe, plastic, glass, metal, wood, concrete etc. (CAVING from 0' – 11')
	11.0 – 13.0	SP	**Young Alluvial Flood-Plain Deposits (Qya)** Coarse-grained SAND with abundant sub-rounded Gravel to Cobble, dark yellow brown to gray brown, moist, loose

TOTAL DEPTH 13.0 FT.
NO WATER, CAVING SOILS

Test Pit No.	Depth (ft.)	USCS	Description
TP-10	0.0 – 13.0	SC	**Artificial Fill – Undocumented (afu):** Clayey SAND with Gravel to Cobble, gray brown, moist, loose; trash debris: PVC pipe, plastic, glass, metal, wood, concrete etc. TOTAL DEPTH 13.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-11	0.0 – 1.5	SM/SC	**Topsoil:** Silty to Clayey SAND, fine-grained, red brown to dark gray brown, moist, loose
	1.5 – 10.0	SM	**Old Paralic Deposits (Qop_6)** Silty fine- to coarse-grained SAND, dark gray brown to dark blueish brown, slightly moist, dense; moderately cemented, slightly micaceous, minor porosity
			@ 3.0 ft., non-porous
		CL/ML	@ 7.0 ft., Silty CLAY to Clayey SILT
		SM	@ 8.0 ft., grades back to Silty SAND
			TOTAL DEPTH 10.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-12	0.0 – 1.0	SM	**Topsoil:** Silty to Clayey fine- to coarse-grained SAND with some Gravel, red brown, moist to very moist loose
	1.0 – 13.0	SM-SC	**Young Alluvial Flood-Plain Deposits (Qya)** Silty to Clayey fine- to coarse-grained SAND with sub-rounded Gravel to Cobble, gray brown to dark yellow brown, moist to very moist, loose (CAVING from 1' – 13')
		SP	Coarse-grained SAND with abundant sub-rounded Gravel to Cobble, yellow brown to gray brown, moist to very moist, loose; occasional boulder
			TOTAL DEPTH 13.0 FT. NO WATER, CAVING SOILS

Test Pit No.	Depth (ft.)	USCS	Description
TP-13	0.0 – 2.5.	SC	**Artificial Fill – Undocumented (afu):** Clayey SAND with sub-rounded Gravel to Cobble, dark brown, very moist, loose
	2.5 – 6.0	SM/SC	**Young Alluvial Flood-Plain Deposits (Qya)** Silty to Clayey fine- to coarse-grained SAND with abundant sub-rounded Gravel to Cobble, dark yellow brown, to gray brown, moist, loose
	6.0 – 12.0	SM	**Old Paralic Deposits (Qop_6)** Silty fine-grained SAND with abundant Gravel to Cobble, yellow brown, slightly moist to moist, dense; moderately cemented, abundant carbonate stringers, slightly micaceous
			TOTAL DEPTH 12.0 FT. NO WATER, NO CAVING

APPENDIX C

LABORATORY TESTING RESULTS

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

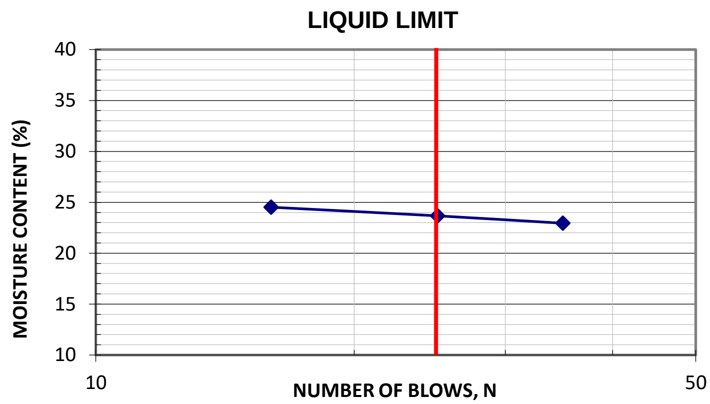
Project Name:	555 Hollister St.	Excavation:	B-3
Location:	San Diego	Depth:	0-2 ft
Project No:	1912-01	Description:	SC
Date:	6/29/2021	By:	FV

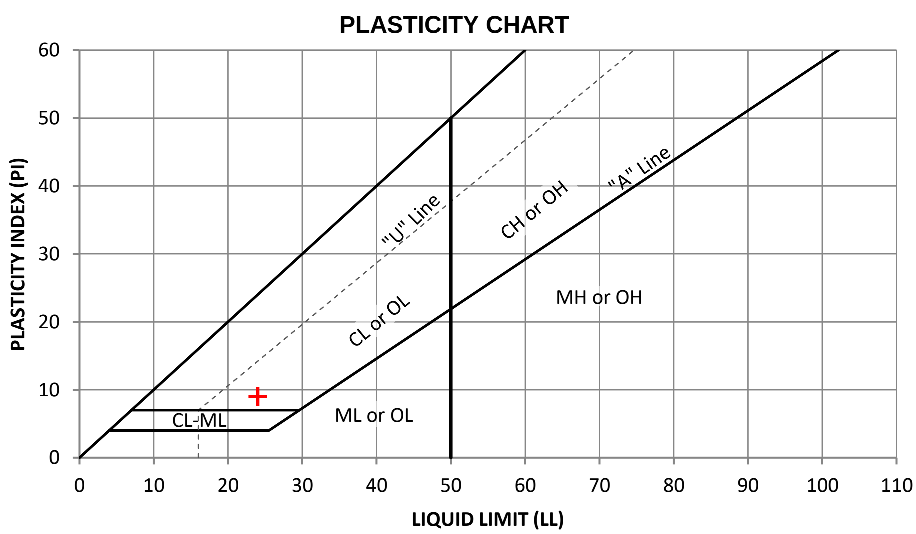
LIQUID LIMIT

Can No.	4	1	6
Wt. wet soil+can (g)	21.55	20.31	21.52
Wt. dry soil+can (g)	19.60	18.58	19.50
Wt. can (g)	11.10	11.27	11.26
Wt. mosture (g)	1.95	1.73	2.02
Wt. dry soil (g)	8.50	7.31	8.24
Water Content %	22.94	23.67	24.51
No. of Blows	35	25	16

PLASTIC LIMIT

109	111
60.78	60.00
59.65	58.87
51.57	51.44
1.13	1.13
8.08	7.43
13.99	15.21





Liquid Limit (LL)	24	Plastic Limit (PL)	15	Plasticity Index (PI)	9

1912-01_Atterberg_B-3_0-2 ft_06-29-2021_FV

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

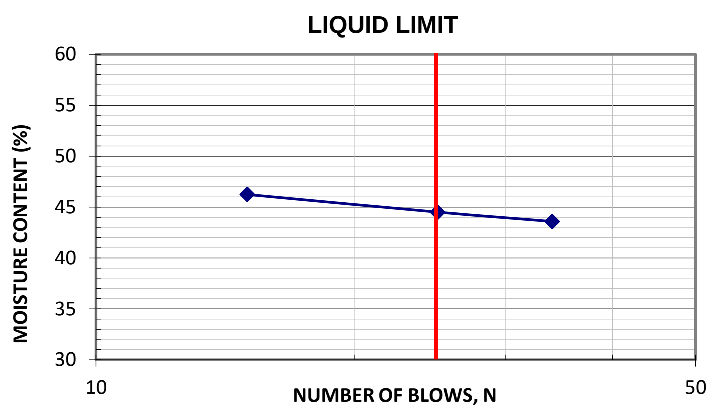
Project Name:	555 Hollister	Excavation:	B-5
Location:	San Diego	Depth:	10-11.5 ft
Project No:	1912-01	Description:	ML
Date:	7/16/2021	By:	FV

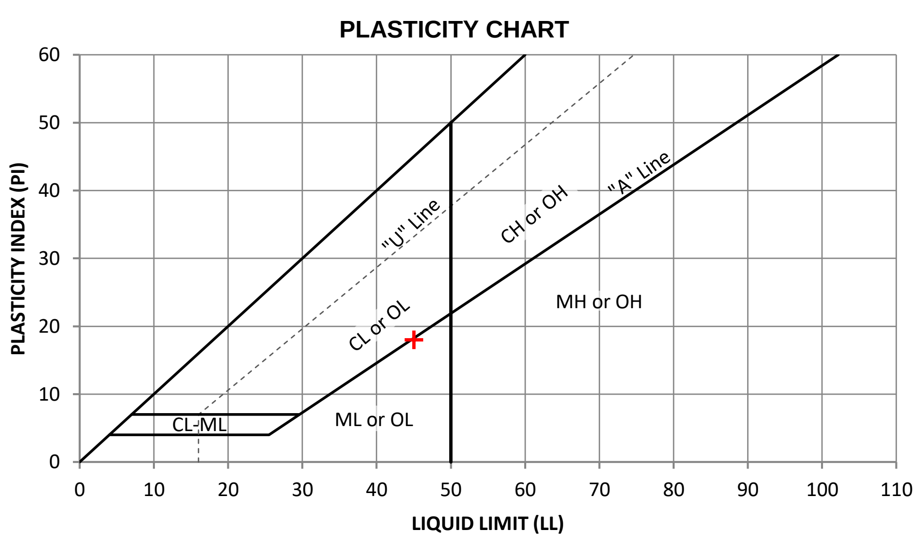
LIQUID LIMIT

Can No.	2	14	5
Wt. wet soil+can (g)	19.29	19.27	19.65
Wt. dry soil+can (g)	16.81	16.80	17.01
Wt. can (g)	11.12	11.25	11.30
Wt. mosture (g)	2.48	2.47	2.64
Wt. dry soil (g)	5.69	5.55	5.71
Water Content %	43.59	44.50	46.23
No. of Blows	34	25	15

PLASTIC LIMIT

106	104
57.81	56.69
56.44	55.51
51.32	51.03
1.37	1.18
5.12	4.48
26.76	26.34





Liquid Limit (LL)	45	Plastic Limit (PL)	27	Plasticity Index (PI)	18

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

AGS Form E-2

ATTERBERG LIMITS - ASTM D4318

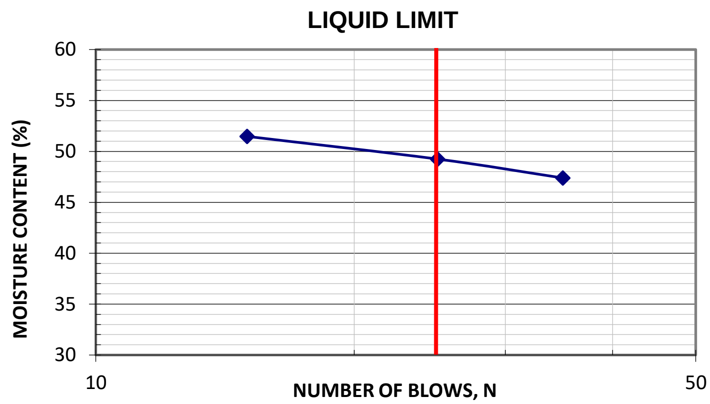
Project Name:	555 Hollister	Excavation:	B-5
Location:	San Diego	Depth:	30-31.5 ft
Project No:	1912-01	Description:	ML
Date:	7/14/2021	By:	FV

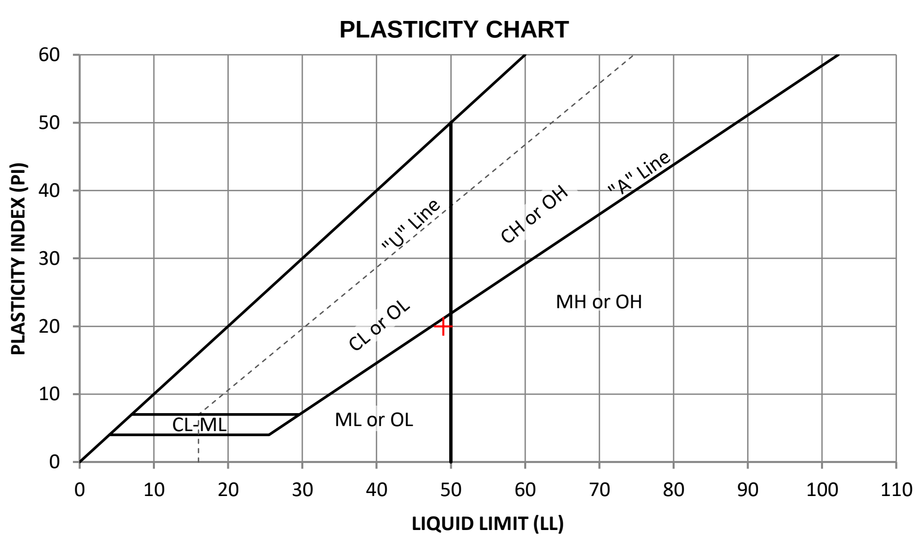
LIQUID LIMIT

Can No.	3	11	10
Wt. wet soil+can (g)	19.97	20.16	20.92
Wt. dry soil+can (g)	17.16	17.22	17.60
Wt. can (g)	11.23	11.25	11.15
Wt. mosture (g)	2.81	2.94	3.32
Wt. dry soil (g)	5.93	5.97	6.45
Water Content %	47.39	49.25	51.47
No. of Blows	35	25	15

PLASTIC LIMIT

111	109
57.24	57.59
55.92	56.23
51.42	51.56
1.32	1.36
4.50	4.67
29.33	29.12





Liquid Limit (LL) 49 Plastic Limit (PL) 29 Plasticity Index (PI) 20

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

AGS FORM E-6

Project Name:	555 Hollister St.	Excavation/Tract:	B-3
Location:	San Diego	Depth/Lot:	0-2 ft
P/W:	1902-01	Description:	SC
Date:	7/1/21	Tested by:	FV
		Checked by:	AB

Expansion Index - ASTM D4829

Initial Dry Density (pcf):	117.6
Initial Moisture Content (%):	8.3
Initial Saturation (%):	51.7
Final Dry Density (pcf):	116.9
Final Moisture Content (%):	14.9
Final Saturation (%):	91.5
Expansion Index:	6
Potential Expansion:	Very Low

ASTM D4829 - Table 5.3

Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

AGS FORM E-6

Project Name:	555 Hollister St	Excavation/Tract:	TP-4
Location:	San Diego	Depth/Lot:	0.0-2.0 ft
P/W:	1912-01	Description:	Reddish Brn SM
Date:	1/22/20	Tested by:	FV
		Checked by:	SS

Expansion Index - ASTM D4829

Initial Dry Density (pcf):	103.3
Initial Moisture Content (%):	11.5
Initial Saturation (%):	49.2
Final Dry Density (pcf):	99.9
Final Moisture Content (%):	25.3
Final Saturation (%):	99.7
Expansion Index:	34
Potential Expansion:	Low

ASTM D4829 - Table 5.3

Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

AGS FORM E-6

Project Name:	555 Hollister St	Excavation/Tract:	TP-8
Location:	San Diego	Depth/Lot:	1-3 ft
P/W:	1912-01	Description:	Brown SC-SM
Date:	1/23/20	Tested by:	FV
		Checked by:	SS

Expansion Index - ASTM D4829	
Initial Dry Density (pcf):	120.0
Initial Moisture Content (%):	7.7
Initial Saturation (%):	51.4
Final Dry Density (pcf):	120.8
Final Moisture Content (%):	12.8
Final Saturation (%):	87.3
Expansion Index:	0
Potential Expansion:	Very Low

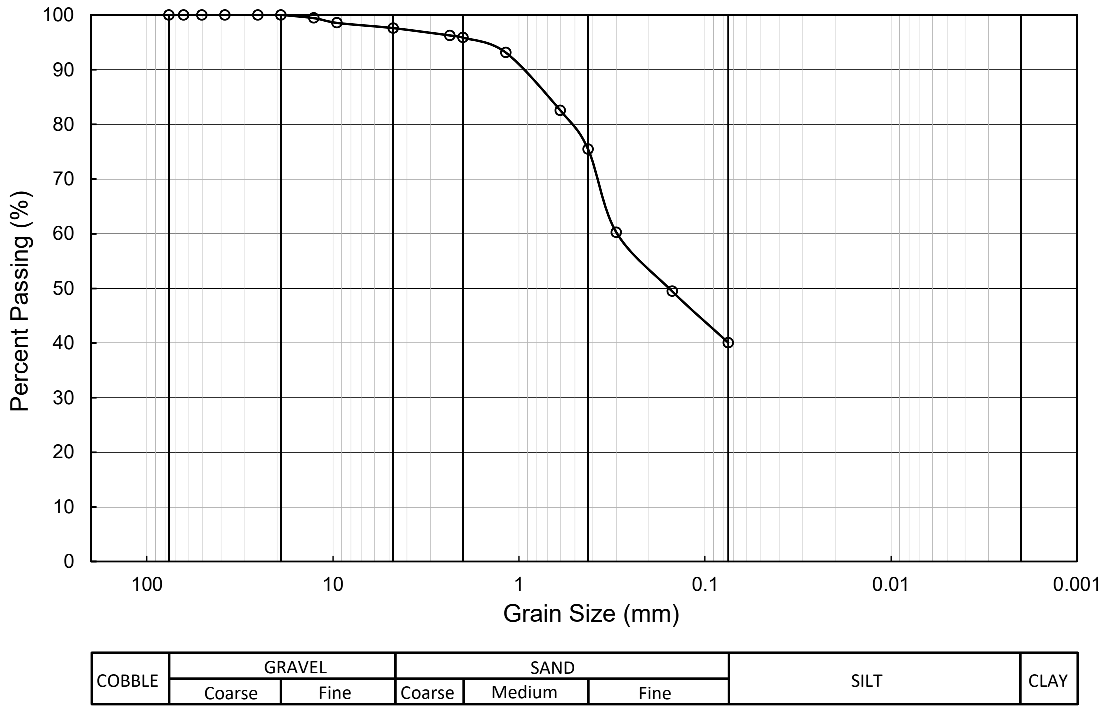
ASTM D4829 - Table 5.3	
Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	555 Hollister St.	Excavation:	B-3
Location:	San Diego	Depth:	0-2 ft
Project No.:	1912-01	Tested by:	FV
Date:	06-2021	Checked by:	AB



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	99
3/8 "	9.53	99
# 4	4.75	97.6
# 8	2.36	96.2
#10	2.00	95.9
#16	1.18	93.2
# 30	0.60	82.5
# 40	0.425	75.4
# 50	0.30	60.2
# 100	0.15	49.5
# 200	0.075	40.0

Summary	
% Gravel =	2.4
% Sand =	57.6
% Fines =	40.0
Sum =	100.0

LL= 24
PL= 15
PI = 9

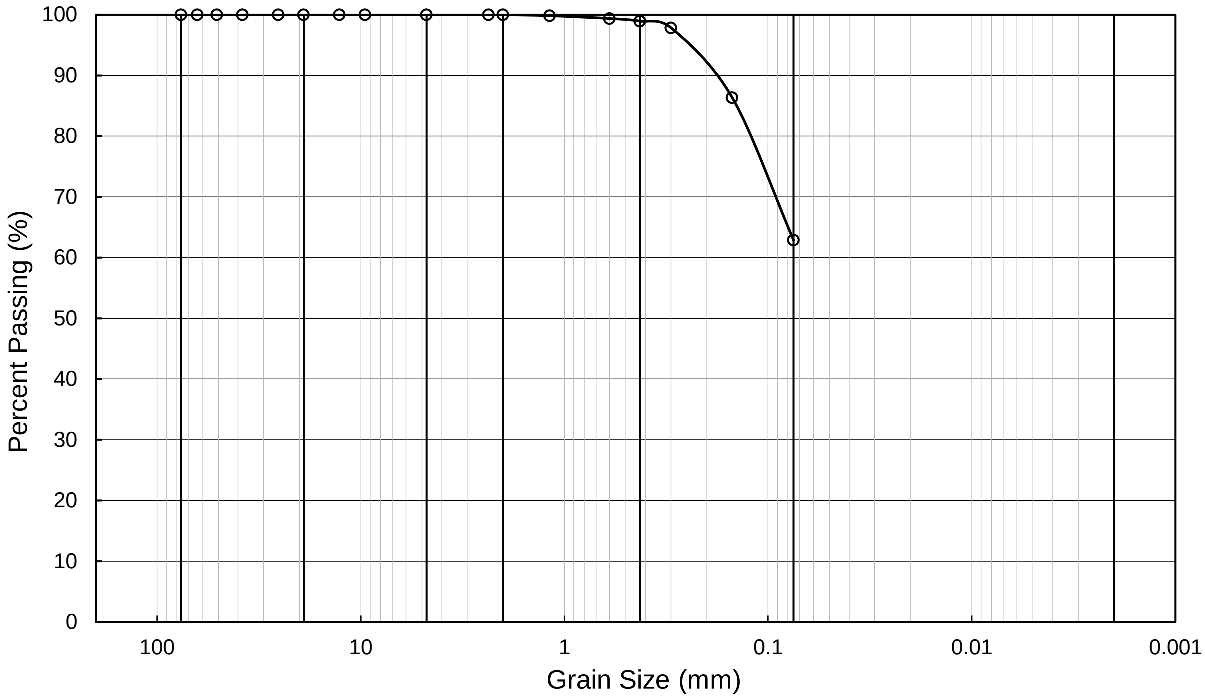
Soil Type: SC

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name:	555 Hollister St.	Excavation:	B-5
Location:	San Diego	Depth:	10-11.5 ft
Project No.:	1912-01	Tested by:	FV
Date:	07-2021	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100.0
# 8	2.36	100.0
#10	2.00	100.0
#16	1.18	99.8
# 30	0.60	99.4
# 40	0.425	98.9
# 50	0.30	97.9
# 100	0.15	86.4
# 200	0.075	62.9

