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

"Villas by the Sea"

PTS 686049

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

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

Engineer of Work:

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

Prepared For:

KDTD, Inc.
4641 Ingraham Street
San Diego, CA 92109
(858)274-5995

Prepared By:

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

Date:

April 25, 2021

Approved by: City of San Diego Date

The City of SAN DIEGO

Project Name: "Villas by the Sea (1011 Grand Units)"

Table of Contents

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

Project Name: "Villas by the Sea (1011 Grand Units)"

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

Project Name: "Villas by the Sea (1011 Grand Units)"

Certification Page

Project Name:
Permit Application

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

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

Engineer of Work's Signature

RCE 54021 — PE#

December 31, 2021 — Expiration Date

Antony K. Christensen

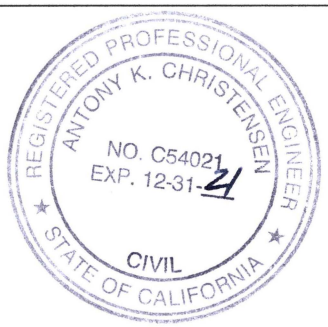
Print Name

Christensen Engineering & Surveying

Company

April 25, 2021

Date



Engineer's Stamp

Project Name: "Villas by the Sea (1011 Grand Units)"

Submittal Record

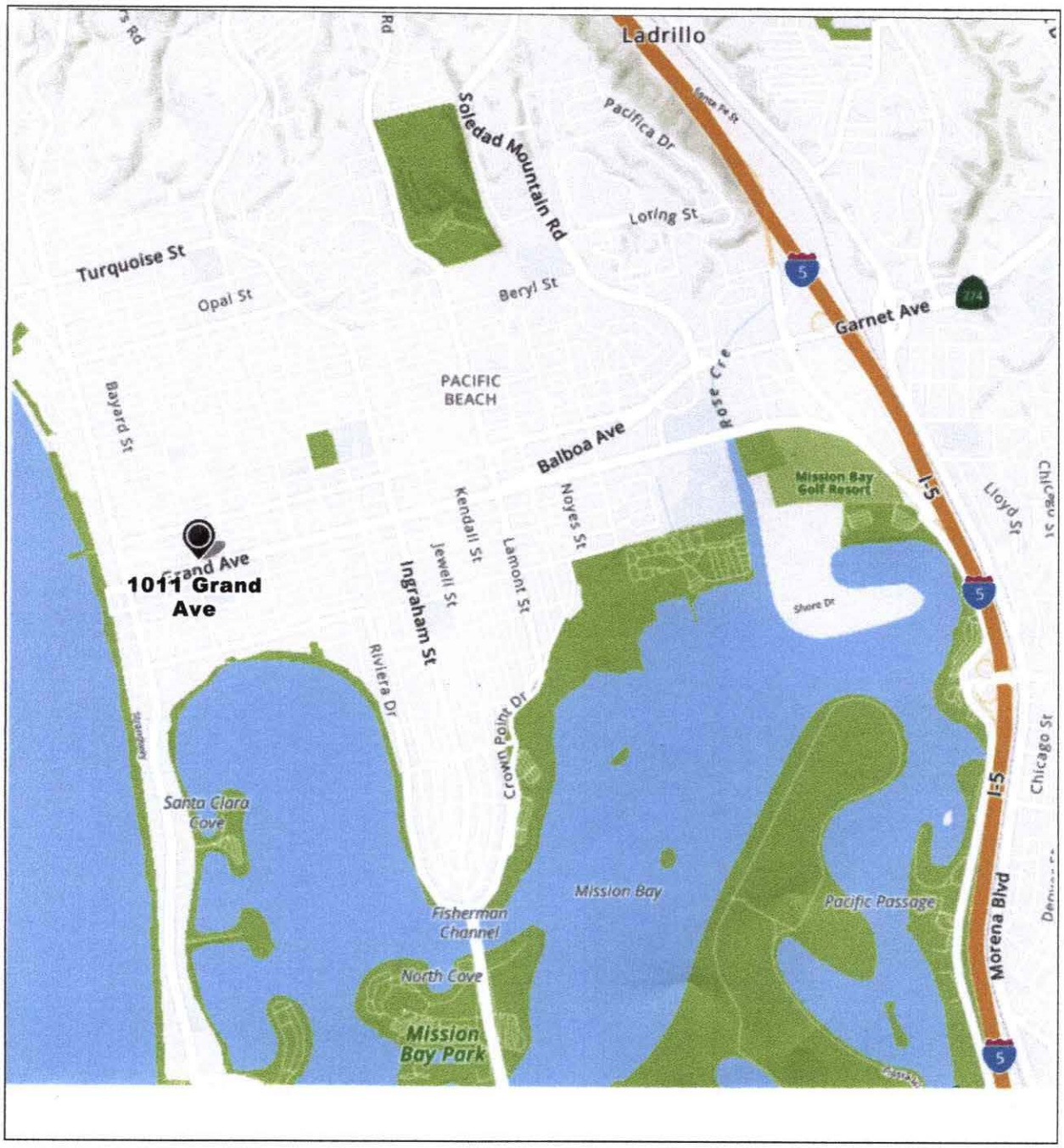
Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck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

Submittal Number	Date	Project Status	Changes
1	02-15-21	☑ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	**Initial Submittal**
2	04-25-21	☑ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	Address City Comments
3		☑ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	
4		☐ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	

Project Name: 1011 Grand Units

Project Vicinity Map

Project Name: 1011 Grand Units
Permit Application



Project Name: "Villas by the Sea (1011 Grand Units)"

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

Attach DS-560 form.

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

Storm Water Requirements Applicability Checklist

FORM
DS-560
November 2018

Project Address: 1011 Grand Avenue, San Diego, CA 92109	Project Number:

SECTION 1. Construction Storm Water BMP Requirements:

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

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

PART A: Determine Construction Phase Storm Water Requirements.

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

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

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

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

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

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

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

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

   ☐ Yes; no document required

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

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

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

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

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

PART B: Determine Construction Site Priority

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

Complete PART B and continued to Section 2

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

2. ☐ **High Priority**
   a. Projects that qualify as Risk Level 2 or Risk Level 3 per the Construction General Permit (CGP) and not located in the ASBS watershed.
   b. Projects that qualify as LUP Type 2 or LUP Type 3 per the CGP and 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 not located in an ASBS watershed.
   c. WPCP projects (>5,000sf of ground disturbance) located within the Los Penasquitos 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. Permanent Storm Water BMP Requirements.

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

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

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

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

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

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

PART D: PDP Exempt Requirements.

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

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

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

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

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

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

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

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

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

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

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

7. **New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). ☐ Yes ☒ No

8. **New development or redevelopment projects of a retail gasoline outlet (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. ☐ Yes ☒ No

9. **New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539. ☐ Yes ☒ No

10. **Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces. ☐ Yes ☒ No

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

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

Joy D. Christensen — Name of Owner or Agent *(Please Print)*

Assistant Engineer — Title

Joy D. Christensen — Signature

02/13/2021 — Date

Project Name: "Villas by the Sea (1011 Grand Units)"

Applicability of Permanent, Post-Construction Storm Water BMP Requirements		Form I-1
Project Identification		
Project Name: Villas by the Sea		
Permit Application Number: PTS 686049		Date: April 25, 2021
Determination of Requirements		
The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements. Answer each step below, starting with **Step 1** and progressing through each step until reaching "Stop". Refer to the manual sections and/or separate forms referenced in each step below.		
Step	**Answer**	**Progression**
Step 1: Is the project a "development project"? See Section 1.3 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	Go to **Step 2**.
	☐ No	**Stop**. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building):		
Step 2: Is the project a Standard Project, PDP, or PDP Exempt? To answer this item, see Section 1.4 of the manual in its entirety for guidance AND complete Form DS-560, Storm Water Requirements Applicability Checklist.	☐ Standard Project	**Stop.** Standard Project requirements apply
	☑ PDP	PDP requirements apply, including PDP SWQMP. Go to **Step 3**.
	☐ PDP Exempt	**Stop.** Standard Project requirements apply. Provide discussion and list any additional requirements below.
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:		

Project Name: "Villas by the Sea (1011 Grand Units)"

Form I-1 Page 2 of 2		
Step	**Answer**	**Progression**
Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Consult the City Engineer to determine requirements. Provide discussion and identify requirements below. Go to **Step 4**.
	☑ No	BMP Design Manual PDP requirements apply. Go to **Step 4**.
Discussion / justification of prior lawful approval, and identify requirements (not required if prior lawful approval does not apply):		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to **Step 5**.
	☑ No	**Stop**. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do not apply: The project discharges runoff to a hardened conveyance system that discharges to an exempt water body (Mission Bay). Runoff flows onto Cass Street then flows southerly to Oliver Avenue and then easterly to Dawes Street and then southerly to a westerly curb inlet and then flows easterly to another curb inlet and then southerly in a 39" RCP drain to Mission Bay that is lower than the 100-yr BFE of 8'. It discharges from a 30" pipe at an elevation of -2.30' NGVD29 which equates to -.0.21' NAVD88.		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). **Stop**.
	☑ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. **Stop**.
Discussion / justification if protection of critical coarse sediment yield areas does not apply: No potential critical coarse sediment yield areas exist upstream, within the project footprint, nor downstream of the project site,		

Project Name: "Villas by the Sea (1011 Grand Units)"

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.

Hydromodification Exemption Exhibit

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN RANCHO PUEBLO LANDS OF SAN DIEGO LAND GRANT.

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- E 18.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

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

Base map information shown on this FIRM was derived from digital orthophotography collected by the U.S. Department of Agriculture Farm Service Agency. Department of Agriculture imagery was flown in 2016 and was produced with a 1-meter ground sample distance.

Coastal Base Flood Elevations shown on the map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Coastal flood elevations are also provided in the Coastal Transect Parameters table in the FIS Report for this jurisdiction. Elevations shown in the Coastal Transect Parameters table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on the FIRM.

SCALE

N

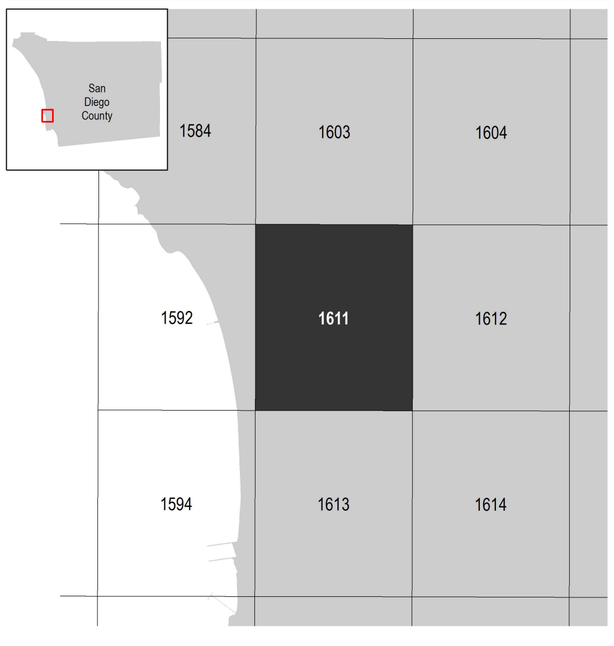
Map Projection:
Universal Transverse Mercator Zone 11N; North American Datum 1983;
Western Hemisphere; Vertical Datum: NAVD 88

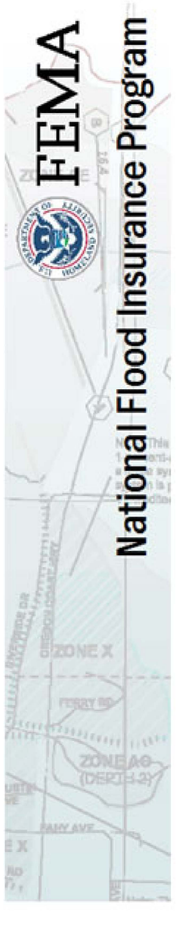
1 inch = 500 feet 1:6,000

0 250 500 750 1,000 2,000 feet

0 125 250 500 meters

PANEL LOCATOR





NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA
and Incorporated Areas

PANEL 1611 OF 2375

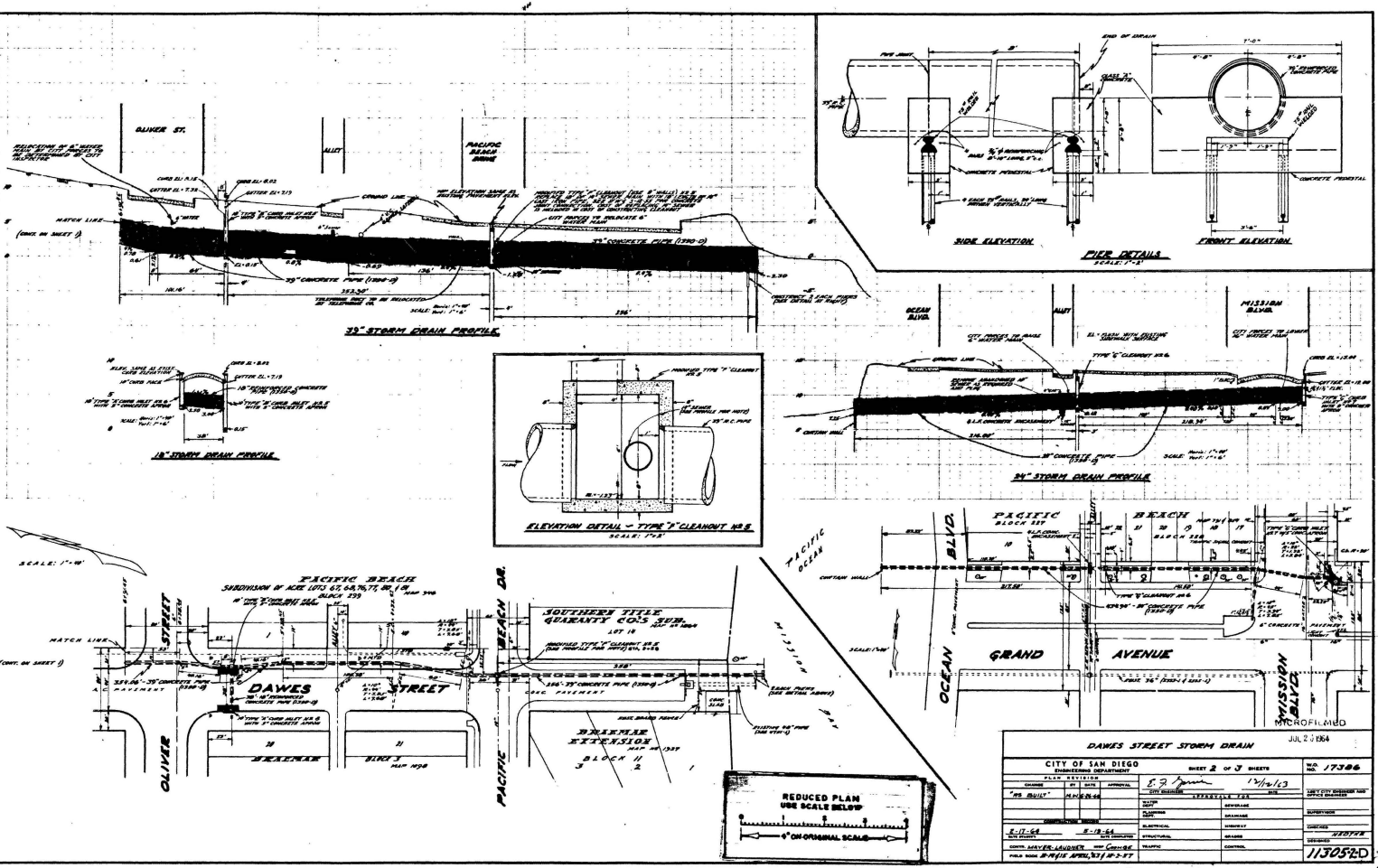
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
SAN DIEGO, CITY OF	060295	1611	H

VERSION NUMBER
2.3.3.3

MAP NUMBER
06073C1611H

MAP REVISED
DECEMBER 20, 2019



DAWES STREET STORM DRAIN

JUL 2 J 1964

CITY OF SAN DIEGO ENGINEERING DEPARTMENT				SHEET 2 OF 3 SHEETS		W.O. NO. 17386
FILE REVISION				E. J. Symon 12/16/63		
CHANGE	BY	DATE	APPROVAL	CITY ENGINEER	DATE	LAKE CITY ENGINEER AND OFFICE ENGINEER
"AS BUILT"	M.K.	6-11-64		APPROVED FOR		
				WATER	SEWERAGE	
				GAS	DRAINAGE	SUPERVISOR
CONSTRUCTION REVISION				ELECTRICAL	DRIVEWAY	CHECKED
6-11-64		6-13-64		STRUCTURAL	GRADES	DESIGNED
DATE COMPLETED		DATE ACCEPTED		TRAFFIC	CONTROL	
CONTR. MAYER-LAUDNER WORK COMPLETED						1130512-D
FIELD BOOK B-MISC APRIL '57						

AS BUILT

MICROFILMED

Project Name: "Villas by the Sea (1011 Grand Units)"

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Villas by the Sea (1011 Grand Units)
Project Address	1011 Grand Avenue San Diego, CA 92109
Assessor's Parcel Number(s) (APN(s))	423-154-02-00
Permit Application Number	PTS
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)	Rose Canyon Hydrologic Area 906.4
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	0.5598 Acres (24,385 Square Feet)
Area to be disturbed by the project (Project Footprint)	0.5598 Acres (24,385 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	0.5465 Acres (23,807 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	0.0133 Acres (578 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	3.2 %

Project Name: "Villas by the Sea (1011 Grand Units)"

Form I-3B Page 2 of 11

Description of Existing Site Condition and Drainage Patterns

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

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

Description / Additional Information:

Existing Land Cover Includes (select all that apply):

- [x] Vegetative Cover
- [ ] Non-Vegetated Pervious Areas
- [x] Impervious Areas

Description / Additional Information:

Commercial buildings

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

- [ ] NRCS Type A
- [ ] NRCS Type B
- [ ] NRCS Type C
- [x] NRCS Type D

Approximate Depth to Groundwater:

- [ ] Groundwater Depth < 5 feet
- [ ] 5 feet < Groundwater Depth < 10 feet
- [ ] 10 feet < Groundwater Depth < 20 feet
- [x] Groundwater Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

- [ ] Watercourses
- [ ] Seeps
- [ ] Springs
- [ ] Wetlands
- [x] None

Description / Additional Information:

Project Name: "Villas by the Sea (1011 Grand Units)"

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
As shown on the pre-construction drainage area map, drainage from the site is by surface flow and is urban in character. Prior to construction site runoff flows westerly onto Cass Street (1.90 cfs for the 100-yr storm). No offsite run-on flows through the project site. The project prior to development is commercial with no drainage conveyance system nor runoff treatment.

Project Name: "Villas by the Sea (1011 Grand Units)"

Form I-3B Page 4 of 11
Description of Proposed Site Development and Drainage Patterns
Project Description / Proposed Land Use and/or Activities: This project involves the demolition of all existing improvements on the property located at 1011 Grand Avenue (commercial development) and the construction of a mixed-use project consisting of 40 residential apartment units and 4 commercial units with parking garage, utilities, treatment BMPs and landscaping.
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features): Impervious surfaces will include the new building roof and decks, entry and walkway.
List/describe proposed pervious features of the project (e.g., landscape areas): Landscaped areas will include planter, vegetated swale.
Does the project include grading and changes to site topography? ☐ Yes ☐ No Description / Additional Information: Grading will be limited to that required to remove the existing improvements and to prepare for the construction of the building. There will be little change in elevation or slope of the site.

Project Name: "Villas by the Sea (1011 Grand Units)"

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:

Following construction, site runoff flows to Grand Avenue from a curb outlet, then flows westerly to Cass Street and joins runoff from a Cass Street curb outlet and from the unnamed alley southerly of the site (1.30 cfs). Due to a change in use from commercial use to multi-residential use (for the part of the project exposed to precipitation) results in a decrease in total site runoff (0.30 cfs). The ultimate collection of runoff into the public storm drain system remains the same (at a curb inlet Dawes Street southerly of Oliver Avenue). The site has 23,027 sf of imperviousness existing and a proposed 23,807 of imperviousness, following development, a change from 94.4% to 97.6% area of imperviousness.

Impervious area runoff will be treated by two raised standard Filterra units due to the site being hydromodification exempt and being classified a non-infiltration site. The site is required to treat 1.5 times the flow based runoff (weight adjusted runoff coefficient) times 0.2 in/hr times the area flowing to the Filterra units). After treatment, runoff is conveyed to two curb outlets, one in Grand Avenue and Cass Street. The required retention element of the project is achieved through flow from 496 sf of roof runoff flowing over 514 sf of landscaping in 18” amended soil in a raised planter at the NE corner of the property and a vegetated swale along the easterly boundary, discharging to the unnamed alley southerly of the project site, by sheet flow. The project discharges runoff to a hardened conveyance system that discharges to an exempt water body (Mission Bay). Runoff flows onto Cass Street then flows southerly to Oliver Avenue and then easterly to Dawes Street and then southerly to a westerly curb inlet and then flows easterly to another curb inlet and then southerly in a 39” RCP drain to Mission Bay that is lower than the 100-yr BFE of 8'. It discharges from a 30" pipe at an elevation of -2.30' NGVD29 which equates to -.0.21' NAVD88.

Project Name: "Villas by the Sea (1011 Grand Units)"

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)

The project discharges runoff to a hardened conveyance system that discharges to an exempt water body (Mission Bay). Runoff flows onto Cass Street then flows southerly to Oliver Avenue and then easterly to Dawes Street and then southerly to a westerly curb inlet and then flows easterly to another curb inlet and then southerly in a 39" RCP drain to Mission Bay that is lower than the 100-yr BFE of 8'. It discharges from a 30" pipe at an elevation of -2.30' NGVD29 which equates to -.0.21' NAVD88. See attached Drainage Study and Infiltration testing results found in the geotechincal report for additional information.

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

For Mission Bay uses include Industrial service supply, Contact Water Recreation, Non-Contact Water Recreation, Estuarine, Wildlife, Rare and Marine habitats, Migration, Shellfish Harvesting, Spawning.

Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations

None

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

Approximately 0.30 miles southerly to Mission Bay.

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

There are no MHPA or ESL areas near the project site.

Project Name: "Villas by the Sea (1011 Grand Units)"

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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)
Mission Bay	Bacteria	Total coliform
		Fecal coliform
		Enterococcus

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	☑	☐	☐

Project Name: "Villas by the Sea (1011 Grand Units)"

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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 runoff to a hardened conveyance system that discharges to an exempt water body (Mission Bay). Runoff flows onto Cass Street then flows southerly to Oliver Avenue and then easterly to Dawes Street and then southerly to a westerly curb inlet and then flows easterly to another curb inlet and then southerly in a 39” RCP drain to Mission Bay that is lower than the 100-yr BFE of 8'. It discharges from a 30" pipe at an elevation of -2.30' NGVD29 which equates to -.0.21' NAVD88. See attached Drainage Study and Infiltration testing results found in the geotechincal report for additional information.

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:

Project Name: "Villas by the Sea (1011 Grand Units)"

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.
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)

Project Name: "Villas by the Sea (1011 Grand Units)"

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. None.
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.

Project Name: "Villas by the Sea (1011 Grand Units)"

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: None anticipated			
4.2.2 Storm Drain Stenciling or Signage	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.2 not implemented: None occur onsite that are applicable for stenciling			
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: Will not occur onsite.			
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: Will not occur onsite.			
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: There will refuse containers in garage.			

Project Name: "Villas by the Sea (1011 Grand Units)"

Form I-4B Page 2 of 2			
Source Control Requirement	**Applied?**		
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
On-site storm drain inlets	☐ Yes	☐ No	☑ N/A
Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	☑ N/A
Interior parking garages	☐ Yes	☐ No	☑ N/A
Need for future indoor & structural pest control	☐ Yes	☐ No	☑ N/A
Landscape/Outdoor Pesticide Use	☑ Yes	☐ No	☐ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☑ N/A
Food service	☐ Yes	☐ No	☑ N/A
Refuse areas	☑ Yes	☐ No	☐ N/A
Industrial processes	☐ Yes	☐ No	☑ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☑ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☑ N/A
Fuel Dispensing Areas	☐ Yes	☐ No	☑ N/A
Loading Docks	☐ Yes	☐ No	☑ N/A
Fire Sprinkler Test Water	☐ Yes	☐ No	☑ N/A
Miscellaneous Drain or Wash Water	☐ Yes	☐ No	☑ N/A
Plazas, sidewalks, and parking lots	☐ Yes	☐ No	☑ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☑ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☑ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☑ N/A
SC-6D: Automotive Facilities	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.			
Landscaping will be employed but pesticide use is not anticipated. Refuse will be collected in a containers in garage.			

Project Name: "Villas by the Sea (1011 Grand Units)"

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: Does not exist onsite.			
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: No credit is applied for trees as part of this project.			

Project Name: "Villas by the Sea (1011 Grand Units)"

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: Dispersion from portion of roof to landscaped areasl.			
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

Project Name: "Villas by the Sea (1011 Grand Units)"

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: Runoff is collected from the impervious areas and directed to the Filterra Units. There is no collection and storage of site runoff				
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: The water demand in the 36 hour limit is exceeded by the DCV.				
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

Project Name: "Villas by the Sea (1011 Grand Units)"

Form I-5B Page 4 of 4
Insert Site Map with all site design BMPs identified:

LEGEND

	PROPERTY LINE
	EXISTING CONTOUR
	EXISTING OVERHEAD LINES
—G—G—	EXISTING GAS LINE
—S—S—	EXISTING SEWER LINE
—W—W—	EXISTING WATER LINE
	EXISTING MANHOLE
(S)	PROPOSED 6" PVC SEWER LATERAL
(W)	EXISTING 2" WATER SERVICE / PROPOSED 1" WATER SERVICE
(FS)	PROPOSED 4" FIRE SERVICE
(I)	PROPOSED 1" IRRIGATION SERVICE
	PROPOSED CURB OUTLET
	PROPOSED RAISED FILTERRA BIOFILTRATION BASIN (4' X 8') IMP-FE BIOFILTRATION BASIN (4' X 8') IMP-FW
	PROPOSED 2424 CATCH BASIN (WITH PUMP)
======	PROPOSED PVC DRAIN
DS	PROPOSED DOWNSPOUT
	LANDSCAPE AREA
	AREA DRAIN
	18" AMENDED SOIL LANDSCAPE AREA ACCEPTING RUNOFF FROM ROOF (IMPERVIOUS AREA DISPERSION)

LEGAL DESCRIPTION:

LOTS 1 THROUGH 8 IN BLOCK 257 OF PACIFIC BEACH, ACCORDING TO MAPS THEREOF NOS. 697 AND 854, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, JANUARY 8, 1892 AND SEPTEMBER 24, 1898 RESPECTIVELY. EXCEPTING FROM SAID LOT 1 THE SOUTH 15 FEET THEREOF. ALSO EXCEPTING FROM SAID LOT 2 THE SOUTH 15 FEET OF THE WESTERLY 15 FEET THEREOF.

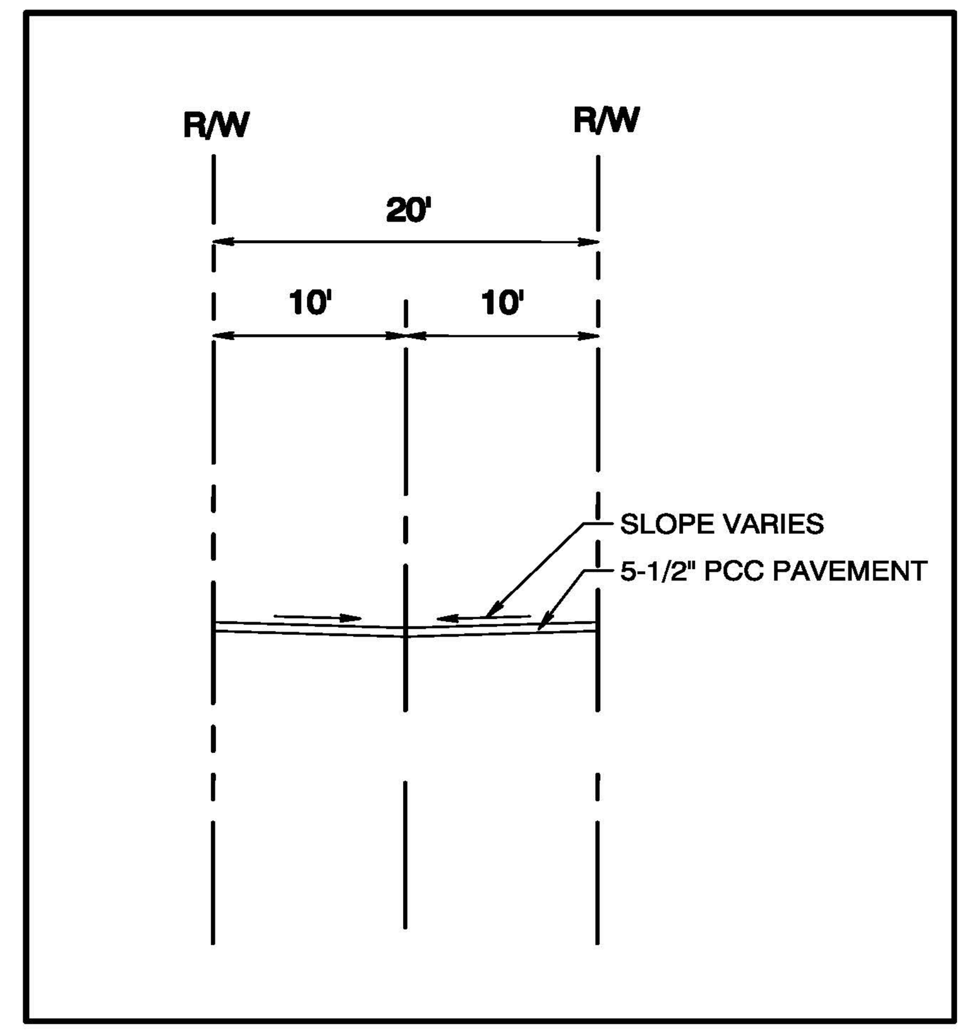
APN: 423-154-02-00

BENCHMARK

CITY OF SAN DIEGO BENCHMARK LOCATED AT THE NORTHWESTERLY CORNER OF GRAND AVENUE AND DAWES STREET.
ELEVATION 28.320' MEAN SEA LEVEL (N.G.V.D. 1929).