Summary	
% Gravel =	0.0
% Sand =	37.1
% Fines =	62.9
Sum =	100.0

LL= 45
PL= 27
PI = 18

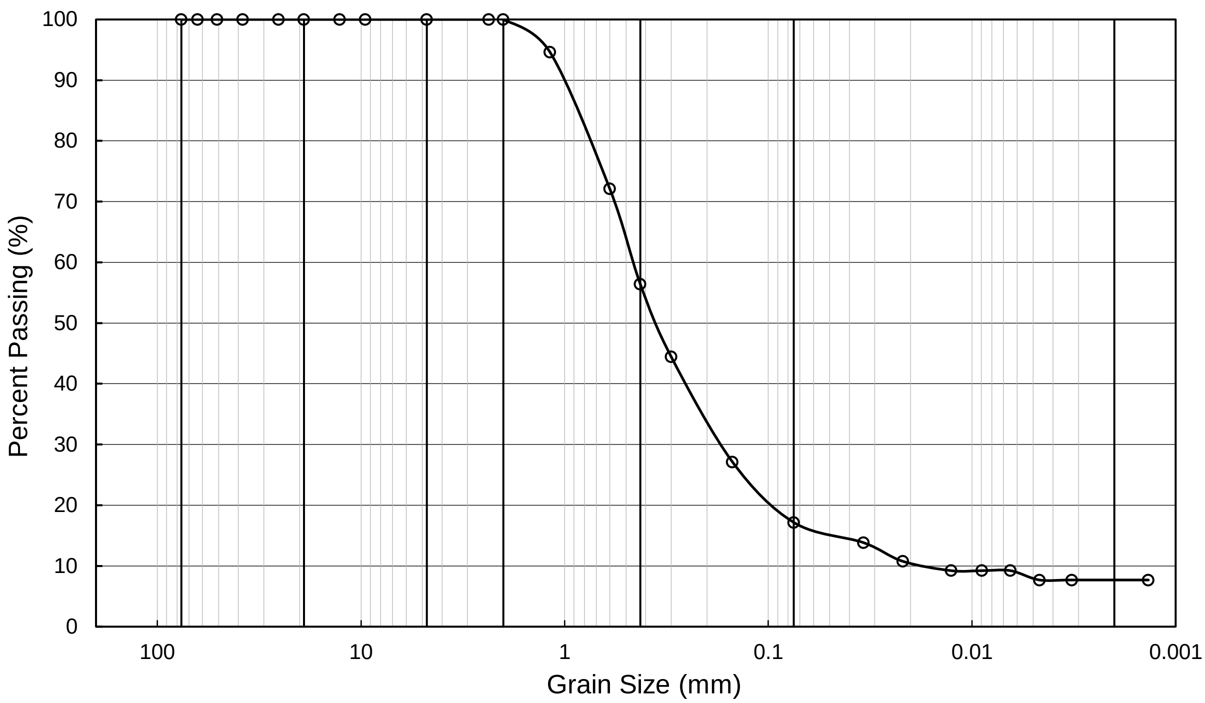
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: 555 Hollister St.
Location: San Diego
Project No.: 1912-01
Date: 7/15/2021

Excavation: B-5
Depth: 20-21 ft
Tested by: FV
Checked by: AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100
# 8	2.36	100
#10	2.00	100
#16	1.18	95
# 30	0.60	72.1
# 40	0.425	56.4
# 50	0.30	44.5
# 100	0.15	27.1
# 200	0.075	17.2
Hydro	0.0341	13.8
Hydro	0.0218	10.8
Hydro	0.0127	9.2
Hydro	0.0089	9.2
Hydro	0.0065	9.2
Hydro	0.0047	7.7
Hydro	0.0032	7.7
Hydro	0.0014	7.7

Summary	
% Gravel =	0.0
% Sand =	82.8
% Fines =	17.2
Sum =	100.0

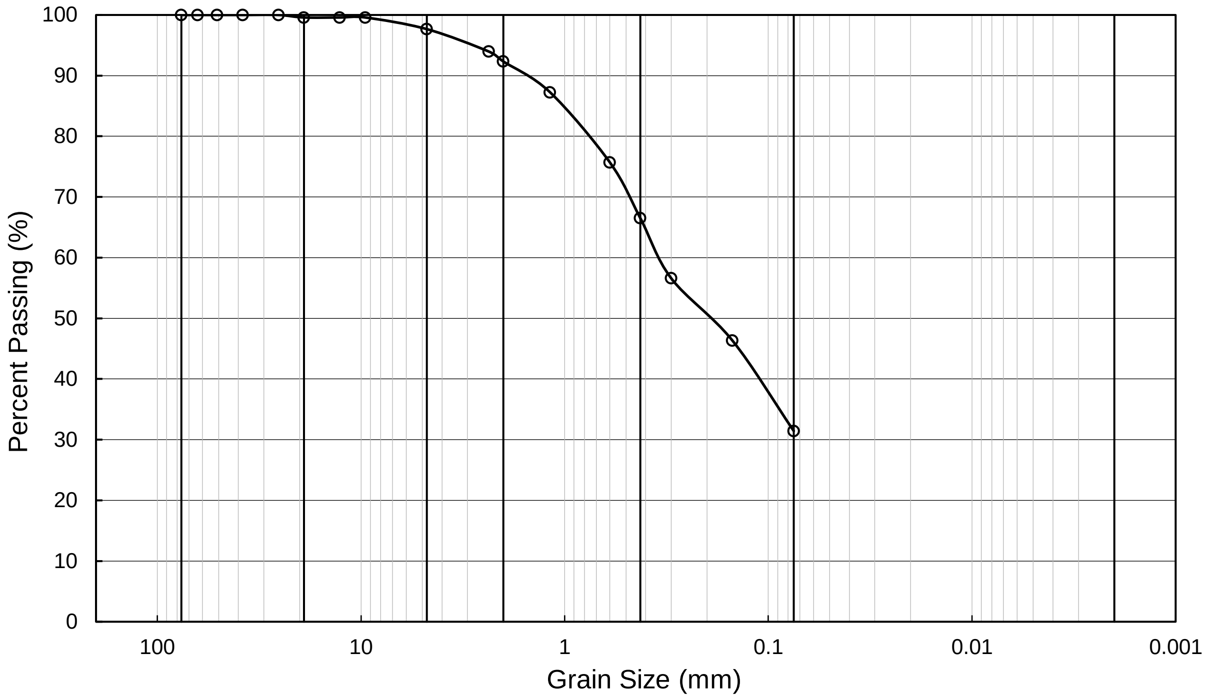
LL= n/a
PL= n/a
PI = n/a

Soil Type: SP

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422 AGS FORM E-7

Project Name:	555 Hollister	Excavation:	B-5
Location:	San Diego	Depth:	21-21.5 ft
Project No.:	1912-01	Tested by:	FV
Date:	07-2021	Checked by:	AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	97.7
# 8	2.36	94.0
#10	2.00	92.3
#16	1.18	87.3
# 30	0.60	75.7
# 40	0.425	66.5
# 50	0.30	56.6
# 100	0.15	46.3
# 200	0.075	31.4

Summary	
% Gravel =	2.3
% Sand =	66.2
% Fines =	31.4
Sum =	100.0

LL= NP
PL= NP
PI = NP

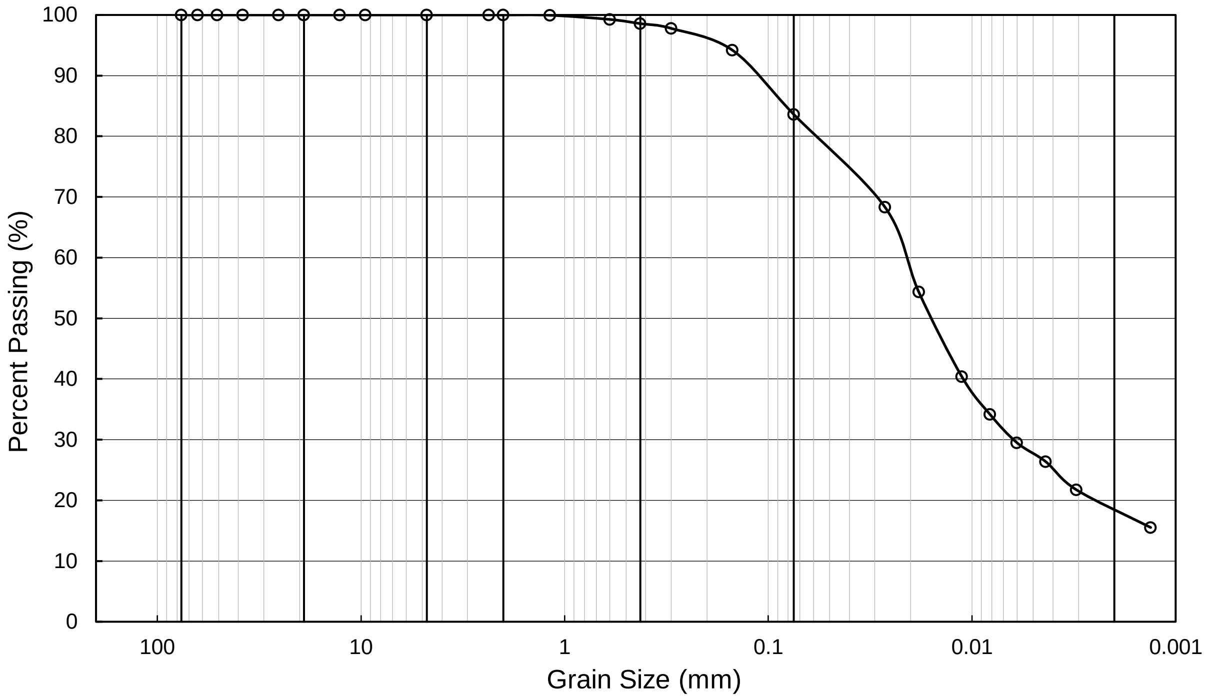
Soil Type: SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: 555 Hollister St.
Location: San Diego
Project No.: 1912-01
Date: 7/15/2021

Excavation: B-5
Depth: 30-31.5 ft
Tested by: FV
Checked by: AB



COBBLE	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	Coarse	Medium	Fine		

Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	100
# 8	2.36	100
#10	2.00	100
#16	1.18	100
# 30	0.60	99.3
# 40	0.425	98.6
# 50	0.30	97.8
# 100	0.15	94.2
# 200	0.075	83.6
Hydro	0.0267	68.3
Hydro	0.0182	54.3
Hydro	0.0112	40.4
Hydro	0.0082	34.2
Hydro	0.0060	29.5
Hydro	0.0044	26.4
Hydro	0.0031	21.7
Hydro	0.0013	15.5

Summary	
% Gravel =	0.0
% Sand =	16.4
% Fines =	83.6
Sum =	100.0

LL= 49
PL= 29
PI = 20

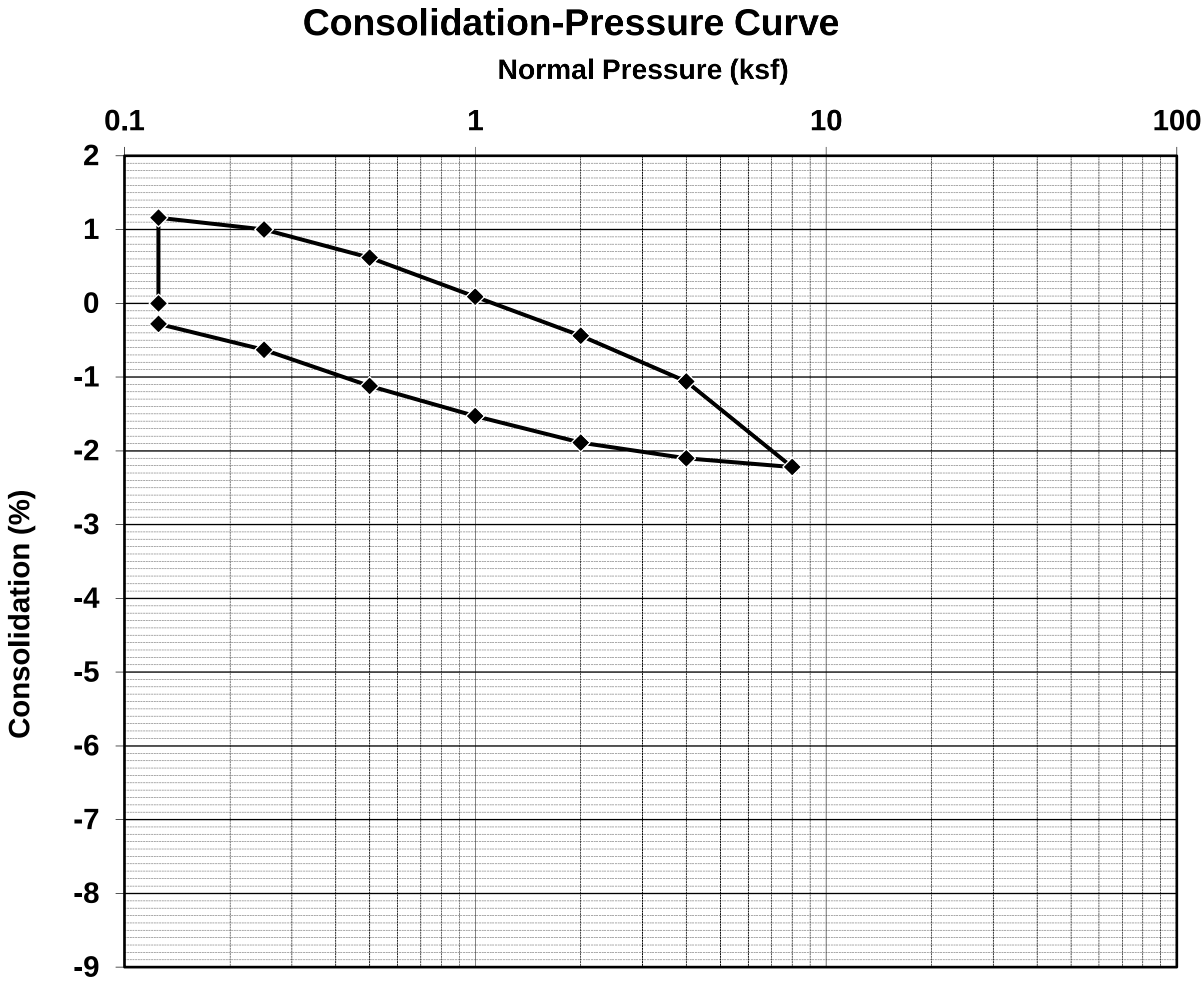
Soil Type: ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	555 Hollister St.	Excavation:	B-5
Location:	San Diego	Depth:	10-11.5 ft
Project No:	1912-01	Description:	CL-ML
Date:	7/12/21	By:	FV



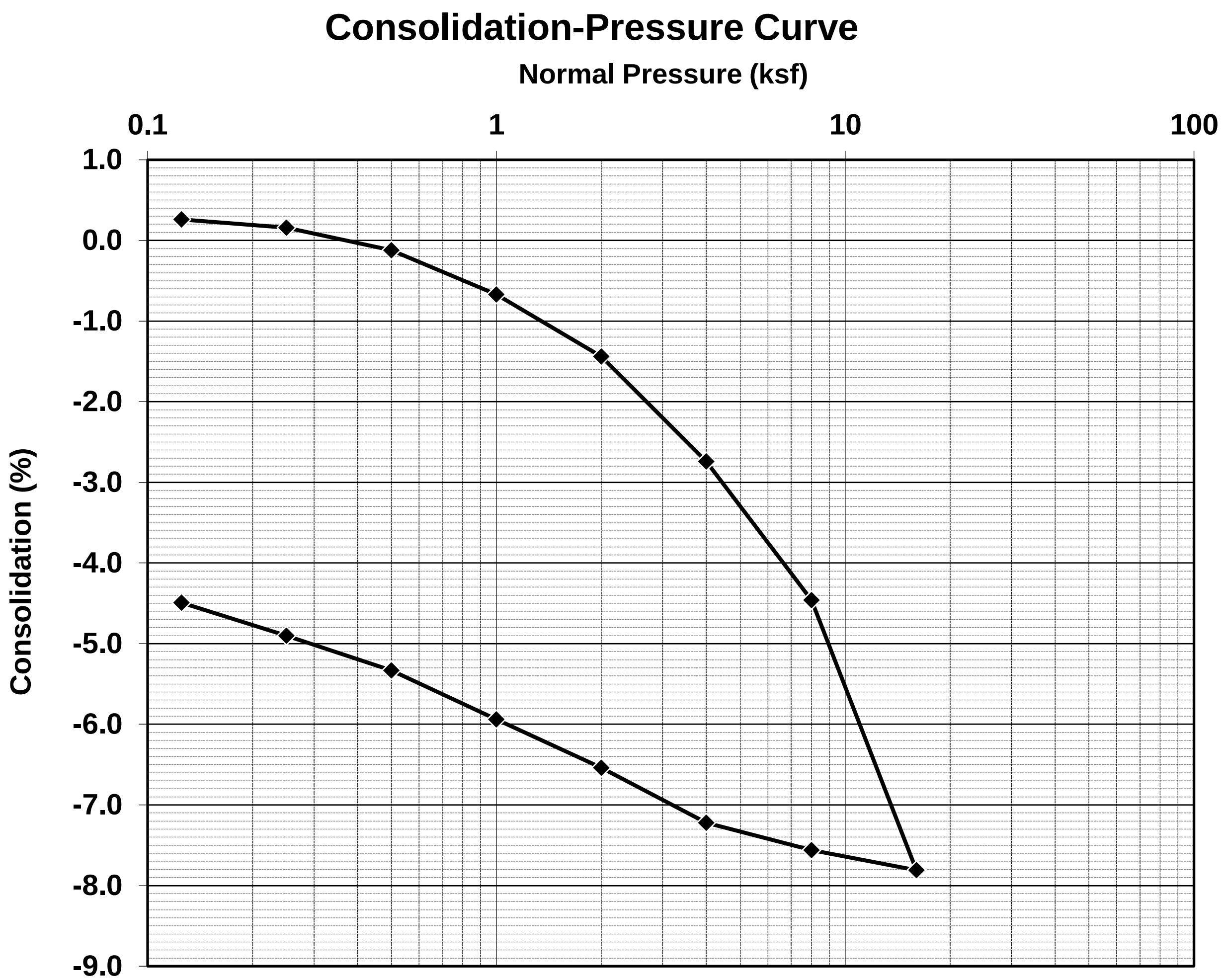
Test Data	Before Test	After Test
Water Content, w	22.1%	27.7%
Void Ratio, e	0.791	0.786
Saturation, S	80%	100%
Dry Density (pcf)	99.3	99.5
Wet Density (pcf)	121.2	127.2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CONSOLIDATION - ASTM D2435

AGS Form E-3

Project Name:	555 Hollister St.	Excavation:	B-5
Location:	San Diego	Depth:	30.5-31 ft
Project No:	1912-01	Description:	ML
Date:	7/12/21	By:	FV



Test Data	Before Test	After Test
Water Content, w	20.3%	31.2%
Void Ratio, e	0.653	0.579
Saturation, S	84%	145%
Dry Density (pcf)	101.9	106.7
Wet Density (pcf)	122.6	140.0

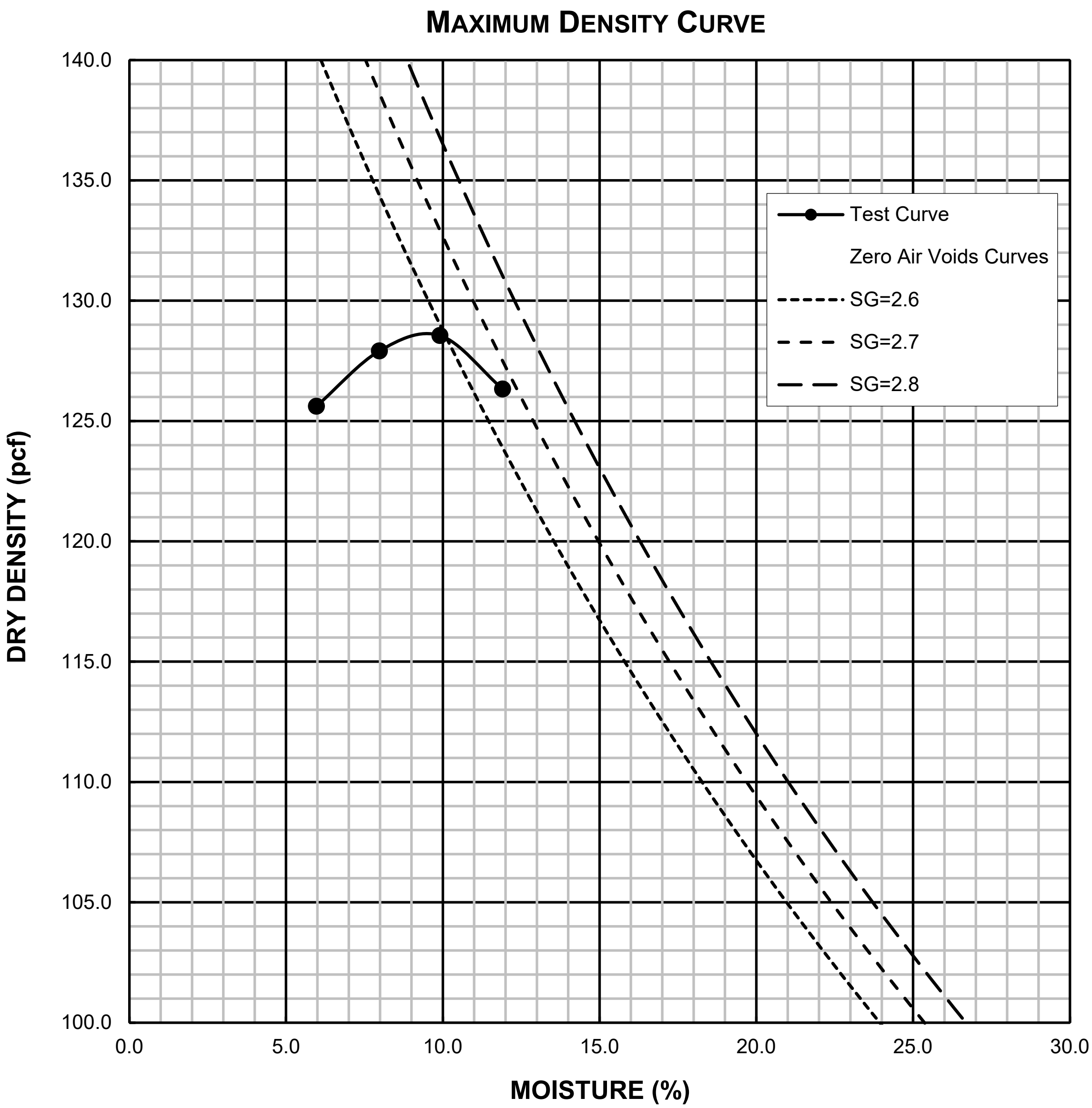
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	555 Hollister St.	Excavation:	B-3
Location:	San Diego	Depth:	0-2 ft
P/W No.:	1912-01	Soil Type:	SC
Date:	07-2021	Tested by:	FV
		Checked by:	AB

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	125.6	127.9	128.6	126.3
Moisture Content (%)	6.0	8.0	9.9	11.9



Corrected Max. Dry Density	**131.7 pcf**	Corrected Moisture	**8.6** %
Max. Dry Density	**128.7 pcf**	Optimum Moisture	**9.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

MAXIMUM DENSITY - ASTM D1557

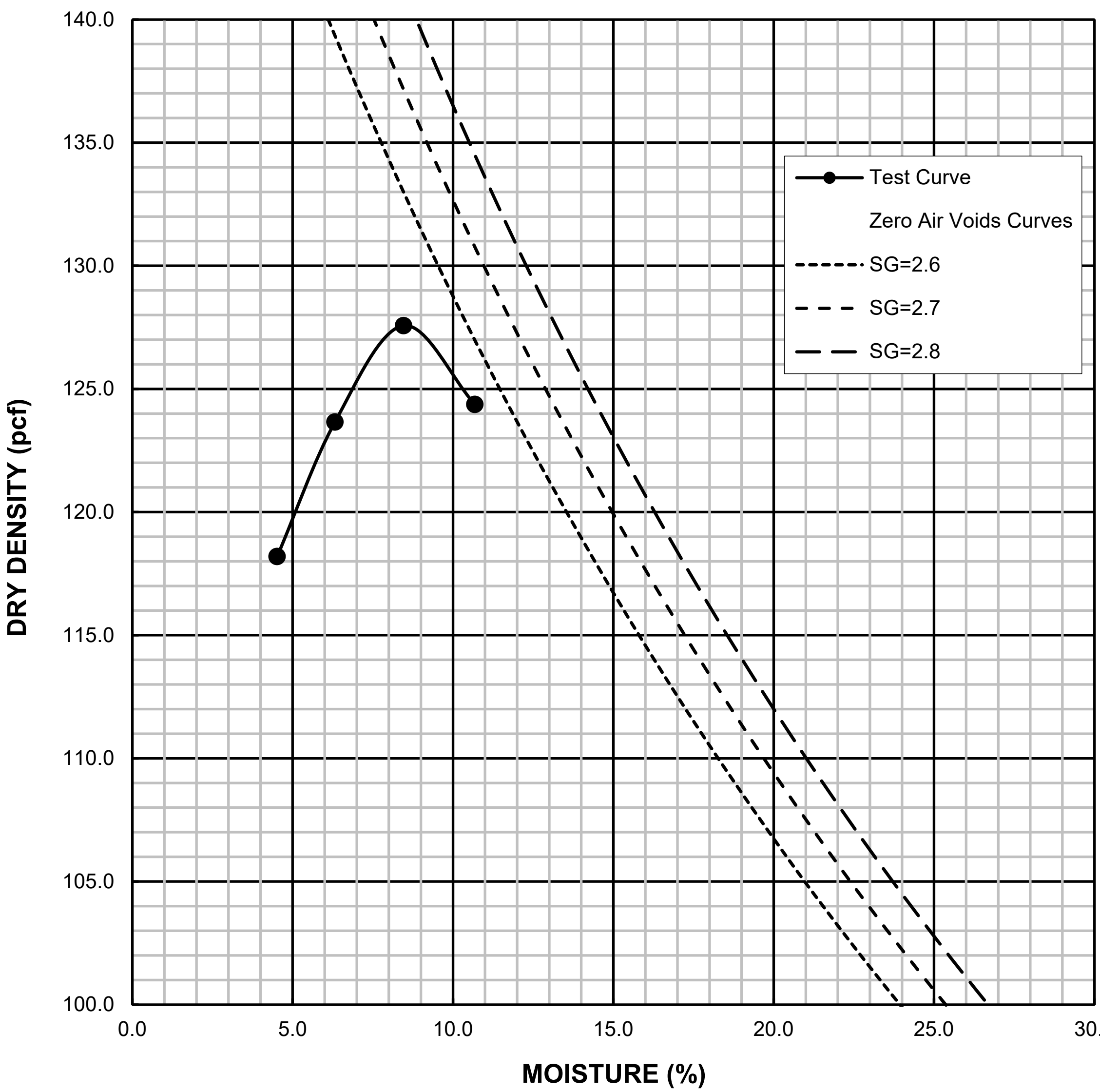
AGS FORM E-8

Project Name: 555 Hollister St
Location: San Diego
P/W No.: 1912-01
Date: 01-2020

Excavation: TP-11
Depth: 1.5-2.5 ft
Soil Type: Brown SC-SM
Tested by: FV
Checked by: JC

Method:	A	Oversize Retained: 0 %		
Point No.	1	2	3	4
Dry Density (pcf)	118.2	123.7	127.6	124.4
Moisture Content (%)	4.5	6.3	8.5	10.7

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density **127.5 pcf** Corrected Moisture **8.5** %

Max. Dry Density **127.5 pcf** Optimum Moisture **8.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

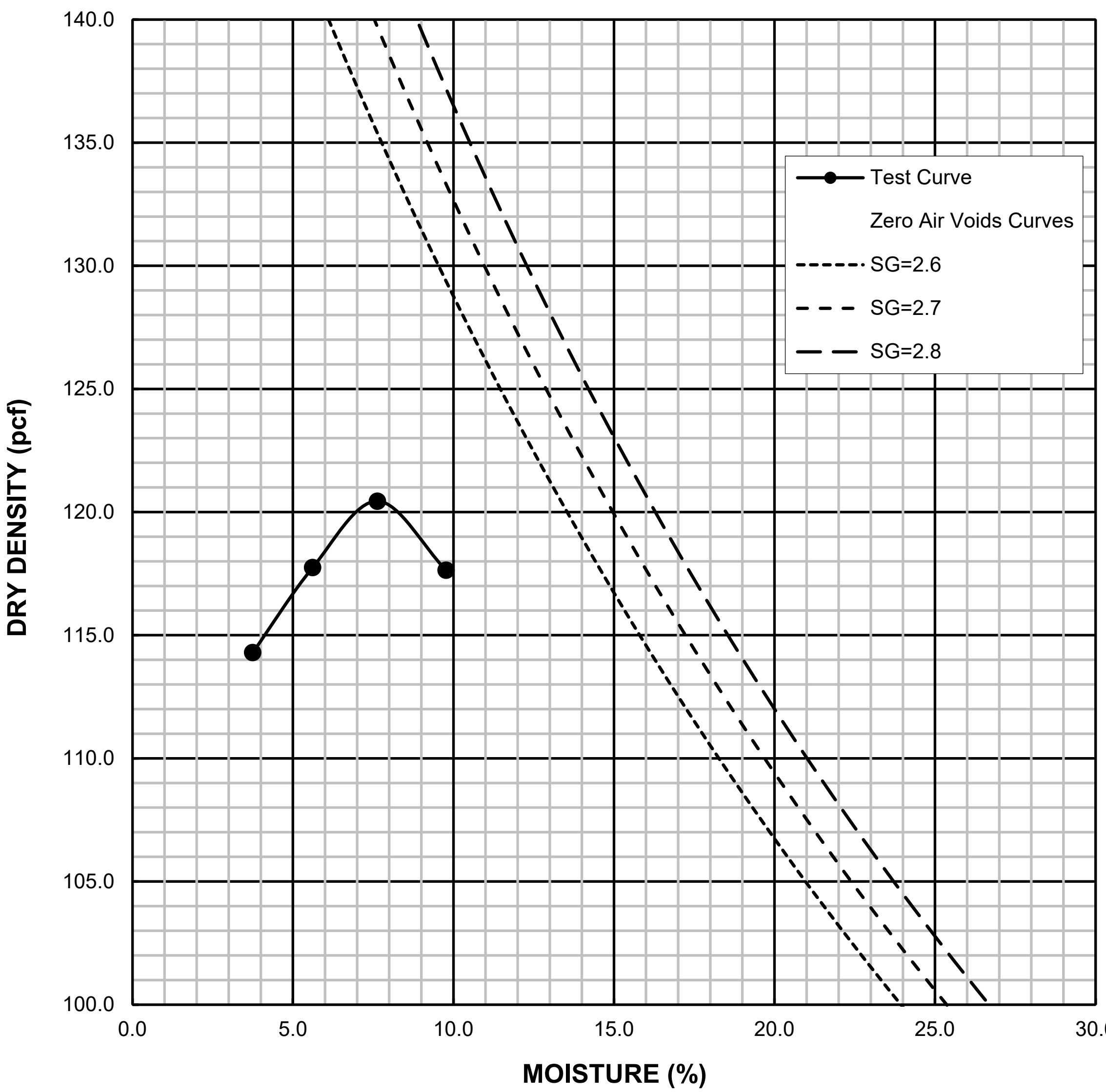
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	555 Holister St	Excavation:	TP-3
Location:	San Diego	Depth:	4-5 ft
P/W No.:	1912-01	Soil Type:	Reddish Brn. SC-SM
Date:	01-2020	Tested by:	FV
		Checked by:	JC

Method:	A	Oversize Retained: 0 %		
Point No.	1	2	3	4
Dry Density (pcf)	114.3	117.8	120.4	117.6
Moisture Content (%)	3.7	5.6	7.6	9.8

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**120.5 pcf**	Corrected Moisture	**7.5** %
Max. Dry Density	**120.5 pcf**	Optimum Moisture	**7.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

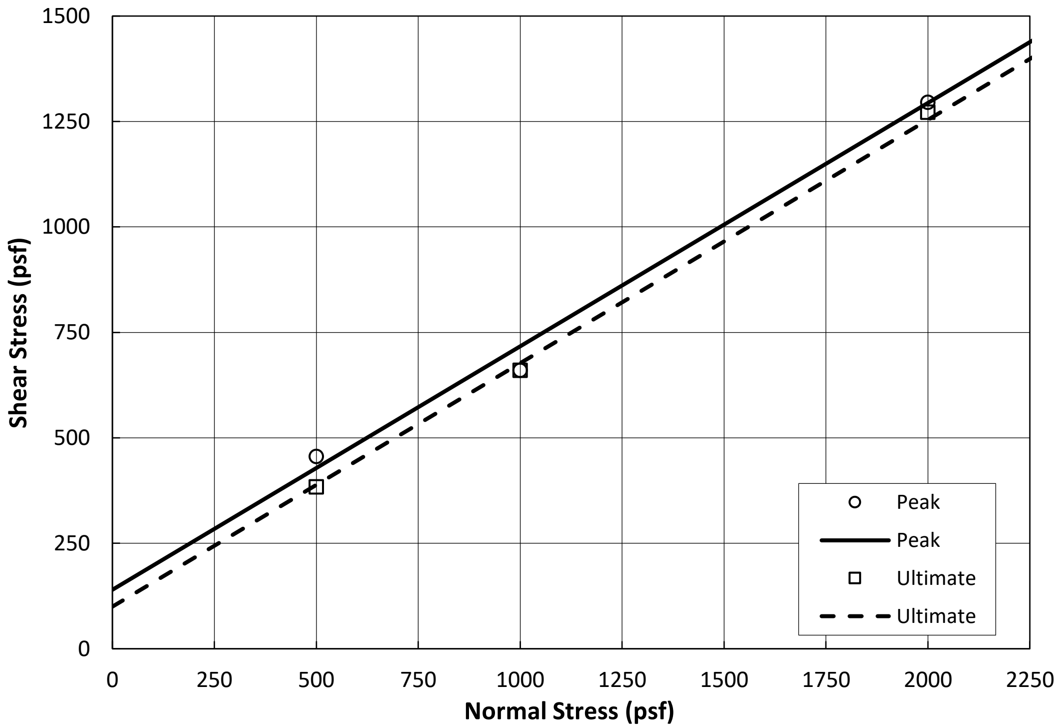
DIRECT SHEAR - ASTM D3080

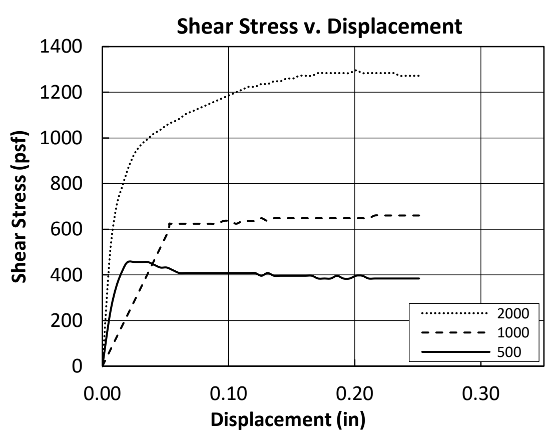
Project Name:	555 Hollister St.	Excavation:	B-3
Location:	San Diego	Depth:	0-2 ft
Project No.:	1912-01	Tested by:	FV
Date:	7/2/2021	Reviewed by:	AB

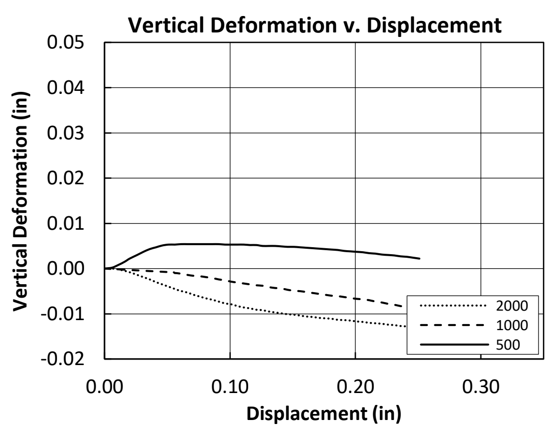
Samples Tested	1	2	3
Intial Moisture (%)	9.5	9.5	9.5
Initial Dry Density (pcf)	115.8	115.8	115.8
Normal Stress (psf)	500	1000	2000
Peak Shear Stress (psf)	456	660	1296
Ult. Shear Stress (psf)	384	660	1272

Soil Type:	SC
Test:	Remolded 90%
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	30	30
Cohesion (psf)	140	100







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

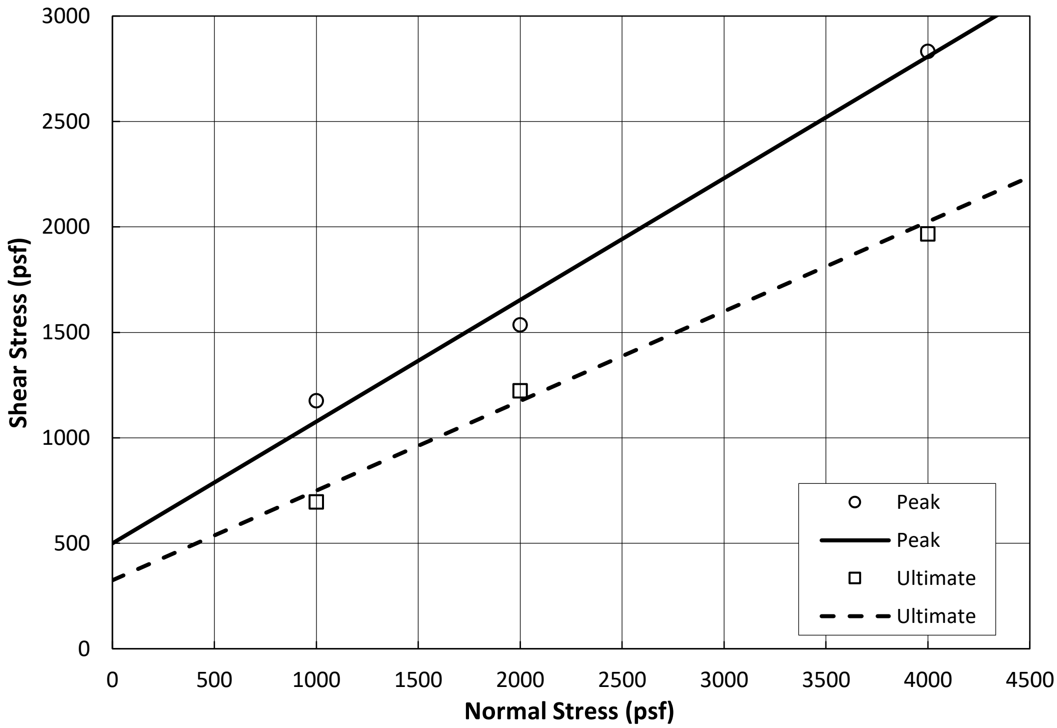
Project Name: 555 Hollister St.
Location: San Diego
Project No.: 1912-01
Date: 6/28/2021

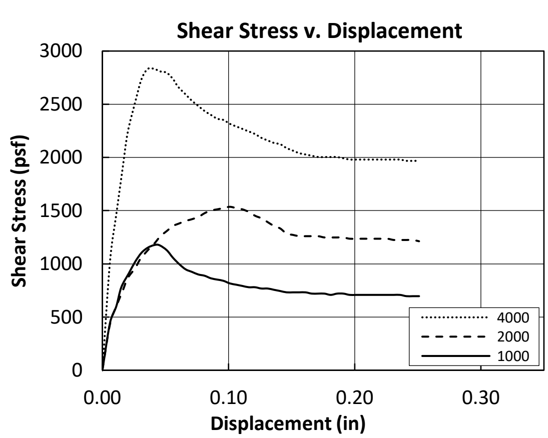
Excavation: B-5
Depth: 10-11.5 ft
Tested by: FV
Reviewed by: AB

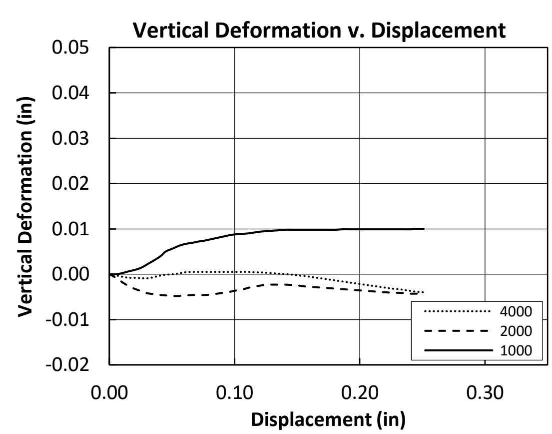
Samples Tested	1	2	3
Intial Moisture (%)	22.1	22.1	22.1
Initial Dry Density (pcf)	100.7	100.7	101.6
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1176	1536	2832
Ult. Shear Stress (psf)	696	1224	1968

Soil Type: CL-ML
Test: Undisturbed
Method: Drained
Consolidation: Yes
Saturation: Yes
Shear Rate ($^{in}/_{min}$): 0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	30	23
Cohesion (psf)	500	325







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

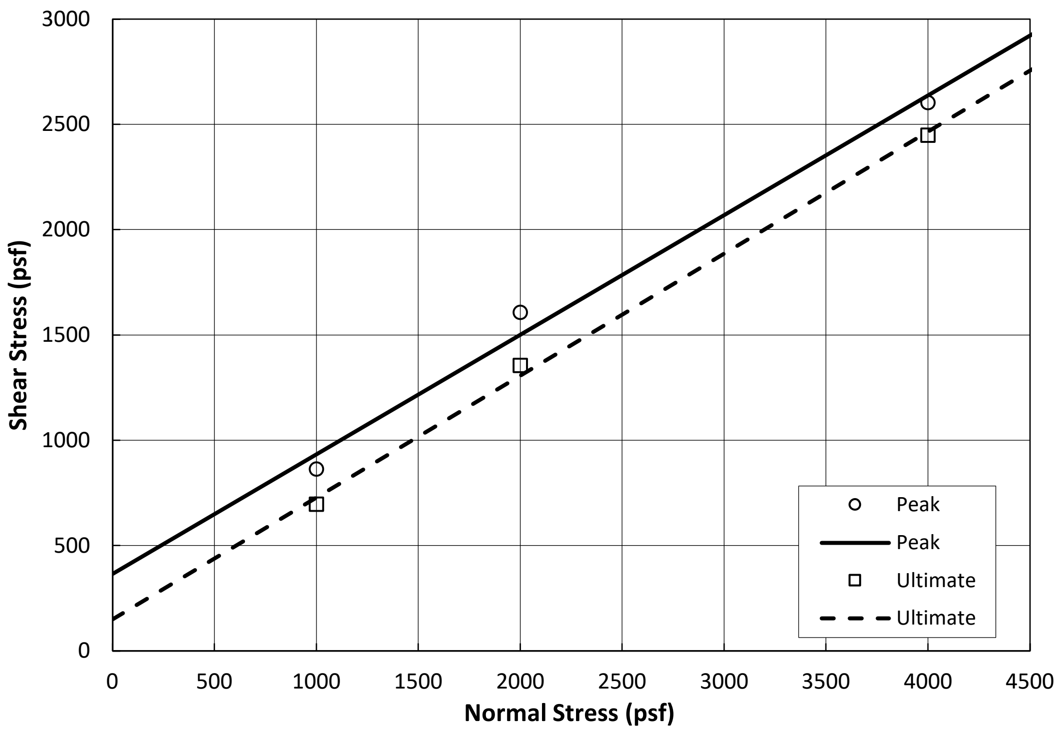
Project Name: 555 Hollister St
Location: San Deigo
Project No.: 1912-01
Date: 1/20/2020

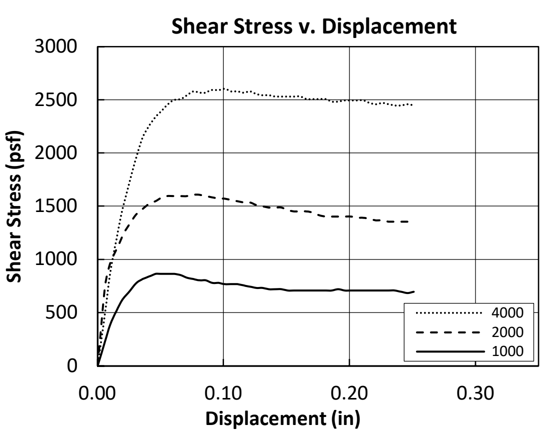
Excavation: TP-3
Depth: 4-5 FT
Tested by: FV
Reviewed by: JC

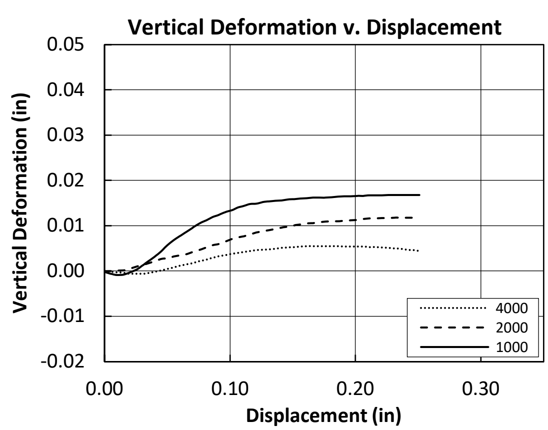
Samples Tested	1	2	3
Intial Moisture (%)	7.5	7.5	7.5
Initial Dry Density (pcf)	108.3	108.3	108.3
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	864	1608	2604
Ult. Shear Stress (psf)	696	1356	2448

Soil Type: Reddish Brn SC-SM
Test: Remolded 90%
Method: Drained
Consolidation: Yes
Saturation: Yes
Shear Rate ($^{in}/_{min}$): 0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	30	30
Cohesion (psf)	366	150