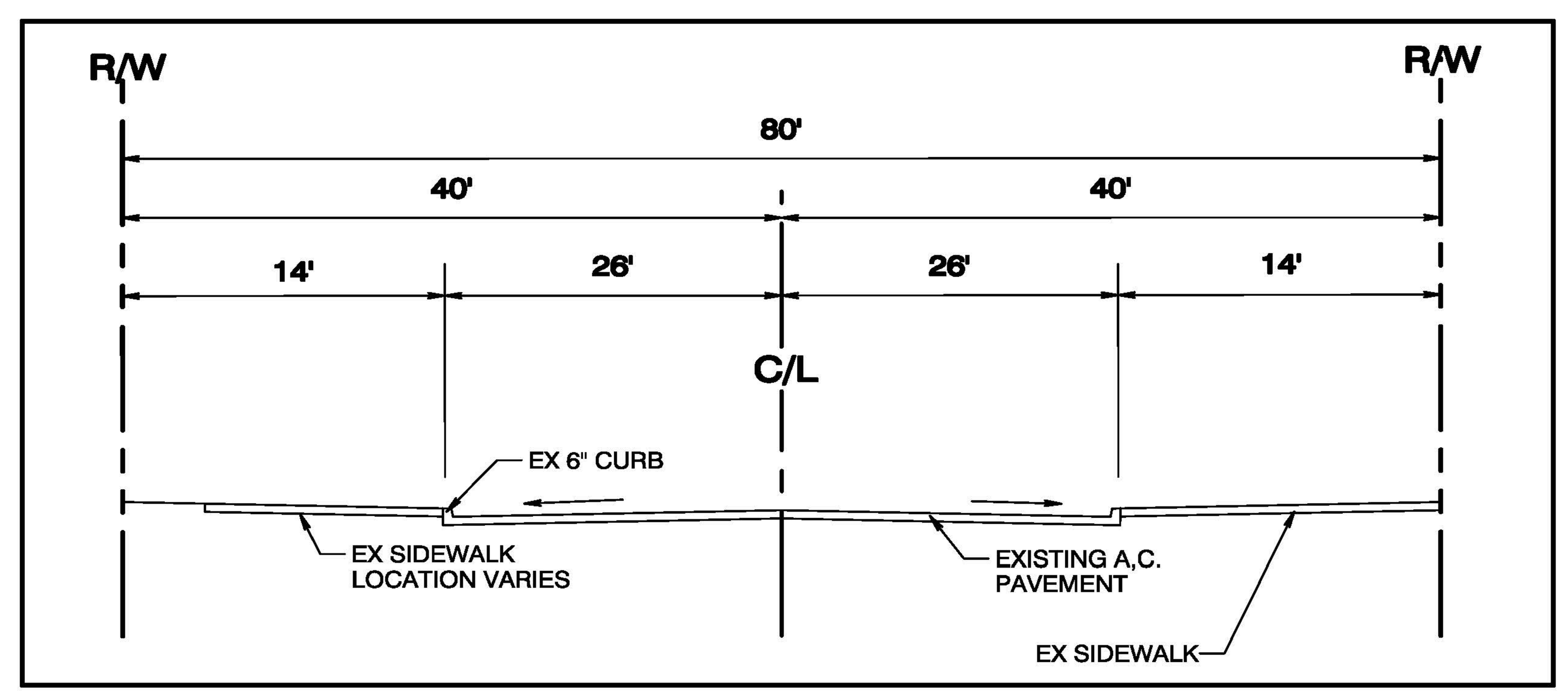
NOTES

1. THE SOURCE OF THE TOPOGRAPHIC INFORMATION SHOWN HEREON IS PHOTOGRAMMETRIC SURVEY CHRISTENSEN ENGINEERING & SURVEYING, DATED AUGUST 07, 2020.
2. THE USE OF PROPOSED LOT IS FOR MIXED USE MULTI-FAMILY RESIDENTIAL/COMMERCIAL.
3. THE SUBJECT PROPERTY IS SERVED BY SANITARY SEWER LATERALS AND WATER SERVICES CONNECTED TO CITY OF SAN DIEGO MAINS.
4. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE, SATISFACTORY TO THE CITY ENGINEER.
5. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL INCORPORATE ANY CONSTRUCTION BMP'S NECESSARY TO COMPLY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, INTO THE CONSTRUCTION PLANS OR SPECIFICATIONS.
6. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT THE OWNER/PERMITTEE SHALL SUBMIT A WATER POLLUTION CONTROL PLAN (WPCP). THE WPCP SHALL BE PREPARED IN ACCORDANCE WITH THE GUIDELINES IN PART 2 CONSTRUCTION BMP STANDARDS CHAPTER 4 OF THE CITY'S STORM WATER STANDARDS.
7. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE APPLICANT SHALL SUBMIT A TECHNICAL REPORT THAT WILL BE SUBJECT TO FINAL REVIEW BY THE CITY ENGINEER, BASED ON THE STORM WATER STANDARDS IN EFFECT AT THE TIME OF THE CONSTRUCTION PERMIT ISSUANCE.
8. ONSITE EASEMENTS EXIST, AS SHOWN.
9. AN ENCROACHMENT MAINTENANCE AND REMOVAL AGREEMENT WILL BE REQUIRED FOR PRIVATE CURB OUTLETS (D-25), LANDSCAPING AND IRRIGATION, TOGETHER WITH ANY OTHER PRIVATE IMPROVEMENTS TO REMAIN, WITHIN THE PUBLIC RIGHT OF WAY
10. SITE IMPERVIOUS SURFACE RUNOFF WILL BE DIRECTED TO TWO FILTERRA FILTRATION UNITS FOR TREATMENT AND TO LANDSCAPING WITH AND WITHOUT AMENDED SOIL, BEFORE LEAVING SITE. SEE SHEET C-2.
11. FOR LANDSCAPE AND HARDSCAPE, SEE LANDSCAPE PLAN.
12. ALL PROPOSED PUBLIC IMPROVEMENTS SHALL BE IN ACCORDANCE WITH CURRENT CITY STANDARDS AT THE TIME OF THEIR CONSTRUCTION.
13. HISTORIC SIDEWALK SCORING, IF ANY, SHALL BE MAINTAINED AND ANY CONTRACTOR DATE STAMPS SHALL BE PRESERVED.
14. 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.



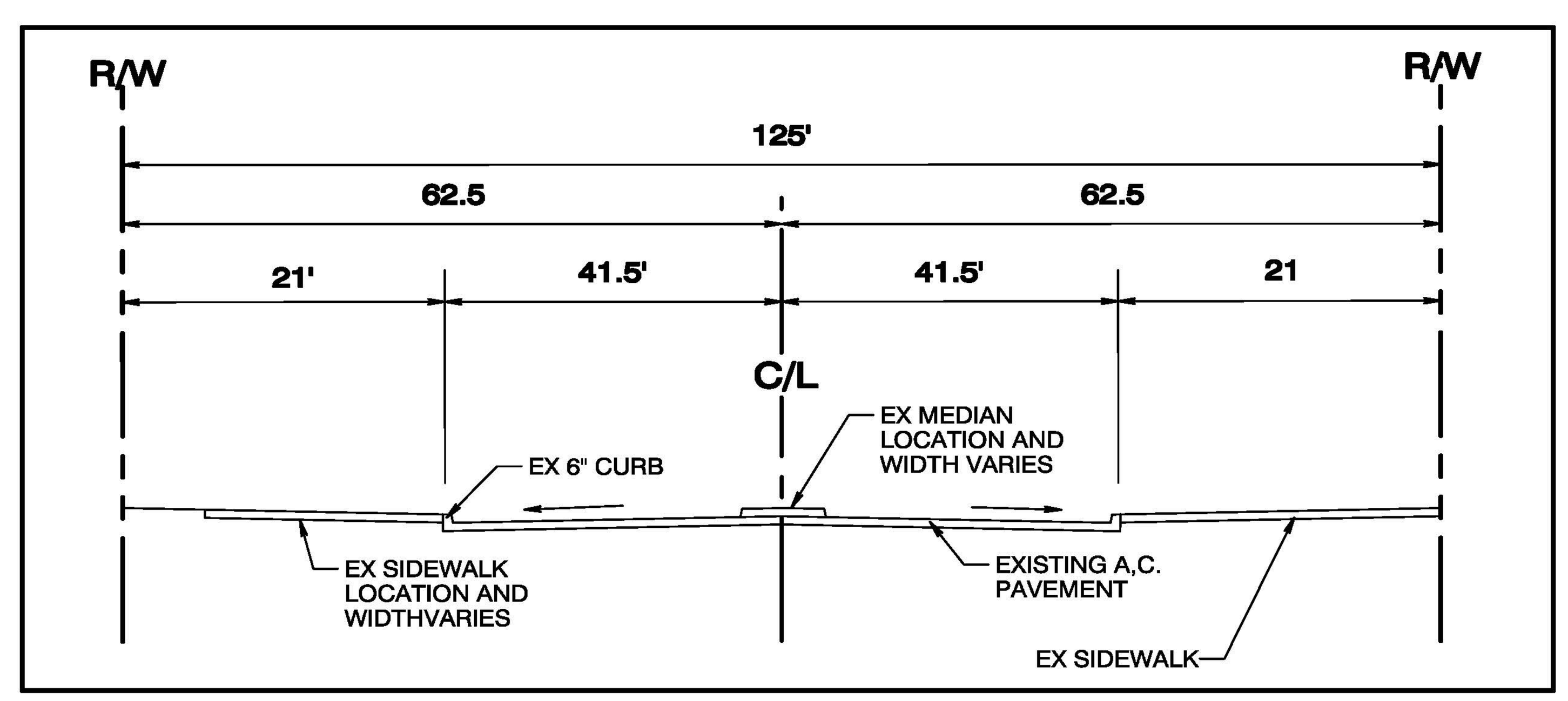
TYPICAL SECTION ALLEY

NOT TO SCALE



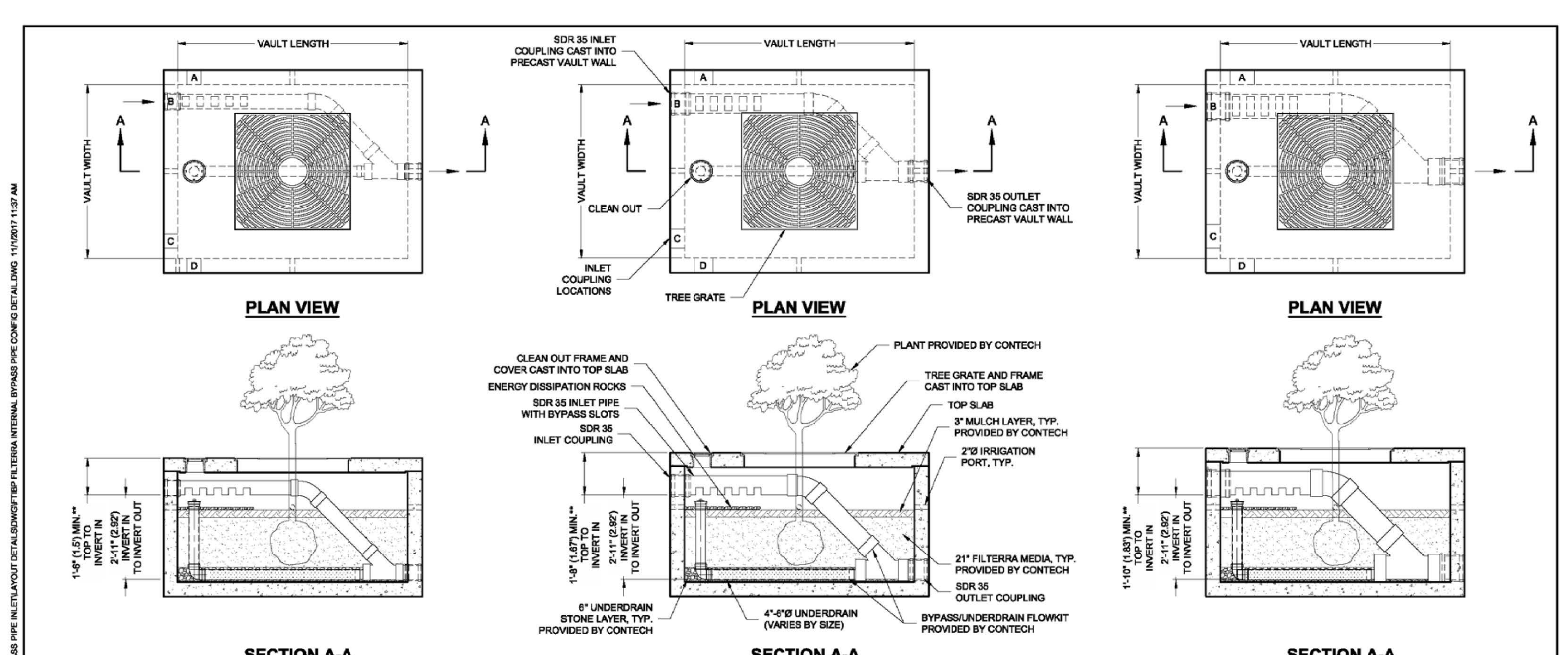
TYPICAL SECTION CASS STREET

NOT TO SCALE



TYPICAL SECTION GRAND AVENUE

NOT TO SCALE



FTIBP-6" BYPASS INLET/OUTLET PIPE CONFIGURATION
APPROXIMATE MAXIMUM BYPASS = 0.6 CFS

DESIGNATION	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (L x W)	INLET/ OUTLET PIPE DIA.	UNDER-DRAIN PIPE DIA. (PERF.)	TREE GRATE QTY. & SIZE
FTIBP0404-6	ALL	4 x 4	4 x 4	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0604-6	N/A CA	6 x 4	6 x 4	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0606-6	ALL	6 x 6	6 x 6	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP06504-6	CA ONLY	6.5 x 4	6.5 x 4	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP078045-6	MID-ATL ONLY	7.83 x 4.5	7.83 x 4.5	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0804-6	N/A MID-ATL	8 x 4	8 x 4	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0806-6	ALL	8 x 6	8 x 6	6" SDR 35	4" SDR 35	(1) 4' x 4'
FTIBP1006-6	ALL	10 x 6	10 x 6	6" SDR 35	6" SDR 35	(1) 4' x 4'
FTIBP1206-6	ALL	12 x 6	12 x 6	6" SDR 35	6" SDR 35	(2) 4' x 4'
FTIBP1307-6	ALL	13 x 7	13 x 7	6" SDR 35	6" SDR 35	(2) 4' x 4'

N/A = NOT AVAILABLE
MAXIMUM TOP TO INVERT OUT = 5'-5"
** MAXIMUM TOP TO INVERT IN = 2'-6"

* INTERNAL PIPING MAY VARY DEPENDING UPON INFLUENT LOCATION.

FTIBP-8" BYPASS INLET/OUTLET PIPE CONFIGURATION
APPROXIMATE MAXIMUM BYPASS = 1.2 CFS

DESIGNATION	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (L x W)	INLET/ OUTLET PIPE DIA.	UNDER-DRAIN PIPE DIA. (PERF.)	TREE GRATE QTY. & SIZE
FTIBP0604-8	N/A CA	6 x 4	6 x 4	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0606-8	ALL	6 x 6	6 x 6	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP06504-8	CA ONLY	6.5 x 4	6.5 x 4	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP078045-8	MID-ATL ONLY	7.83 x 4.5	7.83 x 4.5	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0804-8	N/A MID-ATL	8 x 4	8 x 4	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0806-8	ALL	8 x 6	8 x 6	8" SDR 35	4" SDR 35	(1) 4' x 4'
FTIBP1006-8	ALL	10 x 6	10 x 6	8" SDR 35	6" SDR 35	(1) 4' x 4'
FTIBP1206-8	ALL	12 x 6	12 x 6	8" SDR 35	6" SDR 35	(2) 4' x 4'
FTIBP1307-8	ALL	13 x 7	13 x 7	8" SDR 35	6" SDR 35	(2) 4' x 4'

N/A = NOT AVAILABLE
MAXIMUM TOP TO INVERT OUT = 5'-5"
** MAXIMUM TOP TO INVERT IN = 2'-6"

FTIBP-10" BYPASS INLET/OUTLET PIPE CONFIGURATION
APPROXIMATE MAXIMUM BYPASS = 2.2 CFS

DESIGNATION	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (L x W)	INLET/ OUTLET PIPE DIA.	UNDER-DRAIN PIPE DIA. (PERF.)	TREE GRATE QTY. & SIZE
FTIBP0606-10	ALL	6 x 6	6 x 6	10" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0806-10	ALL	8 x 6	8 x 6	10" SDR 35	4" SDR 35	(1) 4' x 4'
FTIBP1006-10	ALL	10 x 6	10 x 6	10" SDR 35	6" SDR 35	(1) 4' x 4'
FTIBP1206-10	ALL	12 x 6	12 x 6	10" SDR 35	6" SDR 35	(2) 4' x 4'
FTIBP1307-10	ALL	13 x 7	13 x 7	10" SDR 35	6" SDR 35	(2) 4' x 4'

N/A = NOT AVAILABLE
MAXIMUM TOP TO INVERT OUT = 5'-5"
** MAXIMUM TOP TO INVERT IN = 2'-6"

filterra

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

FILTERRA INTERNAL BYPASS PIPE (FTIBP) CONFIGURATION DETAIL

ANTONY K. CHRISTENSEN, RCE 54021 — APRIL 26, 2021 — Date

REGISTERED PROFESSIONAL ENGINEER — Antony K. Christensen — No. 54021 — Exp. 12-31-21 — CIVIL — STATE OF CALIFORNIA

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Revision 5:
Revision 4:
Revision 3:
Revision 2:
Revision 1: 04-26-21 ADDRESS CITY COMMENTS

Project Name:
VILLAS BY THE SEA

Original Date: FEBRUARY 15, 2021

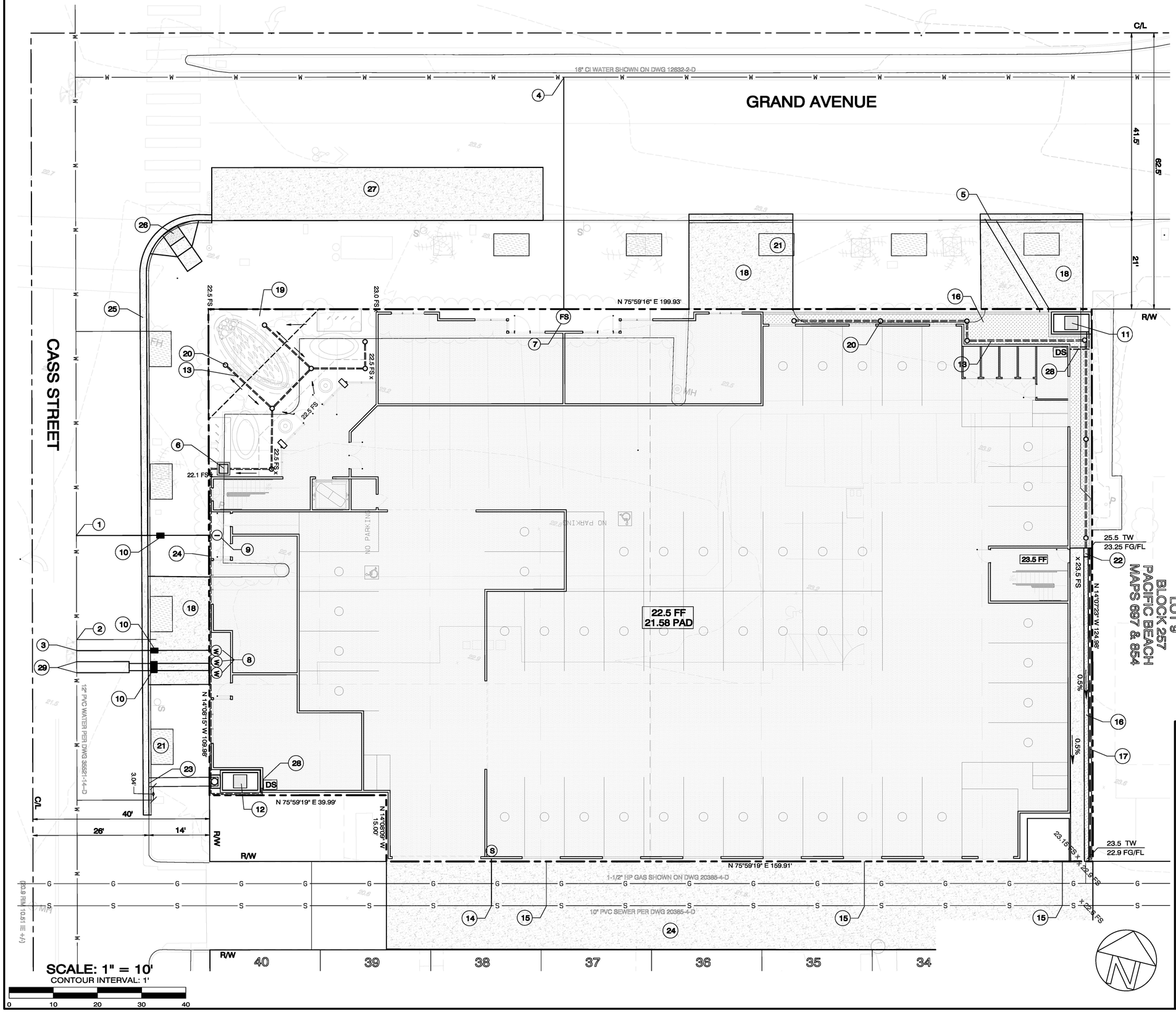
Sheet Title:
PRELIMINARY GRADING PLAN DETAILS AND NOTES

Sheet 4 of 27 Sheets

DEP#

C-1

JN A2020-62



CONSTRUCTION NOTES

1. PROPOSED PUB 1" IRRIGATION SERVICE WITH WATER METER BOX
2. EXISTING PUB 2" WATER SERVICE WITH WATER METER BOX, TO BE KILLED
3. PROPOSED PUB 1" COMMERCIAL WATER SERVICE WITH WATER METER BOX
4. PROPOSED PUB 4" FIRE SERVICE
5. PROPOSED PVT CURB OUTLET Q100 = 0.86 CFS, V100 = 2.9 FPS
6. PROPOSED PVT 2424 CATCH BASIN WITH PUMP CONVEY RUNOFF WESTERLY FILTERRA UNIT
7. PROPOSED PVT FIRE SERVICE BACKFLOW PREVENTER
8. PROPOSED PVT WATER SERVICE BACKFLOW PREVENTER
9. PROPOSED PVT IRRIGATION SERVICE BACKFLOW PREVENTER
10. WATER METER BOX (TYPICAL)
11. PROPOSED PVT 4' X 8' RAISED FILTERRA BIOFILTRATION UNIT (11,415 SF SF OF BUILDING TREATED) IMP-FE
12. PROPOSED PVT 4' X 8' RAISED FILTERRA BIOFILTRATION UNIT (11,670 SF SF OF BUILDING TREATED) IMP-FW
13. PROPOSED PVC DRAIN (TYPICAL)
14. PROPOSED PUB 6" SEWER LATERAL (TYPICAL)
15. EXISTING SEWER LATERAL TO BE ABANDONED AT THE PROPERTY LINE
16. PROPOSED PVT 18" AMENDED SOIL AREA (514 SF). TO RETAIN RUNOFF FROM ROOF (496 SF) (TYPICAL)
17. PROPOSED MASONRY WALL (TYPICAL)
18. REMOVE EXISTING DRIVEWAY, REPLACE WITH 6" CURB GUTTER AND SIDEWALK TO CURRENT CITY OF SAN DIEGO STANDARD. PUBLIC
19. VISIBILITY TRIANGLE AREA (NOTHING GREATER THAN 36" IN HEIGHT ALLOWED IN THIS AREA. (TYPICAL)
20. AREA DRAIN (TYPICAL)
21. AREA OF EXISTING CONCRETE IN R/W TO BE REMOVED AND REPLACED WITH LANDSCAPING/STREET TREES. SEE LANDSCAPE PLAN
22. PLANTER RUNOFF DISCHARGES AT BOTTOM OF PLANTER WALL AND FLOWS IN VEGETATED STRIP (PLANTER AND STRIP CONTAIN 18" OF AMENDED SOIL). DISCHARGE IS ONTO LIGHT CLASS RIP RAP
23. PROPOSED PVT CURB OUTLET Q100 = 0.88 CFS, V100 = 2.9 FPS
24. PROPOSED REPLACEMENT OF CONCRETE ALLEY PAVEMENT PER CURRENT CITY STANDARDS
25. PROPOSED REPLACEMENT OF EXISTING CURB WITH CURB & GUTTER PER CURRENT CITY STANDARD
26. REMOVE AND REPLACE EXISTING CURB RAMP. PROJECT CANNOT REPLACE RAMP WITH TWO RAMPS DUE TO TRAFFIC LIGHT ON SMALL RADIUS CURB RETURN AND DUE TO ALIGNMENT OF CROSSWALKS.
27. PROPOSED CONCRETE BUS PAD PER CURRENT CITY STANDARDS
28. LOCATION OF DISCHARGE FROM ROOF AND DECK DRAINS FROM PART OF BUILDING TO FILTERRA UNIT (TYPICAL). NO OTHER DOWNSPOUTS OR DECK DRAIN DISCHARGES OCCUR.
29. PROPOSED TWO 2" MANIFOLDED WATER SERVICE WITH METER BOX

GRADING DATA

AREA OF SITE - 24,385 S.F. (0.5598 AC)
AREA OF SITE TO BE GRADED - 24,385 SF
PERCENT OF SITE TO BE GRADED - 100%
AMOUNT OF SITE WITH 25% SLOPES OR GREATER: AREA - 0 SF, PERCENT OF TOTAL SITE - 0%.
AMOUNT OF SITE WITH SLOPES THAT ARE SUBJECT TO ESL REGS. (LDC SEC. 143.0110): 0%
AMOUNT OF CUT - 1,160 C.Y.
AMOUNT OF FILL - 0 C.Y.
AMOUNT OF EXPORT - 1,160 C.Y
(VOLUMES ASSUME 5" SLAB AND 2" SAND AND 4" GRAVEL/ROCK BASE)
MAXIMUM HEIGHT OF FILL SLOPE - NONE
MAXIMUM HIEGHT OF CUT SLOPE - NONE
MAXIMUM HEIGHT OF VERTICAL CUT: 3 FEET
MAXIMUM HEIGHT OF VERTICAL FILL: NONE
RETAINING WALL: 70' IN LENGTH; LESS THAN 3' MAX HEIGHT

EXISTING IMPERVIOUS AREA = 23,027 SF, 0.5286 AC (94.4%)
PROPOSED CREATED AND REPLACED IMPERVIOUS AREA = 23,807 SF, 0.5465 AC (97.6%)

ANTONY K. CHRISTENSEN, RCE 54021 — APRIL 26, 2021 Date

REGISTERED PROFESSIONAL ENGINEER — ANTONY K. CHRISTENSEN — No. 54021 Exp. 12-31-21 CIVIL — STATE OF CALIFORNIA

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Revision 5:
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Revision 1: 04-26-21 ADDRESS CITY COMMENTS

Project Name:

VILLAS BY THE SEA

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Sheet Title:

Sheet 5 of 27 Sheets

DEP#

PRELIMINARY GRADING PLAN

C-2

JN A2020-62

Project Name: "Villas by the Sea (1011 Grand Units)"

Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

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

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

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

The site is being modeled as a non-infiltration site based on the Infiltration Feasibility Condition Letter provided by the geotechnical engineer dated . The site impervious areas will be treated by standard Filterra unit. The proprietary soil media infiltration rate permits a lesser impact from the treatment requirements. The site is hydromodification exempt.

(Continue on page 2 as necessary.)

Project Name: "Villas by the Sea (1011 Grand Units)"

Form I-6 Page 2 of 6

(Continued from page 1)

Project Name: "Villas by the Sea (1011 Grand Units)"

Form I-6 Page 3 of 6 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. IMP-FE	
Construction Plan Sheet No. C-1 & C-2	
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	Antony Christensen, RCE 54021 7888 Silverton Ave, Ste J San Diego, CA 92126 - 858-271-9901
Who will be the final owner of this BMP?	1011 Grand Units
Who will maintain this BMP into perpetuity?	Owner
What is the funding mechanism for maintenance?	Private maintenance agreement fees

Form I-6 Page 4 of 6 (Copy as many as needed)
Structural BMP ID No. IMP-FE
Construction Plan Sheet No. C-1 & C-2
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

Water Quality Volume

For Flow Through WQV (runoff to be treated by a Filterra unit)

Q = (0.2 in) * C * A * 1.5

Q = CIA

This runoff coefficient is a weighted average using 0.9 for impermeable surfaces and 0.1 for permeable surfaces. The area conveying runoff to the treatment facilities is as follows:

11,305 sf (0.2596 ac) total area
0 sf (0.0 ac) permeable area
11,305 sf (0.1435 ac) impermeable area

C= ((0.0 * 0.1) + (0.2596* 0.9))/0.2596 = 0.9

A=11,305 sf = 0.2596 ac
I = 0.2 in/hr
C=0.9 for runoff treatment

Q = CIA(1.5)
Q = 0.9*0.2*0.2596*1.5
Q = 0.070 cfs

4’ x 8’ Filterra is capable of treating 0.0741 cfs and so is adequate

Q100 = (0.70) (3.3) (0.2596)
Q100 = 0.60 cfs

Filterra unit with 8” bypass is adequate (capable of conveying 1.2 cfs).

Project Name: "1011 Grand Units"

Form I-6 Page 5 of 6 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. IMP-FW	
Construction Plan Sheet No. C-1 & C-2	
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	Antony Christensen, RCE 54021 7888 Silverton Ave, Ste J San Diego, CA 92126 - 858-271-9901
Who will be the final owner of this BMP?	1011 Grand Units
Who will maintain this BMP into perpetuity?	Owner
What is the funding mechanism for maintenance?	Private maintenance agreement fees

Project Name: "1011 Grand Units"

Form I-6 Page 6 of 6 (Copy as many as needed)
Structural BMP ID No. IMP-FW
Construction Plan Sheet No. C-1 & C-2
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): Water Quality Volume For Flow Through WQV (runoff to be treated by a Filterra unit) Q = (0.2 in) * C * A * 1.5 Q = CIA This runoff coefficient is a weighted average using 0.9 for impermeable surfaces and 0.1 for permeable surfaces. The area conveying runoff to the treatment facilities is as follows: 11,605 sf (0.2664 ac) total area 0 sf (0.0 ac) permeable area 11,605 sf (0.1435 ac) impermeable area C= ((0.0 * 0.1) + (0.2664* 0.9))/0.2664 = 0.9 A=11,605 sf = 0.2664 ac I = 0.2 in/hr C=0.9 for runoff treatment Q = CIA(1.5) Q = 0.9*0.2*0.2664*1.5 Q = 0.072 cfs 4’ x 8’ Filterra is capable of treating 0.0741 cfs and so is adequate Q100 = (0.70) (3.3) (0.2664) Q100 = 0.62 cfs Filterra unit with 8” bypass is adequate (capable of conveying 1.2 cfs).

Project Name: "Villas by the Sea (1011 Grand Units)"

Attachment 1
Backup For PDP Pollutant Control BMPs

This is the cover sheet for Attachment 1.