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

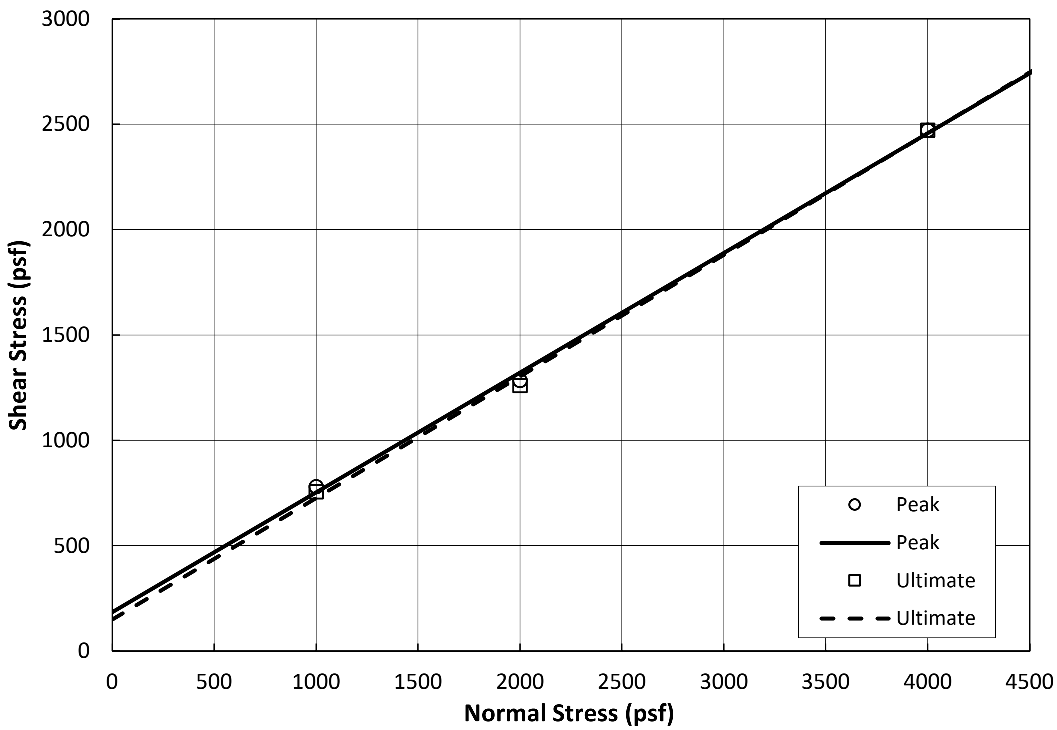
DIRECT SHEAR - ASTM D3080

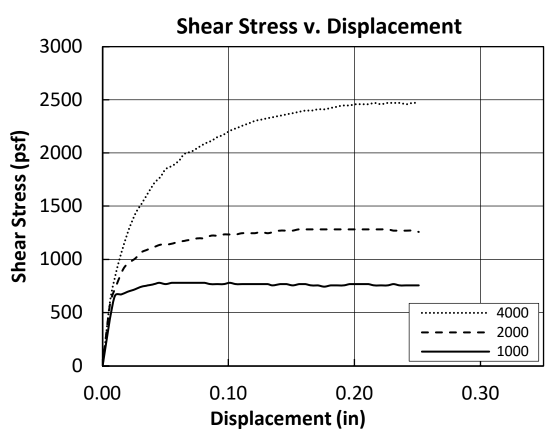
Project Name:	555 Hollister St	Excavation:	TP-11
Location:	San Diego	Depth:	1.5-2.5 ft
Project No.:	1912-01	Tested by:	FV
Date:	1/23/2020	Reviewed by:	JC

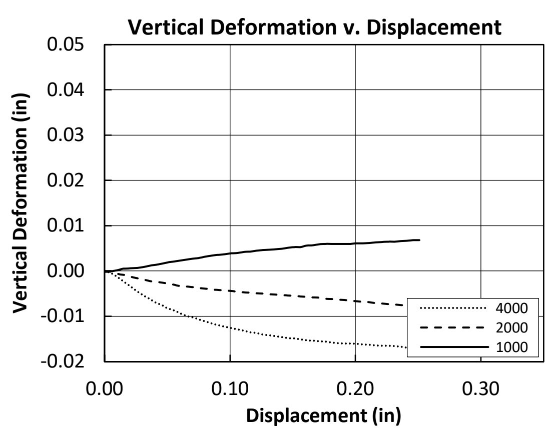
Samples Tested	1	2	3
Intial Moisture (%)	8.5	8.5	8.5
Initial Dry Density (pcf)	114.7	114.7	114.7
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	780	1284	2472
Ult. Shear Stress (psf)	756	1260	2472

Soil Type:	Brown SC-SM
Test:	Remolded 90%
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shear Rate ($^{in}/_{min}$):	0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	30	30
Cohesion (psf)	186	150







ANAHEIM TEST LAB, INC

196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949)336-6544

DATE: 07/06/2021

Advanced Geotechnical Solutions, Inc.
485 Corporate Ave., Suite B
Escondido, CA 92029

P.O. NO.: Chain of Custody

LAB NO.: C-4983

SPECIFICATION: CTM-643/417/422

MATERIAL: Soil

Project No.: 1912-01
Project: 555 Hollister St.
Date sampled: 06/29/2021
Sample ID: B-3 @ 0-2'

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

pH	MIN. RESISTIVITY per CT. 643 ohm-cm	SOLUBLE SULFATES per CT. 417 ppm	SOLUBLE CHLORIDES per CT. 422 ppm
8.4	3,800	209	76

RESPECTFULLY SUBMITTED

WES BRIDGER, LAB MANAGER

APPENDIX D

INFILTRATION FEASIBILITY STUDY

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
P: (619) 867-0487 | E: info@adv-geosolutions.com

AMBIENT COMMUNITIES
179 Calle Magdalena Suite #201
Encinitas, Ca. 92024

August 26, 2021
PW 1912-01
Report No. 1912-01-B-5

Attention: **Duncan Budinger**
Director of Retail Development

Subject: ***Preliminary Infiltration Feasibility Study, Multifamily Residential Development, 555 Hollister Street, San Diego, California***

References: See Attached

Gentleperson:

In accordance with your request, Advanced Geotechnical Solutions, Inc. (AGS) has prepared this infiltration feasibility study for the proposed Multifamily Residential Development located on 555 Hollister Street in the City of San Diego, California. This report is intended to meet the preliminary infiltration testing requirements of the City of San Diego. AGS has evaluated the feasibility for storm water infiltration in accordance with the City of San Diego Storm Water Standards (2018).

1.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The rectangular shaped property covers approximately 6.3 acres and currently supports a residential structure on the central portion of the site along with several outbuildings. The site is bounded on the north and east by active nursery facilities, on the west by Metropolitan Transit System trolley tracks on an embankment fill, and to the south by an asphalt paved parking lot, a mobile home park, unimproved property, and a playing field. Elevations onsite ranges from a high of 54 feet above mean sea level (msl) at the southeast corner to a low of 22 feet msl in the northwest corner. An approximately 20-foot high descending slope is located along the northern portion of the site. The southern portion of the site is flat, has been cleared of vegetation and is currently being used as a storage yard by a general contractor. The descending slope to the north is covered by grass, weeds and isolated trees. Drainage across the site generally flows to the north and west (see Figure 1, Site Location Map)..

It is our understanding that the residential development will consist of five 3- to 4-story wood-frame apartment buildings and one 1-story recreation/leasing building that will be supported by conventional slab-on-grade foundations. The apartment buildings will be located on the northern portion of the property and will require construction of ~22-foot high retaining walls. Parking areas and an access driveway will be located along the south central portion of the property. At this time detailed grading plans are not available; however, based on the reviewed preliminary grading plan, which is subject to change, it is our understanding that design cuts will likely be on the order of 8 feet with design fills of up to 26 feet. It is anticipated that cut-fill grading techniques will be utilized and approximately 7,000 cu. yd. of import soil will be required to develop the site..

2.0 FIELD INVESTIGATION

On June 7, 2021, four percolation test borings (labeled P-1 through P-4) were advanced to depths ranging between 4.5 and 5.5 feet below ground surface using a truck mounted drill rig equipped with 8-inch diameter hollow-stem augers. Approximate boring and percolation test locations are shown on Plate 1, Geologic Map and Exploration Location Plan. An engineer from our firm logged the percolation test borings for soil and geologic conditions. Boring logs are presented in Appendix B.

3.0 GEOLOGY

Based upon our subsurface exploration and familiarity with the area, the site is mantled by artificial underlain by Old Paralic Deposits, Unit 6.

4.0 TEST PROCEDURE

Borehole percolation tests were performed to evaluate the feasibility of storm water infiltration in general conformance with Appendix D of the City of San Diego Storm Water Standards (2018). After drilling, the test holes were cleaned of sediment and the bottom was lined with approximately 2 inches of washed gravel. Four-inch diameter slotted PVC pipe was installed in the holes and the annular space was backfilled with gravel. The test holes were then successively filled with clean, potable water and allowed to pre-soak.

On June 8, 2021, the borehole percolation tests were performed by filling the test holes with clean potable water.. Water was allowed to infiltrate during 30-minute periods and the water drop was measured to calculate the percolation rate in inches per hour. The test hole was then refilled with water as necessary and the test procedure was repeated over the course of several hours until a stabilized percolation rate was recorded The stabilized percolation rate was then converted to an infiltration rate based on the "Porchet Method" utilizing the following equation:

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

Where:

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

The infiltration rate was modified due to the use of gravel in the annular space by multiplying it by the following adjustment factor:

$$AF = \frac{r}{p + n\,(r - p)}$$

Where:

p = pipe radius
n = gravel porosity

Logs of field testing and graphical representations of test data presented as infiltration versus time interval are included in Appendix AA.

5.0 TEST RESULTS AND PRELIMINARY DESIGN VALUES

In accordance with Appendix D, Section D.5.4 of the BMP Design Manual, a minimum 'Factor of Safety' of 2 should be applied to the tested infiltration rates to determine the design infiltration rates. The percolation test observations and results are summarized in Table 1.

TABLE 1
SUMMARY OF INFILTRATION TEST RESULTS

Test No.	Depth of Test Hole (ft)	Approximate Test Elevation (ft, msl)	Geologic Unit	Soil Classification (USCS)	Infiltration Rate (in/hr)	Factor of Safety	Design Infiltration Rate (in/hr)
P-1	4.5	42.5	Afu/Qop	Gravelly Clay (CL)	0.0	2	0.0
P-2	4.5	45.5	Afu/Qop	Silty Sand (SM)	5.6	2	2.8
P-3	5.0	49.0	Afu/Qop	Silty Sand (SM)	0.58	2	0.29
P-4	5.0	49.0	Afu/Qop	Sandy Clay (CL)	0.14	2	0.07

Note: *Calculated by Porchet Method. Incorporates gravel Adjustment Factor (AF).

Utilizing a factor of safety of 2, the design infiltration rate ranges between 0.0 in/hr and 2.8 in/hr, which can be categorized as "No Infiltration" to "Full Infiltration" conditions.

6.0 DESIGN CONSIDERATIONS

6.1. <u>Groundwater</u>

Groundwater was encountered at depths of 10 and 6.5 feet bgs in borings B-5 and B-7 drilled at the toe of the northerly descending slope. Based on these observations, the groundwater level was at approximate El. 12.5 feet msl during our subsurface exploration. According to our review, no natural groundwater condition is known to exist at the site that would impact the proposed development. Groundwater will be encountered during remedial grading activities extending into the lower, northern portion of the site. It should be noted that localized perched groundwater may develop at a later date, most likely at or near fill/bedrock contacts, due to fluctuations in precipitation, irrigation practices, or factors not evident at the time of our field exploration. According to the BMP Design Handbook, in areas where infiltration BMPs are planned, a minimum separation of 10 feet between the infiltration surface and the historic high groundwater should be maintained.

6.2. <u>Soil Characteristics and Anticipated Flow Paths</u>

Based on our subsurface exploration and infiltration testing performed at the site, Old Paralic Deposits will allow for "No Infiltration" to a "Full Infiltration" with design infiltration rates on the order of 0.0 to 2.8 inches per hour. The highly variable rates observed may be related to the presence of discontinuous layers of gravelly sands encountered in the Old Paralic Deposits. These may be underlain by less permeable materials. As such, infiltrating water may flow vertically within the sandy gravel layers until less permeable materials are encountered. The infiltrating water may then flow laterally.

6.3. Geotechnical Hazards

We anticipate that the stormwater basins will be located in close proximity to proposed structures and underground utilities. There is a high likelihood for water intrusion to occur in subjacent utility trenches and artificial fill which could create saturated soil conditions beneath structures and other settlement sensitive improvements. This potential geotechnical hazard could be mitigated by designing the basin for no infiltration and lining the basin with an impermeable membrane, deepening foundation elements of nearby proposed structures, installing moisture cut-off walls between the infiltration basins and nearby settlement-sensitive improvements, and/or backfilling subjacent utility trenches with a lean sand-cement slurry.

6.4. Soil Contamination

During our recent site investigation, no evidence of soil contamination was observed, nor is any contamination known to exist onsite. Utilizing the DWR online resource Geotracker.ca.gov, no open cases were identified within 1000 feet of the subject site.

6.5. Proximity to Water Supply Wells

An existing water supply well is located in the vicinity of Boring B-5. It is anticipated that this well will be abandoned during earthwork activities.

6.6. Maintenance of Infiltration Device

Regular maintenance of any infiltration system is critical to the long term successful operation of the system. Responsibilities of maintaining the system are typically borne by the owner. Improperly maintained infiltration devices and basins have a high failure rate. A plan should be developed by the designer of the system and implemented throughout the project's lifetime.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Infiltration testing in the upper soils yielded preliminary design infiltration rates ranging between 0.0 to 2.8 inches per hour which correspond to a "No Infiltration" to "Full Infiltration" condition. Vertical infiltration is feasible in the vicinity of boring P-2.

Infiltration at the potential BMP locations will increase the potential for geotechnical issues such as water intrusion and ground settlement. Mitigation typically includes an appropriate setback between nearby improvements and infiltration devices. A minimum setback of 25 feet to nearby structures and 75 feet to the MSE wall is recommended. An alternative mitigation can include construction of a cutoff wall, such as placement of a vertical impermeable liner or slurry filled trench, to mitigate infiltration of water below adjacent improvements. To prevent the migration of water along utility pipe bedding zones, slurry backfill should be considered in utility pipes located near infiltration devices. Preventing all water intrusion may be accomplished by installing an impermeable liner on all underground BMP improvements. It should be recognized that if infiltration is allowed, some water intrusion is possible beneath nearby existing improvements such as roadways and nearby structures.

The infiltration rates presented in this report are based on limited testing performed as part of a preliminary screening for feasibility purposes. Dependent upon the final location, depth, and type of proposed BMP, additional testing may be warranted.

Advanced Geotechnical Solutions, Inc. appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.

ANDRES BERNAL, Sr. Geotechnical Engineer
RCE 62366/RGE 2715

PAUL J. DERISI, Vice President
CEG 2536, Reg. Exp. 5-31-23

Distribution: (1) Addressee

Attachments: References
Appendix AA - Borehole Percolation Field Data
Appendix B - Boring Logs
Figure 1 - Site Location Map
Plate 1 - Geologic Map and Exploration Location Plan

REFERENCES

Advanced Geotechnical Solutions, Inc., 2021, Supplemental Geotechnical Investigation and Design Recommendations, Multifamily Residential Development, 555 Hollister Street, San Diego, California, dated August 26, 2021 (Report No. 1912-01-B-4).

City of San Diego, 2018, Storm Water Standards, dated October 1, 2018.

APPENDIX AA

BOREHOLE PERCOLATION FIELD DATA

PERCOLATION TEST DATA SHEET

Project:	555 Hollister Street	Surface El.:	42.5	ft, msl	Date:	6/8/2021
Project No.:	1912-01	Depth of Test Hole:	4.5	ft.	Weather:	Sunny 75-80°
Test Hole No.:	P-1	Test El.:	38	ft, msl	Tested By:	AB

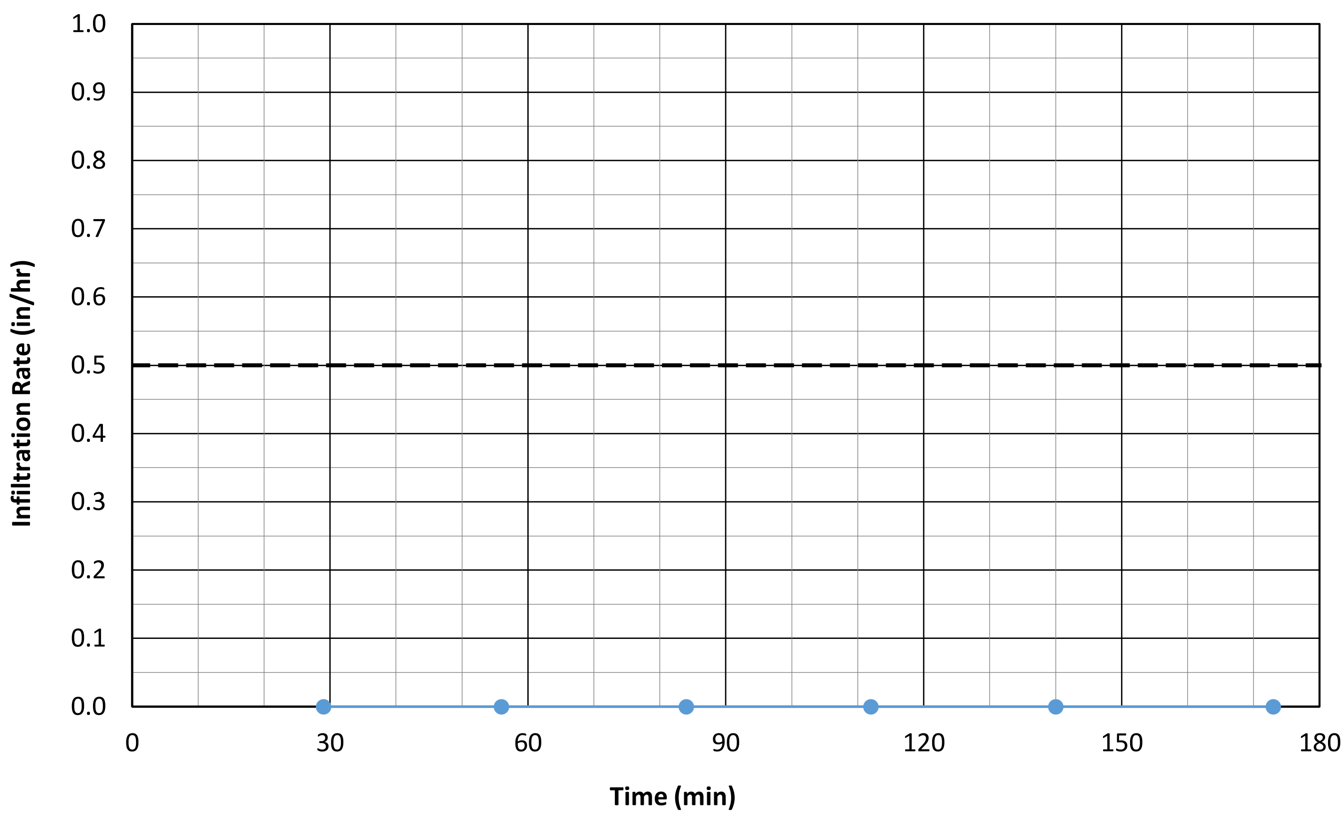
Test Hole Dimensions (in.)

Depth:	54	Pipe Diameter:	3	USCS:	SM
Diameter:	8	Gravel (Y or N):	Y	Gravel Adjustment Factor:	2.06

Infiltration Test

Trial No.	Start Time (hr:min)	Stop Time (hr:min)	Interval (min)	Depth to Water (in.) Start	End	Change	Ave. Water Column (in.)	Perc. Rate (in/hr)	Infiltration Rate (in/hr)*
1	8:24	8:53	29	13.00	13.00	0.00	41.00	0.00	0.000
2	8:54	9:21	27	11.50	11.50	0.00	42.50	0.00	0.000
3	9:23	9:51	28	11.50	11.50	0.00	42.50	0.00	0.000
4	9:53	10:21	28	11.50	11.50	0.00	42.50	0.00	0.000
5	10:22	10:50	28	11.50	11.50	0.00	42.50	0.00	0.000
6	10:50	11:23	33	12.00	12.00	0.00	42.00	0.00	0.000
7									
8									

*Calculated by Porchet Method. Incorporates Gravel Adjustment Factor.



PERCOLATION TEST DATA SHEET

Project:	555 Hollister Street	Surface El.:	45.5	ft, msl	Date:	6/8/2021
Project No.:	1912-01	Depth of Test Hole:	4.5	ft.	Weather:	Sunny 75-80°
Test Hole No.:	P-2	Test El.:	41	ft, msl	Tested By:	AB

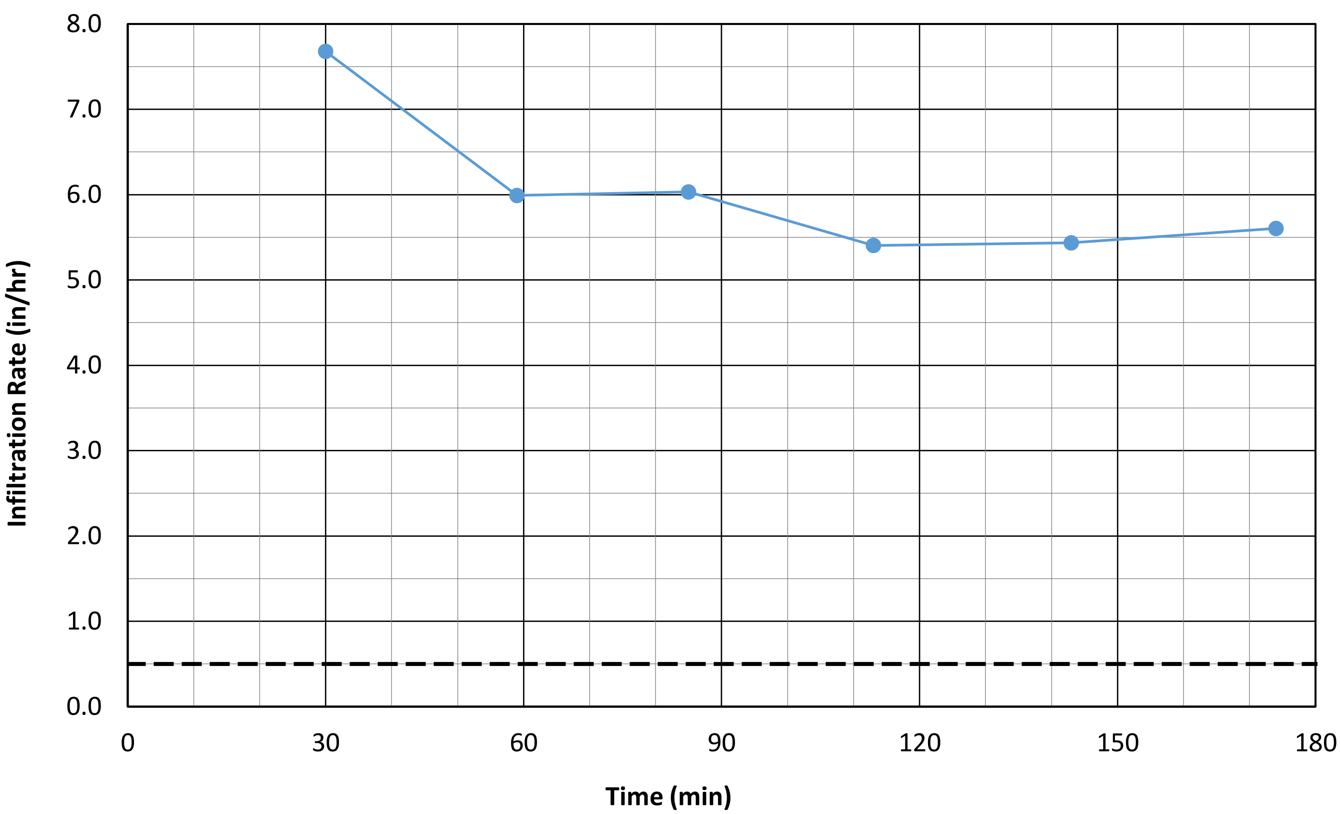
Test Hole Dimensions (in.)