Project Name: "Villas by the Sea (1011 Grand Units)"

Indicate which Items are Included:

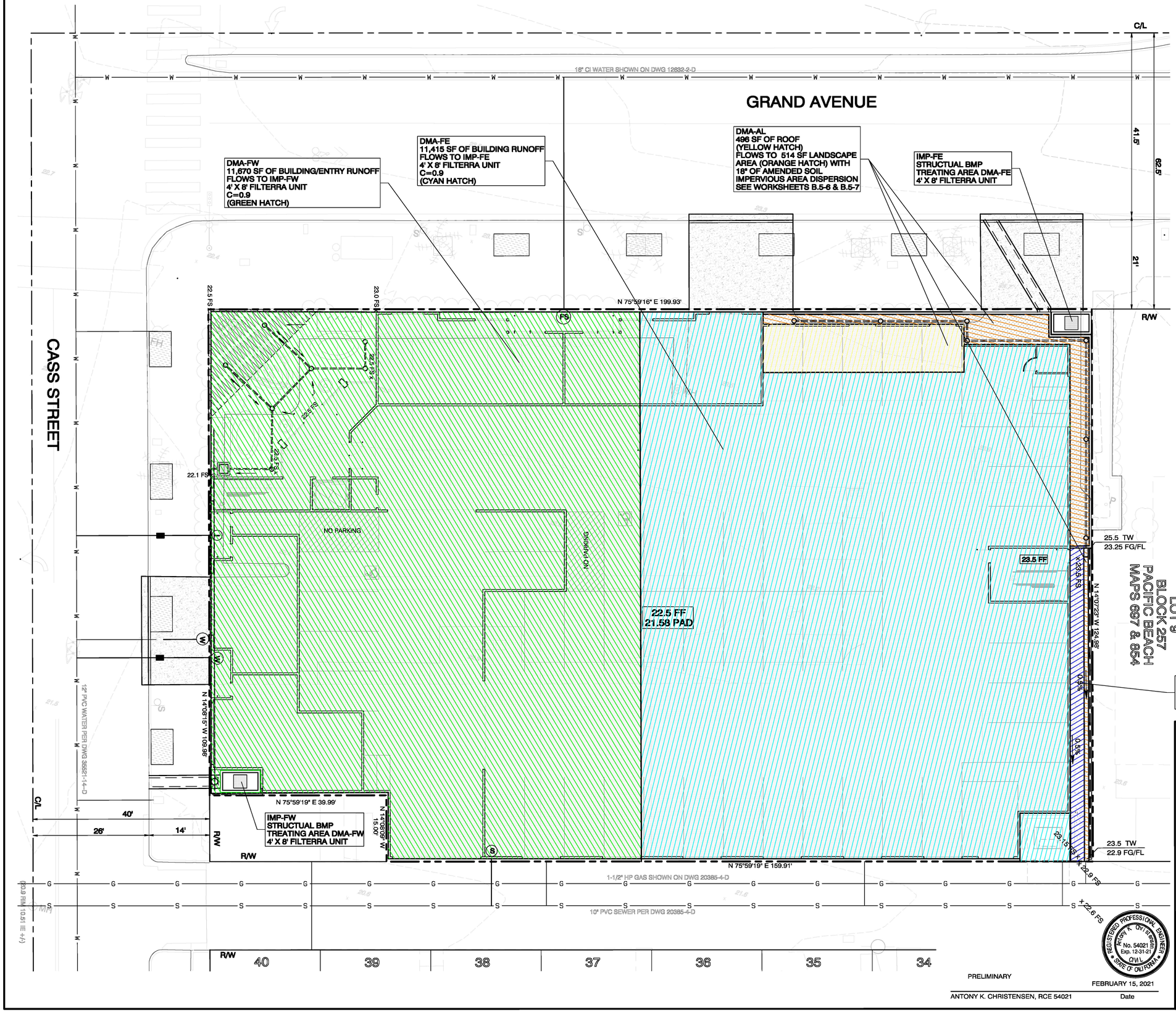
Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☐ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☐ Included on DMA Exhibit in Attachment 1a ☑ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☑ Included ☐ Not included because the entire project will use infiltration BMPs
Attachment 1d	Infiltration Feasibility Information. Contents of Attachment 1d depend on the infiltration condition: • No Infiltration Condition: ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) ○ Form I-8A (optional) ○ Form I-8B (optional) • Partial Infiltration Condition: ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) ○ Form I-8A ○ Form I-8B • Full Infiltration Condition: ○ Form I-8A ○ Form I-8B ○ Worksheet C.4-3 ○ Form I-9 Refer to Appendices C and D of the BMP Design Manual for guidance.	☑ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations	☑ Included

Project Name: "Villas by the Sea (1011 Grand Units)"

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)



DRAINAGE MANAGEMENT AREA EXHIBIT

EXHIBIT CHECKLIST:

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

APPROXIMATE DEPTH TO GROUNDWATER: GREATER THAN 10'

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

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

EXISTING TOPOGRAPHY AND IMPERVIOUS AREAS: TOPOGRAPHY IS SHOWN COMMERCIAL DEVELOPMENT

EXISTING AND PROPOSED SITE DRAINAGE NETWORK AND CONNECTIONS TO DRAINAGE OFFSITE: CURRENTLY DRAINAGE FLOWS WESTERLY TO CASS STREET AND THEN SOUTHERLY. FOLLOWING CONSTRUCTION A PORTION OF SITE RUNOFF WILL FLOW TO GRAND AVENUE AND THEN WESTERLY TO CASS STREET WHERE IT WILL JOIN ADDITIONAL SITE RUNOFF DISCHARGING DIRECTLY TO CASS ST WITH SOME DISCHARGING TO THE ALLEY AND THEN FLOWING TO CASS ST. WITH RUNOFF FLOWING TO THE SAME STREETS.

PROPOSED GRADING: IS SHOWN ON DMA MAP

PROPOSED IMPERVOUS FEATURES: IMPERVIOUS ROOF, DECKS AND SOME HARDSCAPE PAVEMENT

PROPOSED DESIGN FEATURES AND SURFACE TREATMENTS USED TO MINIMIZE IMPERVIOUSNESS: ARE SHOWN AND LANDSCAPING IS USED TO MINIMIZE IMPERVIOUSNESS.

DMA MANAGEMENT AREA BOUNDARIES, NUMBERS, AREAS AND TYPES: SHOWN
POTENTIAL POLLUTANT SOURCE AREAS AND SOURCE CONTROLS:

EXISTING ONSITE STORM DRAIN INLET: NONE
INDOOR DRAINS, GARAGES AND PESTICIDE USE: GARAGE IS SHOWN
NO STORM WATER RUNOFF IS COLLECTED IN GARAGE DRAINS.
LANDSCAPE/OUTSIDE PESTICIDE USE: NOT ANTICIPATED TO BE USED
POOLS, SPAS, PONDS: ARE NOT EMPLOYED
FOOD SERVICE: NOT EMPLOYED
REFUSE AREAS: COVERED REFUSE AREA WILL BE WITHIN GARAGE
INDUSTRIAL PROCESSES: DO NOT OCCUR
OUTDOOR STORAGE OF EQUIPMENT OR MATERIALS: DOES NOT EXIST
VEHICLE CLEANING: DOES NOT EXIST
VEHICLE AND EQUIPMENT REPAIR: DOES NOT EXIST
FUEL DISPENSING AREAS: DO NOT EXIST
LOADING DOCKS: DO NOT EXIST
FIRE SPRINKLER TEST WATER: WILL BE CONVEYED TO SEWER
MISCELLANEOUS DRAIN OR WASH WATER: DOES NOT EXIST
PLAZAS, SIDEWALKS AND PARKING LOTS: DO NOT OCCUR

STRUCTURAL BMP SHOWN AS TO LOCATION, TYPE, SIZE AND DETAIL ARE SHOWN (FILTERRA UNITS)

HYDROMODIFICATION REQUIREMENTS: IS EXEMPT. RUNOFF FLOWS VIA HARDENED CONVEYANCE TO AN EXEMPT WATER BODY (MISSION BAY)

NOTE:

RUNOFF FROM AREAS DRAINING TO IMP-FE IS CONVEYED TO A CURB OUTLET DISCHARGING TO GRAND AVENUE. RUNOFF TO IMP-FW IS CONVEYED TO A CURB OUTLET DISCHARGING TO CASS STREET.

COLORED, HATCHED AREAS SHOWN HEREON REPRESENT THE AREAS OF THE PROJECT THAT DRAIN TO THE REFERENCED IMPS. TO ADDRESS RETENTION REQUIREMENTS ARE MET BY ROOF RUNOFF TO (496 SF) TO LANDSCAPE WITH 18" OF AMENDED SOIL AT THE NORTHERLY AND EASTERLY SIDE OF THE PROPERTY (514 SF).

LEGEND:

TYPICAL DMA - COLOR OF HATCHING REPRESENTS DMA LIMIT - SEE EXHIBIT

4' X 8' FILTERRA UNIT

SCALE: 1" = 10'

CONTOUR INTERVAL: 1'

0 10 20 30 40

PRELIMINARY

FEBRUARY 15, 2021

ANTONY K. CHRISTENSEN, RCE 54021 Date

REGISTERED PROFESSIONAL ENGINEER ANTONY K. CHRISTENSEN No. 54021 Exp. 12-31-21 CIVIL STATE OF CALIFORNIA

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Revision 5:
Revision 4:
Revision 3:
Revision 2:
Revision 1:

Project Name:

1011 GRAND UNITS

Original Date: FEBRUARY 15, 2021

Sheet Title:

DRAINAGE MANAGEMENT AREA EXHIBIT

Sheet 1 of 1 Sheets

DEP#

C-DMA

JN A2020-62

Project Name: "Villas by the Sea (1011 Grand Units)"

Tabular Summary of DMAs								Worksheet B-1	
DMA Unique Identifier	Area (acres)	Impervious Area (acres)	% Imp	HSG	Area Weighted Runoff Coefficient	DCV (cubic feet)	Treated By (BMP ID)	Pollutant Control Type	Drains to (POC ID)
FE	0.2621	0.2621	100	D	0.9	441	IMP-FE	Flow Through	N/A
FW	0.2679	0.2679	100	D	0.9	453	IMP-FW	Flow Through	N/A
AL	0.0232	0.0114	49.1	D	0.49	N/A	Amended Soil	Imp Dispersion	N/A
D	0.0052	0.0052	100	D	0.9	N/A	N/A	Di Minimis	N/A
Summary of DMA Information (Must match project description and SWQMP Narrative)									
No. of DMAs	Total DMA Area (acres)	Total Impervious Area (acres)	% Imp		Area Weighted Runoff Coefficient	Total DCV (cubic feet)	Total Area Treated (acres)		No. of POCs
4	0.5584	0.5466	97.9		0.883	894	0.5532		N/A

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

1011 Grand Units IMP-FE

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=	0.2596	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.90	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	441	cubic-feet

C= ((0.2596*0.9) + (0*0.1))/0.2596 = 0.90

1011 Grand Units IMP-FW

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=	0.2664	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.90	unitless
4	Trees Credit Volume Note: In the SWQMP list the number of trees, size of each tree, amount of soil volume installed for each tree, contributing area to each tree and the inlet opening dimension for each tree.	TCV=	0	cubic-feet
5	Rain barrels Credit Volume Note: In the SWQMP list the number of rain barrels, size of each rain barrel and the use of the captured storm water runoff.	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	453	cubic-feet

C= ((0.2664*0.9) + (0*0.1))/0.2664 = 0.90

Harvest and Use Feasibility Checklist	Worksheet B.3-1 : Form I-7

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

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

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

From Table B.3-3 for Low Plant Water use 390 gal/36hr/Ac
Area of landscaping = 0.0133 Ac
Landscape water demand = 390 x 0.0133 = 5.2 gallon = 0.7 cf

3. Calculate the DCV using worksheet B-2.1.
DCV = 928 (cubic feet)
[Provide a summary of calculations here]

total imp area conveying runoff to Filterras = 22,911 sf
85th percentile depth 0.52 inches , weighted runoff =0.90
22,911*0.52/12*0.90= 894 cf

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

Is harvest and use feasible based on further evaluation?

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

The City of SAN DIEGO	Project Name	1011 Grand Units	
	BMP ID	IMP - FE	
Volume Retention From Amended Soils		Worksheet B.5-7	
1	Impervious area draining to the pervious area	248	sq. ft.
2	Pervious area (must meet the requirements in SD-B and SD-F Fact Sheets)	257	sq. ft.
3	Dispersion Ratio [Line 1/Line 2] Note: This worksheet is not applicable when Line 3 > 50 or Line 3 < 0.25	0.96	
4	Adjusted runoff factor [(Line 1 * 0.9 + Line 2 * 0.1) / (Line 1 + Line 2)]	0.49	
5	85th percentile 24-hour rainfall depth	0.52	inches
6	Design capture volume [(Line 1 + Line 2) x Line 4 x (Line 5/12)]	11	cu. ft.
7	Amendment Depth (Choose from 3", 6", 9", 12", 15" and 18")	18	inches
8	Storage [(porosity – field capacity) + 0.5 * (field capacity – wilting point)]	0.25	in./in.
9	Pervious Storage [Line 2 * (Line 7/12) * Line 8]	96	cu. ft.
10	Fraction of DCV [Line 9 / Line 6]	8.73	
11	Measured Infiltration Rate When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	in/hr.
12	Factor of Safety	2	
13	Reliable Infiltration Rate [Line 11/Line 12]	0	in/hr.
14	Dispersion Credit (Based on Figures B.5.6 to B.5.11; Line 10 and Line 13)	0.450	
15	Volume retention due to amendment [Line 1 * (Line 5/12) * Line 14]	5	cu. ft.

The City of SAN DIEGO	Project Name	1011 Grand Units	
	BMP ID	IMP - FW & FE (SITE RETENTION REQUIREMENT)	
Volume Retention From Amended Soils		**Worksheet B.5-7**	
1	Impervious area draining to the pervious area	496	sq. ft.
2	Pervious area (must meet the requirements in SD-B and SD-F Fact Sheets)	514	sq. ft.
3	Dispersion Ratio [Line 1/Line 2] Note: This worksheet is not applicable when Line 3 > 50 or Line 3 < 0.25	0.96	
4	Adjusted runoff factor [(Line 1 * 0.9 + Line 2 * 0.1) / (Line 1 + Line 2)]	0.49	
5	85th percentile 24-hour rainfall depth	0.52	inches
6	Design capture volume [(Line 1 + Line 2) x Line 4 x (Line 5/12)]	21	cu. ft.
7	Amendment Depth (Choose from 3", 6", 9", 12", 15" and 18")	18	inches
8	Storage [(porosity – field capacity) + 0.5 * (field capacity – wilting point)]	0.25	in./in.
9	Pervious Storage [Line 2 * (Line 7/12) * Line 8]	193	cu. ft.
10	Fraction of DCV [Line 9 / Line 6]	9.19	
11	Measured Infiltration Rate When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	in/hr.
12	Factor of Safety	2	
13	Reliable Infiltration Rate [Line 11/Line 12]	0	in/hr.
14	Dispersion Credit (Based on Figures B.5.6 to B.5.11; Line 10 and Line 13)	0.455	
15	Volume retention due to amendment [Line 1 * (Line 5/12) * Line 14]	10	cu. ft.

The City of SAN DIEGO	Project Name	1011 Grand Units
	BMP ID	IMP - FW & FE (SITE RETENTION REQUIREMENT)

Volume Retention for No Infiltration Condition							Worksheet B.5-6	
1	Area draining to the biofiltration BMP						22085	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)						0.9	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]						19877	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]						596	sq. ft.
5	Biofiltration BMP Footprint						64	sq. ft.
Landscape Area (must be identified on DS-3247)								
		Identification	**1**	**2**	**3**	**4**	**5**	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)		496					
7	Impervious area draining to the landscape area (sq. ft.)		514					
8	Impervious to Pervious Area ratio [Line 7/Line 6]		1.04	0.00	0.00	0.00	0.00	
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		343	0	0	0	0	
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]						343	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]						407	sq. ft.
Volume Retention Performance Standard								
12	Is Line 11 ≥ Line 4?		No, Proceed to Line 13					
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]						0.68	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]						20	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]						6.4	cu. ft.
Site Design BMP								
	Identification	**Site Design Type**					**Credit**	
16	**1**	Amended Soil					10	cu. ft.
	2							cu. ft.
	3							cu. ft.
	4							cu. ft.
	5							cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.						10	cu. ft.
17	Is Line 16 ≥ Line 15?		Volume Retention Performance Standard is Met					

The City of SAN DIEGO	Project Name	1011 Grand Units	
	BMP ID	IMP - FW	
Volume Retention From Amended Soils		Worksheet B.5-7	
1	Impervious area draining to the pervious area	248	sq. ft.
2	Pervious area (must meet the requirements in SD-B and SD-F Fact Sheets)	257	sq. ft.
3	Dispersion Ratio [Line 1/Line 2] Note: This worksheet is not applicable when Line 3 > 50 or Line 3 < 0.25	0.96	
4	Adjusted runoff factor [(Line 1 * 0.9 + Line 2 * 0.1) / (Line 1 + Line 2)]	0.49	
5	85th percentile 24-hour rainfall depth	0.52	inches
6	Design capture volume [(Line 1 + Line 2) x Line 4 x (Line 5/12)]	11	cu. ft.
7	Amendment Depth (Choose from 3", 6", 9", 12", 15" and 18")	18	inches
8	Storage [(porosity – field capacity) + 0.5 * (field capacity – wilting point)]	0.25	in./in.
9	Pervious Storage [Line 2 * (Line 7/12) * Line 8]	96	cu. ft.
10	Fraction of DCV [Line 9 / Line 6]	8.73	
11	Measured Infiltration Rate When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	in/hr.
12	Factor of Safety	2	
13	Reliable Infiltration Rate [Line 11/Line 12]	0	in/hr.
14	Dispersion Credit (Based on Figures B.5.6 to B.5.11; Line 10 and Line 13)	0.450	
15	Volume retention due to amendment [Line 1 * (Line 5/12) * Line 14]	5	cu. ft.

The City of SAN DIEGO	Project Name	1011 Grand Units
	BMP ID	IMP - FW

Volume Retention for No Infiltration Condition							Worksheet B.5-6	
1	Area draining to the biofiltration BMP						11670	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)						0.9	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]						10503	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]						315	sq. ft.
5	Biofiltration BMP Footprint						32	sq. ft.
Landscape Area (must be identified on DS-3247)								
		Identification	**1**	**2**	**3**	**4**	**5**	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)		248					
7	Impervious area draining to the landscape area (sq. ft.)		257					
8	Impervious to Pervious Area ratio [Line 7/Line 6]		1.04	0.00	0.00	0.00	0.00	
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		171	0	0	0	0	
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]						171	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]						203	sq. ft.
Volume Retention Performance Standard								
12	Is Line 11 ≥ Line 4?		No, Proceed to Line 13					
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]						0.64	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]						10	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]						3.6	cu. ft.
Site Design BMP								
	Identification	**Site Design Type**					**Credit**	
16	**1**	Amended Soil					5	cu. ft.
	2							cu. ft.
	3							cu. ft.
	4							cu. ft.
	5							cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.						5	cu. ft.
17	Is Line 16 ≥ Line 15?		Volume Retention Performance Standard is Met					

The City of SAN DIEGO	Project Name	1011 Grand Units	
	BMP ID	IMP - FW	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	11670	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.9	
3	85th percentile 24-hour rainfall depth	0.52	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	455	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	10	cu. ft.

The City of SAN DIEGO	Project Name	1011 Grand Units	
	BMP ID	IMP - FW & FE (SITE RETENTION REQUIREMENT)	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	22085	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.9	
3	85th percentile 24-hour rainfall depth	0.52	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	861	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	20	cu. ft.

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

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	441	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow-thru}$	441	cubic-feet
5	Adjustment factor (Line 4 / Line 1)	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr.
7	Area tributary to BMP (s)	A=	0.2621	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.047	cfs

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

The FE MWS unit is capable of treating 0.0741 cfs and is required to treat 0.047 cfs and so is adequate.

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

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	453	cubic-feet
2	DCV retained	$DCV_{retained}$	0	cubic-feet
3	DCV biofiltered	$DCV_{biofiltered}$	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	$DCV_{flow-thru}$	453	cubic-feet
5	Adjustment factor (Line 4 / Line 1)	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr.
7	Area tributary to BMP (s)	A=	0.2679	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.048	cfs

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

The FW MWS unit is capable of treating 0.0741 cfs and is required to treat 0.048 cfs and so is adequate.

TerraPacific
CONSULTANTS INC

Mr. Mike Turk
KDTD, Inc.
4641 Ingraham Street
San Diego, CA 92109

March 9, 2021
File No. 20-142

Subject: **Infiltration Feasibility Condition Letter**
Grand Avenue Units
1011 Grand Avenue
San Diego, California

References:
1) "Geotechnical Investigation, Grand Avenue Units, 1011 Grand Avenue, San Diego, California," by TerraPacific Consultants, Inc., dated August 26, 2020.
2) "Storm Water Standards," by City of San Diego, dated October 2018.
3) "Floor Plans, Grand Avenue Units, San Diego, California," by Golba Architecture.

Dear Mr. Turk:

The following updated letter provides our opinions regarding site infiltration for the proposed development at the subject project. For simplicity, we are addressing each bullet item as indicated in Section C.1.1, in the October 2018 edition of the City of San Diego Storm Water Standards BMP Design Manual.

- Our firm conducted a preliminary geotechnical investigation during the initial design phase of the project; the report is referenced above.
- The geotechnical investigation revealed site topography that is essentially flat. Site stratigraphy consists of undocumented fill soil mantling the site. Native paralic deposits underlie the surficial soils. Based on the site-specific exploration, incluiding numerous borings, existing undocumented fill soils in excess of 5 feet in thickness were encountered.
- The site is currently developed with structures and other appurtenances; undocumented fill soils from the initial site development blanket the site.
- The current design footprint is consistent with the initial concept design due to the limited lot size and dimensions. The proposed development will consist of multi-family structures over an on-grade parking garage and commercial units that will utilize the entire lot.

- The physical impairment associated with the limited lot size and proposed improvement footprint prevents full/partial infiltration.

- The existing site configuration consists of undocumented fill soils blanketing the site. Undocumented fill soils with thicknesses in excess of 5 feet were encountered during our site-specific investigation, including numerous borings. These soils are not considered suitable for support of the proposed improvements (structures and appurtenances). As is always the case, infiltration can induce soil settlement and volume change that would adversely impact the proposed improvements, which utilize the entire lot footprint.

- The referenced floor plan was utilized as a base map for the Geotechnical Plan, Figure 1, attached to this letter.

- Based on our referenced site-specific geotechnical investigation, infiltration is not considered feasible from a geotechnical standpoint due to the negative impacts on proposed improvements (structures and appurtenances) that would result from infiltration and associated soil volume changes.

- The Geotechnical Plan, Figure 1, depicts the site design and is provided in the attachment within this letter.

We appreciate the opportunity to be of service. If you have any questions, please do not hesitate to call.

Respectfully submitted,

TerraPacific Consultants, Inc.

Digitally signed by Cristopher O'Hern
Date: 2021.04.23 16:10:00 -07'00'

Cristopher C. O'Hern, CEG 2397
Senior Engineering Geologist

REGISTERED PROFESSIONAL GEOLOGIST
CRISTOPHER C. O'HERN
No. 2397
EXP. 10/31/21
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Digitally signed by Octavio Brambila
Date: 2021.04.23 16:10:19 -07'00'

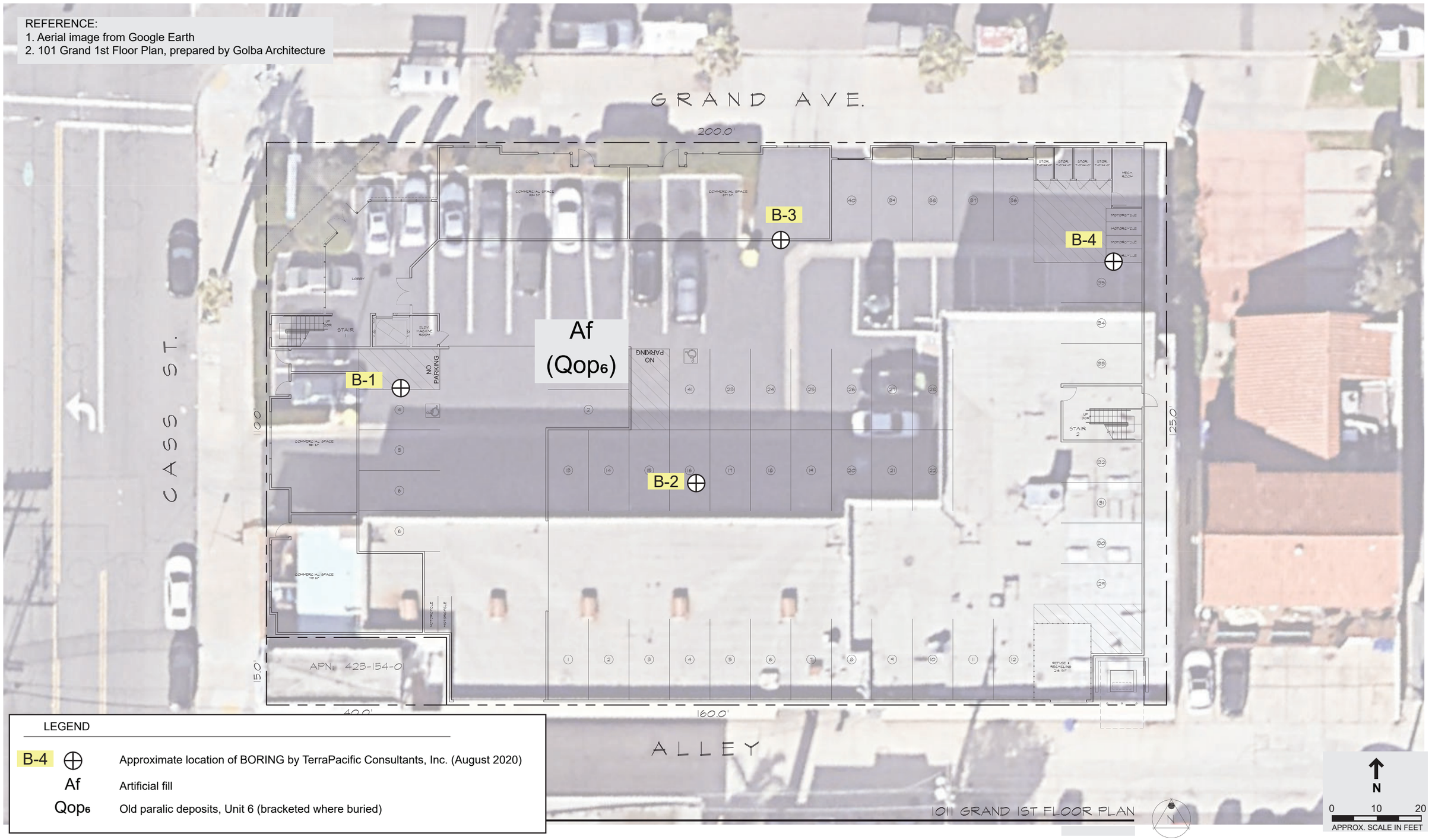
Octavio Brambila, PE 70633
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
OCTAVIO BRAMBILA
C 70633
EXP. 06/30/21
CIVIL
STATE OF CALIFORNIA

ATTACHMENT

Geotechnical Plan

REFERENCE:
1. Aerial image from Google Earth
2. 101 Grand 1st Floor Plan, prepared by Golba Architecture



LEGEND

B-4	⊕	Approximate location of BORING by TerraPacific Consultants, Inc. (August 2020)
Af		Artificial fill
Qop_6		Old paralic deposits, Unit 6 (bracketed where buried)

TerraPacific CONSULTANTS INC
4010 Morena Boulevard
Suite 108
San Diego CA 92117
858-521-1190

Geotechnical Plan

Grand Avenue Units

File No. 20-142
September 2020

Figure 2

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

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

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

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

Section 1: Biofiltration Criteria Checklist (Appendix F)

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

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

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

Provide basis for Criteria 1 and 3:

Feasibility Analysis:

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

If Partial Infiltration Condition:

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

If No Infiltration Condition:

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

Please see Worksheet B.5-2 B.5-6 for both IMP-FE and IMP-FW and for combined FE and FW retention requirements. The retention requirement is met in DMA-AL. Sean Torres had agreed that a separate DMA may be used to address retention requirements and that it is not required to be so satisfied with the same DMA as the IMP is contained in.

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

Provide basis for Criteria 2:

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

See TAPE attached certification for MWS unit

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

Provide basis for Criteria 4:

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

See TAPE attached certification for MWS unit

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

Provide basis for Criteria 5:

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

See TAPE attached certification for MWS unit as well as its description

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

Provide basis for Criteria 6:

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

SDHM printout indicating the MWS unit exceeds the numeric criteria.

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

Provide basis for Criteria 7:

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

See TAPE attached certification for MWS unit. The maintenance of the MWS Unit will be in accordance with the manufacturer Operation and Maintenance Manual (attached).

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

WASHINGTON STATE DEPARTMENT OF ECOLOGY

September 2019

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS), ENHANCED, PHOSPHORUS & OIL TREATMENT

For

CONTECH Engineered Solutions Filterra®

Ecology's Decision:

Based on Contech's submissions, including the Final Technical Evaluation Reports, dated August 2019, March 2014, December 2009, and additional information provided to Ecology dated October 9, 2009, Ecology hereby issues the following use level designations:

1. A General Use Level Designation for Basic, Enhanced, Phosphorus, and Oil Treatment for the Filterra® system constructed with a minimum media thickness of 21 inches (1.75 feet), at the following water quality design hydraulic loading rates:

Treatment	Infiltration Rate (in/hr) for use in Sizing
Basic	175
Phosphorus	100
Oil	50
Enhanced	175

2. The Filterra is not appropriate for oil spill-control purposes.
3. Ecology approves Filterra systems for treatment at the hydraulic loading rates listed above, to achieve the maximum water quality design flow rate. Calculate the water quality design flow rates using the following procedures:

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

4. This General Use Level Designation has no expiration date, but Ecology may revoke or amend the designation, and is subject to the conditions specified below.

Ecology's Conditions of Use:

Filterra systems shall comply with these conditions shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the Filterra systems in accordance with applicable Contech Filterra manuals and this Ecology Decision.
2. The minimum size filter surface-area for use in Washington is determined by using the design water quality flow rate (as determined in this Ecology Decision, Item 3, above) and the Infiltration Rate from the table above (use the lowest applicable Infiltration Rate depending on the level of treatment required). Calculate the required area by dividing the water quality design flow rate (cu-ft/sec) by the Infiltration Rate (converted to ft/sec) to obtain required surface area (sq-ft) of the Filterra unit.
3. Each site plan must undergo Contech Filterra review before Ecology can approve the unit for site installation. This will ensure that design parameters including site grading and slope are appropriate for use of a Filterra unit.
4. Filterra media shall conform to the specifications submitted to and approved by Ecology and shall be sourced from Contech Engineered Solutions, LLC with no substitutions.
5. Maintenance includes removing trash, degraded mulch, and accumulated debris from the filter surface and replacing the mulch layer. Use inspections to determine the site-specific maintenance schedules and requirements. Follow maintenance procedures given in the most recent version of the Filterra Operation and Maintenance Manual.
6. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured treatment device.

    - Contech designs Filterra systems for a target maintenance interval of 6 months in the Pacific Northwest. Maintenance includes removing and replacing the mulch layer above the media along with accumulated sediment, trash, and captured organic materials therein, evaluating plant health, and pruning the plant if deemed necessary.
    - Conduct maintenance following manufacturer's guidelines.

7. Filterra systems come in standard sizes.

8. Install the Filterra in such a manner that flows exceeding the maximum Filterra operating rate are conveyed around the Filterra mulch and media and will not resuspend captured sediment.
9. Discharges from the Filterra units shall not cause or contribute to water quality standards violations in receiving waters.

Approved Alternate Configurations

Filterra Internal Bypass - Pipe (FTIB-P)

1. The Filterra® Internal Bypass – Pipe allows for piped-in flow from area drains, grated inlets, trench drains, and/or roof drains. Design capture flows and peak flows enter the structure through an internal slotted pipe. Filterra® inverted the slotted pipe to allow design flows to drop through to a series of splash plates that then disperse the design flows over the top surface of the Filterra® planter area. Higher flows continue to bypass the slotted pipe and convey out the structure.
2. To select a FTIB-P unit, the designer must determine the size of the standard unit using the sizing guidance described above.

Filterra Internal Bypass – Curb (FTIB-C)

1. The Filterra® Internal Bypass –Curb model (FTIB-C) incorporates a curb inlet, biofiltration treatment chamber, and internal high flow bypass in one single structure. Filterra® designed the FTIB-C model for use in a "Sag" or "Sump" condition and will accept flows from both directions along a gutter line. An internal flume tray weir component directs treatment flows entering the unit through the curb inlet to the biofiltration treatment chamber. Flows in excess of the water quality treatment flow rise above the flume tray weir and discharge through a standpipe orifice; providing bypass of untreated peak flows. Americast manufactures the FTIB-C model in a variety of sizes and configurations and you may use the unit on a continuous grade when a single structure providing both treatment and high flow bypass is preferred. The FTIB-C model can also incorporate a separate junction box chamber to allow larger diameter discharge pipe connections to the structure.
2. To select a FTIB-C unit, the designer must determine the size of the standard unit using the sizing guidance described above.

Filterra® Shallow

1. The Filterra Shallow provides additional flexibility for design engineers and designers in situations where various elevation constraints prevent application of a standard Filterra configuration. Engineers can design this system up to six inches shallower than any of the previous Filterra unit configurations noted above.
2. Ecology requires that the Filterra Shallow provide a media contact time equivalent to that of the standard unit. This means that with a smaller depth of media, the surface area must increase.
3. To select a Filterra Shallow System unit, the designer must first identify the size of the standard unit using the modeling guidance described above.
4. Once the size of the standard Filterra unit is established using the sizing technique described above, use information from the following table to select the appropriate size Filterra Shallow System unit.

Shallow Unit Basic, Enhanced, and Oil Treatment Sizing

Standard Depth	Equivalent Shallow Depth
4x4	4x6 or 6x4
4x6 or 6x4	6x6
4x8 or 8x4	6x8 or 8x6
6x6	6x10 or 10x6
6x8 or 8x6	6x12 or 12x6
6x10 or 10x6	13x7

Notes:
1. Shallow Depth Boxes are less than the standard depth of 3.5 feet but no less than 3.0 feet deep (TC to INV).

Applicant: Contech Engineered Solutions, LLC.

Applicant's Address: 11815 NE Glenn Widing Drive
Portland, OR 97220

Application Documents:

- State of Washington Department of Ecology Application for Conditional Use Designation, Americast (September 2006)
- Quality Assurance Project Plan Filterra® Bioretention Filtration System Performance Monitoring, Americast (April 2008)
- Quality Assurance Project Plan Addendum Filterra® Bioretention Filtration System Performance Monitoring, Americast (June 2008)
- Draft Technical Evaluation Report Filterra® Bioretention Filtration System Performance Monitoring, Americast (August 2009)
- Final Technical Evaluation Report Filterra® Bioretention Filtration System Performance Monitoring, Americast (December 2009)
- Technical Evaluation Report Appendices Filterra® Bioretention Filtration System Performance Monitoring, Americast, (August 2009)
- Memorandum to Department of Ecology Dated October 9, 2009 from Americast, Inc. and Herrera Environmental Consultants
- Quality Assurance Project Plan Filterra® Bioretention System Phosphorus treatment and Supplemental Basic and Enhanced Treatment Performance Monitoring, Americast (November 2011)
- Filterra® letter August 24, 2012 regarding sizing for the Filterra® Shallow System.
- University of Virginia Engineering Department Memo by Joanna Crowe Curran, Ph. D dated March 16, 2013 concerning capacity analysis of Filterra® internal weir inlet tray.
- Terraphase Engineering letter to Jodi Mills, P.E. dated April 2, 2013 regarding Terraflume Hydraulic Test, Filterra® Bioretention System and attachments.
- Technical Evaluation Report, Filterra® System Phosphorus Treatment and Supplemental Basic Treatment Performance Monitoring. March 27th, 2014.
- State of Washington Department of Ecology Application for Conditional Use Level Designation, Contech Engineered Solutions (May 2015)

- Quality Assurance Project Plan Filterra® Bioretention System, Contech Engineered Solutions (May 2015)
- Filterra Bioretention System Armco Avenue General Use Level Designation Technical Evaluation Report, Contech Engineered Solutions (August 2019)

Applicant's Use Level Request:

General Level Use Designation for Basic (175 in/hr), Enhanced (175 in/hr), Phosphorus (100 in/hr), and Oil Treatment (50 in/hr).

Applicant's Performance Claims:

Field-testing and laboratory testing show that the Filterra® unit is promising as a stormwater treatment best management practice and can meet Ecology's performance goals for basic, enhanced, phosphorus, and oil treatment.

Findings of Fact:

Field Testing 2015-2019

1. Contech completed field testing of a 4 ft. x 4 ft. Filterra® unit at one site in Hillsboro, Oregon from September 2015 to July 2019. Throughout the monitoring period a total of 24 individual storm events were sampled, of which 23 qualified for TAPE sampling criteria.
2. Contech encountered several unanticipated events and challenges that prevented them from collecting continuous flow and rainfall data. An analysis of the flow data from the sampled events, including both the qualifying and non-qualifying events, demonstrated the system treated over 99 % of the influent flows. Peak flows during these events ranged from 25 % to 250 % of the design flow rate of 29 gallons per minute.
3. Of the 23 TAPE qualified sample events, 13 met requirements for TSS analysis. Influent concentrations ranged from 20.8 mg/L to 83 mg/L, with a mean concentration of 46.3 mg/L. The UCL95 mean effluent concentration was 15.9 mg/L, meeting the 20 mg/L performance goal for Basic Treatment.
4. All 23 TAPE qualified sample events met requirements for dissolved zinc analysis. Influent concentrations range from 0.0384 mg/L to 0.2680 mg/L, with a mean concentration of 0.0807 mg/L. The LCL 95 mean percent removal was 62.9 %, meeting the 60 % performance goal for Enhanced Treatment.
5. Thirteen of the 23 TAPE qualified sample events met requirements for dissolved copper analysis. Influent concentrations ranged from 0.00543 mg/L to 0.01660 mg/L, with a mean concentration of 0.0103 mg/L. The LCL 95 mean percent removal was 41.2 %, meeting the 30 % performance goal for Enhanced Treatment.
6. Total zinc concentrations were analyzed for all 24 sample events. Influent EMCs for total zinc ranged from 0.048 mg/L to 5.290 mg/L with a median of 0.162 mg/L. Corresponding effluent EMCs for total zinc ranged from 0.015 mg/L to 0.067 mg/L with a median of

0.029 mg/L. Total event loadings for the study for total zinc were 316.85 g at the influent and 12.92 g at the effluent sampling location, resulting in a summation of loads removal efficiency of 95.9 %.

7. Total copper concentrations were analyzed for all 24 sample events. Influent EMCs for total copper ranged from 0.003 mg/L to 35.600 mg/L with a median value of 0.043 mg/L. Corresponding effluent EMCs for total copper ranged from 0.002 mg/L to 0.015 mg/L with a median of 0.004 mg/L. Total event loadings for total copper for the study were 1,810.06 g at the influent and 1.90 g at the effluent sampling location, resulting in a summation of loads removal efficiency of 99.9 %.

Field Testing 2013

1. Filterra completed field-testing of a 6.5 ft x 4 ft. unit at one site in Bellingham, Washington. Continuous flow and rainfall data collected from January 1, 2013 through July 23, 2013 indicated that 59 storm events occurred. Water quality data was obtained from 22 storm events. Not all the sampled storms produced information that met TAPE criteria for storm and/or water quality data.
2. The system treated 98.9 % of the total 8-month runoff volume during the testing period. Consequently, the system achieved the goal of treating 91 % of the volume from the site. Stormwater runoff bypassed Filterra treatment during four of the 59 storm events.
3. Of the 22 sampled events, 18 qualified for TSS analysis (influent TSS concentrations ranged from 25 to 138 mg/L). The data were segregated into sample pairs with influent concentration greater than and less than 100 mg/L. The UCL95 mean effluent concentration for the data with influent less than 100 mg/L was 5.2 mg/L, below the 20-mg/L threshold. Although the TAPE guidelines do not require an evaluation of TSS removal efficiency for influent concentrations below 100 mg/L, the mean TSS removal for these samples was 90.1 %. Average removal of influent TSS concentrations greater than 100 mg/L (three events) was 85 %. In addition, the system consistently exhibited TSS removal greater than 80 % at flow rates equivalent to a 100 in/hr infiltration rate and was observed at 150 in/hr.
4. Ten of the 22 sampled events qualified for TP analysis. Americast augmented the dataset using two sample pairs from previous monitoring at the site. Influent TP concentrations ranged from 0.11 to 0.52 mg/L. The mean TP removal for these twelve events was 72.6 %. The LCL95 mean percent removal was 66.0, well above the TAPE requirement of 50 %. Treatment above 50 % was evident at 100 in/hr infiltration rate and as high as 150 in/hr. Consequently, the Filterra test system met the TAPE Phosphorus Treatment goal at 100 in/hr. Influent ortho-P concentrations ranged from 0.005 to 0.012 mg/L; effluent ortho-P concentrations ranged from 0.005 to 0.013 mg/L. The reporting limit/resolution for the ortho-P test method is 0.01 mg/L, therefore the influent and effluent ortho-P concentrations were both at and near non-detect concentrations.

Field Testing 2008-2009

1. Filterra completed field-testing at two sites at the Port of Tacoma. Continuous flow and rainfall data collected during the 2008-2009 monitoring period indicated that 89 storm events occurred. The monitoring obtained water quality data from 27 storm events. Not all the sampled storms produced information that met TAPE criteria for storm and/or water quality data.
2. During the testing at the Port of Tacoma, 98.96 to 99.89 % of the annual influent runoff volume passed through the POT1 and POT2 test systems respectively. Stormwater runoff bypassed the POT1 test system during nine storm events and bypassed the POT2 test system during one storm event. Bypass volumes ranged from 0.13 % to 15.3% of the influent storm volume. Both test systems achieved the 91 % water quality treatment-goal over the 1-year monitoring period.
3. Consultants observed infiltration rates as high as 133 in/hr during the various storms. Filterra did not provide any paired data that identified percent removal of TSS, metals, oil, or phosphorus at an instantaneous observed flow rate.
4. The maximum storm average hydraulic loading rate associated with water quality data is <40 in/hr, with the majority of flow rates < 25 in/hr. The average instantaneous hydraulic loading rate ranged from 8.6 to 53 in/hr.
5. The field data showed a removal rate greater than 80 % for TSS with an influent concentration greater than 20 mg/L at an average instantaneous hydraulic loading rate up to 53 in/hr (average influent concentration of 28.8 mg/L, average effluent concentration of 4.3 mg/L).
6. The field data showed a removal rate generally greater than 54 % for dissolved zinc at an average instantaneous hydraulic loading rate up to 60 in/hr and an average influent concentration of 0.266 mg/L (average effluent concentration of 0.115 mg/L).
7. The field data showed a removal rate generally greater than 40 % for dissolved copper at an average instantaneous hydraulic loading rate up to 35 in/hr and an average influent concentration of 0.0070 mg/L (average effluent concentration of 0.0036 mg/L).
8. The field data showed an average removal rate of 93 % for total petroleum hydrocarbon (TPH) at an average instantaneous hydraulic loading rate up to 53 in/hr and an average influent concentration of 52 mg/L (average effluent concentration of 2.3 mg/L). The data also shows achievement of less than 15 mg/L TPH for grab samples. Filterra provided limited visible sheen data due to access limitations at the outlet monitoring location.
9. The field data showed low percentage removals of total phosphorus at all storm flows at an average influent concentration of 0.189 mg/L (average effluent concentration of 0.171 mg/L). We may relate the relatively poor treatment performance of the Filterra system at this location to influent characteristics for total phosphorus that are unique to the Port of Tacoma site. It appears that the Filterra system will not meet the 50 % removal performance goal when the majority of phosphorus in the runoff is expected to be in the dissolved form.

Laboratory Testing

1. Filterra performed laboratory testing on a scaled down version of the Filterra unit. The lab data showed an average removal from 83-91 % for TSS with influents ranging from 21 to 320 mg/L, 82-84 % for total copper with influents ranging from 0.94 to 2.3 mg/L, and 50-61 % for orthophosphate with influents ranging from 2.46 to 14.37 mg/L.
2. Filterra conducted permeability tests on the soil media.
3. Lab scale testing using Sil-Co-Sil 106 showed removals ranging from 70.1 % to 95.5 % with a median removal of 90.7 %, for influent concentrations ranging from 8.3 to 260 mg/L. Filterra ran these laboratory tests at an infiltration rate of 50 in/hr.
4. Supplemental lab testing conducted in September 2009 using Sil-Co-Sil 106 showed an average removal of 90.6 %. These laboratory tests were run at infiltration rates ranging from 25 to 150 in/hr for influent concentrations ranging from 41.6 to 252.5 mg/L. Regression analysis results indicate that the Filterra system's TSS removal performance is independent of influent concentration in the concentration rage evaluated at hydraulic loading rates of up to 150 in/hr.

Contact Information:

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

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Department of Ecology
Water Quality Program
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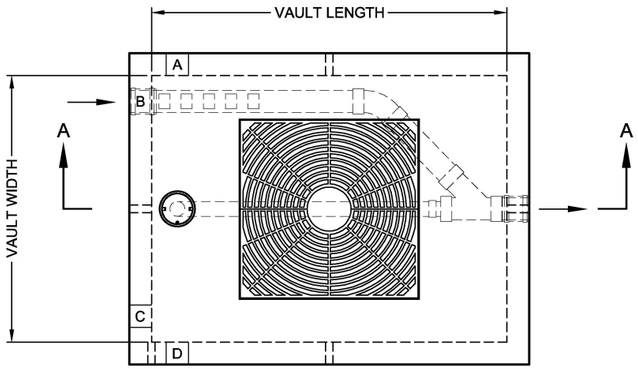
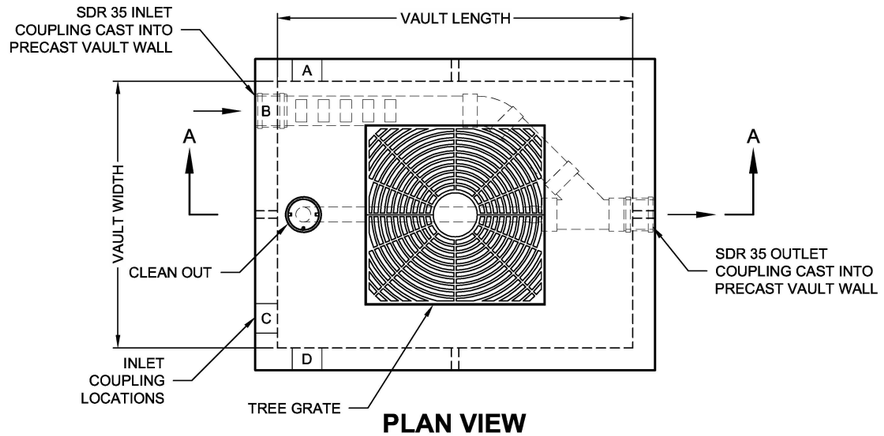
Date	**Revision**
December 2009	GULD for Basic, Enhanced, and Oil granted, CULD for Phosphorus
September 2011	Extended CULD for Phosphorus Treatment
September 2012	Revised design storm discussion, added Shallow System.
January 2013	Revised format to match Ecology standards, changed Filterra contact information
February 2013	Added FTIB-P system
March 2013	Added FTIB-C system
April 2013	Modified requirements for identifying appropriate size of unit

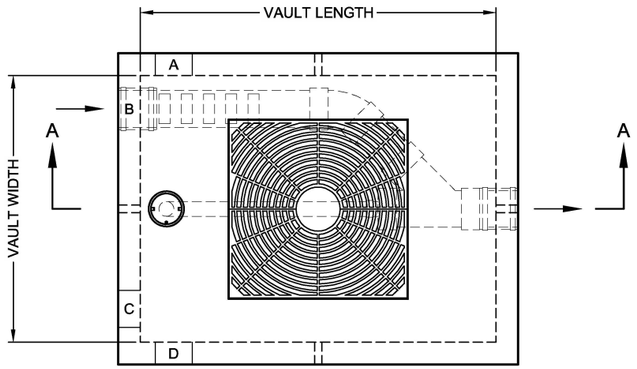
June 2013	Modified description of FTIB-C alternate configuration
March 2014	GULD awarded for Phosphorus Treatment. GULD updated for a higher flow-rate for Basic Treatment.
June 2014	Revised sizing calculation methods
March 2015	Revised Contact Information
June 2015	CULD for Basic and Enhanced at 100 in/hr infiltration rate
September 2019	GULD for Basic and Enhanced at 175 in/hr infiltration rate



PLAN VIEW



PLAN VIEW



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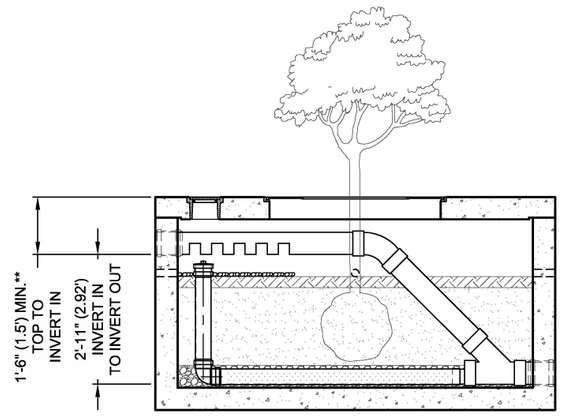
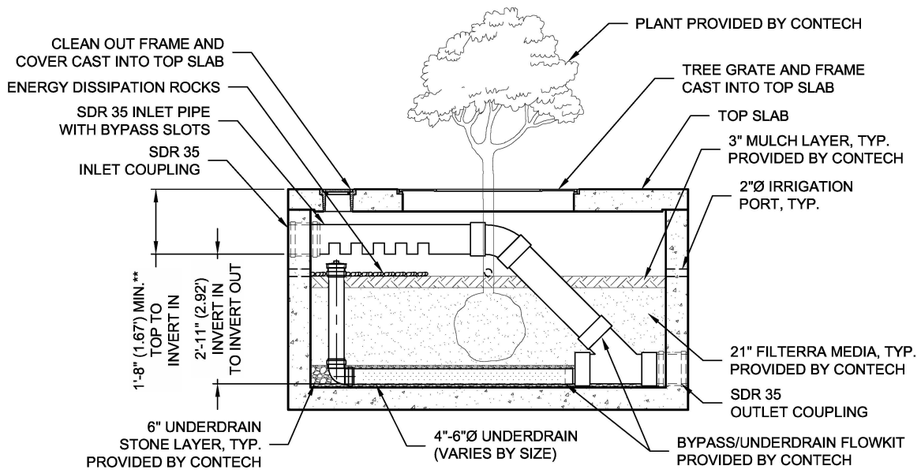
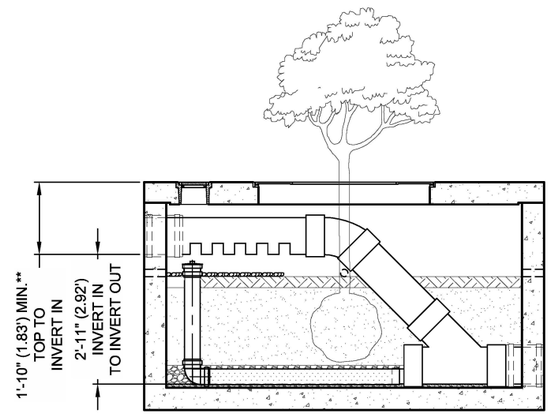


SECTION A-A



SECTION A-A



SECTION A-A

FTIBP-6" BYPASS INLET/OUTLET PIPE CONFIGURATION

APPROXIMATE MAXIMUM BYPASS = 0.6 CFS

DESIGNATION	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (L x W)	INLET/ OUTLET PIPE DIA.	UNDER-DRAIN PIPE DIA. (PERF.)	TREE GRATE QTY. & SIZE
FTIBP0404-6	ALL	4 x 4	4 x 4	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0604-6	N/A CA	6 x 4	6 x 4	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0606-6	ALL	6 x 6	6 x 6	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP06504-6	CA ONLY	6.5 x 4	6.5 x 4	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP078045-6	MID-ATL ONLY	7.83 x 4.5	7.83 x 4.5	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0804-6	N/A MID-ATL	8 x 4	8 x 4	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0806-6	ALL	8 x 6	8 x 6	6" SDR 35	4" SDR 35	(1) 4' x 4'
FTIBP1006-6	ALL	10 x 6	10 x 6	6" SDR 35	6" SDR 35	(1) 4' x 4'
FTIBP1206-6	ALL	12 x 6	12 x 6	6" SDR 35	6" SDR 35	(2) 4' x 4'
FTIBP1307-6	ALL	13 x 7	13 x 7	6" SDR 35	6" SDR 35	(2) 4' x 4'

N/A = NOT AVAILABLE

MAXIMUM TOP TO INVERT OUT = 5'-5"

** MAXIMUM TOP TO INVERT IN = 2'-6"

FTIBP-8" BYPASS INLET/OUTLET PIPE CONFIGURATION

APPROXIMATE MAXIMUM BYPASS = 1.2 CFS

DESIGNATION	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (L x W)	INLET/ OUTLET PIPE DIA.	UNDER-DRAIN PIPE DIA. (PERF.)	TREE GRATE QTY. & SIZE
FTIBP0604-8	N/A CA	6 x 4	6 x 4	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0606-8	ALL	6 x 6	6 x 6	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP06504-8	CA ONLY	6.5 x 4	6.5 x 4	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP078045-8	MID-ATL ONLY	7.83 x 4.5	7.83 x 4.5	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0804-8	N/A MID-ATL	8 x 4	8 x 4	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0806-8	ALL	8 x 6	8 x 6	8" SDR 35	4" SDR 35	(1) 4' x 4'
FTIBP1006-8	ALL	10 x 6	10 x 6	8" SDR 35	6" SDR 35	(1) 4' x 4'
FTIBP1206-8	ALL	12 x 6	12 x 6	8" SDR 35	6" SDR 35	(2) 4' x 4'
FTIBP1307-8	ALL	13 x 7	13 x 7	8" SDR 35	6" SDR 35	(2) 4' x 4'

N/A = NOT AVAILABLE

MAXIMUM TOP TO INVERT OUT = 5'-5"

** MAXIMUM TOP TO INVERT IN = 2'-6"

FTIBP-10" BYPASS INLET/OUTLET PIPE CONFIGURATION

APPROXIMATE MAXIMUM BYPASS = 2.2 CFS

DESIGNATION	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (L x W)	INLET/ OUTLET PIPE DIA.	UNDER-DRAIN PIPE DIA. (PERF.)	TREE GRATE QTY. & SIZE
FTIBP0606-10	ALL	6 x 6	6 x 6	10" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0806-10	ALL	8 x 6	8 x 6	10" SDR 35	4" SDR 35	(1) 4' x 4'
FTIBP1006-10	ALL	10 x 6	10 x 6	10" SDR 35	6" SDR 35	(1) 4' x 4'
FTIBP1206-10	ALL	12 x 6	12 x 6	10" SDR 35	6" SDR 35	(2) 4' x 4'
FTIBP1307-10	ALL	13 x 7	13 x 7	10" SDR 35	6" SDR 35	(2) 4' x 4'

N/A = NOT AVAILABLE

MAXIMUM TOP TO INVERT OUT = 5'-5"

** MAXIMUM TOP TO INVERT IN = 2'-6"

* INTERNAL PIPING MAY VARY DEPENDING UPON INFLUENT LOCATION.

filterra®

CONTECH®
ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

FILTERRA INTERNAL BYPASS PIPE (FTIBP) CONFIGURATION DETAIL

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

Filterra Infiltration Rate = 100 (in/hr)
Filterra Flow per Square Foot = 0.00231 (ft3/sec/ft2)

Filterra Flow Rate, Q = 0.00231 ft3/sec x Filterra Surface Area
Rational Method, Q = C x I x A
San Diego Multiplier, M = 1.5

Site Flowrate, Q = (C x DI x DA x M x 43560) / (12 x3600)
OR DA = (12 x 3600 x Q) / (C x 43560 x DI x M)

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

			DI 0.2	C 0.95	C 0.85	C 0.50
Available Filterra Box Sizes			Filterra	100%	Commercial	Residential
L (ft)	W (ft)	Filterra Surface Area (ft2)	Flow Rate, Q (ft3/sec)	Imperv. DA (acres)	max DA (acres)	max DA (acres)
4	4	16	0.0370	0.129	0.144	0.245
6	4	24	0.0556	0.193	0.216	0.367
6.5	4	26	0.0602	0.209	0.234	0.398
8	4	32	0.0741	0.258	0.288	0.490
10	4	40	0.0926	0.322	0.360	0.612
12	4	48	0.1111	0.387	0.432	0.735
6	6	36	0.0833	0.290	0.324	0.551
8	6	48	0.1111	0.387	0.432	0.735
10	6	60	0.1389	0.483	0.540	0.918
12	6	72	0.1667	0.580	0.648	1.102
13	7	91	0.2106	0.733	0.819	1.393
12	8	96	0.2222	0.773	0.864	1.469
14	8	112	0.2593	0.902	1.008	1.714
16	8	128	0.2963	1.031	1.152	1.959
18	8	144	0.3333	1.160	1.296	2.204
20	8	160	0.3704	1.289	1.440	2.449
22	8	176	0.4074	1.418	1.584	2.694

Project Name: "Villas by the Sea (1011 Grand Units)"

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: "Villas by the Sea (1011 Grand Units)"

Indicate which Items are Included:

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

Project Name: "Villas by the Sea (1011 Grand Units)"

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

The Hydromodification Management Exhibit must identify:

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

Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

Project Name: "Villas by the Sea (1011 Grand Units)"

Indicate which Items are Included:

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

Project Name: "Villas by the Sea (1011 Grand Units)"

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

Attachment 3: For private entity operation and maintenance, Attachment 3 must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

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

Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

Project Name: "Villas by the Sea (1011 Grand Units)"

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

The plans must identify:

- [x] Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- [x] The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- [x] Details and specifications for construction of structural BMP(s)
- [x] Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- [x] How to access the structural BMP(s) to inspect and perform maintenance
- [x] Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- [x] Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- [ ] 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)
- [x] All BMPs must be fully dimensioned on the plans
- [x] When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

Attachment 5
Drainage Report

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

Preliminary Drainage Study
“Villas by the Sea”

Lots 1-8, Block 257 Map No. 697/854

1011 Grand Avenue
San Diego, California 92109

Prepared for:
KTDT, Inc.
4641 Ingraham Street
San Diego, CA 92109

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

April 25, 2021

PTS No. 686049

Introduction

This project involves the demolition of all existing improvements on the property located at 1011 Grand Avenue (commercial development) and the construction of a mixed-use project consisting of 40 residential apartment units and 4 commercial units with parking garage, utilities, treatment BMPs and landscaping.

The attached drainage area maps are from a topographic survey by Christensen Engineering & Surveying, dated August 07, 2020. As shown on the pre-construction drainage area map, drainage from the site is by surface flow and is urban in character. Prior to construction site runoff flows westerly onto Cass Street (1.90 cfs for the 100-yr storm). No offsite run-on flows through the project site. The project prior to development is commercial with no drainage conveyance system nor runoff treatment.

Following construction, site runoff flows to Grand Avenue from a curb outlet, then flows westerly to Cass Street and joins runoff from a Cass Street curb outlet and from the unnamed alley southerly of the site (1.85 cfs). Due to a change in slope precipitation intensity is decreased slightly, which results in a decrease in total site runoff (0.05 cfs). The ultimate collection of runoff into the public storm drain system remains the same (at a curb inlet Dawes Street southerly of Oliver Avenue). The site has 23,027 sf of imperviousness existing and a proposed 23,807 of imperviousness, following development, a change from 94.4% to 97.6% area of imperviousness.

Impervious area runoff will be treated by two raised standard Filterra units due to the site being hydromodification exempt and being classified a non-infiltration site. The site is required to treat 1.5 times the flow based runoff (weight adjusted runoff coefficient) times 0.2 in/hr times the area flowing to the Filterra units). After treatment, runoff is conveyed to two curb outlets, one in Grand Avenue and Cass Street. The required retention element of the project is achieved through flow from 496 sf of roof runoff flowing over 514 sf of landscaping in 18” amended soil in a raised planter at the NE corner of the property and a vegetated swale along the easterly boundary, discharging to the unnamed alley southerly of the project site, by sheet flow. The project discharges runoff to a hardened conveyance system that discharges to an exempt water body (Mission Bay). Runoff flows onto Cass Street then flows southerly to Oliver Avenue and then easterly to Dawes Street and then southerly to a westerly curb inlet and then flows easterly to another curb inlet and then southerly in a 39” RCP drain to

Mission Bay that is lower than the 100-yr BFE of 8'. It discharges from a 30" pipe at an elevation of -2.30' NGVD29 which equates to -.0.21' NAVD88.

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

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

DECLARATION OF RESPONSIBLE CHARGE

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

Antony K. Christensen
RCE 54021 Exp. 12-31-21
JN A2020-62

04-25-21
Date

Calculations

1. Intensity Calculation

Existing Condition

From the City of San Diego Drainage Design Manual, Figure A-4
Tc = Time of concentration

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

Since the difference in elevation is 3.8' (25'-21.2') and the distance traveled is 272', S=1.4%. C = 0.85 (pre-construction).

Tc = 6.6 minutes.

From Figure A-1

I_{100} = 4.0 inches

Post-Construction Condition

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

Since the difference in elevation is 3' (23.5'-20.5') and the distance traveled is 280', S=1.1%. C = 0.70 (portion of site exposed to rainfall is multi-residential but Commercial C=0.85 is used).

Tc = 7.3 minutes.

From Figure A-1

I_{100} = 3.9 inches

2. Coefficient Determination

Pre-Construction:

From Table A-1 for Commercial:

C= 0.85

Post-Construction:

From Table A-1 for Commercial:
(Multi-Residential is not used)

C= 0.85

3. Volume calculations

Q = CIA

Areas of Drainage

Pre-Construction

Area draining to Cass Street	S = 0.5598 Ac

Post-Construction

Area of entry pumped to westerly Filterra	E= 0.0247 Ac
Area of building conveyed To westerly Filterra	FW= 0.2417 Ac
Area of building conveyed To easterly Filterra	FE= 0.2596 Ac
Area amended soil planter, vegetated swale and easterly concrete walkway to alley	AL= 0.0339 Ac

Pre-Construction

Q_{100S} = (0.85) (4.0) (0.5598)

Q_{100PC} = 1.90 cfs

Post-Construction

Q_{100E} = (0.85) (3.9) (0.0247)
Q_{100FW} = (0.85) (3.9) (0.2417)
Q_{100FE} = (0.85) (3.9) (0.2596)
Q_{100AL} = (0.85) (3.9) (0.0339)

Q_{100E} = 0.08 cfs
Q_{100FW} = 0.80 cfs
Q_{100FE} = 0.86 cfs
Q_{100AL} = 0.11 cfs

Q_{TOTAL} = 1.85 cfs

4. Discussion

Due to a change in slope the total calculated runoff decreases from 1.90 cfs to 1.85 cfs. Runoff is conveyed to Grand Avenue (0.86 cfs) which then flows westerly to Cass Street and then southerly where it joins runoff discharging to Cass Street from a curb outlet and alley (0.88 cfs). The ultimate collection of runoff into the public storm drain system remains the same (at the westerly curb inlet on Dawes Street southerly of Oliver Avenue).

Runoff from Area E is conveyed to a catch basin equipped with a pump to convey it to the westerly Filterra unit. Sizing of the pump will be determined at the time of ministerial permit processing.