Depth:	54	Pipe Diameter:	3	USCS:	SM
Diameter:	8	Gravel (Y or N):	Y	Gravel Adjustment Factor:	2.06

Infiltration Test

Trial No.	Start Time (hr:min)	Stop Time (hr:min)	Interval (min)	Depth to Water (in.) Start	End	Change	Ave. Water Column (in.)	Perc. Rate (in/hr)	Infiltration Rate (in/hr)*
1	8:27	8:57	30	1.25	36.00	34.75	35.38	69.50	7.678
2	8:59	9:28	29	4.00	31.00	27.00	36.50	55.86	5.991
3	9:29	9:55	26	4.00	29.00	25.00	37.50	57.69	6.031
4	9:56	10:24	28	1.50	27.00	25.50	39.75	54.64	5.404
5	10:25	10:55	30	2.50	29.00	26.50	38.25	53.00	5.437
6	10:55	11:26	31	4.00	31.00	27.00	36.50	52.26	5.605
7									
8									

*Calculated by Porchet Method. Incorporates Gravel Adjustment Factor.



PERCOLATION TEST DATA SHEET

Project:	555 Hollister Street	Surface El.:	49 ft, msl	Date:	6/8/2021
Project No.:	1912-01	Depth of Test Hole:	5 ft.	Weather:	Sunny 75-80°
Test Hole No.:	P-3	Test El.:	44 ft, msl	Tested By:	AB

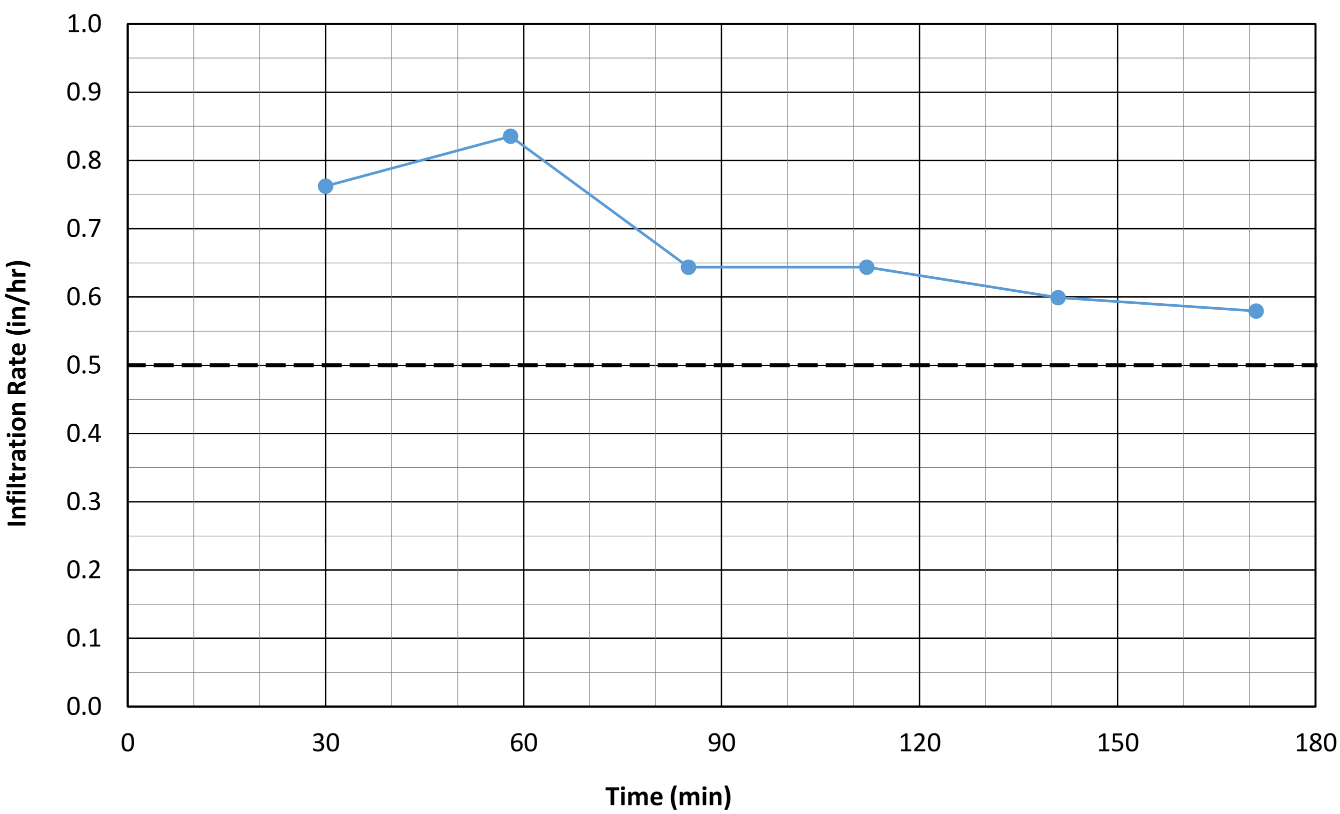
Test Hole Dimensions (in.)

Depth:	60	Pipe Diameter:	3	USCS:	SM
Diameter:	8	Gravel (Y or N):	Y	Gravel Adjustment Factor:	2.06

Infiltration Test

Trial No.	Start Time (hr:min)	Stop Time (hr:min)	Interval (min)	Depth to Water (in.) Start	Depth to Water (in.) End	Depth to Water (in.) Change	Ave. Water Column (in.)	Perc. Rate (in/hr)	Infiltration Rate (in/hr)*
1	8:30	9:00	30	2.50	7.75	5.25	54.88	10.50	0.762
2	9:03	9:31	28	1.00	6.50	5.50	56.25	11.79	0.835
3	9:32	9:59	27	3.00	7.00	4.00	55.00	8.89	0.644
4	10:00	10:27	27	3.00	7.00	4.00	55.00	8.89	0.644
5	10:28	10:57	29	3.00	7.00	4.00	55.00	8.28	0.599
6	10:57	11:27	30	3.00	7.00	4.00	55.00	8.00	0.580
7									
8									

*Calculated by Porchet Method. Incorporates Gravel Adjustment Factor.



PERCOLATION TEST DATA SHEET

Project:	555 Hollister Street	Surface El.:	49 ft, msl	Date:	6/8/2021
Project No.:	1912-01	Depth of Test Hole:	5 ft.	Weather:	Sunny 75-80°
Test Hole No.:	P-4	Test El.:	44 ft, msl	Tested By:	AB

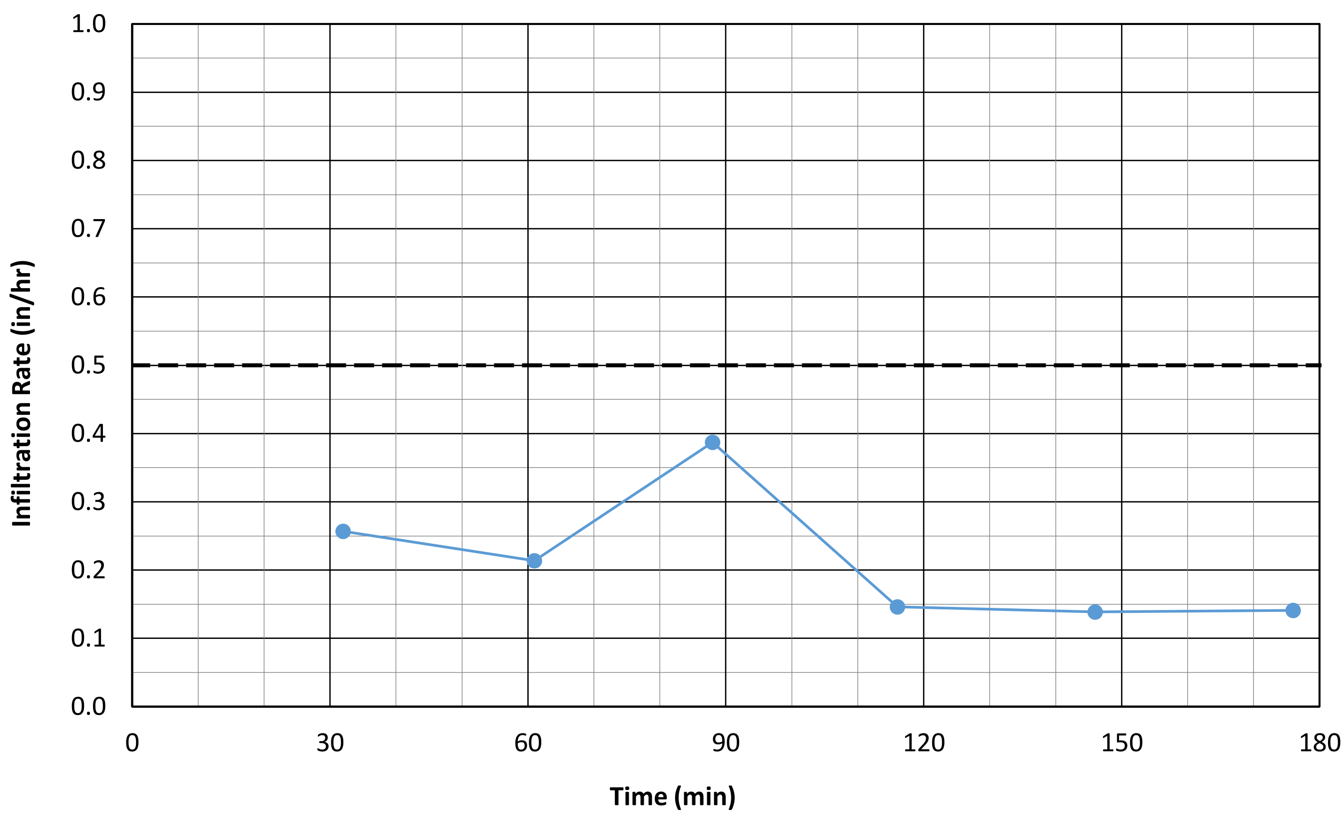
Test Hole Dimensions (in.)

Depth:	60	Pipe Diameter:	3	USCS:	SM
Diameter:	8	Gravel (Y or N):	Y	Gravel Adjustment Factor:	2.06

Infiltration Test

Trial No.	Start Time (hr:min)	Stop Time (hr:min)	Interval (min)	Depth to Water (in.) Start	End	Change	Ave. Water Column (in.)	Perc. Rate (in/hr)	Infiltration Rate (in/hr)*
1	8:33	9:05	32	0.75	2.75	2.00	58.25	3.75	0.257
2	9:06	9:35	29	1.25	2.75	1.50	58.00	3.10	0.214
3	9:36	10:03	27	1.50	4.00	2.50	57.25	5.56	0.387
4	10:04	10:32	28	1.00	2.00	1.00	58.50	2.14	0.146
5	10:32	11:02	30	2.00	3.00	1.00	57.50	2.00	0.139
6	11:02	11:32	30	3.00	4.00	1.00	56.50	2.00	0.141
7									
8									

*Calculated by Porchet Method. Incorporates Gravel Adjustment Factor.



APPENDIX E

SLOPE STABILITY

1912-01 Hollister St. 22 ft. MSE Wall - Static

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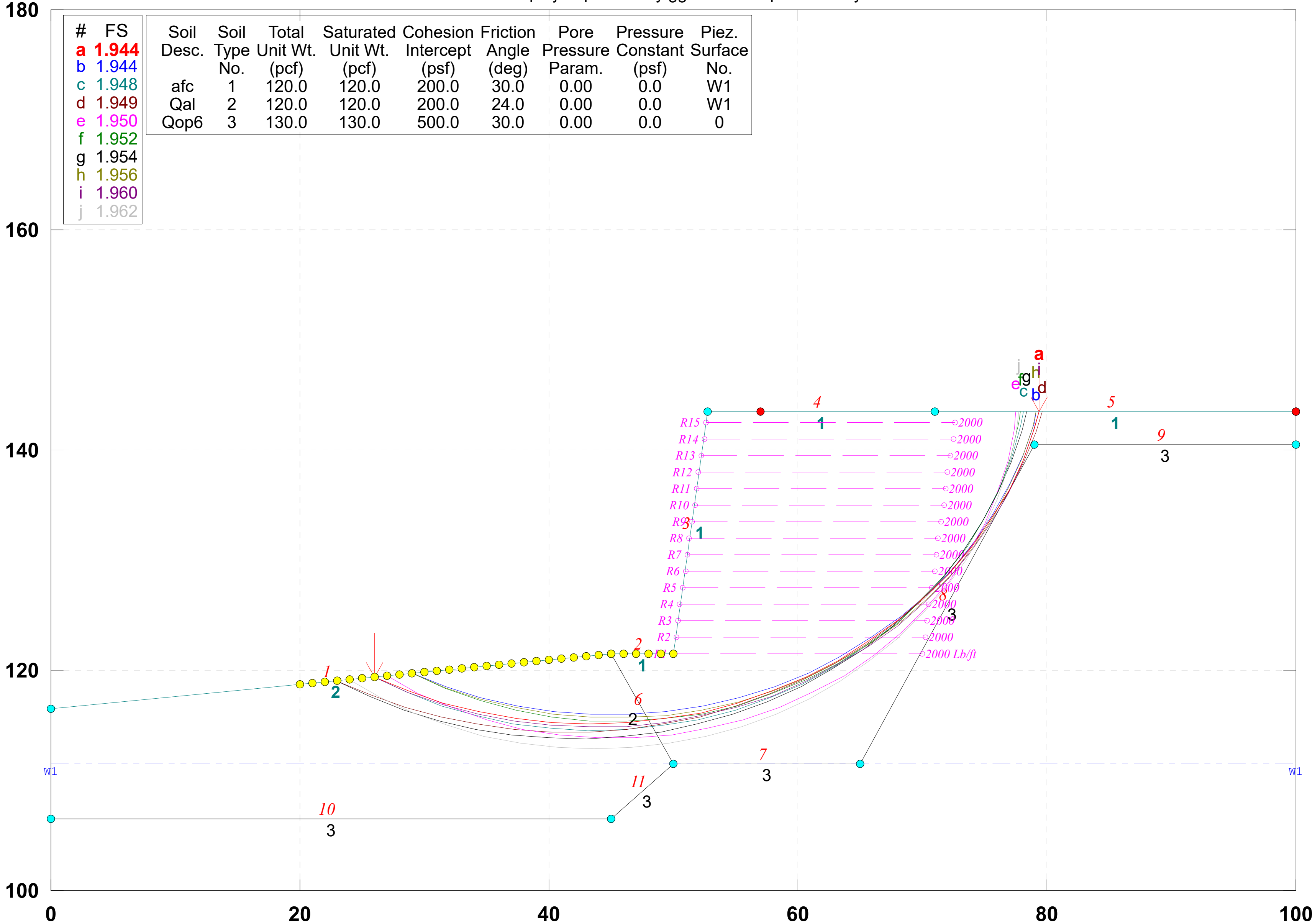

GSTABL7 v.2 FSmin=1.944

Safety Factors Are Calculated By The Modified Bishop Method

1912-01 Hollister St. 22 ft. MSE Wall - Pseudo-static (Seismic)

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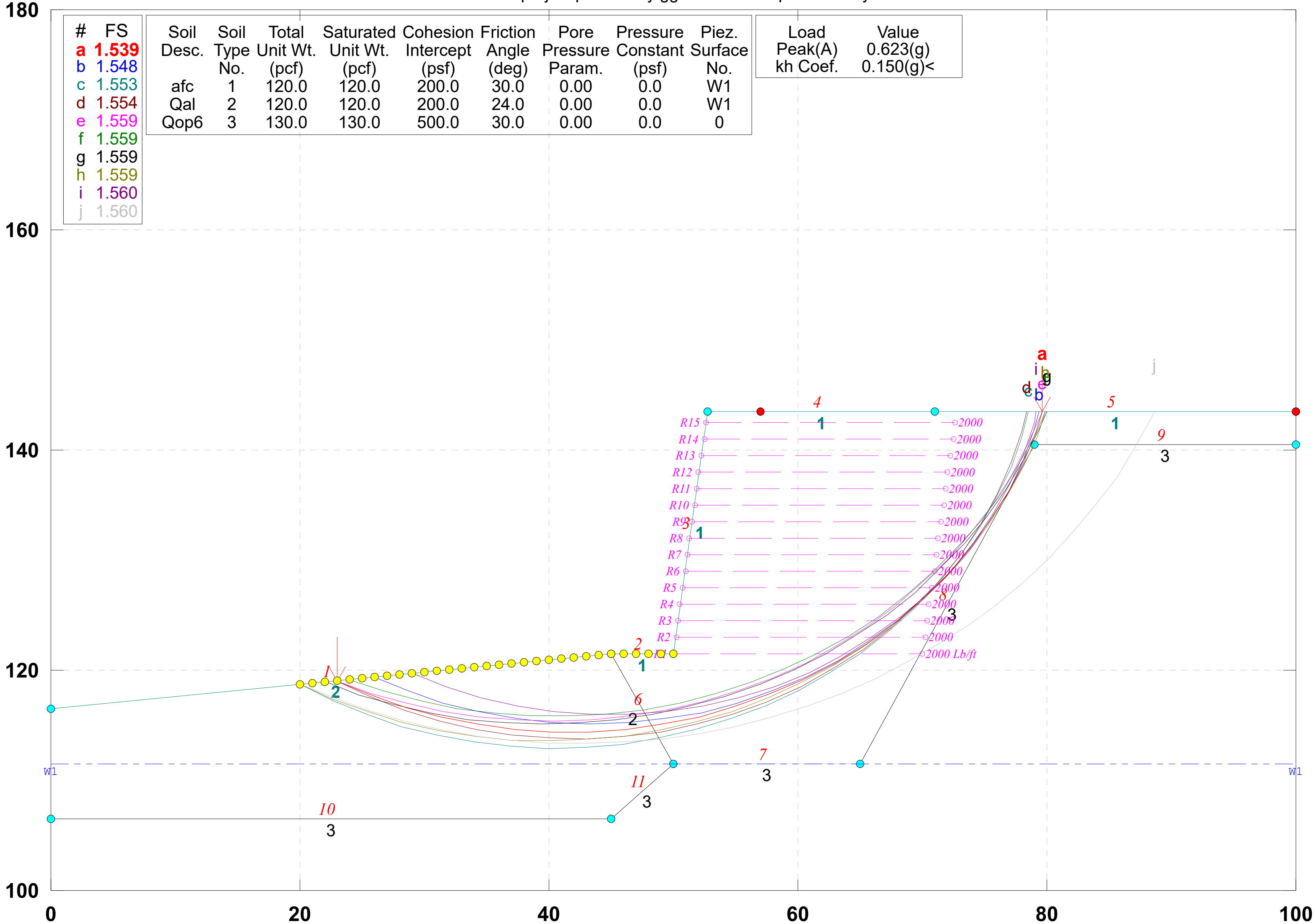


GSTABL7 v.2 FSmin=1.539

Safety Factors Are Calculated By The Modified Bishop Method

APPENDIX F

GENERAL EARTHWORK SPECIFICATIONS AND GRADING DETAILS

GENERAL EARTHWORK SPECIFICATIONS

I. General

A. General procedures and requirements for earthwork and grading are presented herein. The earthwork and grading recommendations provided in the geotechnical report are considered part of these specifications, and where the general specifications provided herein conflict with those provided in the geotechnical report, the recommendations in the geotechnical report shall govern. Recommendations provided herein and in the geotechnical report may need to be modified depending on the conditions encountered during grading.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with the project plans, specifications, applicable building codes, and local governing agency requirements. Where these requirements conflict, the stricter requirements shall govern.

C. It is the contractor's responsibility to read and understand the guidelines presented herein and in the geotechnical report as well as the project plans and specifications. Information presented in the geotechnical report is subject to verification during grading. The information presented on the exploration logs depicts conditions at the particular time of excavation and at the location of the excavation. Subsurface conditions present at other locations may differ, and the passage of time may result in different subsurface conditions being encountered at the locations of the exploratory excavations. The contractor shall perform an independent investigation and evaluate the nature of the surface and subsurface conditions to be encountered and the procedures and equipment to be used in performing his work.

D. The contractor shall have the responsibility to provide adequate equipment and procedures to accomplish the earthwork in accordance with applicable requirements. When the quality of work is less than that required, the Geotechnical Consultant may reject the work and may recommend that the operations be suspended until the conditions are corrected.

E. Prior to the start of grading, a qualified Geotechnical Consultant should be employed to observe grading procedures and provide testing of the fills for conformance with the project specifications, approved grading plan, and guidelines presented herein. All remedial removals, clean-outs, removal bottoms, keyways, and subdrain installations should be observed and documented by the Geotechnical Consultant prior to placing fill. It is the contractor's responsibility to apprise the Geotechnical Consultant of their schedules and notify the Geotechnical Consultant when those areas are ready for observation.

F. The contractor is responsible for providing a safe environment for the Geotechnical Consultant to observe grading and conduct tests.

II. Site Preparation

A. Clearing and Grubbing: Excessive vegetation and other deleterious material shall be sufficiently removed as required by the Geotechnical Consultant, and such materials shall be properly disposed of offsite in a method acceptable to the owner and governing agencies. Where applicable, the contractor may obtain permission from the Geotechnical Consultant, owner, and governing agencies to dispose of vegetation and other deleterious materials in designated areas onsite.

B. Unsuitable Soils Removals: Earth materials that are deemed unsuitable for the support of fill shall be removed as necessary to the satisfaction of the Geotechnical Consultant.

C. Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, other utilities, or other structures located within the limits of grading shall be removed and/or abandoned in accordance with the requirements of the governing agency and to the satisfaction of the Geotechnical Consultant.