The volume of runoff conveyed to the Grand Avenue curb outlet is 0.86 cfs and its velocity is will be 2.9 fps. The volume of runoff conveyed to the Cass Street curb outlet is 0.88 cfs and its velocity is will be 2.9 fps.

5. Water Quality Treatment

The site is categorized as non-infiltration and hydromodification exempt so qualifies for treatment with a proprietary biofiltration unit. The following depicts the calculations:

Easterly Filterra Unit

A= 11,306 sf = 0.2596 ac
I = 0.2 in/hr
C=0.9 for runoff treatment

Q = CIA (1.5)
Q = 0.9*0.2*0.2596*1.5
Q = 0.070 cfs

Westerly Filterra Unit

A= 10,527 sf = 0.2417 ac
I = 0.2 in/hr
C=0.9 for runoff treatment

Q = CIA (1.5)
Q = 0.9*0.2*0.2417*1.5
Q = 0.065 cfs

A 4’ x 8’ Filterra is capable of treating 0.0741 cfs and so is adequate for each area being treated.

A Filterra unit with 8” bypass is capable of conveying 1.2 cfs.
Since the maximum100-yr flow to the Filterra units is 0.62 cfs the units are adequate.

APPENDIX

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).

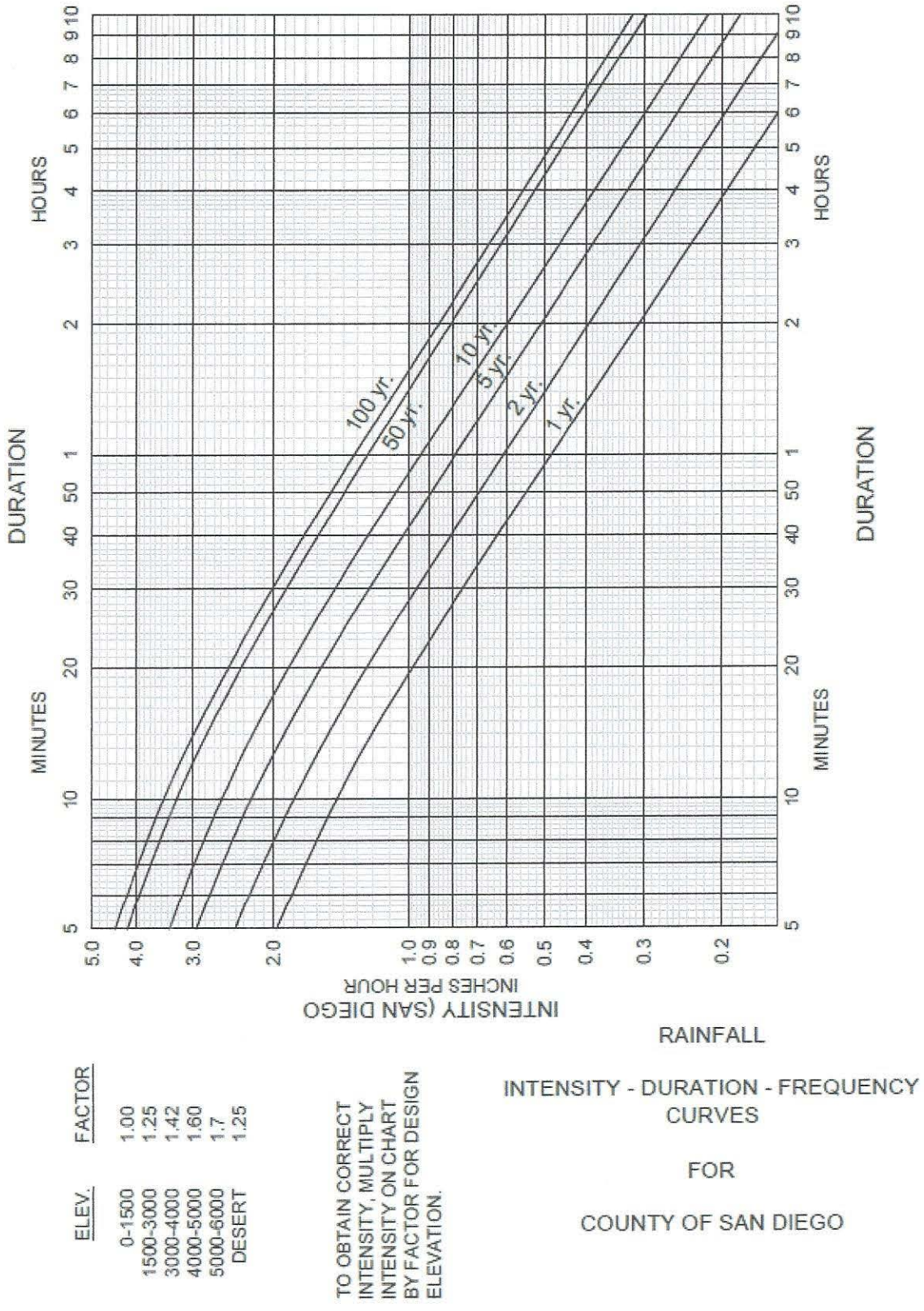


Figure A-1. Intensity-Duration-Frequency Design Chart

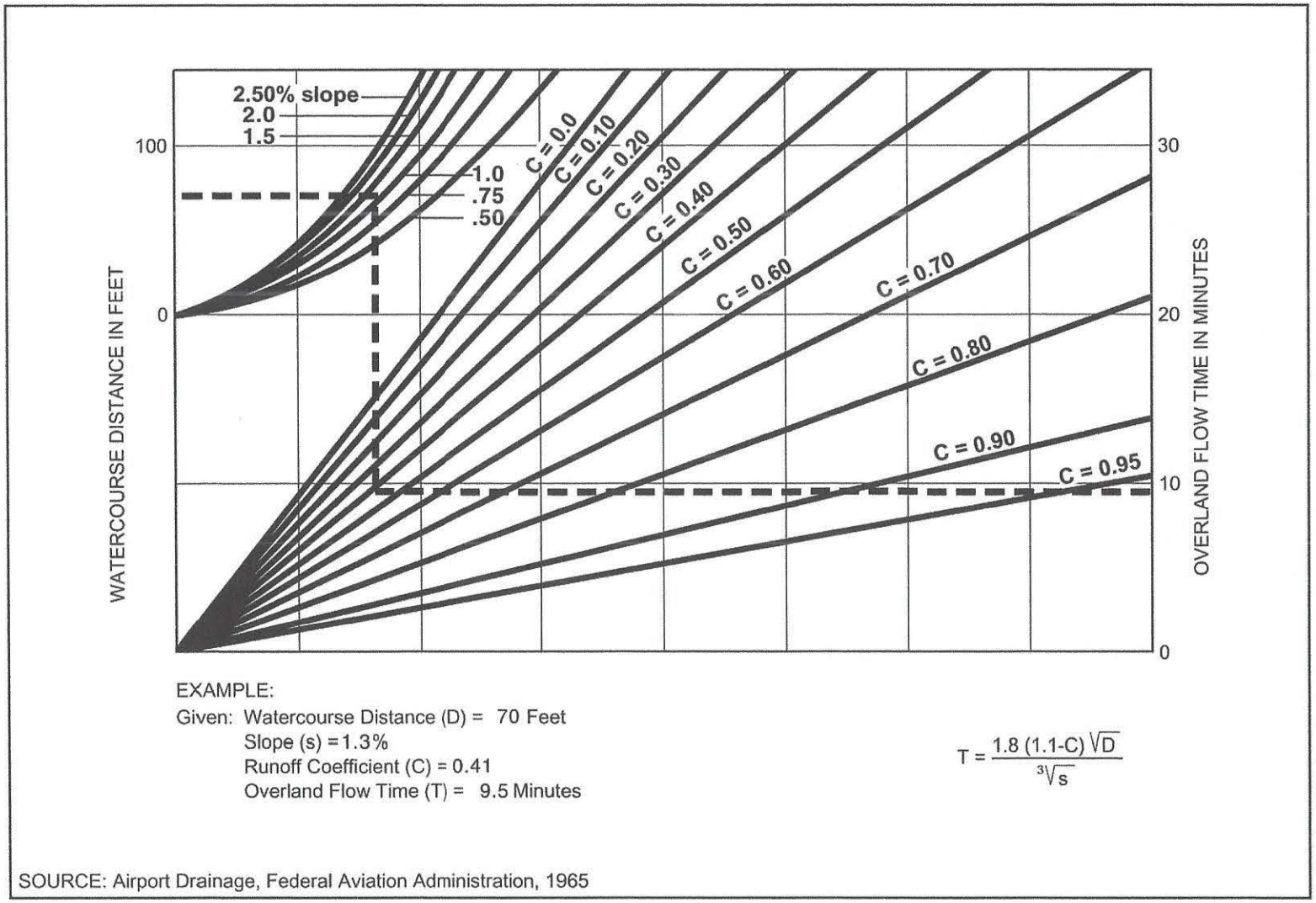


Figure A-4. Rational Formula – Overland Time of Flow Nomograph

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

Type of conveyance is a: Grand Avenue Curb Outlet
Depth of channel equals .25 Feet
Bottom Width Equals 3
Side slope equals .01
Slope of conveyance equals 1.5 %
Roughness equals .013
Flow quantity equals .8611061 CFS
Area equals .2983021 Square Feet
Velocity equals 2.882983 FPS
Depth of flow equals 9.940111E-02 Feet

Type of conveyance is a: Cass Street Curb Outlet
Depth of channel equals .25 Feet
Bottom Width Equals 3
Side slope equals .01
Slope of conveyance equals 1.5 %
Roughness equals .013
Flow quantity equals .8809075 CFS
Area equals .302505 Square Feet
Velocity equals 2.909043 FPS
Depth of flow equals .1008011 Feet

DRAINAGE AREA MAPS

PRE-DEVELOPMENT DRAINAGE AREA MAP

POST-CONSTRUCTION DRAINAGE AREA MAP

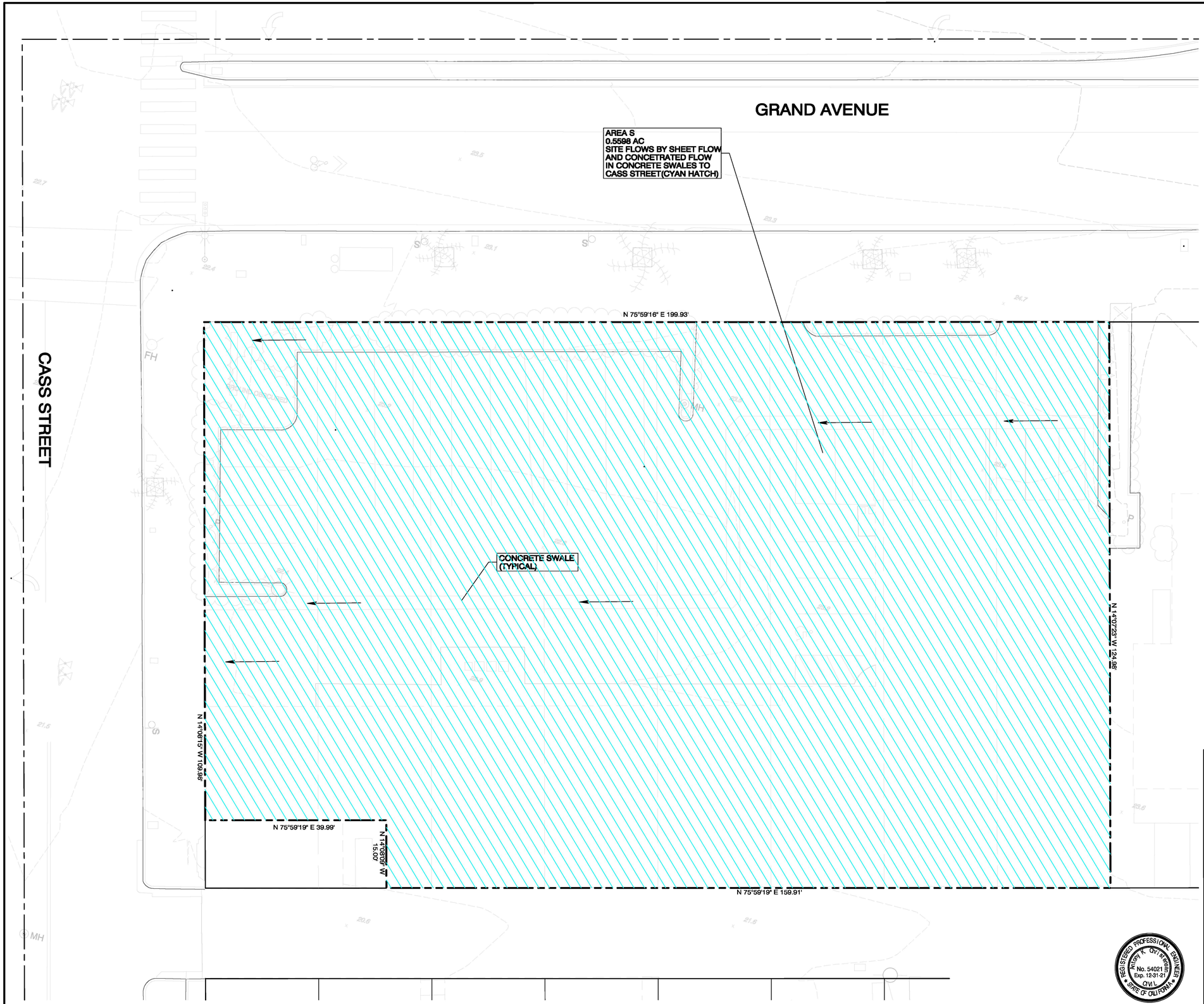
LEGAL DESCRIPTION:

LOTS 1 THROUGH 8 IN BLOCK 257 OF PACIFIC BEACH, ACCORDING TO MAPS THEREOF NOS. 697 AND 864, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, JANUARY 8, 1892 AND SEPTEMBER 24, 1896 RESPECTIVELY. EXCEPTING FROM SAID LOT 1 THE SOUTH 15 FEET THEREOF. ALSO EXCEPTING FROM SAID LOT 2 THE SOUTH 15 FEET OF THE WESTERLY 15 FEET THEREOF.

APN: 423-154-02-00

BENCHMARK

CITY OF SAN DIEGO BENCHMARK LOCATED AT THE NORTHWESTERLY CORNER OF GRAND AVENUE AND DAWES STREET.
ELEVATION 28.320' MEAN SEA LEVEL (N.G.V.D. 1929).



SCALE: 1" = 10'
CONTOUR INTERVAL: 1'

0 10 20 30 40

Prepared By:

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

Project Address:

1011 GRAND AVENUE
SAN DIEGO, CA 92109

Revision 5:
Revision 4:
Revision 3:
Revision 2:
Revision 1:

Project Name:

1011 GRAND UNITS

Original Date: FEBRUARY 15, 2021

Sheet Title:

PRE-CONSTRUCTION DRAINAGE AREA MAP

Sheet 1 of 1 Sheets

DEP#_____

REGISTERED PROFESSIONAL ENGINEER
ANTONY K. CHRISTENSEN
No. 54021
Exp. 12-31-21
CIVIL
STATE OF CALIFORNIA

PRELIMINARY

FEBRUARY 15, 2021

ANTONY K. CHRISTENSEN, RCE 54021 — Date

JN A2020-62

POST-DEVELOPMENT DRAINAGE AREA MAP

POST-CONSTRUCTION DRAINAGE AREA MAP

LEGAL DESCRIPTION:

LOTS 1 THROUGH 8 IN BLOCK 257 OF PACIFIC BEACH, ACCORDING TO MAPS THEREOF NOS. 697 AND 854, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, JANUARY 8, 1892 AND SEPTEMBER 24, 1898 RESPECTIVELY. EXCEPTING FROM SAID LOT 1 THE SOUTH 15 FEET THEREOF. ALSO EXCEPTING FROM SAID LOT 2 THE SOUTH 15 FEET OF THE WESTERLY 15 FEET THEREOF.

APN: 423-154-02-00

BENCHMARK

CITY OF SAN DIEGO BENCHMARK LOCATED AT THE NORTHWESTERLY CORNER OF GRAND AVENUE AND DAWES STREET.
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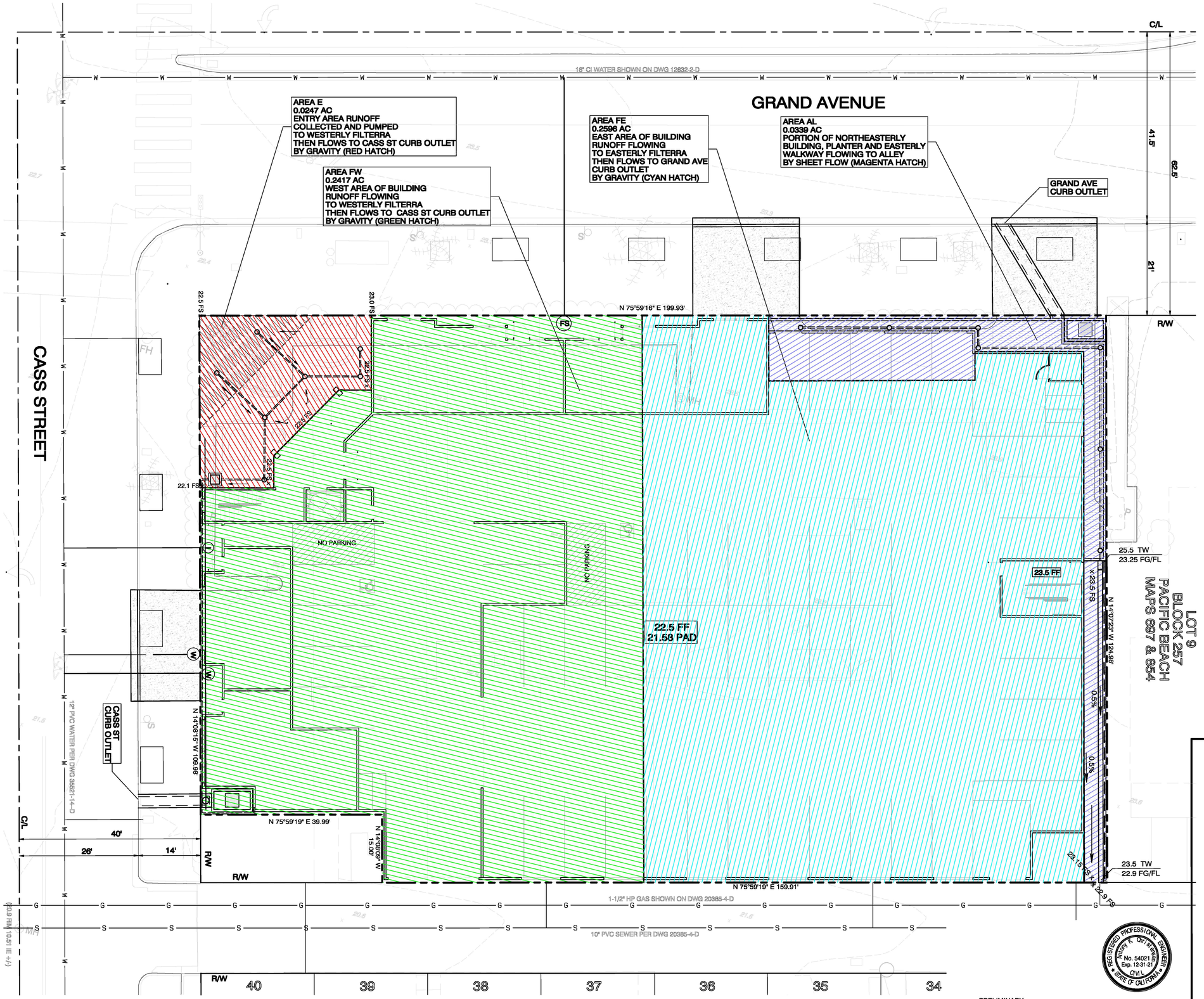

SCALE: 1" = 10'
CONTOUR INTERVAL: 1'

0 10 20 30 40

PRELIMINARY

FEBRUARY 15, 2021

ANTONY K. CHRISTENSEN, RCE 54021 — Date

REGISTERED PROFESSIONAL ENGINEER
ANTONY K. CHRISTENSEN
No. 54021
Exp. 12-31-21
CIVIL
STATE OF CALIFORNIA

Prepared By:

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PHONE (858)271-9901 FAX (858)271-8912

Project Address:

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SAN DIEGO, CA 92109

Revision 5:
Revision 4:
Revision 3:
Revision 2:
Revision 1:

Project Name:

1011 GRAND UNITS

Original Date: FEBRUARY 15, 2021

Sheet Title:

POST-CONSTRUCTION DRAINAGE AREA MAP

Sheet 1 of 1 Sheets

DEP# _____

JN A2020-62

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.

GEOTECHNICAL INVESTIGATION

Grand Avenue Units
1011 Grand Avenue
San Diego, California

prepared for:

Mr. Mike Turk
KDTD, Inc.
4641 Ingraham Street
San Diego, CA 92109

by:

TerraPacific Consultants, Inc.
4010 Morena Boulevard, Suite 108
San Diego, CA 92117

September 1, 2020
File No. 20-142

TerraPacific
CONSULTANTS INC

Mr. Mike Turk
KDTD, Inc.
4641 Ingraham Street
San Diego, CA 92109

September 1, 2020
File No. 20-142

Subject: **Geotechnical Investigation**
Grand Avenue Units
1011 Grand Avenue
San Diego, California

Dear Mr. Turk:

In accordance with our proposal dated July 27, 2020, TerraPacific Consultants, Inc. (TCI) has prepared the following report presenting our findings and recommendations from a geotechnical investigation at the subject property. The purpose of the investigation was to evaluate the subsurface conditions at the site and provide recommendations and design parameters for the proposed construction. The following report contains a summary of our findings and recommendations.

We greatly appreciate the opportunity to be of service. If you should have any questions or comments regarding this report or our findings, please do not hesitate to call.

Sincerely,
TerraPacific Consultants, Inc.

Cristopher C. O'Hern, CEG 2397
Senior Engineering Geologist

Octavio Brambila, PE 70633
Project Engineer

CCO/OB:gg

Distribution: (3) – Mr. Mike Turk, KDTD, Inc.

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 General

The following report presents the findings of a geotechnical investigation performed at 1011 Grand Avenue in San Diego, California. The location of the property is presented on the Site Location Plan (Figure 1 in Appendix A). The purpose of the investigation was to evaluate the subsurface conditions at the site in order to provide recommendations and soil design parameters for the proposed construction.

1.2 Scope of Services

The scope of the investigation consisted of field reconnaissance, subsurface exploration, laboratory testing, and engineering and geologic analysis of the obtained data. The following tasks were performed during the investigation and production of this report:

- Site reconnaissance and review of published geologic, seismologic, and geotechnical reports and maps pertinent to the project. A list of references is provided in Appendix B;
- Logging/sampling of four small-diameter borings at the subject property. The Geotechnical Plan (Figure 2 in Appendix A) presents the approximate subsurface exploration locations. The excavation logs are presented in Appendix C;
- Collection of representative soil samples from selected depths within the excavations, which were transported to our laboratory for testing and analysis;
- Laboratory testing of samples collected from the test excavations. The testing included in-situ moisture and density, maximum dry density, direct shear, expansion index, hydro-response, and sulfate and chloride concentration. The laboratory data is presented in Appendix D;
- Engineering and geologic analysis of data acquired from the investigation, which provided the basis for our conclusions and recommendations; and
- Preparation of this report presenting our findings and recommendations.

2.0 PROJECT BACKGROUND

2.1 Site Description and Development History

The subject property is located on the south side of Grand Avenue in San Diego, California. The legal description of the property is APN 423-154-0200, BLK 257, LOT 8, Submap 854, Pacific Beach Amended Trustees Map. The rectangular-shaped lot is bordered by developed commercial properties to the east, an alleyway to the south, Grand Avenue to the north, and Cass Street to the west. The site is essentially flat with an estimate elevation of 20 mean sea level (msl). The lot is currently improved with commercial structures, asphalt and concrete pavements, and other associated appurtenances.

2.2 Proposed Development

Based on our review of the current architectural plans, it is our understanding that the existing structure is to be razed, and the site will be developed to accommodate a mixed-use structure consisting of commercial space and parking on the ground floor and residential spaces on the second and third floors.

3.0 SITE INVESTIGATION

The site investigation was conducted on August 14, 2020, and consisted of visual reconnaissance and subsurface exploration. The purpose of the investigation was to gain an understanding of the site configuration and subsurface conditions in the vicinity of the proposed construction.

3.1 Site Reconnaissance

Our site reconnaissance consisted of walking the site to determine if any indications of adverse geologic conditions were present. No outward signs of distress indicating adverse geologic conditions were noted.

3.2 Subsurface Exploration

The subsurface exploration consisted of four small-diameter borings excavated with a truck-mounted rig. The borings, B-1 through B-4, extended to depths of up to 20 feet below ground surface (bgs). The approximate excavation locations are presented on the Geotechnical Plan (Figure 2 in Appendix A). The borings were logged and sampled by a licensed professional from our office.

In general, the subsurface exploration revealed the site is mantled by undocumented fill soil, which is underlain by native marine terrace deposits identified as Old Paralic Deposits, Unit 6. Groundwater was not encountered within the depths of our excavations. Descriptions of each material are detailed in Section 4.2 Site Stratigraphy, and the subsurface excavation logs are provided in Appendix C.

3.3 Laboratory Testing

Soil samples collected during the field exploration were transported to our laboratory for testing. The purpose of the testing was to characterize the soil types and evaluate the engineering properties of the soil. The laboratory testing included in-situ moisture and density, expansion index, maximum dry density, direct shear, hydro-response, and sulfate and chloride concentrations. Each of the laboratory tests was performed in accordance with ASTM specifications or other accepted testing procedures. The results of the laboratory tests are presented in Appendix D.

4.0 SITE GEOLOGY

4.1 Geologic Setting

The site is located within the coastal portion of the Peninsular Ranges Geomorphic Province of California. This province, which extends 900 miles from Southern California to the southern tip of Baja California, is characterized by northwest-trending structural blocks. The coastal portion of the province in San Diego County is typically comprised of upper Cretaceous-aged to Tertiary-aged (1.8 million to 65 million years) marine and non-marine sedimentary bedrock units that have been deposited within a northwest-trending basin known as the San Diego Embayment (Norris & Webb, 1976). Recent geologic uplift along the San Diego coastal margin, combined with sea level changes, have created marine terraces and associated deposits consisting of near-shore marine, beach estuarine, and lagoonal facies. These deposits range from early to mid-Quaternary-aged (45,000 to 1.5 million years) and are designated in geologic literature as Paralic Deposits.

According to geologic literature from the California Geological Survey (CGS), the site is underlain by Quaternary-aged surficial deposits designated as Old Paralic Deposits, Unit 6. The literature describes the paralic deposits as "poorly sorted, moderately permeable, reddish-brown, inter-fingered strandline, beach, estuarine and colluvial deposits composed of siltstone, sandstone and conglomerate" (Kennedy and Tan, 2008).

Based on the City of San Diego Seismic Safety Study Map, the site is located within a Zone 52 – "other level areas, gently sloping to steep terrain, favorable geologic structure, low risk." The site is located on the Geologic Map (Figure 3 in Appendix A) and the Seismic Safety Study Map (Figure 4 in Appendix A).

4.2 Site Stratigraphy

The subsurface descriptions presented below are interpreted from the conditions exposed during the field investigation and/or inferred from local geologic literature. In addition to the following descriptions, detailed exploration logs are presented in Appendix C.

Fill Soil (Af) - Fill soil is earth material that has been placed using mechanical means, such as bulldozers or other large earthmovers. Typically, the fill soil has been removed from topographically high locations and placed in low-lying areas to create level building pads. When properly compacted, fill soil can be used to support structures. However, it is typically more compressible than natural formational soils. Fill soils placed without documentation of observation and testing are considered undocumented and are typically not suitable for foundation support.

Undocumented fill soils were encountered in each of the borings B-1 through B-4 from the ground surface to respective depths of 5.6, 5.1, 5.4, and 5.3 feet bgs. The fill soils were relatively consistent and generally described as medium gray-brown to red-brown, loose to medium dense, slightly moist, clayey to silty sand. Asphalt and concrete clasts were identified within the fill soil.

Old Paralic Deposits, Unit 6 (Qop6) – Marine terrace deposits designated Quaternary-aged Old Paralic Deposits, Unit 6, were encountered in each of the borings underlying the fill material. These deposits are associated with the Nestor marine terrace and are approximately 120,000 years old. The material encountered during our exploration was generally described as a medium red-brown to medium gray-brown, clayey to silty sandstone that was slightly moist, dense to very dense. Zones with high cobble content and friable sands were observed.

4.3 Groundwater

Groundwater was not encountered within the depths of our excavations, which extended to depths of 20.0 feet bgs. It should be noted that additional zones of perched groundwater could develop during periods of heavy or prolonged rainfall, and/or with changes in site improvements on the subject or adjacent lots, and/or changes in irrigation patterns on the subject or adjacent lots.

5.0 SEISMICITY

5.1 Regional Seismicity

Generally, the seismicity within California can be attributed to the regional tectonic movement taking place along the San Andreas Fault Zone, which includes the San Andreas Fault, and most parallel and sub-parallel faulting within the state. A majority of Southern California, which includes the subject site, is considered seismically active. Seismic hazards can be attributed to potential ground shaking from earthquake events along nearby faults or more distant faulting.

According to regional geologic literature, the closest known active faults are located within the Rose Canyon Fault Zone. The Rose Canyon fault zone consists of a complex zone of several en echelon strike slip, oblique, reverse, and normal faults, which extend onshore in this area from San Diego Bay north to La Jolla Bay. Several other potentially active and pre-Quaternary faults also occur within the regional vicinity. Currently, the geologic literature presents varying opinions regarding the seismicity of these faults. As such, the following Seismic Analysis only considers the effects of nearby faults currently considered active.

5.2 Probabilistic Ground Acceleration

A deterministic seismic hazard analysis was performed for the site using the computer program EQFault (Blake, 2000). The analysis considers the maximum movement magnitude earthquake for active faults within the specified search radius to provide a maximum expected earthquake event for the known tectonic structure. For this site, we specified a search radius of 62.4 miles (100 km) and the attenuation equation of Campbell & Bozorgnia (1997 Rev.) for soft rock. The analysis results for the faults most likely to affect the site are presented in Appendix E, Summary of Active Faults.

In addition to the deterministic analysis, a simplified probabilistic seismic hazard analysis was performed for the site. The California Geological Survey has a webpage that allows a user to calculate the ground motion at a site with either a 2 percent or 10 percent probability of exceedance in a 50-year period. The results of the output indicated the site had respectively calculated peak ground accelerations of 0.54g and 0.26g

The values provided above are for comparing the potential for seismic shaking due to fault activity most likely to affect the site. Other factors should be considered when completing seismic design, such as duration of shaking, period of the structure, design category, etc. The design structural engineer should consider the information provided herein and evaluate the structure(s) in accordance with the California Building Code and guidelines of the City of San Diego. The earthquake design parameters based on the 2019 CBC applicable to the site are provided in Section 7.6.

5.3 Hazard Assessment

Faulting/Fault Rupture Hazard - An "active" fault, as defined by the Alquist-Priolo Earthquake Fault Zoning Act, is a fault that has had surface rupture within Holocene time (the past 11,000 years). A "potentially active" fault is defined as any fault that showed evidence of surface displacement during Quaternary time (last approximate 1.6 million years), but not since Holocene time.

According to the City of San Diego Seismic Safety Study 2008 and the Quaternary Fault Map from the USGS Earthquake Hazards Program, the subject parcel is located approximately 2.2 miles southwest of an "active" portion of the Rose Canyon Fault Zone (Rose Canyon Fault). Several other unnamed faults are mapped nearby, these faults are considered to be older than Quaternary-aged and are classified on the City map as "potentially active, inactive, presumed inactive or activity unknown." The site is not located within an Alquist-Priolo fault zone, and according to geologic literature, is not intersected by any faults. The site is depicted on the Seismic Safety Study Map (Figure 4 in Appendix A).

Seismically Induced Settlement - Within the depths of our exploration, the soils encountered consisted of relatively dense formational soils at shallow depths. Based on the anticipated earthquake effect and the stratigraphy of the site, seismically induced settlement is expected to be minor and within tolerable limits. Structures designed and constructed in accordance with applicable building codes are expected to perform well with respect to settlement associated with predictable seismic events.

Liquefaction - Liquefaction involves the substantial loss of shear strength in saturated soil, usually taking place within a saturated medium, exhibiting a uniform fine-grained characteristic, loose consistency, and low confining pressure when subjected to impact by seismic or dynamic loading. Based on the shallow depth to dense formational soil, the site is considered to have a negligible risk for liquefaction.

Lurching and Shallow Ground Rupture - Rupturing of the ground is not likely due to the absence of known active fault traces within the project limits. Due to the generally active seismicity of Southern California, however, the possibility for ground lurching or rupture cannot be completely ruled out. In this light, "flexible" design for on-site utility lines and connections should be considered.

Landsliding - Given the shallow topographic relief of the site and surrounding area, the possibility for landsliding is believed to be negligible. Furthermore, the San Diego Seismic Safety Study does not depict any known landslides in the vicinity of the site.

Tsunamis or Seiches – Tsunamis are great sea waves produced by seismic events. Given the site elevation of approximately 20 feet msl, it is not likely that a tsunami could impact the site. Historically, the magnitudes of tsunamis to impact the San Diego coastline have been fairly small, typically less than 1 meter in height. Recent studies into the possibility of offshore seismic events triggering tsunamis via fault movement or undersea landslides have experts of the opinion that Southern California is not free from tsunami risks (Krier, 2005). However, predicting the level of risk is difficult due to the lack of knowledge about the offshore fault system.

In our opinion, there is no practical approach for mitigating the potential impact to the site from a tsunami. This is an inherent risk for those living within the beach area. All residents in coastal areas should have an evacuation plan in place for a strong seismic event (i.e., typically 20 seconds or more of sturdy ground shaking) or when an official tsunami warning is issued.

6.0 CONCLUSIONS

Based on the results of our geotechnical investigation, it is our opinion that the proposed development is feasible from a geotechnical standpoint, provided the recommendations presented in the following sections are adopted and incorporated into the project plans and specifications.

The following sections provide recommendations for the proposed site development. The civil and/or structural engineer should use this information during the planning and design of the proposed construction. Once the plans and details have been prepared, they should be forwarded to this office for review and comment.

The key aspect of the site, which will need to be considered during the design, is the presence of undocumented fill soil and/or weathered paralic deposits within the upper approximate 5 feet of the site. As a means to provide a uniform engineered fill pad for the site, it is recommended that all undocumented fill be removed, and the removals extend to a minimum depth of 2 feet below the deepest foundation. It is anticipated that these depths will be on the order of 5 feet below existing grade. As is always the case, localized areas of deeper removals may be required.

7.0 RECOMMENDATIONS

The following sections provide our recommendations for site preparation, design, and construction of the proposed foundation systems. Once the plans and details have been prepared, they should be forwarded to this office for review and comment.

7.1 Site Preparation and Grading

7.1.1 Clearing/Grubbing

In order to prepare the site for the new construction, it is assumed that all of the existing improvements will be demolished and removed from the site. However, if unsuitable materials (e.g., construction debris, plant material, etc.) are encountered during the grading phase, they should be removed and properly disposed of off-site.

7.1.2 Site Grading

Site grading should be conducted to remove the undocumented fill soils and provide a uniform fill mat extending 2 feet below foundation bottom for all structures. Removals on the order of 5 feet below grade are anticipated. Localized areas of deeper removals may be required.

The removals should extend a minimum of 5 feet beyond the structural footprint. This may be reduced due to property line constraints. Once the removal bottoms into competent paralic deposit soils have been established, the bottoms should be scarified a minimum of 6 inches, moisture-conditioned, and compacted to a minimum of 90 percent relative compaction.

7.1.3 Fill Materials and Compaction Requirements

The on-site soil, less any organic debris, may be used for fill, provided that it is placed in thin lifts (not exceeding 8 inches in loose thickness). All soil should be properly moisture conditioned and mechanically compacted to a minimum of 90 percent of the laboratory maximum dry density, per ASTM D-1557, and at or slightly above optimum moisture condition. The removal bottoms, fill placement, and compaction should be observed and tested by the geotechnical consultant. Standard guidelines for grading are provided in Appendix G.

7.2 Temporary Excavations

Foundation excavations, utility trenches, or other temporary vertical cuts may be conducted in fill or formational soils to a maximum height of 4 feet. Any temporary cuts beyond the above height restraint could experience sloughing or caving and, therefore, should be either shored or laid-back. Laid-back slopes should have a maximum inclination of 1:1 (horizontal:vertical) and not exceed a vertical height of 10 feet without further input from the geotechnical consultant. In addition, no excavation should undercut a 1:1 projection below the foundation for any existing improvements, i.e., existing building foundations both on and off-site. Regional safety measures should be enforced, and all excavations should be conducted in strict accordance with OSHA guidelines.

If deeper excavations are required or excavations encroach into a 1:1 projection from an existing structure, shoring will likely be required. We recommend using a triangular pressure distribution for calculating earth pressures for temporary excavations that will be shored but not braced with tiebacks or struts. Cantilevered shoring design may be based on an equivalent fluid pressure of 38 pcf for shoring of fill and native materials. Shoring design should also include any groundwater pressures that may be encountered in the excavation, and any additional surcharge loads resulting from loads placed above the excavation and within a 1:1 plane extending upward from the base of the excavation. For design of soldier piles, an allowable passive pressure of 350 psf per foot of embedment may be used.

Excavation spoils should not be stockpiled adjacent to excavations, as they can surcharge the soils and trigger failure. In addition, proper erosion protection, including runoff diversion, is recommended to reduce the possibility for erosion of slopes during grading and building construction. Ultimately, it is the contractor's responsibility to maintain safe working conditions for persons on-site and verify compliance with the project's BMPs.

7.3 Foundation Recommendations

The following sections provide the soil parameters and general guidelines for foundation design and construction. It is anticipated that all new construction will be supported by conventional continuous and spread footings. As mentioned previously, the new foundations should be supported on competently engineered fill in accordance with Section 7.1. If additional parameters are desired, they can be provided on request.

The foundation design parameters and guidelines provided below are considered to be "minimums" in keeping with the current standard-of-practice. They do not preclude more restrictive criteria that may be required by the governing agency or structural engineer. The architect or structural engineer should evaluate the foundation configurations and reinforcement requirements for structural loading, concrete shrinkage, and temperature stress.

7.4 Soil Design Criteria

The following separate soil design criteria are provided for design and construction of the conventional foundations for building structures. The parameters provided assume foundation embedment in competent engineered fill material with an expansion index classification as low.

Conventional Foundations

Allowable bearing capacity for square or continuous footings.....2,000 psf

Minimum embedment in competent engineered fill .....24 inches

Minimum width for continuous footings.....18 inches

Minimum width for square footings..... 3.0 feet

Note: The bearing capacity value may be increased by one-third for transient loads such as wind and seismic. In addition, the value provided may be increased by 500 psf for each additional foot of width or depth beyond the minimums provided. The increased bearing capacity should not exceed 4,000 psf.

Coefficient of friction against sliding 0.35

Passive resistance.....250 psf/ft up to a maximum of 2,000 psf

7.5 Retaining Walls

Lateral Loading and Resistance Parameters

For retaining walls, the bearing capacity and foundation dimensions provided for Section 7.4 may be followed. Additional design parameters for lateral loading and resistance are provided below:

Active earth pressure for level backfill (non-restrained walls) ..... 40 psf/ft

At-rest earth pressure for level backfill (restrained walls) ..... 60 psf/ft

Note: The active and at-rest pressures are provided assuming granular soil is used for backfill. Backfill and subdrain recommendations are provided in the following sections.

Passive resistance in competent fill ..... 250 psf/ft

Coefficient of friction against sliding 0.35

Note: The passive resistance and coefficient of friction may be used in combination if there is a fixed structure, such as a floor slab at the toe of the retaining wall. If the two values are used in combination, the passive resistance value should be reduced by one third.

Earthquake Loads

Seismic loading for retaining walls with level backfill should be approximated by applying a 17 psf/ft in an inverse triangle shape, where the lateral force at the bottom of the wall is equal to zero, and the lateral force at the top of the retaining wall is equal to 17 psf times the height of the wall. The resultant seismic load should be applied from the bottom of the wall a distance of 0.6 times the overall height of the wall.

The seismic loads would be in addition to the normal earth pressure loads applied on the retaining walls, which are provided above. The structural engineer should evaluate the overall height of the wall and apply the appropriate retaining wall loading parameters to be used for analysis and design.

7.6 Earthquake Design Parameters

Earthquake resistant design parameters may be determined from the California Building Code (2019 Edition). Based on our investigation and characterization of the site, the following design parameters may be adopted:

Site coordinates ..... Latitude: 32.7951 Longitude: -117.2507

Site classification ..... D

Site coefficient Fa 1.000

Site coefficient Fv ..... null

Spectral response acceleration at short periods Ss 1.318

Spectral response acceleration at 1-second period S1 ..... 0.459

Maximum spectral response accelerations at short periods Sms 1.318

Maximum spectral response accelerations at 1-second period Sm1 ..... null

Design spectral response accelerations at short periods Sds 0.879

Design spectral response accelerations at 1-second period Sd1 ..... null

7.7 Foundation and Retaining Wall Design Guidelines

The following guidelines are provided for assistance in the design of the various foundation elements and are based on the anticipated low expansion potential of the bearing soils. As is always the case, where more restrictive, the structural and/or architectural design criteria should take precedent.

Foundations - Continuous exterior and interior footings for the buildings should be a minimum of 24 inches deep. Reinforcement should consist of a minimum of four No. 5 rebar, two placed at the top and two at the bottom of the footing. All footing embedments should be verified by the soil engineer.

Slabs-on-Grade - Interior and exterior slabs-on-grade should be a minimum of 5 inches thick (net) and reinforced with No. 4 rebar placed at a maximum spacing of 16 inches on center, each way. The steel reinforcement should be placed at the midpoint or slightly above the midpoint in the slab section. For exterior slabs, control joints should be installed at a maximum spacing of 10 feet in each direction. Prior to construction of slabs, the subgrade should be moistened to approximately 12 inches in depth at least 24 hours before placing the concrete.

All interior floor slabs should be underlain by 2 inches of clean sand, followed by a minimum 15-mil PVC vapor retarder (Stego Wrap or similar). The vapor retarder should be further underlain by a 4-inch thick layer of gravel or crushed rock. Also, the vapor retarder should be properly lapped and sealed around all plumbing penetrations.

Retaining Walls - Retaining walls should be provided with a gravel subdrain system. The drain system should start with a minimum 4-inch diameter perforated PVC Schedule 40 or ABS pipe, which is placed at the heel of the wall footing and below the adjacent slab level. The pipe should be sloped at least 1 percent to a suitable outlet, such as an approved site drainage system or off-site storm drain. The pipe should be surrounded by a gravel backfill consisting of tamped $^{3}/_{4}$-inch sized gravel. This gravel backfill zone should be a minimum of 12 inches wide and should extend from slightly below the drain pipe up to approximately two-thirds of wall height. The entire gravel section should be wrapped in a filter cloth such as Mirafi 140 NS or similar to prevent contamination with fines. Alternatively, walls can be drained using geo-composite panel drains that connect to a gravel sub-drain at the heel of the wall. In addition, the wall should be properly moisture-proofed per the project architect. See the Retaining Wall Drain Details (Figure 5 in Appendix A).

Foundation and Slab Concrete – The results of the corrosion tests indicate low levels of sulfates and chlorides within the on-site soils. However, due to the coastal location, it is recommended that the concrete used for foundation elements contain Type V cement. The concrete should be mixed and placed in accordance with ACI specifications. Water should not be added to the concrete at the site, as this can reduce the mix and lead to increased porosity and shrinkage cracking.

Proper curing techniques and a reduction in mixing water can help reduce cracking and concrete permeability. In order to further reduce shrinkage cracking and slab permeability, consideration should be given to using a concrete mix that possesses a maximum water-cement ratio of 0.5. The potential for shrinkage cracking within concrete flatwork elements cannot be completely ruled out and should be expected.

It should be noted that TCI does not consult in the field of corrosion engineering. Thus, the client project architect and project engineer should evaluate the level of corrosion protection required for the project and seek consultation from a qualified professional, as warranted.

Appurtenances - Other site appurtenances such as planter walls, site walls, etc., can be constructed on continuous footings. Footings for such appurtenances should be a minimum of 18 inches deep, 12 inches wide, and minimally reinforced with four No. 4 bars, two top, and two bottom. The bearing capacity for such appurtenances is 1,500 psf.

7.8 Trench Backfill

Trench excavations for utility lines should be properly backfilled and compacted. Utilities should be properly bedded and backfilled with clean sand or approved granular soil to a depth of at least 6 inches over the pipe. This backfill should be uniformly watered and compacted to a firm condition for both vertical and lateral pipe support. The remainder of the backfill may be typical on-site soil or low-expansive import placed near optimum moisture content in lifts not exceeding 8 inches in thickness and mechanically compacted to at least 90 percent relative compaction.

7.9 Pavement

The following pavement sections are provided for the new pavements associated with the proposed improvements. Subgrade preparation should be conducted immediately prior to placement of the pavement section. As a minimum, the upper 12 inches of subgrade in the area of the proposed pavement should be removed and properly re-compacted to 95 percent relative compaction and moisture-conditioned to at least 2 percent over the optimum moisture content (per ASTM D-1557).

It is assumed that the proposed driveway will receive light vehicle traffic, etc. The following pavement sections are recommended based on an assumed R-value of 10 and in accordance with the Caltrans Highway Design Manual and the Flexible Pavement Structural Section Design Guide for California Cities and Counties (3rd edition). Concrete pavement sections were determined utilizing the Design of Concrete Pavement for City Streets by Portland Cement Association.

Assumed Traffic Index	Assumed R-Value	Asphalt Concrete	Aggregate Base (Class II)
Asphalt Pavement Section - Driveway			
5.0	10	3.0 inches	9.0 inches
Concrete Pavement Section - Driveway			
5.0	10	6.0 inches	4.0 inches

Final pavement designs should be determined based on testing of the soils exposed at the completion of the finished grading.

Concrete should be reinforced at a minimum, with No. 4 rebar at 18 inches on center, each way, placed at the midpoint of the section. Additionally, control joints should be saw-cut 2.5 inches deep longitudinally at 10-foot maximum spacing, and transversely at 10-foot maximum spacing. The concrete should be placed in conformance with ACI standards and have a minimum modulus of rupture of 500 psi.

Aggregate base should conform to the specifications for crushed aggregate base, crushed miscellaneous base, or processed miscellaneous base as defined in Section 200-2 of the "Greenbook." Aggregate base should be compacted to at least 95 percent of maximum dry density based on ASTM D-1557 guidelines. Asphalt concrete should conform to "Greenbook" specifications. Asphalt concrete should be compacted to at least 95 percent based on the Hveem unit weight.

7.10 Site Drainage

Drainage should be designed to direct surface water away from structures and on to an approved disposal area. For earth areas, a minimum gradient of 2 percent should be maintained, with drainage directed towards approved collection facilities. In order to reduce saturation of the building foundation soils, positive drainage should be maintained within an away gradient of at least 5 percent, for a minimum distance of 10 feet from foundations. Where property line constraints prohibit this distance, a 5 percent gradient to an approved drainage diversion (i.e., area drains or swales) should be provided. Impervious surfaces within 10 feet of the building foundation should be sloped a minimum of 2 percent away from the building. Drainage patterns approved after grading should be maintained throughout the life of the development. In addition, it is recommended that roof gutters be installed with downspouts tied into the tightlined area drain system.

7.11 Storm Water Infiltration / Percolation BMPs

As is always the case, site infiltration near proposed improvements (structures and appurtenances) would have a negative impact in regards to potential settlement and/or heave of the supporting fill and underlying native soils. In addition, existing site conditions consist of undocumented fill soils in excess of 5-foot depths across the lot. Due to these potential negative impacts and the existing site conditions, the site is not considered feasible for infiltration. A Feasibility Condition Letter is provided within Appendix F.

7.12 Plan Review and Geotechnical Observation

When the grading and foundation plans are completed, they should be reviewed by TCI for compliance with the recommendations herein. Observation by TCI or another company's geotechnical representative is essential during grading and/or construction to confirm conditions anticipated by the preliminary investigation, adjust designs to actual field conditions, and determine that grading is conducted in general accordance with our recommendations. In addition, all foundation excavations should be reviewed for conformance with the plans prior to the placement of forms, reinforcement, or concrete. Observation, testing, and engineering consulting services are provided by our firm and should be budgeted within the cost of development.

8.0 CLOSURE

8.1 Limits of Investigation

Our investigation was performed using the skill and degree of care ordinarily exercised, under similar circumstances, by reputable soils engineers and engineering geologists practicing in this or similar localities. No warranty, expressed or implied, is made as to the conclusions and professional advice in this report. This report is prepared for the sole use of our client and may not be assigned to others without the written consent of the client and TCI.

The samples taken and used for testing, and the observations made, are believed representative of the site conditions; however, soil and geologic conditions can vary significantly between test excavations and surface exposures. As in most projects, conditions revealed by construction excavations may vary with the preliminary findings. If this occurs, the geotechnical engineer should evaluate the changed conditions and adjust recommendations and designs, as necessary.

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

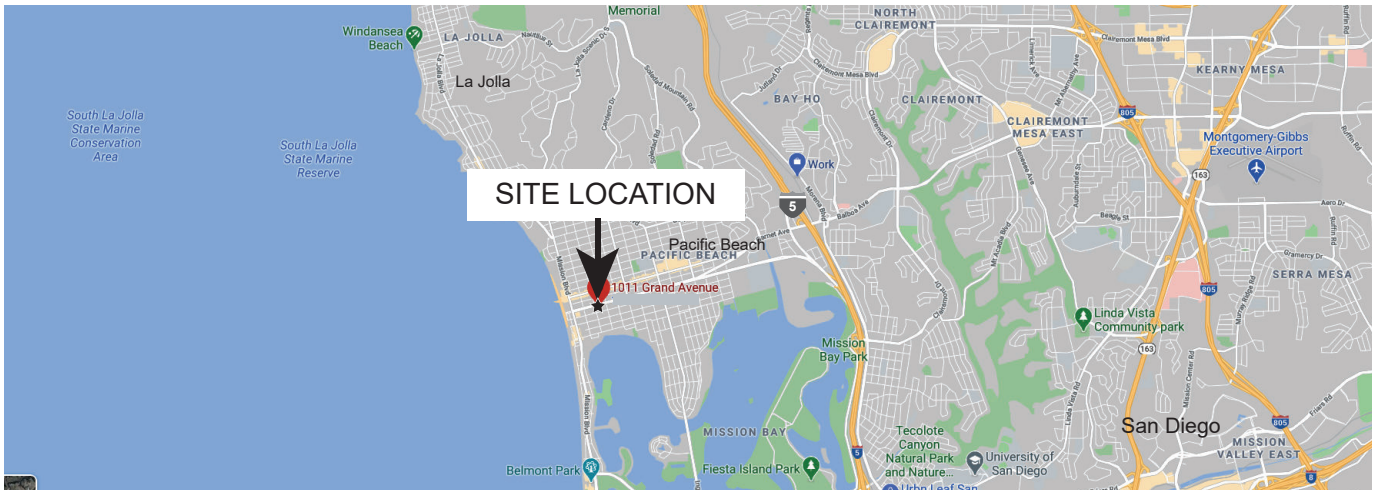
The findings of this report are valid as of the present date. However, the conditions can change with the passage of time, whether they are due to natural processes or the works of man. In addition, changes in applicable or appropriate standards may occur from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside of our control. This report is subject to review and should be updated after a period of 3 years.

*** * * TerraPacific Consultants, Inc. * * ***

APPENDIX A

Figures

LOCATION:
1011 Grand Avenue,
San Diego, CA

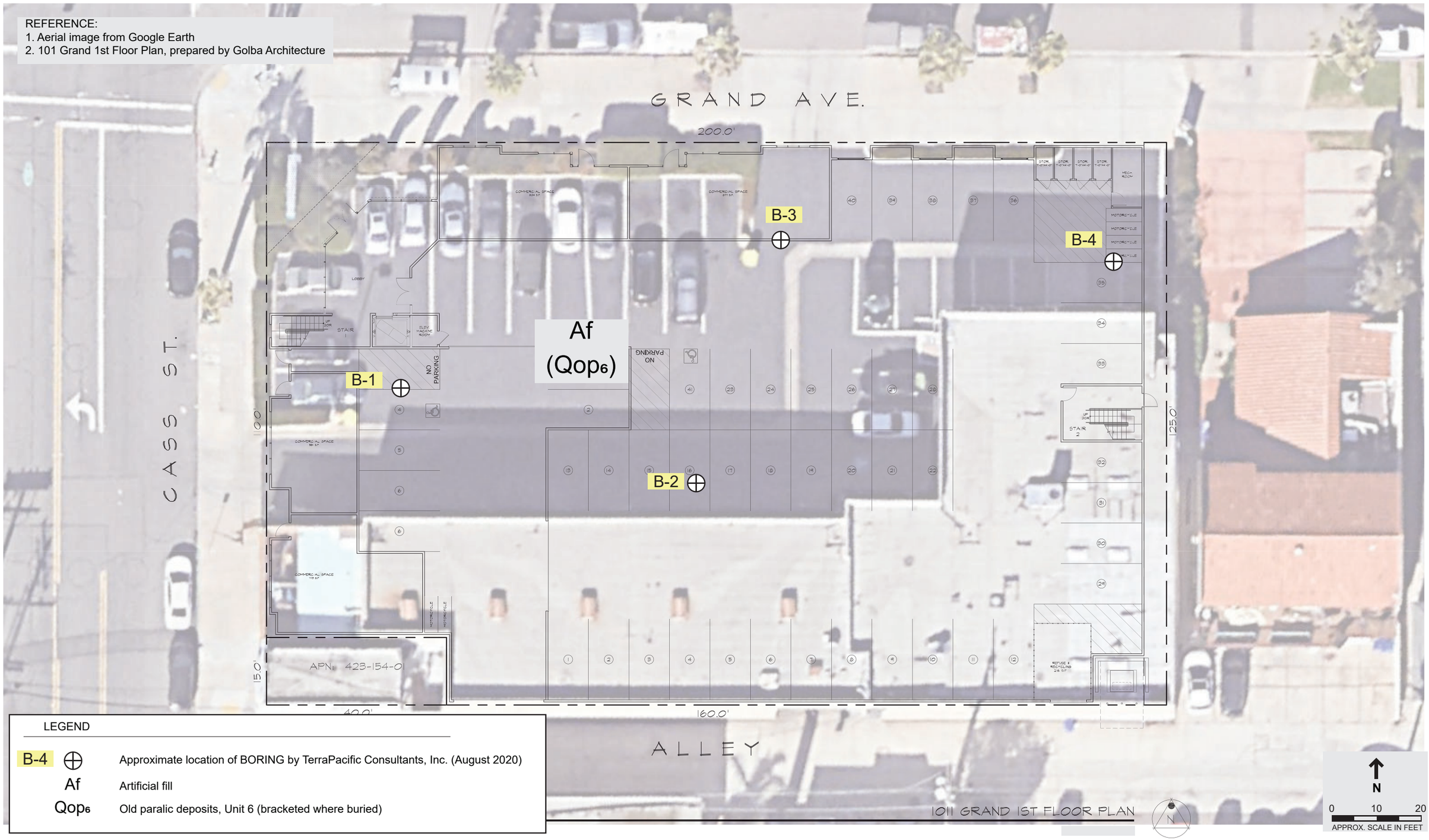


REFERENCE: Google Maps

N

TerraPacific CONSULTANTS INC 4010 Morena Boulevard Suite 108 San Diego CA 92117 858-521-1190	***Site Location Plan***	*Grand Avenue Units* File No. 20-142 September 2020	Figure 1

REFERENCE:
1. Aerial image from Google Earth
2. 101 Grand 1st Floor Plan, prepared by Golba Architecture



LEGEND

B-4	⊕	Approximate location of BORING by TerraPacific Consultants, Inc. (August 2020)
Af		Artificial fill
Qop6		Old paralic deposits, Unit 6 (bracketed where buried)

TerraPacific CONSULTANTS INC
4010 Morena Boulevard
Suite 108
San Diego CA 92117
858-521-1190

Geotechnical Plan

Grand Avenue Units

File No. 20-142
September 2020

Figure 2

Compiled by
Michael P. Kennedy and Siang S. Tan
2008

San Diego Quadrangle

1. U.S. Geological Survey, Department of Earth Sciences, University of California, Riverside

Description of Map Units

Qop6

Old paralic deposits, Unit 6 (late to middle Pleistocene)—Mostly poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of siltstone, sandstone and conglomerate. These deposits rest on the 22-23 m Nestor terrace (Fig. 3)

Kuo

Qya

Ta

Tsc

Tst

Tsd

Kcc

Qvop11

Qvop10

Qvop9

Qop6

Tf

SITE LOCATION

N

0 0.5 mile

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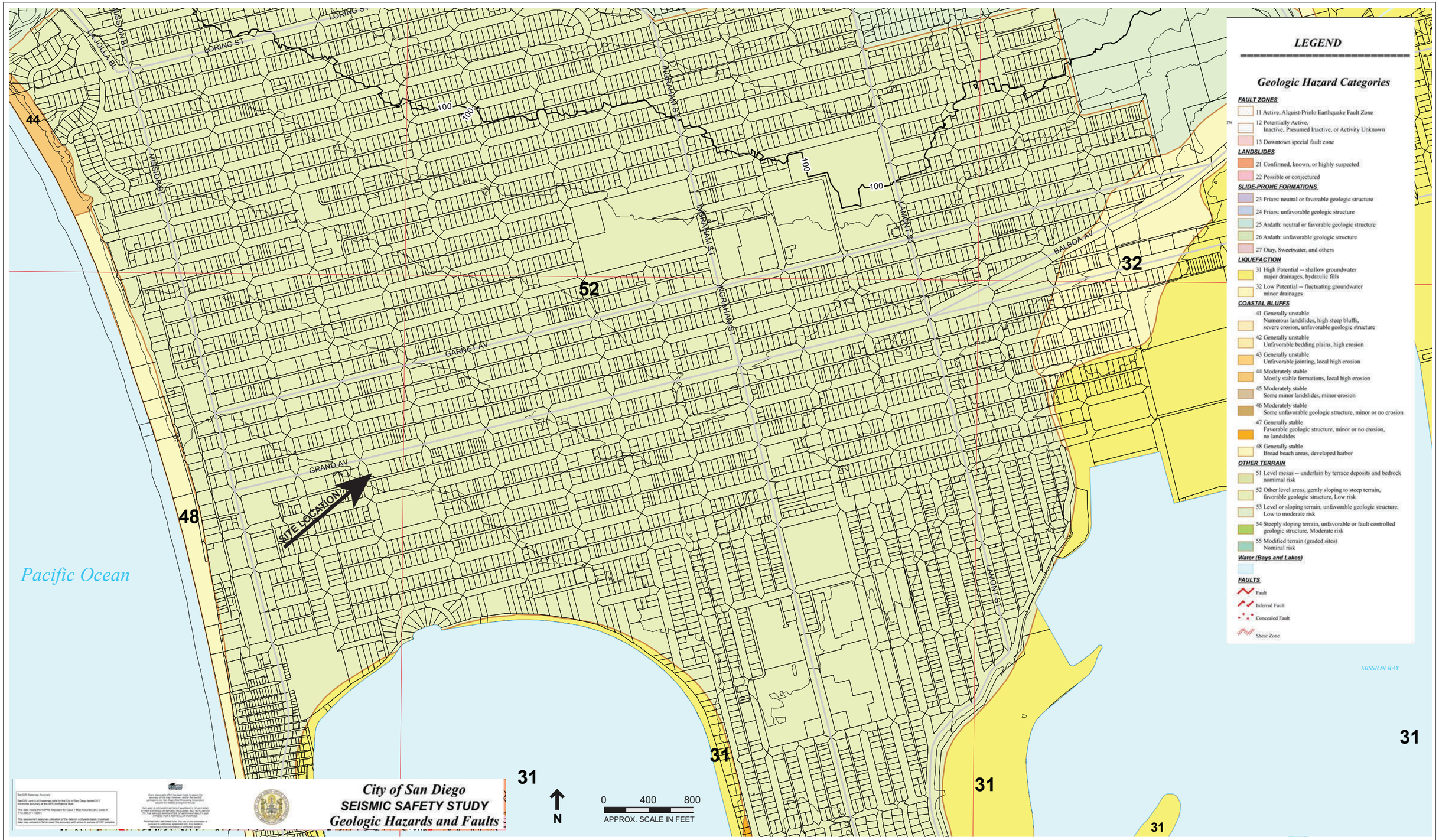
Geologic Map

Grand Avenue Units

File No. 20-142
September 2020

Figure 3



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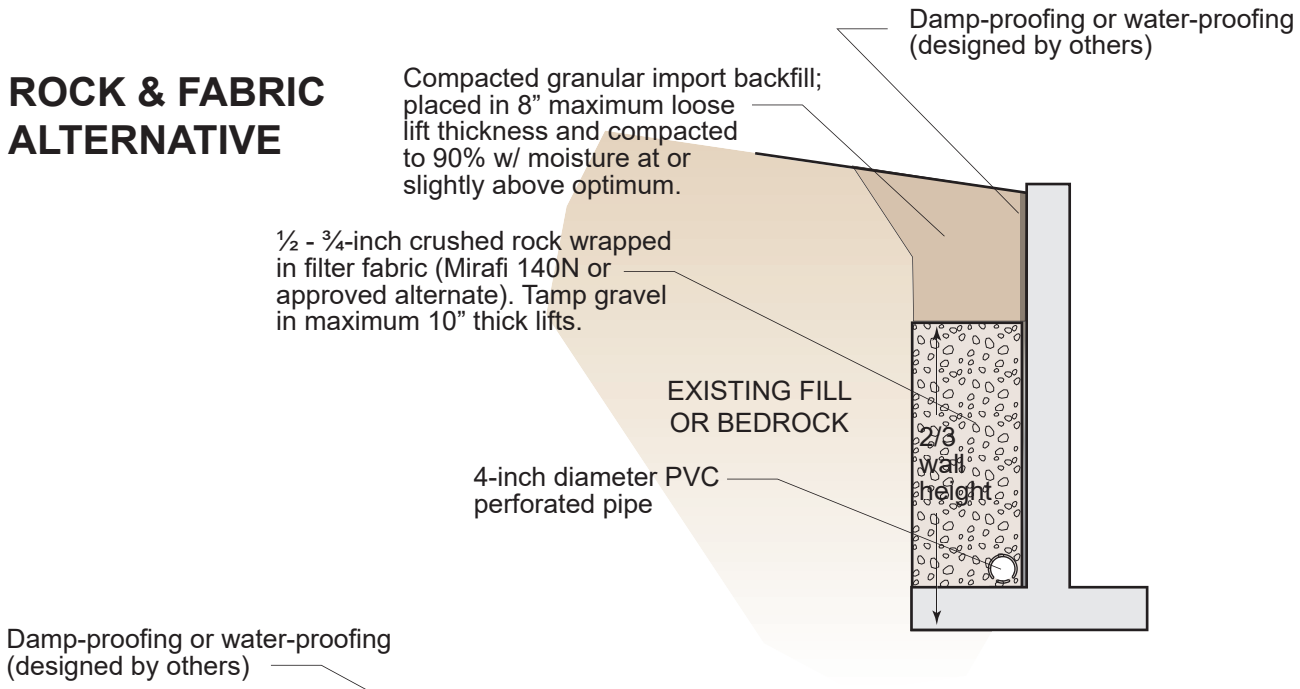
Seismic Safety Study Map

Grand Avenue Units

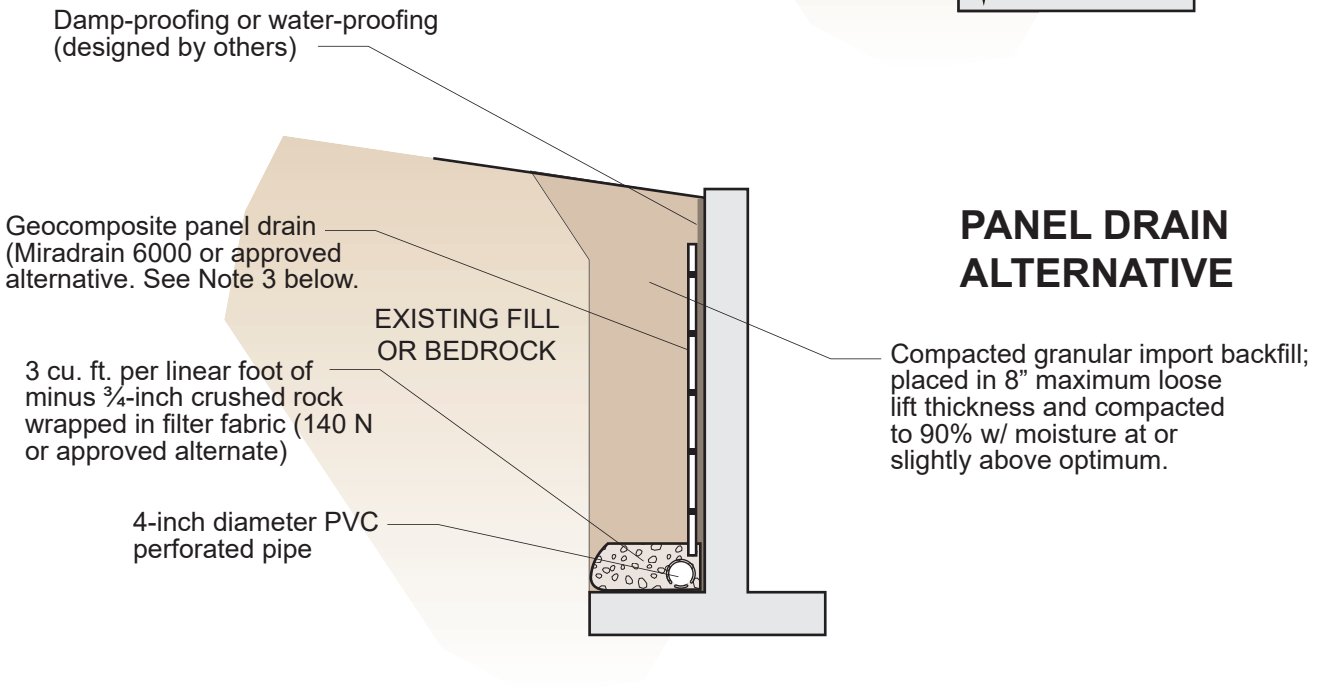
File No. 20-142
September 2020

Figure 4

ROCK & FABRIC ALTERNATIVE



PANEL DRAIN ALTERNATIVE



NOTES:

1) Perforated pipe should outlet through to a solid pipe at maximum 25 foot centers to a free gravity outfall. Perforated pipe and outlet pipe should have a fall of at least 1%.