D. Preparation of Areas to Receive Fill: After removals are completed, the exposed surfaces shall be scarified to a depth of approximately 8 inches, watered or dried, as needed, to achieve a generally uniform moisture content that is at or near optimum moisture content. The scarified materials shall then be compacted to the project requirements and tested as specified.

E. All areas receiving fill shall be observed and approved by the Geotechnical Consultant prior to the placement of fill. A licensed surveyor shall provide survey control for determining elevations of processed areas and keyways.

III. Placement of Fill

A. Suitability of fill materials: Any materials, derived onsite or imported, may be utilized as fill provided that the materials have been determined to be suitable by the Geotechnical Consultant. Such materials shall be essentially free of organic matter and other deleterious materials, and be of a gradation, expansion potential, and/or strength that is acceptable to the Geotechnical Consultant. Fill materials shall be tested in a laboratory approved by the Geotechnical Consultant, and import materials shall be tested and approved prior to being imported.

B. Generally, different fill materials shall be thoroughly mixed to provide a relatively uniform blend of materials and prevent abrupt changes in material type. Fill materials derived from benching should be dispersed throughout the fill area instead of placing the materials within only an equipment-width from the cut/fill contact.

C. Oversize Materials: Rocks greater than 8 inches in largest dimension shall be disposed of offsite or be placed in accordance with the recommendations by the Geotechnical Consultant in the areas that are designated as suitable for oversize rock placement. Rocks that are smaller than 8 inches in largest dimension may be utilized in the fill provided that they are not nested and are their quantity and distribution are acceptable to the Geotechnical Consultant.

D. The fill materials shall be placed in thin, horizontal layers such that, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and shall be thoroughly mixed to obtain near uniform moisture content and uniform blend of materials.

E. Moisture Content: Fill materials shall be placed at or above the optimum moisture content or as recommended by the geotechnical report. Where the moisture content of the engineered fill is less than recommended, water shall be added, and the fill materials shall be blended so that near uniform moisture content is achieved. If the moisture content is above the limits specified by the Geotechnical Consultant, the fill materials shall be aerated by discing, blading, or other methods until the moisture content is acceptable.

F. Each layer of fill shall be compacted to the project standards in accordance to the project specifications and recommendations of the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, the fill shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method: D1557-09.

G. Benching: Where placing fill on a slope exceeding a ratio of 5 to 1 (horizontal to vertical), the ground should be keyed or benched. The keyways and benches shall extend through all unsuitable materials into suitable materials such as firm materials or sound bedrock or as recommended by the Geotechnical Consultant. The minimum keyway width shall be 15 feet and extend into suitable materials, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. The minimum keyway width for fill over cut slopes is also 15 feet, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. As a general rule, unless otherwise recommended by the Geotechnical Consultant, the minimum width of the keyway shall be equal to 1/2 the height of the fill slope.

H. Slope Face: The specified minimum relative compaction shall be maintained out to the finish face of fill and stabilization fill slopes. Generally, this may be achieved by overbuilding the slope and cutting back to the compacted core. The actual amount of overbuilding may vary as field conditions dictate. Alternately, this may be achieved by back rolling the slope face with suitable equipment or other methods that produce the designated result. Loose soil should not be allowed to build up on the slope face. If present, loose soils shall be trimmed to expose the compacted slope face.

I. Slope Ratio: Unless otherwise approved by the Geotechnical Consultant and governing agencies, permanent fill slopes shall be designed and constructed no steeper than 2 to 1 (horizontal to vertical).

J. Natural Ground and Cut Areas: Design grades that are in natural ground or in cuts should be evaluated by the Geotechnical Consultant to determine whether scarification and processing of the ground and/or overexcavation is needed.

K. Fill materials shall not be placed, spread, or compacted during unfavorable weather conditions. When grading is interrupted by rain, filing operations shall not resume until the Geotechnical Consultant approves the moisture and density of the previously placed compacted fill.

IV. Cut Slopes

A. The Geotechnical Consultant shall inspect all cut slopes, including fill over cut slopes, and shall be notified by the contractor when cut slopes are started.

B. If adverse or potentially adverse conditions are encountered during grading; the Geotechnical Consultant shall investigate, evaluate, and make recommendations to mitigate the adverse conditions.

C. Unless otherwise stated in the geotechnical report, cut slopes shall not be excavated higher or steeper than the requirements of the local governing agencies. Short-term stability of the cut slopes and other excavations is the contractor's responsibility.

V. Drainage

A. Back drains and Subdrains: Back drains and subdrains shall be provided in fill as recommended by the Geotechnical Consultant and shall be constructed in accordance with the governing agency and/or recommendations of the Geotechnical Consultant. The location of subdrains, especially outlets, shall be surveyed and recorded by the Civil Engineer.

B. Top-of-slope Drainage: Positive drainage shall be established away from the top of slope. Site drainage shall not be permitted to flow over the tops of slopes.

C. Drainage terraces shall be constructed in compliance with the governing agency requirements and/or in accordance with the recommendations of the Geotechnical Consultant.

D. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

VI. Erosion Control

A. All finish cut and fill slopes shall be protected from erosion and/or planted in accordance with the project specifications and/or landscape architect's recommendations. Such measures to protect the slope face shall be undertaken as soon as practical after completion of grading.

B. During construction, the contractor shall maintain proper drainage and prevent the ponding of water. The contractor shall take remedial measures to prevent the erosion of graded areas until permanent drainage and erosion control measures have been installed.

VII. Trench Excavation and Backfill

A. Safety: The contractor shall follow all OSHA requirements for safety of trench excavations. Knowing and following these requirements is the contractor's responsibility. All trench excavations or open cuts in excess of 5 feet in depth shall be shored or laid back. Trench excavations and open cuts exposing adverse geologic conditions may require further evaluation by the Geotechnical Consultant. If a contractor fails to provide safe access for compaction testing, backfill not tested due to safety concerns may be subject to removal.

B. Bedding: Bedding materials shall be non-expansive and have a Sand Equivalent greater than 30. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting.

C. Backfill: Jetting of backfill materials is generally not acceptable. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting provided the backfill materials are granular, free-draining and have a Sand Equivalent greater than 30.

VIII. Geotechnical Observation and Testing During Grading

A. Compaction Testing: Fill shall be tested by the Geotechnical Consultant for evaluation of general compliance with the recommended compaction and moisture conditions. The tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed. The contractor shall assist the Geotechnical Consultant by excavating suitable test pits for testing of compacted fill.

B. Where tests indicate that the density of a layer of fill is less than required, or the moisture content not within specifications, the Geotechnical Consultant shall notify the contractor of the unsatisfactory conditions of the fill. The portions of the fill that are not within specifications shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed until the last lift of fill is tested and found to meet the project specifications and approved by the Geotechnical Consultant.

C. If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as adverse weather, excessive rock or deleterious materials being placed in the fill, insufficient equipment, excessive rate of fill placement, results in a quality of work that is unacceptable, the consultant shall notify the contractor, and the contractor shall rectify the conditions, and if necessary, stop work until conditions are satisfactory.

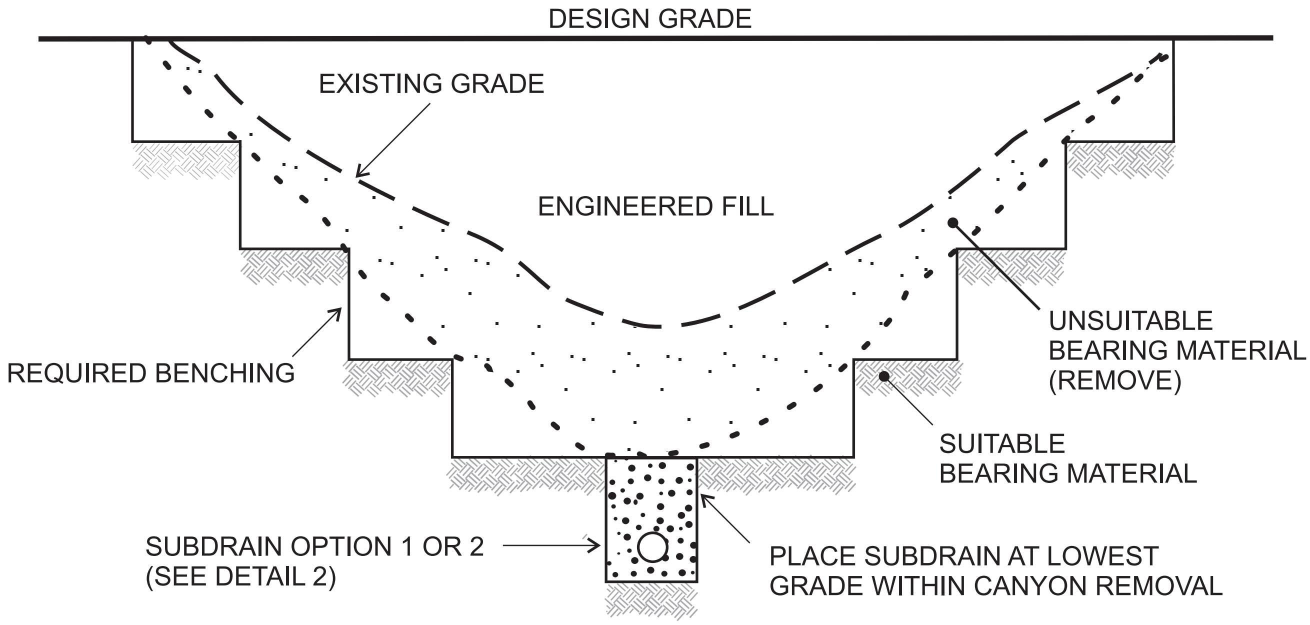
D. Frequency of Compaction Testing: The location and frequency of tests shall be at the Geotechnical Consultant's discretion. Generally, compaction tests shall be taken at intervals not exceeding two feet in fill height and 1,000 cubic yards of fill materials placed.

E. Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of the compaction test locations. The contractor shall coordinate with the surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations. Alternately, the test locations can be surveyed and the results provided to the Geotechnical Consultant.

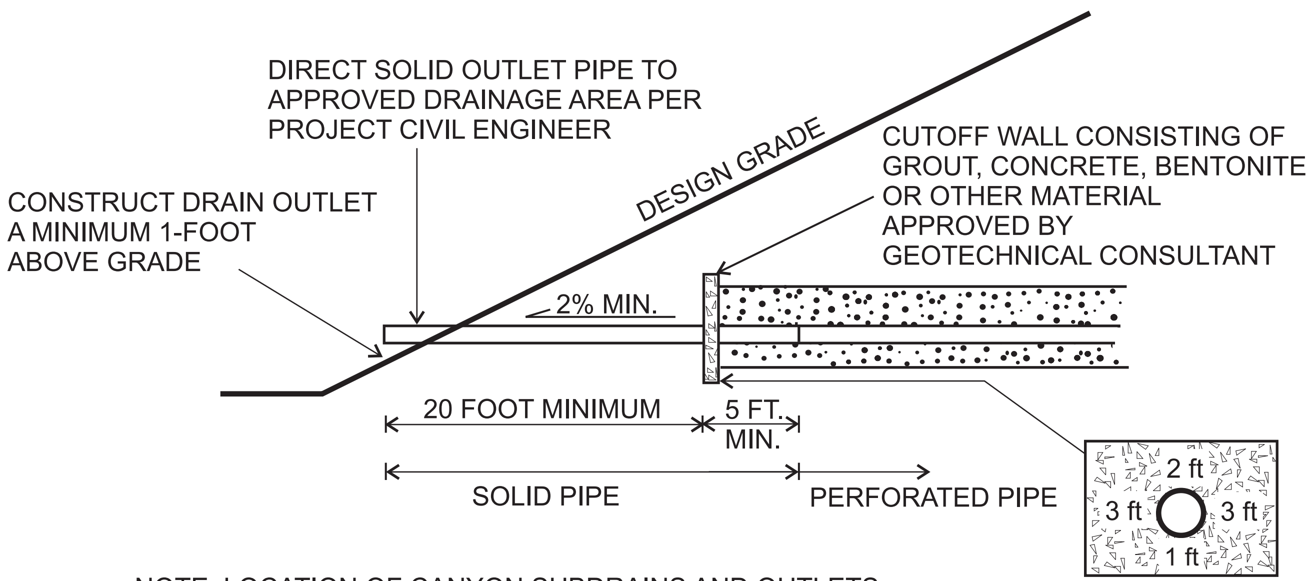
F. Areas of fill that have not been observed or tested by the Geotechnical Consultant may have to be removed and recompacted at the contractor's expense. The depth and extent of removals will be determined by the Geotechnical Consultant.

G. Observation and testing by the Geotechnical Consultant shall be conducted during grading in order for the Geotechnical Consultant to state that, in his opinion, grading has been completed in accordance with the approved geotechnical report and project specifications.

H. Reporting of Test Results: After completion of grading operations, the Geotechnical Consultant shall submit reports documenting their observations during construction and test results. These reports may be subject to review by the local governing agencies.



CANYON SUBDRAIN PROFILE



NOTE: LOCATION OF CANYON SUBDRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

CUTOFF WALL DIMENSIONS

CANYON SUBDRAIN TERMINUS

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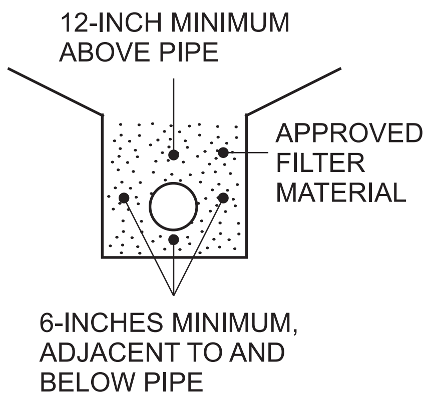
ADVANCED GEOTECHNICAL SOLUTIONS

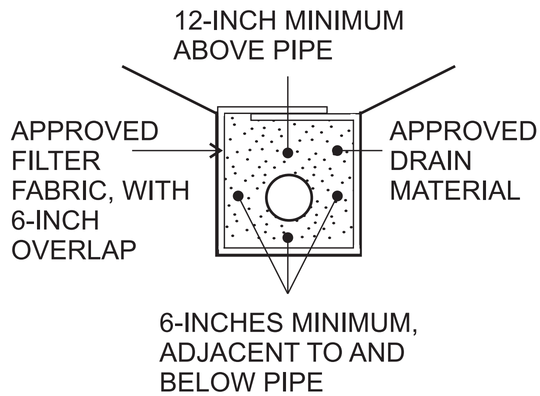
CANYON SUBDRAIN

DETAIL 1



OPTION 1

FILTER MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF CALTRANS CLASS 2 PERMEABLE MATERIAL



OPTION 2

DRAIN MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

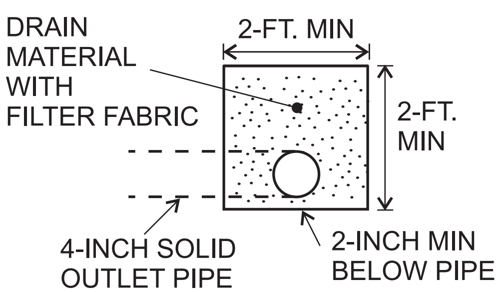
FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

PIPE: 6 OR 8-INCH ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

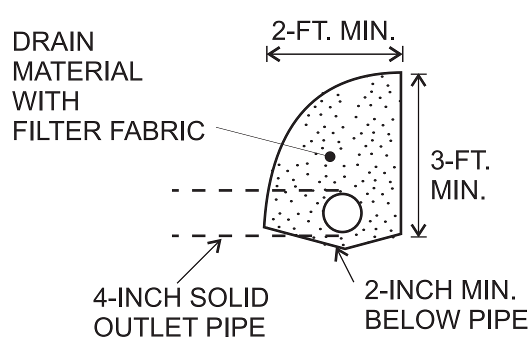
(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

NOTE: CONTINUOUS RUN IN EXCESS OF 5OO FEET REQUIRES 8-INCH DIAMETER PIPE (ASTM D3034, SDR-35, OR ASTM D1785, SCHD. 40)

CANYON SUBDRAIN



OPTION 1



OPTION 2

DRAIN MATERIAL: GRAVEL TRENCH TO BE FILLED WITH 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

PIPE: 4-INCH ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

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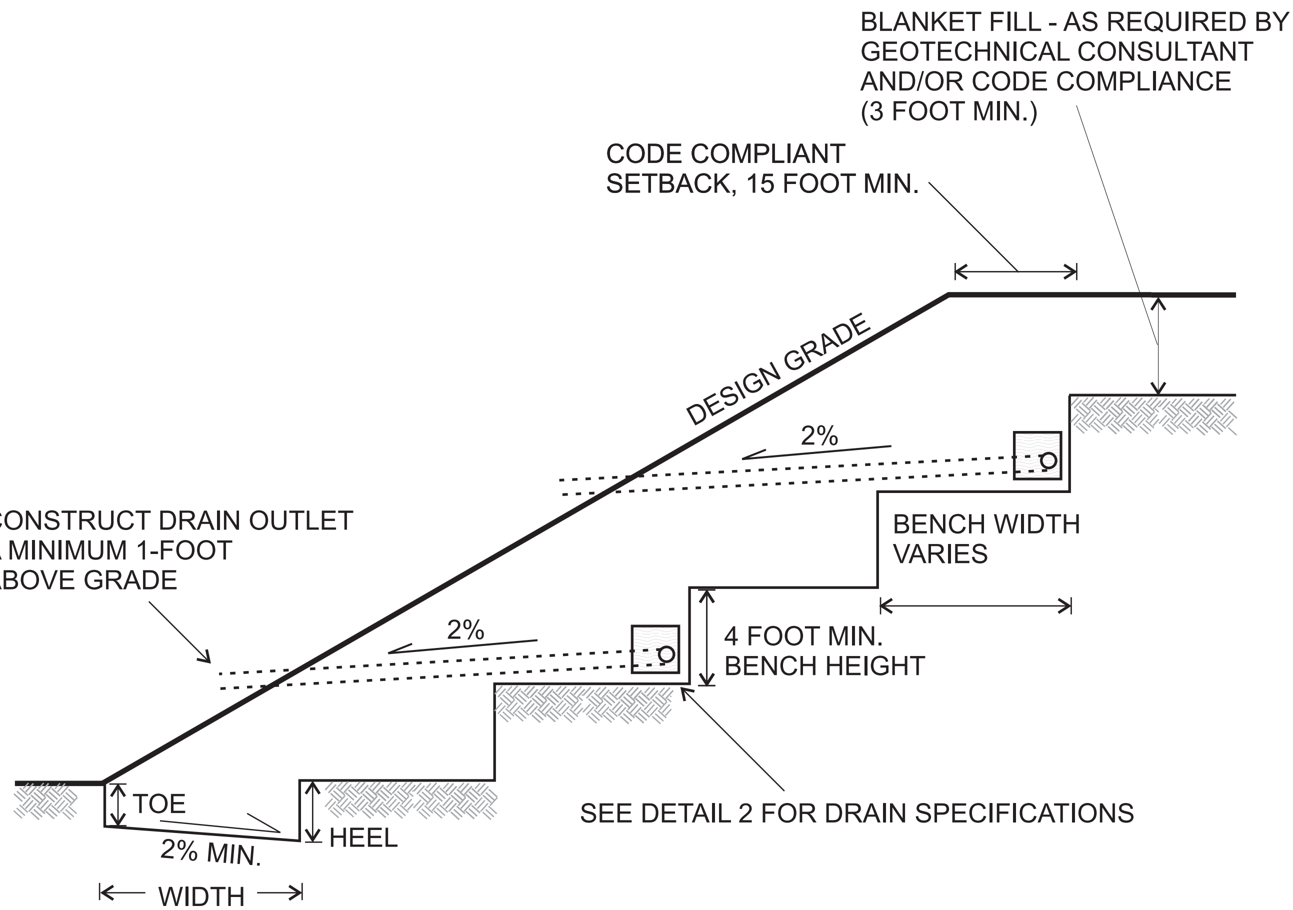
ADVANCED GEOTECHNICAL SOLUTIONS

DRAIN SPECIFICATIONS

DETAIL 2



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE 2 FOOT MIN.
HEEL 3 FOOT MIN.
WIDTH 15 FOOT MIN.

NOTES:

1. DRAIN OUTLETS TO BE PROVIDED EVERY 100 FEET CONNECT TO PERFORATED DRAIN PIPE BY “L” OR “T” AT A MINIMUM 2% GRADIENT.

2. THE NECESSITY AND LOCATION OF ADDITIONAL DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT. UPPER STAGE OUTLETS SHOULD BE EMPTIED ONTO CONCRETE TERRACE DRAINS.

3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.

4. LOCATION OF DRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

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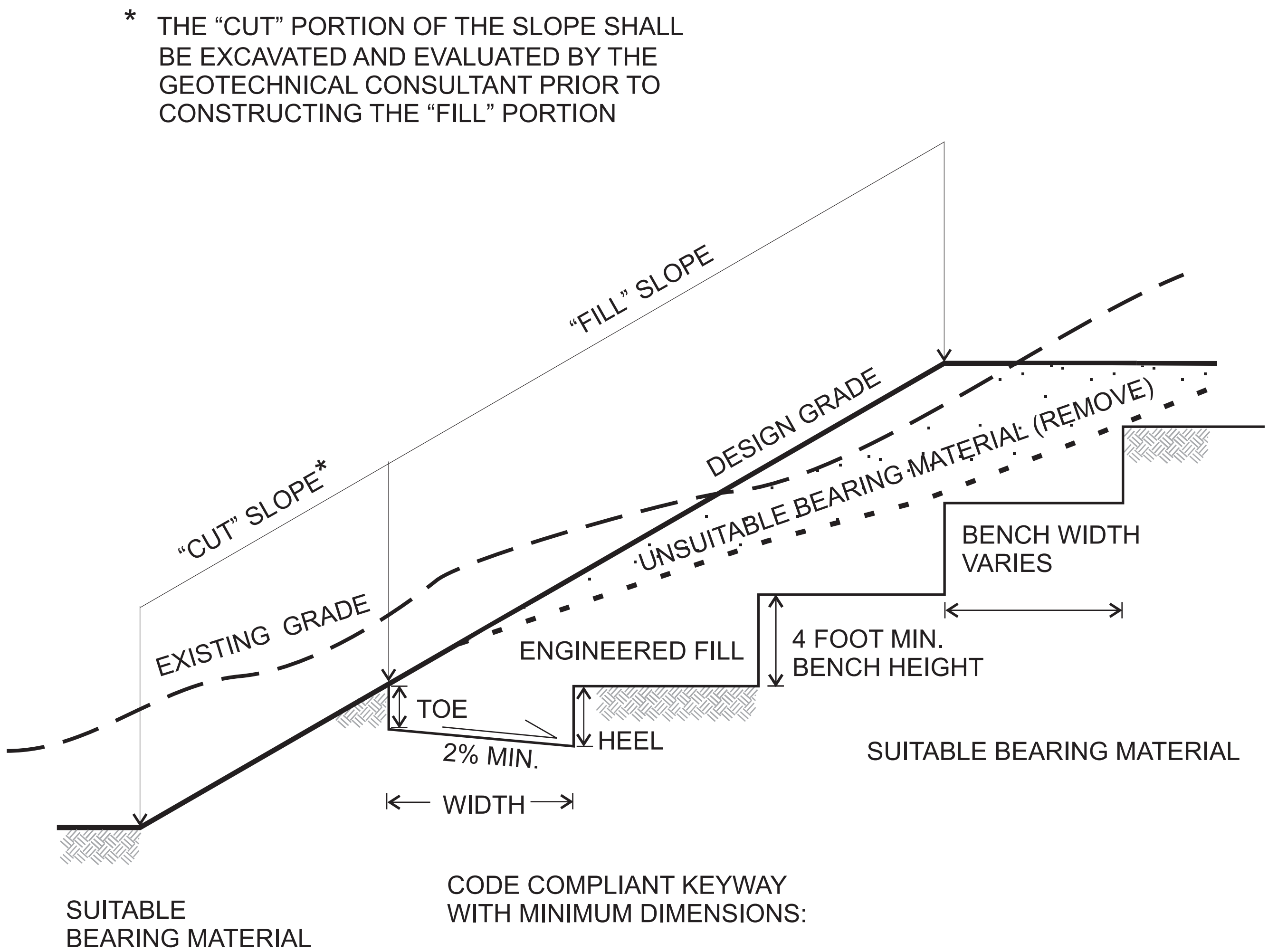
AGS ADVANCED GEOTECHNICAL SOLUTIONS	STABILIZATION/BUTTRESS FILL	DETAIL 3



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE:	2 FOOT MIN.
HEEL:	3 FOOT MIN.
WIDTH:	15 FOOT MIN.