2) Filter fabric should consist of Mirafi 140N or similar approved fabric. Filter fabric should be overlapped at least 6-inches.

3) Geocomposite panel drain should consist of Miradrain 6000, Mirafi G100N, J-Drain 400, or approved similar product.

4) Drain installation should be observed by the geotechnical consultant prior to backfilling.

NOT TO SCALE

TerraPacific CONSULTANTS INC
4010 Morena Boulevard
Suite 108
San Diego CA 92117
858-521-1190

Retaining Wall Drain Details

Grand Avenue Units

File No. 20-142
September 2020

Figure 5

APPENDIX B

References

REFERENCES

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25) United States Geological Survey, Earthquake Hazards Program, Seismic Hazards Maps and Data, http://earthquake.usgs.gov/hazards.

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APPENDIX C

Subsurface Excavation Logs

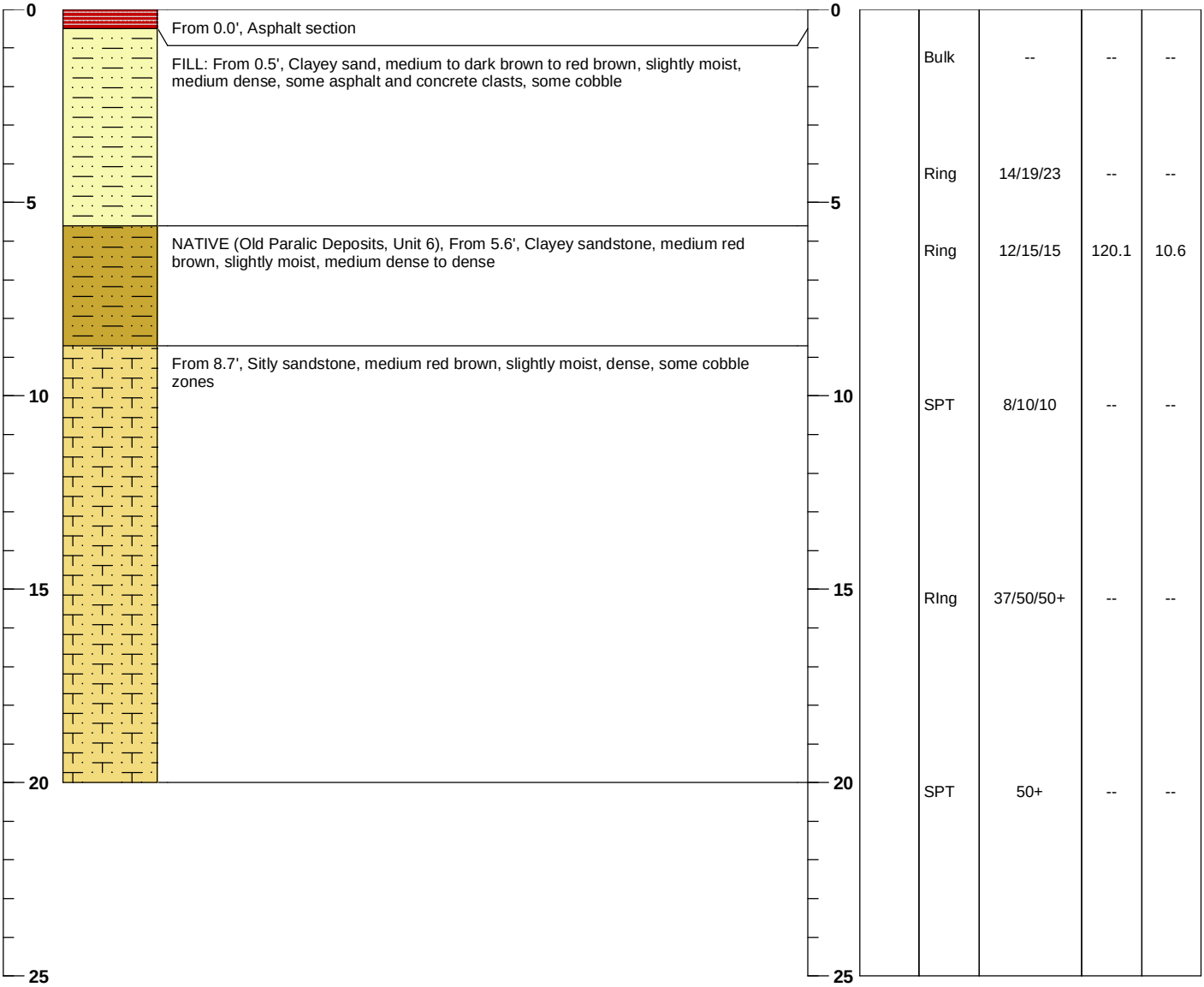
TerraPacific CONSULTANTS INC

Subsurface Boring Log

Boring No: B-1

Project No: 20-142
Project Name: Grand Avenue Units
Location: 1011 Grand Avenue
Sample Method: Modified California Sampler
Instrumentation: None installed
Elevation: Pad

Date: 8/14/20
Logged By: C. O'Hern
Drilling Company: Baja Exploration
Driller: Billy
Drill Rig Type: CME 75
Hammer Wt. & Drop: 140 lbs. for 30"



Depth (ft)	Lithology	DESCRIPTION & REMARKS	USCS	Sample Type	Blow Counts (6", 12", 18")	Dry Density (pcf)	Moisture (%)
0		From 0.0', Asphalt section					
		FILL: From 0.5', Clayey sand, medium to dark brown to red brown, slightly moist, medium dense, some asphalt and concrete clasts, some cobble		Bulk	--	--	--
				Ring	14/19/23	--	--
5		NATIVE (Old Paralic Deposits, Unit 6), From 5.6', Clayey sandstone, medium red brown, slightly moist, medium dense to dense		Ring	12/15/15	120.1	10.6
10		From 8.7', Sitly sandstone, medium red brown, slightly moist, dense, some cobble zones		SPT	8/10/10	--	--
15				RIng	37/50/50+	--	--
20				SPT	50+	--	--
25							

Total Depth: 20.0'
Water: No
Caving: No
Hole Diameter: 8"

Boring

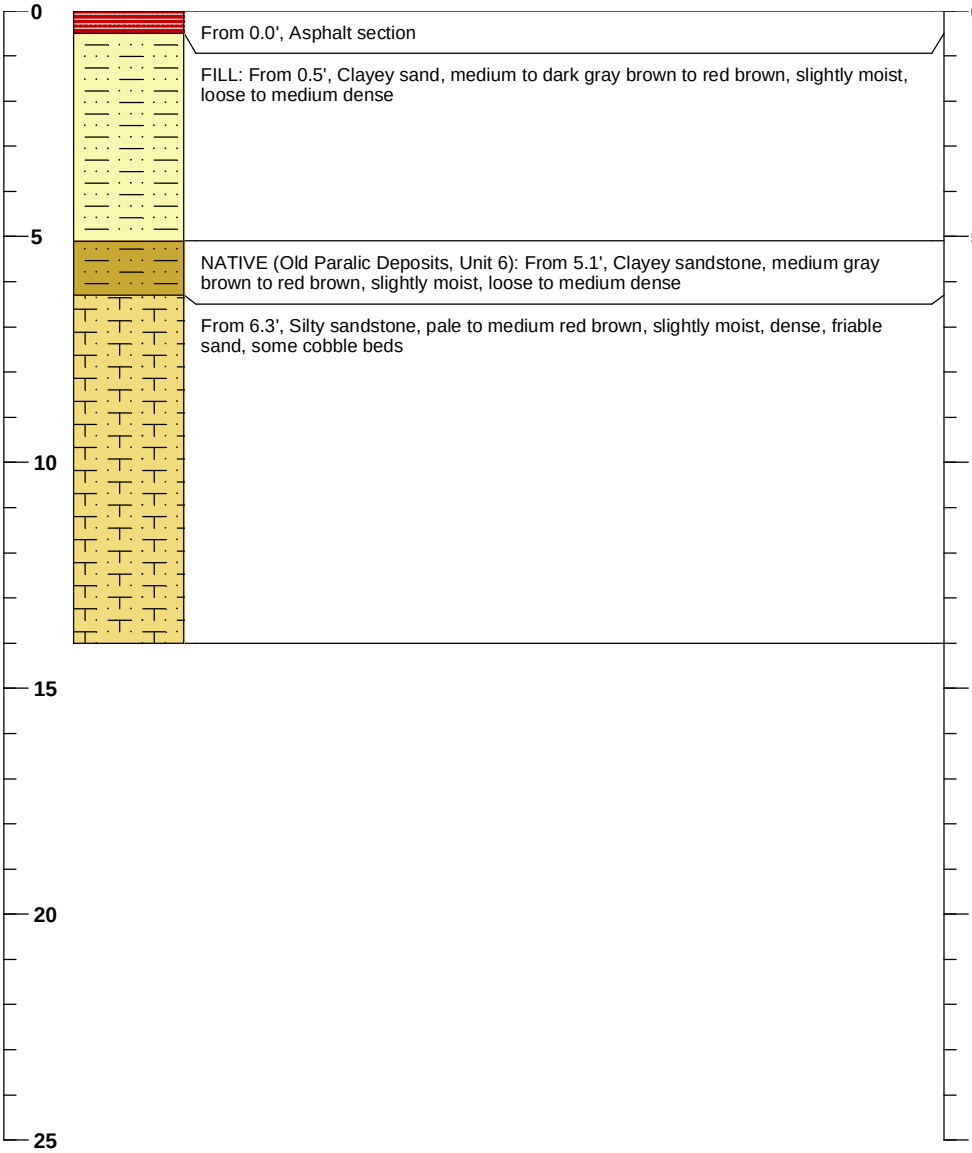
B-1

Subsurface Boring Log

Boring No: B-2

Project No: 20-142
Project Name: Grand Avenue Units
Location: 1011 Grand Avenue
Sample Method: Modified California Sampler
Instrumentation: None installed
Elevation: F.S.

Date: 8/14/20
Logged By: C. O'Hern
Drilling Company: Baja Exploration
Driller: Billy
Drill Rig Type: CME 75
Hammer Wt. & Drop: 140 lbs. for 30"



Depth (ft)	Lithology	DESCRIPTION & REMARKS	USCS	Sample Type	Blow Counts (6", 12", 18")	Dry Density (pcf)	Moisture (%)
0		From 0.0', Asphalt section					
		FILL: From 0.5', Clayey sand, medium to dark gray brown to red brown, slightly moist, loose to medium dense		Ring	8/12/20	--	--
5		NATIVE (Old Paralic Deposits, Unit 6): From 5.1', Clayey sandstone, medium gray brown to red brown, slightly moist, loose to medium dense					
		From 6.3', Silty sandstone, pale to medium red brown, slightly moist, dense, friable sand, some cobble beds		SPT	5/5/5	--	--
10				Ring	8/14/26	--	--
15							
20							
25							

Total Depth: 14.0'
Water: No
Caving: No
Hole Diameter: 8"

Boring

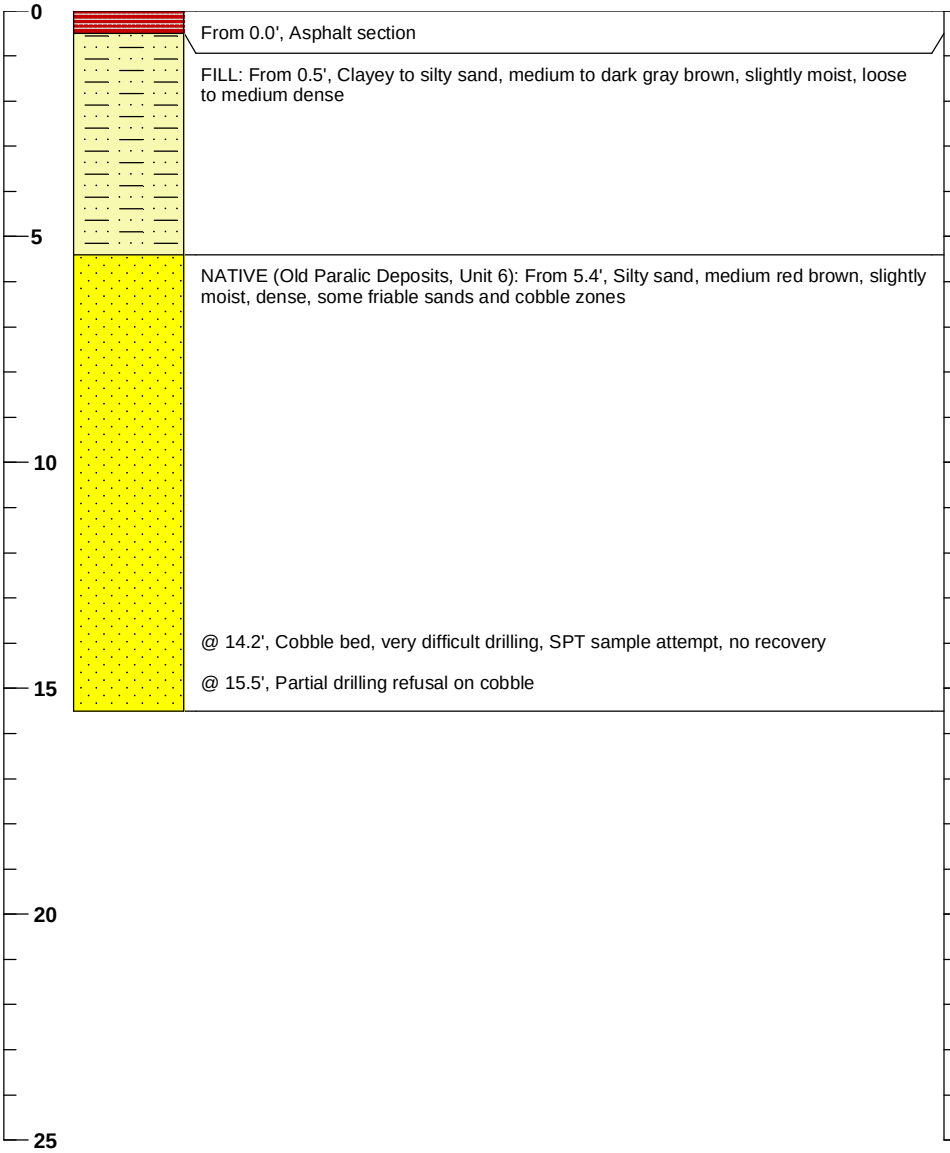
B-2

Subsurface Boring Log

Boring No: B-3

Project No: 20-142
Project Name: Grand Avenue Units
Location: 1011 Grand Avenue
Sample Method: Modified California Sampler
Instrumentation: None installed
Elevation: F.S.

Date: 8/14/20
Logged By: C. O'Hern
Drilling Company: Baja Exploration
Driller: Billy
Drill Rig Type: CME 75
Hammer Wt. & Drop: 140 lbs. for 30"



Depth (ft)	Lithology	DESCRIPTION & REMARKS	USCS	Sample Type	Blow Counts (6", 12", 18")	Dry Density (pcf)	Moisture (%)
0		From 0.0', Asphalt section					
		FILL: From 0.5', Clayey to silty sand, medium to dark gray brown, slightly moist, loose to medium dense		Bulk	--	--	--
5				Ring	3/6/18	--	--
		NATIVE (Old Paralic Deposits, Unit 6): From 5.4', Silty sand, medium red brown, slightly moist, dense, some friable sands and cobble zones					
10				Ring	7/10/15	124.4	10.6
		@ 14.2', Cobble bed, very difficult drilling, SPT sample attempt, no recovery					
15		@ 15.5', Partial drilling refusal on cobble		SPT	18/50	--	--
20							
25							

Total Depth: 15.5'
Water: --
Caving: --
Hole Diameter: --

Boring

B-3

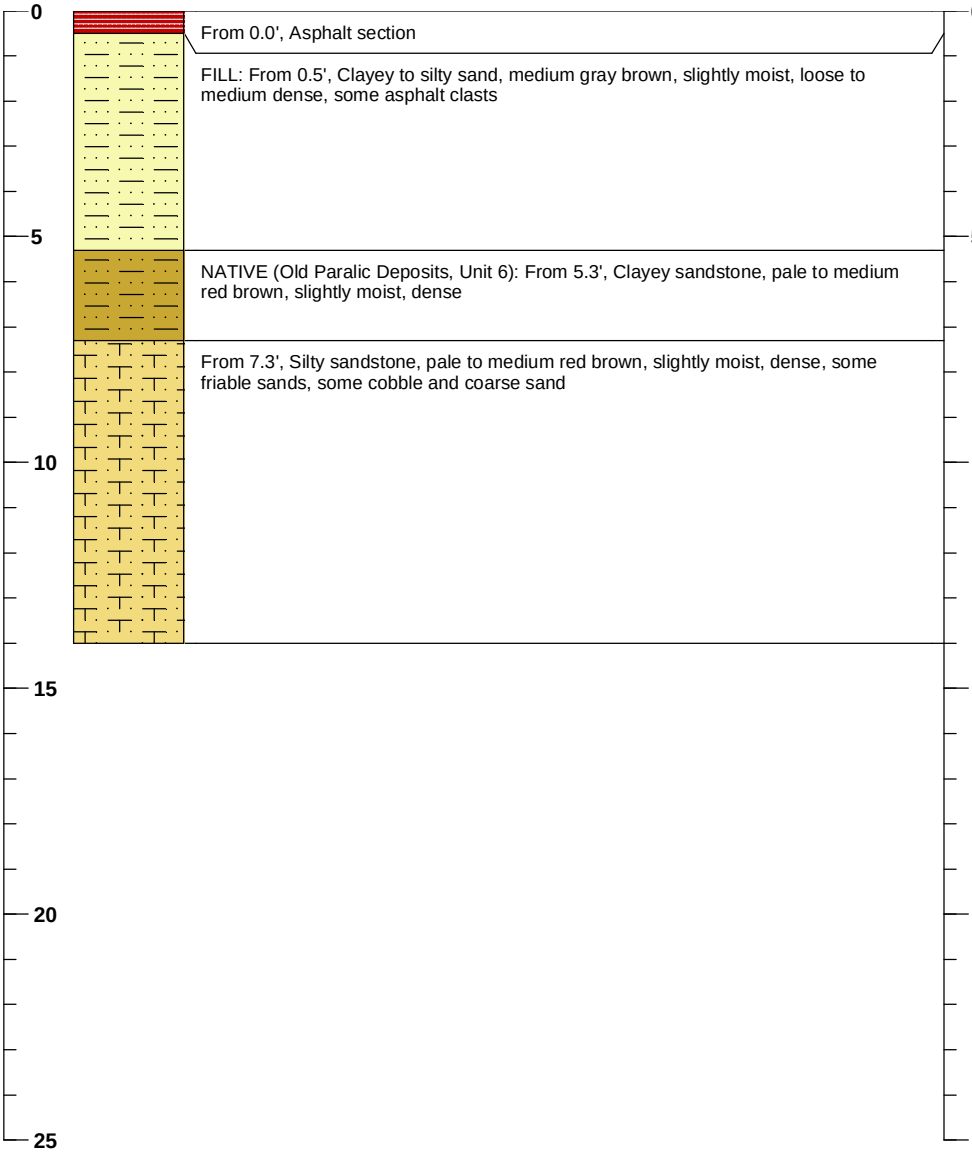
TerraPacific CONSULTANTS INC

Subsurface Boring Log

Boring No: B-4

Project No: 20-142
Project Name: Grand Avenue Units
Location: 1011 Grand Avenue
Sample Method: Modified California Sampler
Instrumentation: None installed
Elevation: F.S.

Date: 8/14/20
Logged By: C. O'Hern
Drilling Company: Baja Exploration
Driller: Billy
Drill Rig Type: CME 75
Hammer Wt. & Drop: 140 lbs. for 30"



Depth (ft)	Lithology	DESCRIPTION & REMARKS	USCS	Sample Type	Blow Counts (6", 12", 18")	Dry Density (pcf)	Moisture (%)
5				Ring	10/8/29	125.0	12.0
10				SPT	5/8/10	--	--
				Ring	--	--	--

Total Depth: 14.0'
Water: No
Caving: No
Hole Diameter: 8"

Boring

B-4

APPENDIX D

Laboratory Test Results

Grand Avenue Units

Summary of Laboratory Test Results

FN: 20-142

Sample Location			Corrosivity Series		ASTM D 1557		ASTM D 2937		ASTM D 3080		ASTM D 4829		ASTM D 4546	
			CTM422	CTM 417										
Location	Sample Depth	Sample Type	Chloride Content	Sulfate Content	Maximum Dry Density	Opt. Moist Content	Dry Density	Moisture Content	Peak ϕ	Peak c	Expansion Index	Expansion Potential	Hydro Response	Normal Stress
B-1	1-4'	LB	--	--	129	7.5	--	--	30	200	35	Low	--	--
B-3	1-4'	LB	0.037	0.017	--	--	--	--	--	--	--	--	--	--
B-1	6'	Ring	--	--	--	--	120.1	10.6	--	--	--	--	-1.07	1500
B-3	10'	Ring	--	--	--	--	124.4	10.6	--	--	--	--	--	--
B-4	4'	Ring	--	--	--	--	125.0	12.0	--	--	--	--	--	--

COMPACTION TEST

ASTM D 1557
Modified Proctor

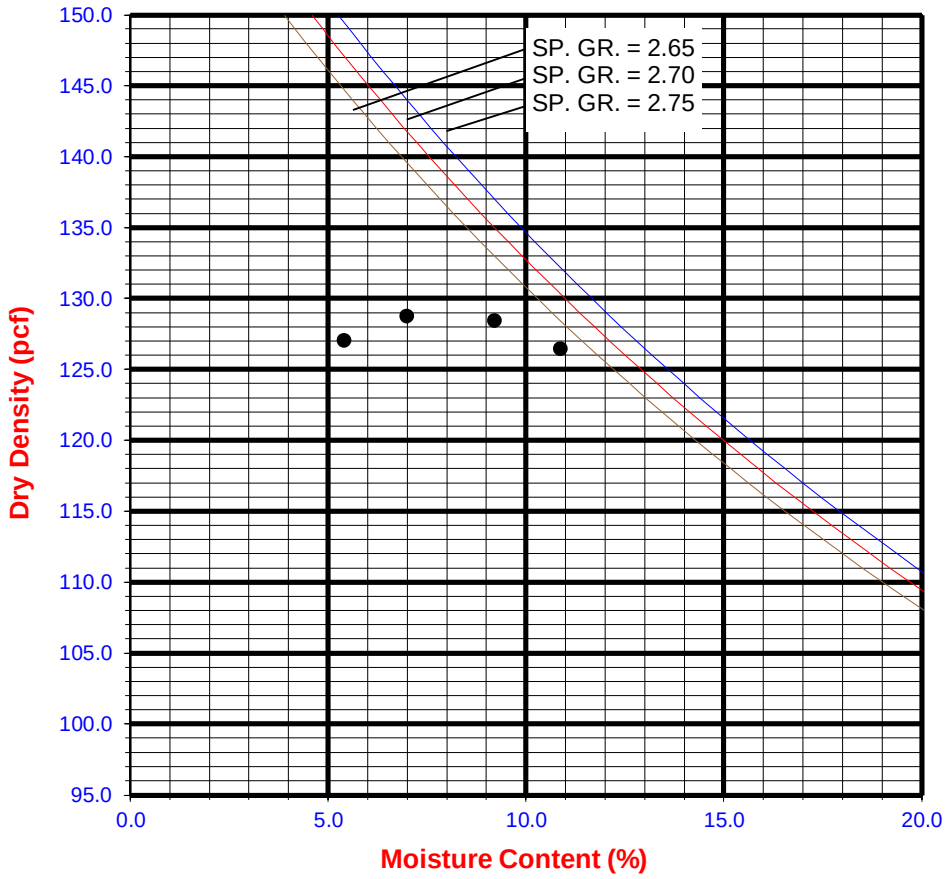
Project Name: Grand Ave Units
Project No. : 20-142
Boring No.: B-1 @ 0-4'
Technician: JMS
Date: 8/26/2020
Visual Sample Description: Medium Brown Clayey Sand

X **Manual Ram**

Ram Weight 10 LBS Drop 18 inches

		TEST NO.	1	2	3	4	5	6
A	Wt. Comp. Soil + Mold (gm.)		3894.00	3932.00	3931.00	3835.00		
B	Wt. of Mold (gm.)		1794.00	1794.00	1794.00	1794.00		
C	Net Wt. of Soil (gm.)	A - B	2100.00	2138.00	2137.00	2041.00		
D	Wet Wt. of Soil + Cont. (gm.)		1834.4	1791.7	1474.1	1333.7		
E	Dry Wt. of Soil + Cont. (gm.)		1724.0	1656.5	1348.0	1275.1		
F	Wt. of Container (gm.)		143.2	186.6	187.8	187.5		
G	Moisture Content (%)	[(D-F)-(E-F)]/(E-F)	7.0	9.2	10.9	5.4		
H	Wet Density (pcf)	C*29.76 /453.6	137.8	140.3	140.2	133.9		
I	Dry Density (pcf)	H/(1+G/100)	128.8	128.5	126.5	127.1		

Maximum Dry Density (pcf) **129.0** **7.5**



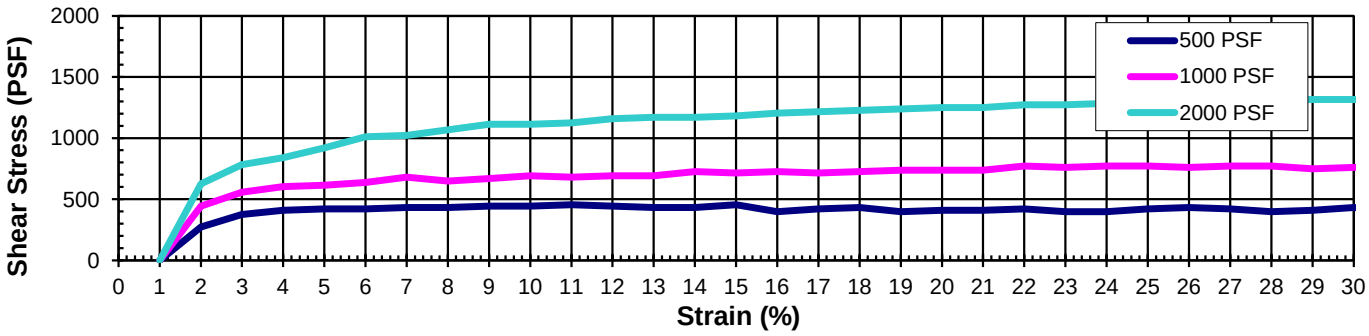
PROCEDURE USED
Procedure A

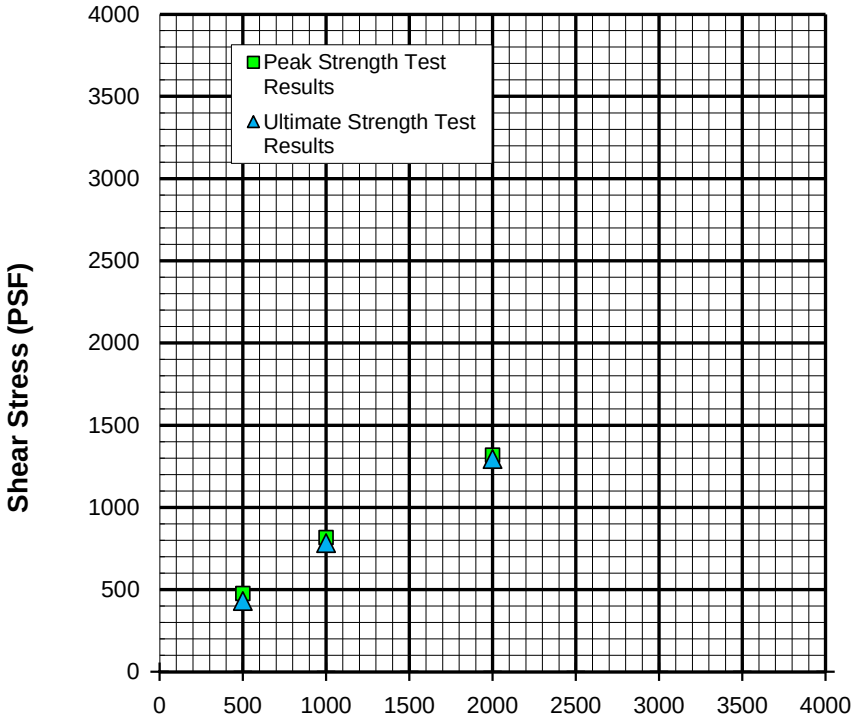
TerraPacific Consultants, Inc. 4010 Morena Boulevard, Suite 108, San Diego, CA 92117 / Phone: (858) 521-1190 Fax: (858) 521-1199