NOTES:

1. THE NECESSITY AND LOCATION OF DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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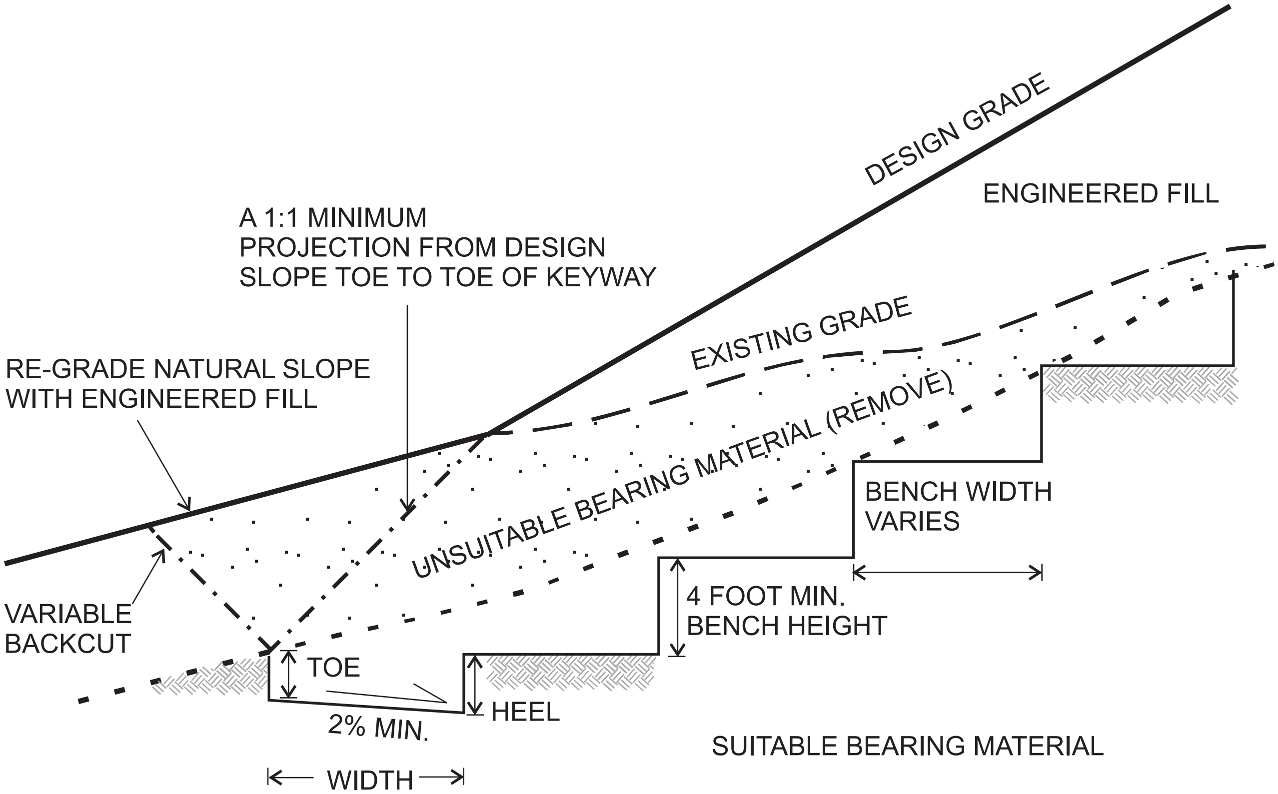
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER CUT SLOPE

DETAIL 4



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. WHEN THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN GRADE SLOPE RATIO, SPECIAL RECOMMENDATIONS ARE NECESSARY BY THE GEOTECHNICAL CONSULTANT

2. THE GEOTECHNICAL CONSULTANT WILL DETERMINE THE REQUIREMENT FOR AND LOCATION OF SUBSURFACE DRAINAGE SYSTEMS.

3. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

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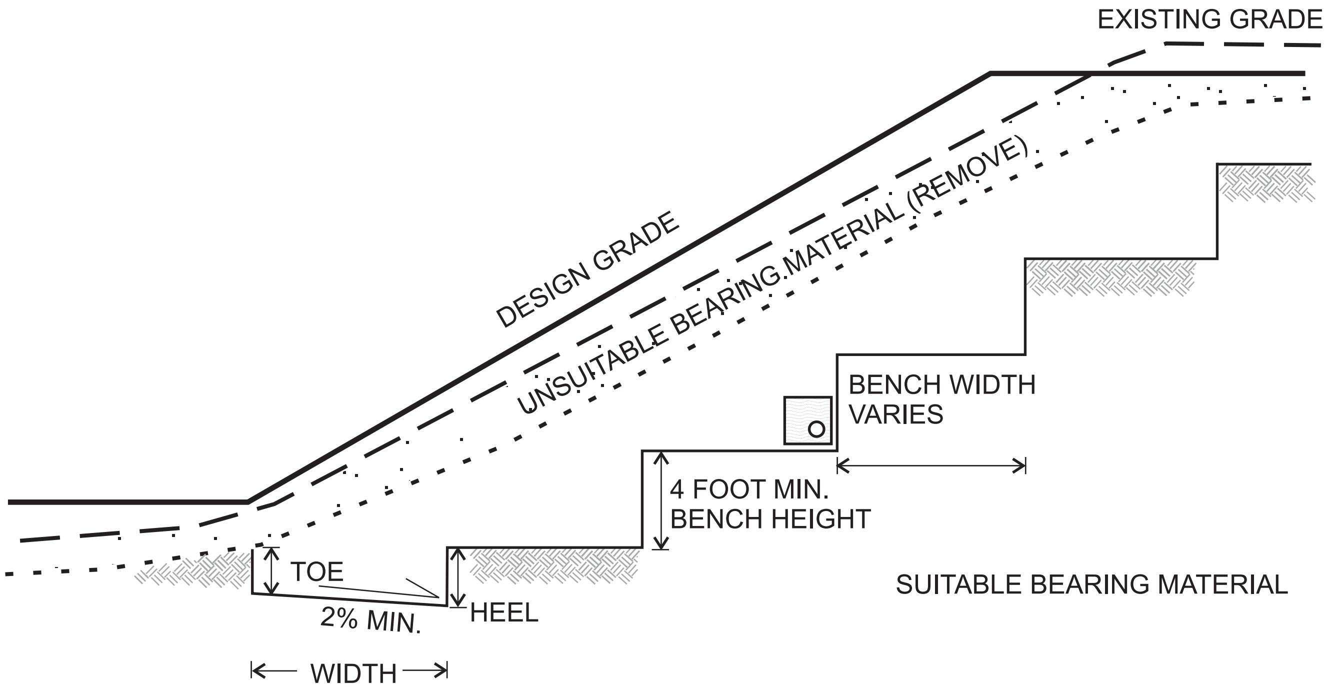
FILL OVER NATURAL SLOPE

DETAIL 5

L



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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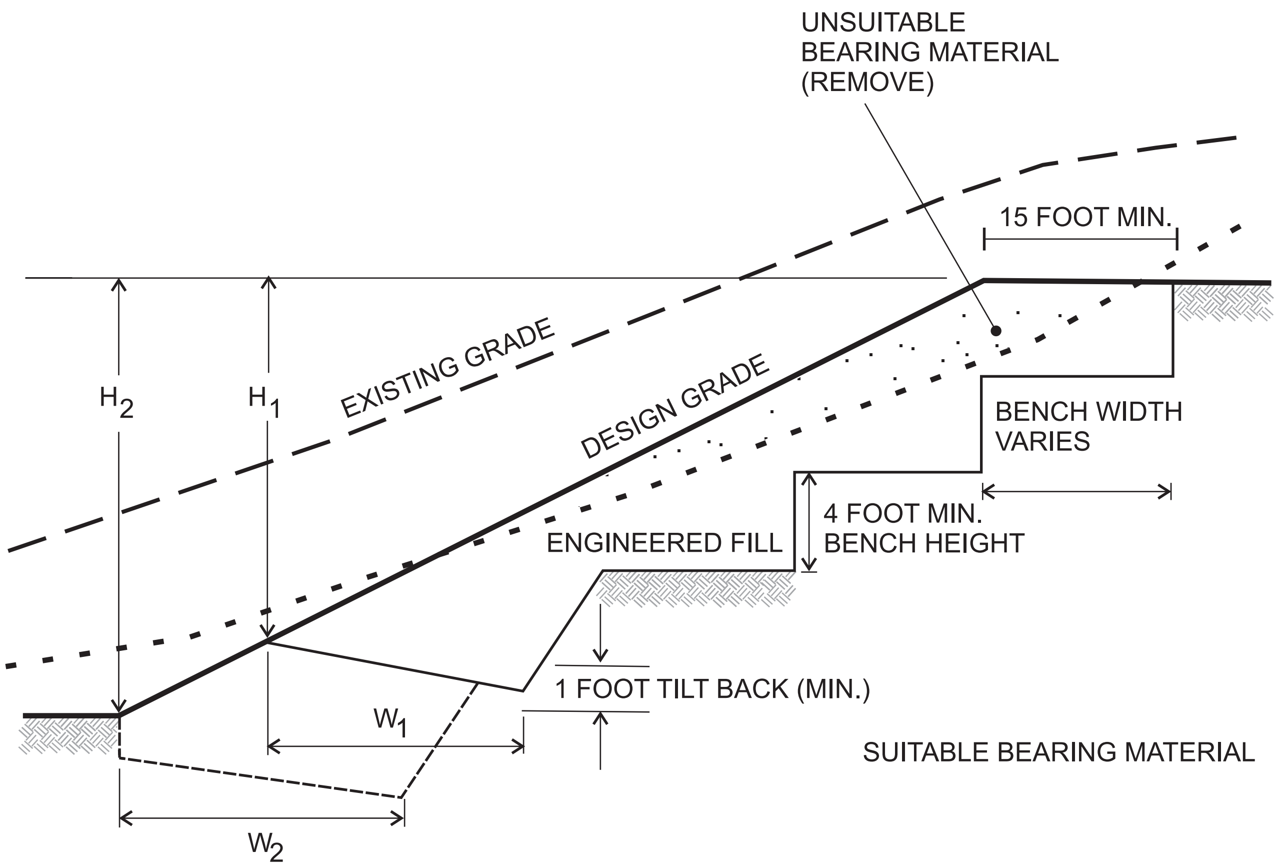
SKIN FILL CONDITION

DETAIL 6



NOTES:

1. IF RECOMMENDED BY THE GEOTECHNICAL CONSULTANT, THE REMAINING CUT PORTION OF THE SLOPE MAY REQUIRE REMOVAL AND REPLACEMENT WITH AN ENGINEERED FILL

2. “W” SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, “W” SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL “W” BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

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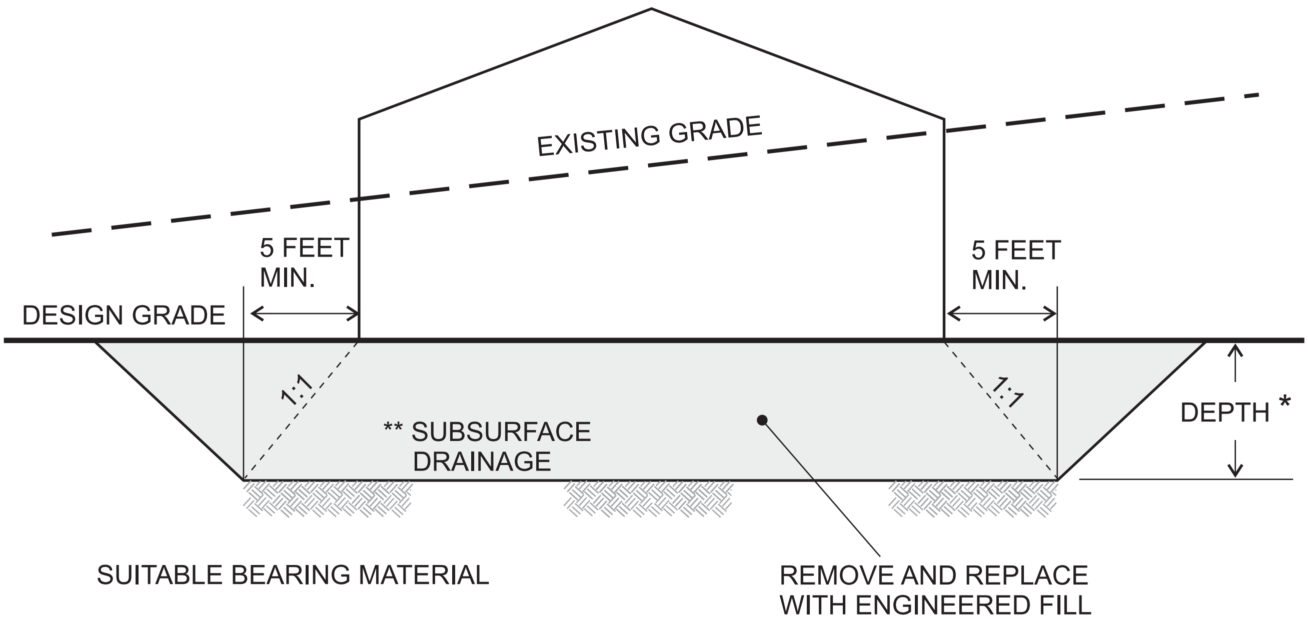
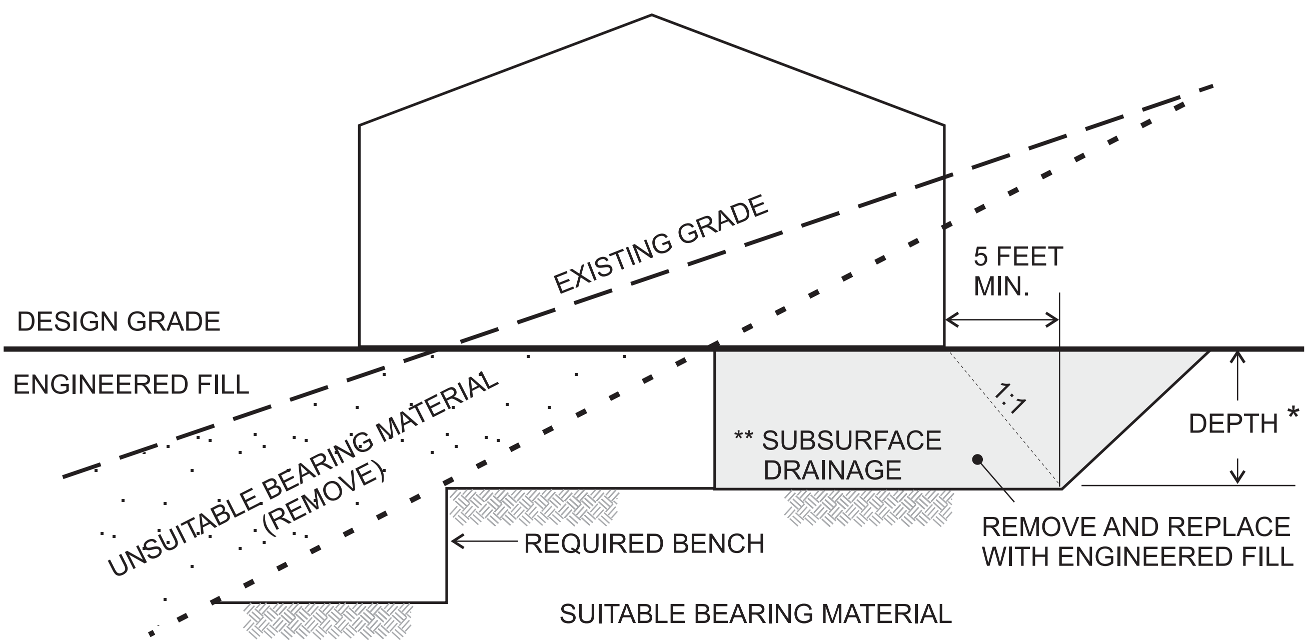
AGS ADVANCED GEOTECHNICAL SOLUTIONS	PARTIAL CUT SLOPE STABILIZATION	DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

NOTES:

* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** CONSTRUCT EXCAVATION TO PROVIDE FOR POSITIVE DRAINAGE TOWARDS STREETS, DEEPER FILL AREAS OR APPROVED DRAINAGE DEVICES BASED ON FIELD CONDITIONS

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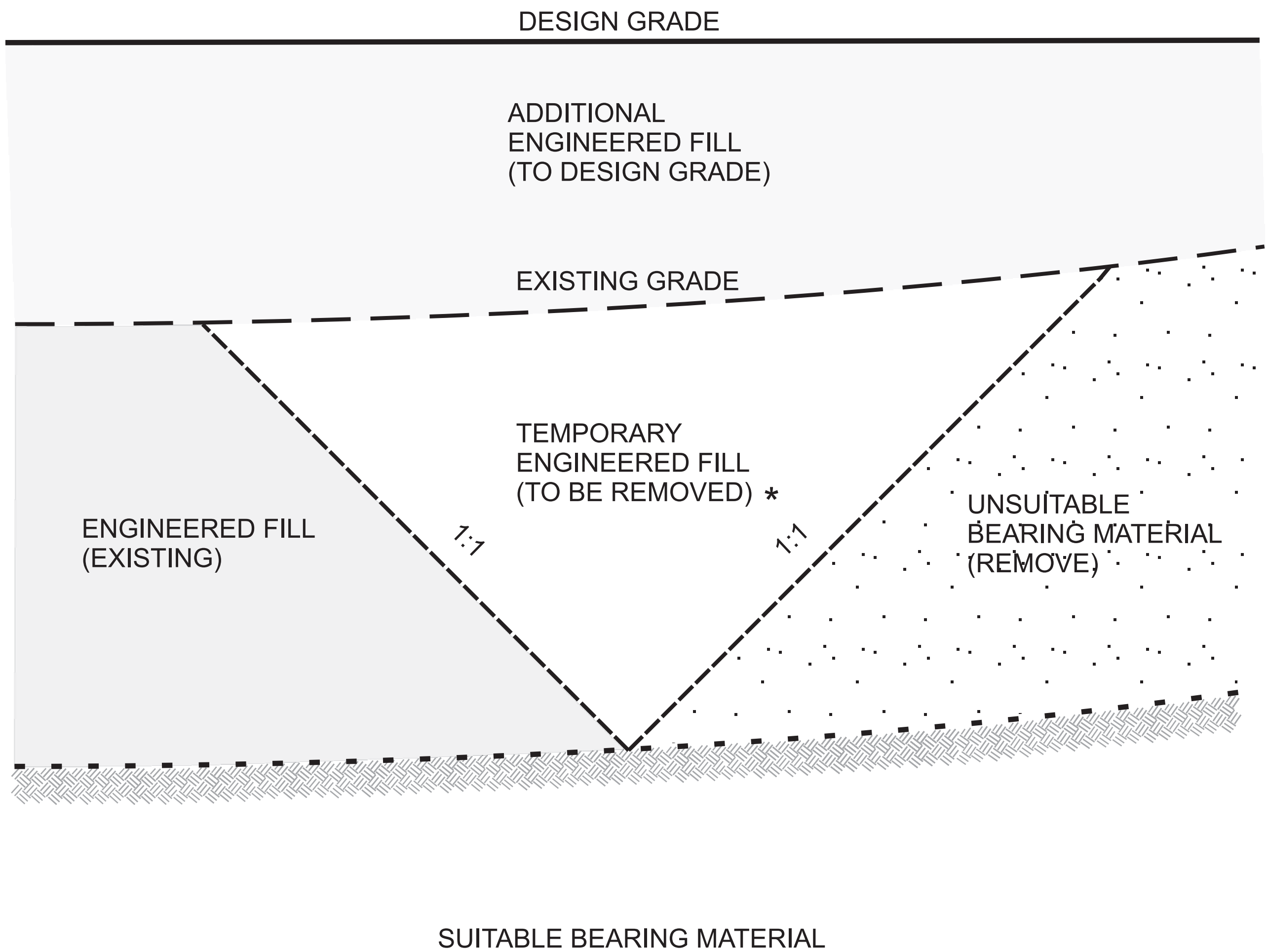
AGS ADVANCED GEOTECHNICAL SOLUTIONS	CUT & CUT-FILL LOT OVEREXCAVATION	DETAIL 8



* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

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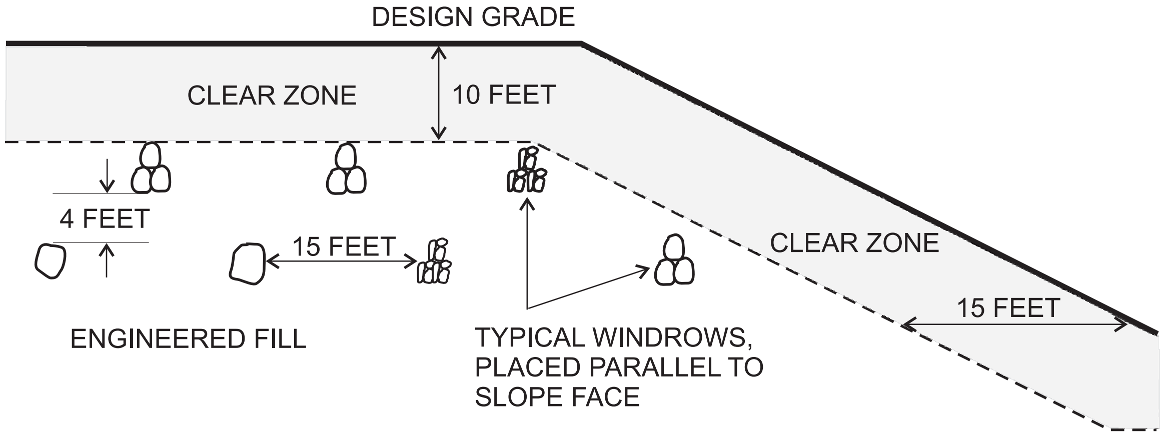
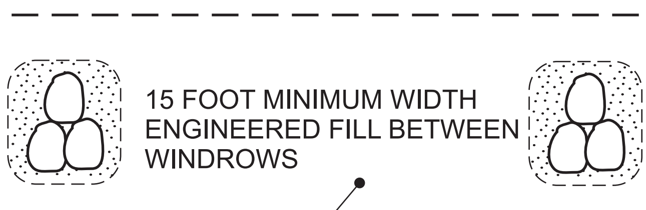
AGS ADVANCED GEOTECHNICAL SOLUTIONS	REMOVAL ADJACENT TO EXISTING FILL	DETAIL 9



CLEAR ZONE DIMENSIONS FOR REFERENCE ONLY, ACTUAL DEPTH, WIDTH, WINDROW LENGTH, ETC. TO BE BASED ON ELEVATIONS OF FOUNDATIONS, UTILITIES OR OTHER STRUCTURES PER THE GEOTECHNICAL CONSULTANT OR GOVERNING AGENCY APPROVAL

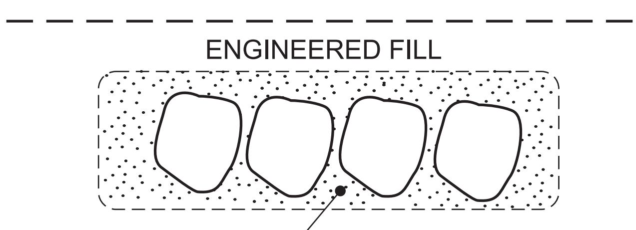
OVERSIZED MATERIAL DISPOSAL PROFILE



HORIZONTALLY PLACED ENGINEERED FILL, FREE OF OVERSIZED MATERIALS AND COMPACTED TO MINIMUM PROJECT STANDARDS

COMPACT ENGINEERED FILL ABOVE OVERSIZED MATERIALS TO FACILITATE "TRENCH" CONDITION PRIOR TO FLOODING GRANULAR MATERIALS

WINDROW CROSS-SECTION



GRANULAR MATERIAL APPROVED BY THE GEOTECHNICAL CONSULTANT AND CONSOLIDATED IN-PLACE BY FLOODING

WINDROW PROFILE

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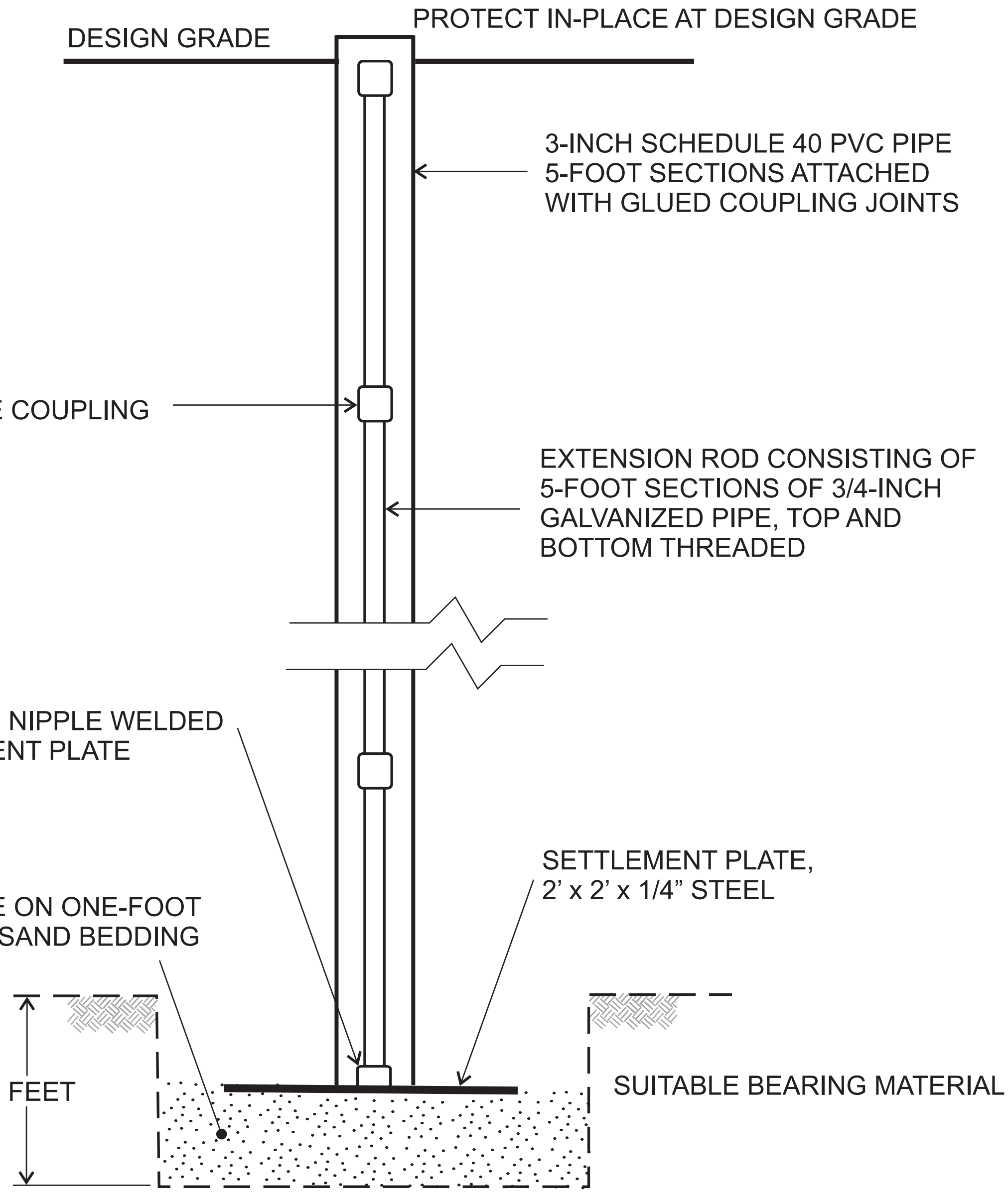
ADVANCED GEOTECHNICAL SOLUTIONS

OVERSIZED MATERIAL DISPOSAL CRITERIA

DETAIL 10



NOTES:

1. SETTLEMENT PLATE LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED BY THE CONTRACTOR AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. CONTRACTOR SHALL MAINTAIN ADEQUATE HORIZONTAL CLEARANCE FOR EQUIPMENT OPERATION AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO SETTLEMENT PLATE DURING SITE CONSTRUCTION.

3. A MINIMUM 5-FOOT ZONE ADJACENT TO SETTLEMENT PLATE/EXTENSION RODS SHALL BE ESTABLISHED FOR HAND-HELD MECHANICAL COMPACTION OF ENGINEERED FILL. ENGINEERED FILL SHALL BE COMPACTED TO MINIMUM PROJECT STANDARD.

4. ELEVATIONS OF SETTLEMENT PLATE AND ALL EXTENSION ROD PLACEMENT SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

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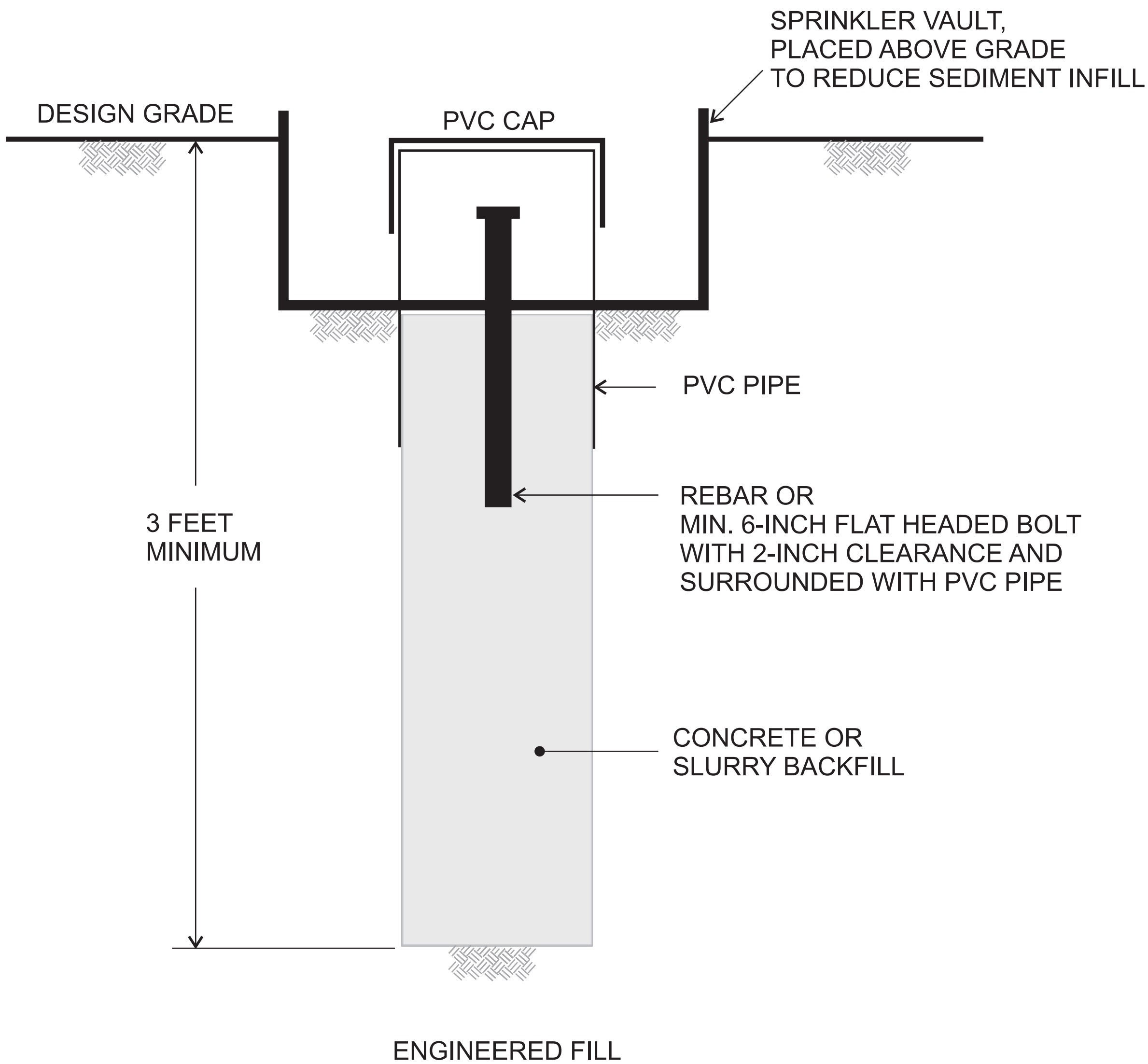
AGS ADVANCED GEOTECHNICAL SOLUTIONS	SETTLEMENT PLATE	DETAIL 11



NOTES:

1. SETTLEMENT MONUMENT LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. ELEVATIONS OF SURFACE MONUMENTS SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

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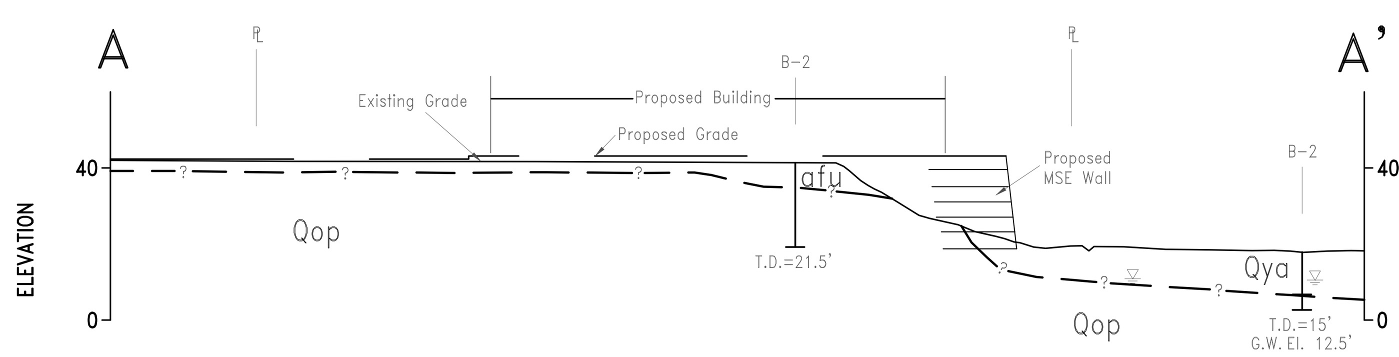
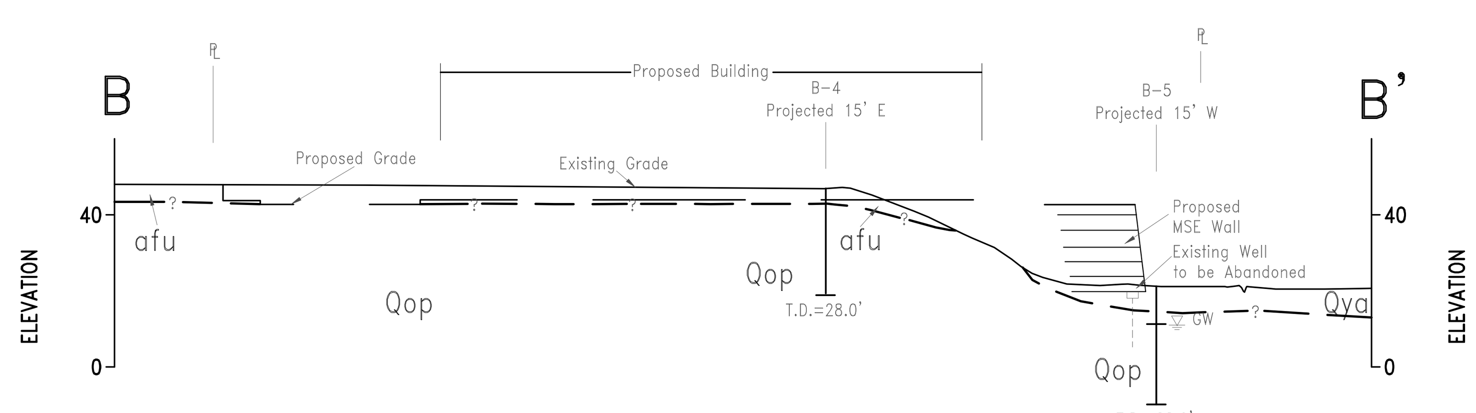
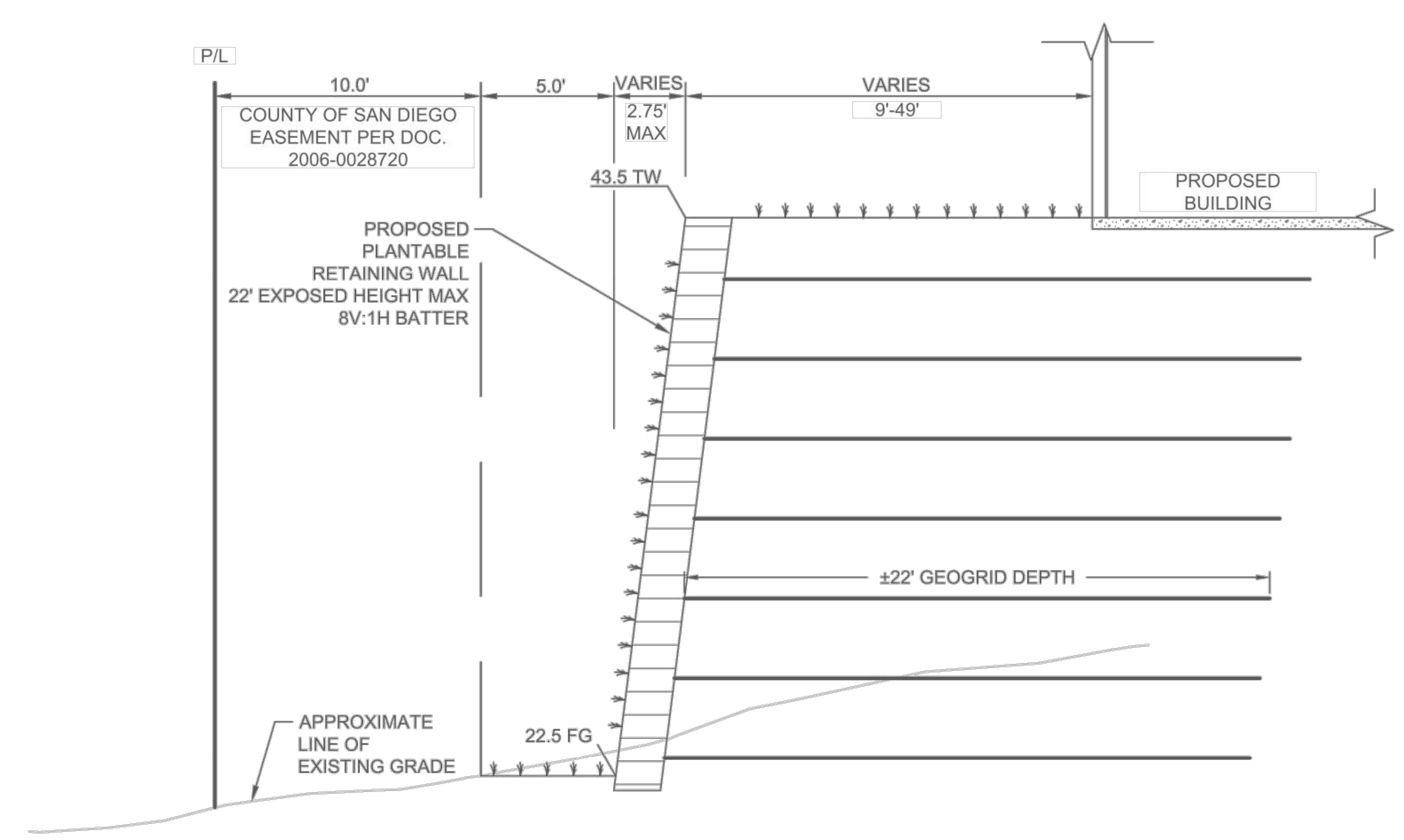
AGS ADVANCED GEOTECHNICAL SOLUTIONS	SETTLEMENT MONUMENT	DETAIL 12

LEGEND

B-7	Approximate Boring Location (AGS, 2021)
P-1	Approximate Percolation Boring Location (AGS, 2021)
TP-7	Approximate Exploratory Test Pit Location (AGS, 2019)
— ? · · ·	Approximate Location of Geologic Contact (Queried where uncertain, dotted where buried)
	Approximate Location of Deep Undocumented Fill
afu	Artificial Fill - Undocumented
Qya	Young Alluvial Flood-plain Deposits
Qop6	Old Paralic Deposits, Unit 6
A — A'	Cross Section Location
5 OX	Estimated Overexcavation Depth (in feet)
4	Estimated Removal Depth (in feet)







RETAINING WALL SECTION C-C'
SCALE: 1"=5'

PRELIMINARY GRADING QUANTITIES

GRADED AREA	5.50 [ACRES]	MAX. CUT DEPTH	14 [FT]
CUT QUANTITIES	19,500 [CYD]	MAX CUT SLOPE RATIO	2:1
FILL QUANTITIES	26,500 [CYD]	MAX. FILL DEPTH	23 [FT]
IMPORT	7,000 [CYD]	MAX FILL SLOPE RATIO	2:1

NOTE:
THE GRADING QUANTITIES SHOWN ARE AN ESTIMATE ONLY. THE GRADING HAS BEEN PERFOMED TO FINISH GRADE AND THE QUANTITIES SHOWN DO NOT ACCOUNT FOR BUILDING PAD AND SUBGRADE PAVEMENT SECTIONS. THE GRADING QUANTITIES DO NOT ACCOUNT FOR VARIATIONS DUE TO LOSS FROM CLEARING AND GRUBBING, STRIPPING, SHRINKAGE, SWELL, BULKING, UNSUITABLE MATERIALS, FOUNDATION SPOILS, UTILITY TRENCH SPOILS, ETC. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THEIR OWN INDEPENDENT QUANTITY & MATERIAL TAKE-OFFS TO CONSTRUCT THE DESIGN AS INDICATED ON THESE DRAWINGS & IN CONFORMANCE WITH THE PROJECT'S GEOTECHNICAL REPORT & SUBSEQUENT UPDATE LETTERS.

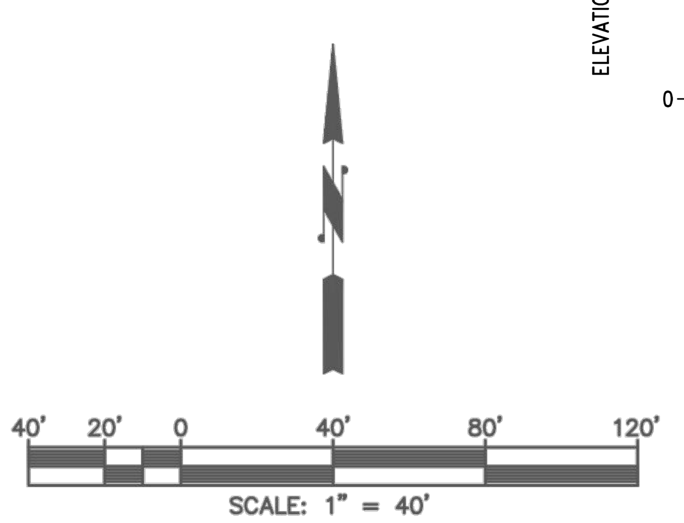


PLATE 1

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 1912-01	1912-01-B-4	August 2021

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

PRELIMINARY GRADING EXHIBIT

PALM AND HOLLISTER
SAN DIEGO, CA
PLSA JOB NO. 3372
SCALE 1"=40'
AUGUST 18, 2021