DIRECT SHEAR TEST

Laboratory Report

File Name:	Grand Ave Units
File No.:	20-142
Date:	8/28/2020
Technician:	JMS





Sample No.& Location:	B-1 @ 1-4'
Soil Description:	Light Brown Silty Sand
Sample Type:	Intact
Specimen Preparation:	Inundated

	Peak	Ultimate
Friction Angle Φ' (deg)	30	30
Cohesion C' (psf)	200	110

TerraPacific Consultants Inc. 4010 Morena Boulevard, Suite 108, San Diego, CA 92117 / Phone: (858) 521-1190 Fax: (858) 521-1199

TerraPacific CONSULTANTS INC

APPENDIX E

Summary of Active Faults

```
**********************
*                    *
*    E Q F A U L T   *
*                    *
*    Version 3.00    *
*                    *
**********************
```

DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: 20-142

DATE: 08-25-2020

JOB NAME: Grand Avenue Units

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CDMGFLTE_new.dat

SITE COORDINATES:
SITE LATITUDE: 32.7951
SITE LONGITUDE: 117.2507

SEARCH RADIUS: 62.4 mi

ATTENUATION RELATION: 15) Campbell & Bozorgnia (1997 Rev.) - Soft Rock
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: cdist
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: 1 Campbell SHR: 0
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CDMGFLTE_new.dat

MINIMUM DEPTH VALUE (km): 3.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
ROSE CANYON	2.2(3.5)	7.2	0.625	X
CORONADO BANK	11.1(17.9)	7.6	0.341	IX
NEWPORT-INGLEWOOD (Offshore)	27.1(43.6)	7.1	0.092	VII
ELSINORE-JULIAN	40.5(65.1)	7.1	0.053	VI
ELSINORE-TEMECULA	42.6(68.5)	6.8	0.038	V
EARTHQUAKE VALLEY	47.2(76.0)	6.5	0.025	V
PALOS VERDES	52.3(84.2)	7.1	0.036	V
ELSINORE-COYOTE MOUNTAIN	52.9(85.2)	6.8	0.027	V
ELSINORE-GLEN IVY	58.9(94.8)	6.8	0.023	IV

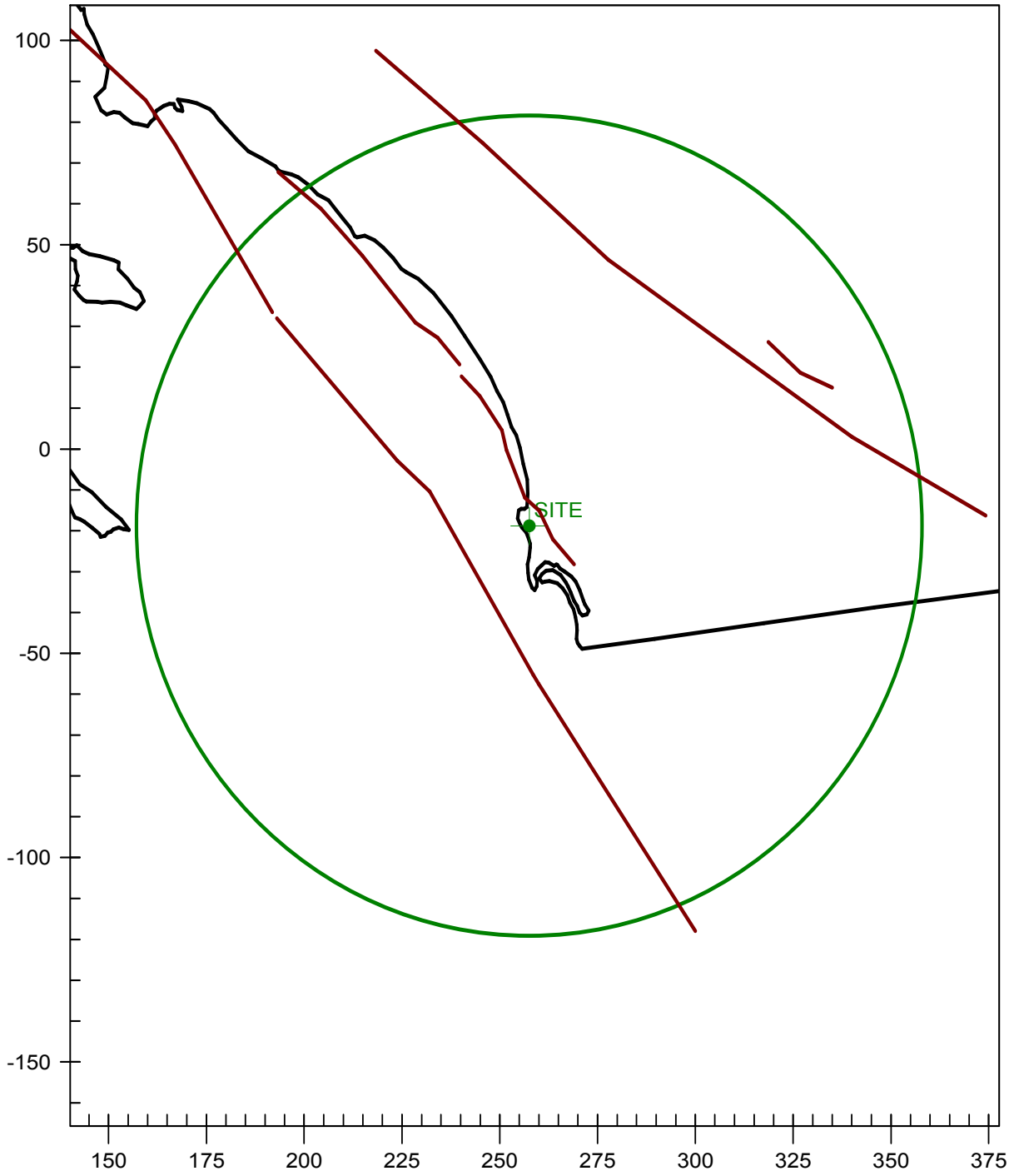
-END OF SEARCH- 9 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE ROSE CANYON FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.2 MILES (3.5 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.6248 g

CALIFORNIA FAULT MAP

Grand Avenue Units



APPENDIX F

Infiltration Feasibility Condition Letter

TerraPacific
CONSULTANTS INC

Mr. Mike Turk
KDTD, Inc.
4641 Ingraham Street
San Diego, CA 92109

March 9, 2021
File No. 20-142

Subject: **Infiltration Feasibility Condition Letter**
Grand Avenue Units
1011 Grand Avenue
San Diego, California

References:
1) "Geotechnical Investigation, Grand Avenue Units, 1011 Grand Avenue, San Diego, California," by TerraPacific Consultants, Inc., dated August 26, 2020.
2) "Storm Water Standards," by City of San Diego, dated October 2018.
3) "Floor Plans, Grand Avenue Units, San Diego, California," by Golba Architecture.

Dear Mr. Turk:

The following updated letter provides our opinions regarding site infiltration for the proposed development at the subject project. For simplicity, we are addressing each bullet item as indicated in Section C.1.1, in the October 2018 edition of the City of San Diego Storm Water Standards BMP Design Manual.

- Our firm conducted a preliminary geotechnical investigation during the initial design phase of the project; the report is referenced above.
- The geotechnical investigation revealed site topography that is essentially flat. Site stratigraphy consists of undocumented fill soil mantling the site. Native paralic deposits underlie the surficial soils. Based on the site-specific exploration, incluiding numerous borings, existing undocumented fill soils in excess of 5 feet in thickness were encountered.
- The site is currently developed with structures and other appurtenances; undocumented fill soils from the initial site development blanket the site.
- The current design footprint is consistent with the initial concept design due to the limited lot size and dimensions. The proposed development will consist of multi-family structures over an on-grade parking garage and commercial units that will utilize the entire lot.

- The physical impairment associated with the limited lot size and proposed improvement footprint prevents full/partial infiltration.

- The existing site configuration consists of undocumented fill soils blanketing the site. Undocumented fill soils with thicknesses in excess of 5 feet were encountered during our site-specific investigation, including numerous borings. These soils are not considered suitable for support of the proposed improvements (structures and appurtenances). As is always the case, infiltration can induce soil settlement and volume change that would adversely impact the proposed improvements, which utilize the entire lot footprint.

- The referenced floor plan was utilized as a base map for the Geotechnical Plan, Figure 1, attached to this letter.

- Based on our referenced site-specific geotechnical investigation, infiltration is not considered feasible from a geotechnical standpoint due to the negative impacts on proposed improvements (structures and appurtenances) that would result from infiltration and associated soil volume changes.

- The Geotechnical Plan, Figure 1, depicts the site design and is provided in the attachment within this letter.

We appreciate the opportunity to be of service. If you have any questions, please do not hesitate to call.

Respectfully submitted,
TerraPacific Consultants, Inc.

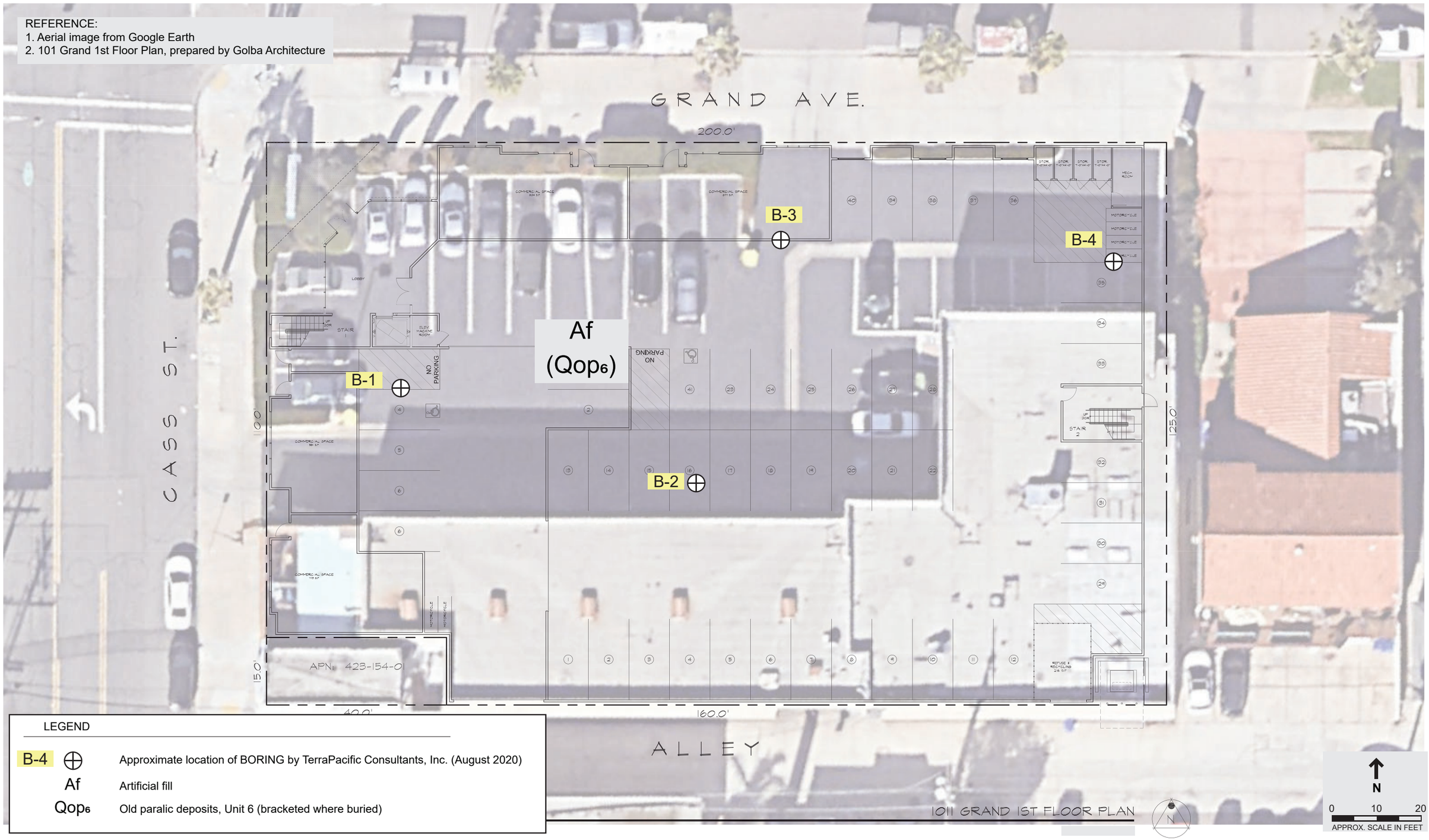
Cristopher C. O'Hern, CEG 2397
Senior Engineering Geologist

Octavio Brambila, PE 70633
Project Engineer

ATTACHMENT

Geotechnical Plan

REFERENCE:
1. Aerial image from Google Earth
2. 101 Grand 1st Floor Plan, prepared by Golba Architecture



LEGEND

B-4	⊕	Approximate location of BORING by TerraPacific Consultants, Inc. (August 2020)
Af		Artificial fill
Qop_6		Old paralic deposits, Unit 6 (bracketed where buried)

TerraPacific CONSULTANTS INC
4010 Morena Boulevard
Suite 108
San Diego CA 92117
858-521-1190

Geotechnical Plan

Grand Avenue Units

File No. 20-142
September 2020

Figure 2

APPENDIX G

Standard Grading Guidelines

STANDARD GUIDELINES FOR GRADING PROJECTS

TABLE OF CONTENTS

GENERAL

The guidelines contained herein and the standard details attached hereto represent this firm's standard recommendations for grading and other associated operations on construction projects. These guidelines should be considered a portion of the project specifications.

All plates attached hereto shall be considered as part of these guidelines.

The Contractor should not vary from these guidelines without prior recommendation by the Geotechnical Consultant and the approval of the Client or his authorized representative. Recommendation by the Geotechnical Consultant and/or Client should not be considered to preclude requirements for approval by the controlling agency prior to the execution of any changes.

These Standard Grading Guidelines and Standard Details may be modified and/or superseded by recommendations contained in the text of the preliminary geotechnical report and/or subsequent reports.

If disputes arise out of the interpretation of these grading guidelines or standard details, the Geotechnical Consultant shall provide the governing interpretation.

DEFINITIONS OF TERMS

ALLUVIUM - Unconsolidated soil deposits resulting from flow of water, including sediments deposited in river beds, canyons, flood plains, lakes, fans and estuaries.

AS-GRADED (AS-BUILT) - The surface and subsurface conditions at completion of grading.

BACKCUT - A temporary construction slope at the rear of earth retaining structures such as buttresses, shear keys, stabilization fills or retaining walls.

BACKDRAIN - Generally a pipe and gravel or similar drainage system placed behind earth retaining structures such buttresses, stabilization fills, and retaining walls.

BEDROCK - Relatively undisturbed formational rock, more or less solid, either at the surface or beneath superficial deposits of soil.

BENCH - A relatively level step and near vertical rise excavated into sloping ground on which fill is to be placed.

BORROW (Import) - Any fill material hauled to the project site from off-site areas.

BUTTRESS FILL - A fill mass, the configuration of which is designed by engineering calculations to retain slope conditions containing adverse geologic features. A buttress is generally specified by minimum key width and depth and by maximum backcut angle. A buttress normally contains a back-drainage system.

CIVIL ENGINEER - The Registered Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying and verifying as-graded topographic conditions.

CLIENT - The Developer or his authorized representative who is chiefly in charge of the project. He shall have the responsibility of reviewing the findings and recommendations made by the Geotechnical Consultant and shall authorize the Contractor and/or other consultants to perform work and/or provide services.

COLLUVIUM - Generally loose deposits usually found near the base of slopes and brought there chiefly by gravity through slow continuous downhill creep (also see Slope Wash).

COMPACTION - Densification of man-placed fill by mechanical means.

CONTRACTOR - A person or company under contract or otherwise retained by the Client to perform demolition, grading and other site improvements.

DEBRIS - All products of clearing, grubbing, demolition, contaminated soil materials unsuitable for reuse as compacted fill and/or any other material so designated by the Geotechnical Consultant.

ENGINEERING GEOLOGIST - A licensed Engineering Geologist who applies scientific methods, engineering and geologic principles and professional experience to the acquisition, interpretation and use of knowledge of materials of the earth's crust for the evaluation of engineering problems. Geotechnical Engineering encompasses many of the engineering aspects of soil mechanics, rock mechanics, geology, geophysics, hydrology and related sciences.

ENGINEERED FILL - A fill of which the Geotechnical Consultant or his representative, during grading, has made sufficient tests to enable him to conclude that the fill has been placed in substantial compliance with the recommendations of the Geotechnical Consultant and the governing agency requirements.

EROSION - The wearing away of the ground surface as a result of the movement of wind and/or water.

EXCAVATION - The mechanical removal of earth materials.

EXISTING GRADE - The ground surface configuration prior to grading.

FILL - Any deposits of soil, rock, soil-rock blends or other similar materials placed by man.

FINISH GRADE - The ground surface configuration at which time the surface elevations conform to the approved plan.

GEOFABRIC - Any engineering textile utilized in geotechnical applications including subgrade stabilization and filtering.

GEOLOGIST - A representative of the Geotechnical Consultant educated and trained in the field of geology.

GEOTECHNICAL CONSULTANT - The Geotechnical Engineering and Engineering Geology consulting firm retained to provide technical services for the project. For the purpose of these specifications, observations by the Geotechnical Consultant include observations by the Soil Engineer, Geotechnical Engineer, Engineering Geologist and those performed by persons employed by and responsible to the Geotechnical Consultants.

GEOTECHNICAL ENGINEER - A licensed Geotechnical Engineer or Civil Engineer who applies scientific methods, engineering principles and professional experience to the acquisition, interpretation and use of knowledge of materials of the earth's crust for the evaluation of engineering problems. Geotechnical Engineering encompasses many of the engineering aspects of soil mechanics, rock mechanics, geology, geophysics, hydrology and related sciences.

GRADING - Any operation consisting of excavation, filling or combinations thereof and associated operations.

LANDSLIDE DEBRIS - Material, generally porous and of low density, produced from instability of natural or man-made slopes.

MAXIMUM DENSITY - Standard laboratory test for maximum dry unit weight. Unless otherwise specified, the maximum dry unit weight shall be determined in accordance with ASTM Method of Test D 1557-09.

OPTIMUM MOISTURE - Soil moisture content at the test maximum density.

RELATIVE COMPACTION - The degree of compaction (expressed as a percentage) of dry unit weight of a material as compared to the maximum dry unit weight of the material.

ROUGH GRADE - The ground surface configuration at which time the surface elevations approximately conform to the approved plan.

SITE - The particular parcel of land where grading is being performed.

SHEAR KEY - Similar to buttress, however, it is generally constructed by excavating a slot within a natural slope in order to stabilize the upper portion of the slope without grading encroaching into the lower portion of the slope.

SLOPE - An inclined ground surface the steepness of which is generally specified as a ratio of horizontal:vertical (e.g., 2:1).

SLOPE WASH - Soil and/or rock material that has been transported down a slope by action of gravity assisted by runoff water not confined by channels (also see Colluvium).

SOIL - Naturally occurring deposits of sand, silt, clay, etc., or combinations thereof.

SOIL ENGINEER - Licensed Geotechnical Engineer or Civil Engineer experienced in soil mechanics (also see Geotechnical Engineer).

STABILIZATION FILL - A fill mass, the configuration of which is typically related to slope height and is specified by the standards of practice for enhancing the stability of locally adverse conditions. A stabilization fill is normally specified by minimum key width and depth and by maximum backcut angle. A stabilization fill may or may not have a back drainage system specified.

SUBDRAIN - Generally a pipe and gravel or similar drainage system placed beneath a fill in the alignment of canyons or former drainage channels.

SLOUGH - Loose, non-compacted fill material generated during grading operations.

TAILINGS – Non-engineered fill which accumulates on or adjacent to equipment haul-roads.

TERRACE - Relatively level step constructed in the face of graded slope surface for drainage control and maintenance purposes.

TOPSOIL - The presumable fertile upper zone of soil which is usually darker in color and loose.

WINDROW - A string of large rocks buried within engineered fill in accordance with guidelines set forth by the Geotechnical Consultant.

OBLIGATIONS OF PARTIES

The Geotechnical Consultant should provide observation and testing services and should make evaluations in order to advise the Client on geotechnical matters. The Geotechnical Consultant should report his findings and recommendations to the Client or his authorized representative.

The client should be chiefly responsible for all aspects of the project. He or his authorized representative has the responsibility of reviewing the findings and recommendations of the Geotechnical Consultant. He shall authorize or cause to have authorized the Contractor and/or other consultants to perform work and/or provide services. During grading the Client or his authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

The Contractor should be responsible for the safety of the project and satisfactory completion of all grading and other associated operations on construction projects, including but not limited to, earthwork in accordance with the project plans, specifications and controlling agency requirements. During grading, the Contractor or his authorized representative should remain on-site. Overnight and on days off, the Contractor should remain accessible.

SITE PREPARATION

The Client, prior to any site preparation or grading, should arrange and attend a meeting among the Grading Contractor, the Design Engineer, the Geotechnical Consultant, representatives of the appropriate governing authorities as well an any other concerned parties. All parties should be given at least 48 hours notice.

Clearing and grubbing should consist of the removal of vegetation such as brush, grass, woods, stumps, trees, roots of trees and otherwise deleterious natural materials from the areas to be graded. Clearing and grubbing should extend to the outside of all proposed excavation and fill areas.

Demolition should include removal of buildings, structures, foundations, reservoirs, utilities (including underground pipelines, septic tanks, leach fields, seepage pits, cisterns, mining shafts, tunnels, etc.) and other man-made surface and subsurface improvements from the areas to be graded. Demolition of utilities should include proper capping and/or re-routing pipelines at the project perimeter and cutoff and capping of wells in accordance with the requirements of the governing authorities and the recommendations of the Geotechnical Consultant at the time of demolition.

Trees, plants or man-made improvements not planned to be removed or demolished should be protected by the Contractor from damage or injury.

Debris generated during clearing, grubbing and/or demolition operations should be wasted from areas to be graded and disposed off-site. Clearing, grubbing and demolition operations should be performed under the observation of the Geotechnical Consultant.

The Client or Contractor should obtain the required approvals from the controlling authorities for the project prior, during and/or after demolition, site preparation and removals, etc. The appropriate approvals should be obtained prior to proceeding with grading operations.

SITE PROTECTION

Protection of the site during the period of grading should be the responsibility of the Contractor. Unless other provisions are made in writing and agreed upon among the concerned parties, completion of a portion of the project should not be considered to preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete as identified by the Geotechnical Consultant, the Client and the regulating agencies.

The Contractor should be responsible for the stability of all temporary excavations. Recommendations by the Geotechnical Consultant pertaining to temporary excavations (e.g., backcuts) are made in consideration of stability of the completed project and, therefore, should not be considered to preclude the responsibilities of the Contractor. Recommendations by the Geotechnical Consultant should not be considered to preclude more restrictive requirements by the regulating agencies.

Precautions should be taken during the performance of site clearing, excavations and grading to protect the work site from flooding, ponding, or inundation by poor or improper surface drainage. Temporary provisions should be made during the rainy season to adequately direct surface drainage away from and off the work site. Where low areas can not be avoided, pumps should be kept on hand to continually remove water during periods of rainfall.

During periods of rainfall, plastic sheeting should be kept reasonably accessible to prevent unprotected slopes from becoming saturated. Where necessary during periods of rainfall, the Contractor should install check dams, desilting basins, riprap, sand bags or other devices or methods necessary to control erosion and provide safe conditions.

During periods of rainfall, the Geotechnical Consultant should be kept informed by the Contractor as to the nature of remedial or preventative work being performed (e.g., pumping, placement of sandbags or plastic sheeting, other labor, dozing, etc.).

Following periods of rainfall, the Contractor should contact the Geotechnical Consultant and arrange a walk-over of the site in order to visually assess rain related damage. The Geotechnical Consultant may also recommend excavations and testing in order to aid in his assessments. At the request of the Geotechnical Consultant, the Contractor shall make excavations in order to evaluate the extent of rain related damage.

Rain related damage should be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress and other adverse conditions identified by the Geotechnical Consultant. Soil adversely affected should be classified as Unsuitable Materials and should be subject to over-excavation and replacement with compacted fill or other remedial grading as recommended by the Geotechnical Consultant.

Relatively level areas, where saturated soils and/or erosion gullies exist to depths of greater than 1-foot, should be over-excavated to unaffected, competent material. Where less than 1-foot in depth, unsuitable materials may be processed in-place to achieve near optimum moisture conditions, then thoroughly recompacted in accordance with the applicable specifications. If the desired results are not achieved, the affected materials should be over-excavated, then replaced in accordance with the applicable specifications.

In slope areas, where saturated soil and/or erosion gullies exist to depths of greater than 1 foot, they should be over-excavated and replaced as compacted fill in accordance with the applicable specifications. Where affected materials exist to depths of 1 foot or less below proposed finished grade, remedial grading by moisture conditioning in-place, followed by thorough recompaction in accordance with the applicable grading guidelines herein may be attempted. If the desired results are not achieved, all affected materials should be over-excavated and replaced as compacted fill in accordance with the slope repair recommendations herein. As field conditions dictate, other slope repair procedures may be recommended by the Geotechnical Consultant.

EXCAVATIONS

Unsuitable Materials

Materials which are unsuitable should be excavated under observation and recommendations of the Geotechnical Consultant. Unsuitable materials include, but may not be limited to, dry, loose, soft, wet, organic compressible natural soils and fractured, weathered, soft bedrock and non-engineered or otherwise deleterious fill materials.

Material identified by the Geotechnical Consultant as unsatisfactory due to its moisture conditions should be over-excavated, watered or dried, as needed, and thoroughly blended to a uniform near optimum moisture condition (per Moisture guidelines presented herein) prior to placement as compacted fill.

Cut Slopes

Unless otherwise recommended by the Geotechnical Consultant and approved by the regulating agencies, permanent cut slopes should not be steeper than 2:1 (horizontal:vertical).

If excavations for cut slopes expose loose, cohesionless, significantly fractured or otherwise unsuitable material, over-excavation and replacement of the unsuitable materials with a compacted stabilization fill should be accomplished as recommended by the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, stabilization fill construction should conform to the requirements of the Standard Details.

The Geotechnical Consultant should review cut slopes during excavation. The Geotechnical Consultant should be notified by the contractor prior to beginning slope excavations.

If, during the course of grading, adverse or potentially adverse geotechnical conditions are encountered which were not anticipated in the preliminary report, the Geotechnical Consultant should explore, analyze and make recommendations to treat these problems.

When cut slopes are made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top-of-cut.

Pad Areas

All lot pad areas, including side yard terraces, above stabilization fills or buttresses should be over-excavated to provide for a minimum of 3-feet (refer to Standard Details) of compacted fill over the entire pad area. Pad areas with both fill and cut materials exposed and pad areas containing both very shallow (less than 3-feet) and deeper fill should be over-excavated to provide for a uniform compacted fill blanket with a minimum of 3-feet in thickness (refer to Standard Details).

Cut areas exposing significantly varying material types should also be over-excavated to provide for at least a 3-foot thick compacted fill blanket. Geotechnical conditions may require greater depth of over-excavation. The actual depth should be delineated by the Geotechnical Consultant during grading.

For pad areas created above cut or natural slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm and/or an appropriate pad gradient. A gradient in soil areas away from the top-of-slopes of 2 percent or greater is recommended.

COMPACTED FILL

All fill materials should be compacted as specified below or by other methods specifically recommended by the Geotechnical Consultant. Unless otherwise specified, the minimum degree of compaction (relative compaction) should be 90 percent of the laboratory maximum density.

Placement

Prior to placement of compacted fill, the Contractor should request a review by the Geotechnical Consultant of the exposed ground surface. Unless otherwise recommended, the exposed ground surface should then be scarified (6-inches minimum), watered or dried as needed, thoroughly blended to achieve near optimum moisture conditions, then thoroughly compacted to a minimum of 90 percent of the maximum density. The review by the Geotechnical Consultant should not be considered to preclude requirements of inspection and approval by the governing agency.

Compacted fill should be placed in thin horizontal lifts not exceeding 8-inches in loose thickness prior to compaction. Each lift should be watered or dried as needed, thoroughly blended to achieve near optimum moisture conditions then thoroughly compacted by mechanical methods to a minimum of 90 percent of laboratory maximum dry density. Each lift should be treated in a like manner until the desired finished grades are achieved.

The Contractor should have suitable and sufficient mechanical compaction equipment and watering apparatus on the job site to handle the amount of fill being placed in consideration of moisture retention properties of the materials. If necessary, excavation equipment should be "shut down" temporarily in order to permit proper compaction of fills. Earth moving equipment should only be considered a supplement and not substituted for conventional compaction equipment.

When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal:vertical), horizontal keys and vertical benches should be excavated into the adjacent slope area. Keying and benching should be sufficient to provide at least 6-foot wide benches and minimum of 4-feet of vertical bench height within the firm natural ground, firm bedrock or engineered compacted fill. No compacted fill should be placed in an area subsequent to keying and benching until the area has been reviewed by the Geotechnical Consultant.

Material generated by the benching operation should be moved sufficiently away from the bench area to allow for the recommended review of the horizontal bench prior to placement of fill. Typical keying and benching details have been included within the accompanying Standard Details.

Within a single fill area where grading procedures dictate two or more separate fills, temporary slopes (false slopes) may be created. When placing fill adjacent to a false slope, benching should be conducted in the same manner as above described. At least a 3-foot vertical bench should be established within the firm core of adjacent approved compacted fill prior to placement of additional fill. Benching should proceed in at least 3-foot vertical increments until the desired finished grades are achieved.

Fill should be tested for compliance with the recommended relative compaction and moisture conditions. Field density testing should conform to ASTM Method of Test D 1556-07, and/or D 6938-10. Tests should be provided for about every 2 vertical feet or 1,000 cubic yards of fill placed. Actual test intervals may vary as field conditions dictate. Fill found not to be in conformance with the grading recommendations should be removed or otherwise handled as recommended by the Geotechnical Consultant.

The Contractor should assist the Geotechnical Consultant and/or his representative by digging test pits for removal determinations and/or for testing compacted fill.

As recommended by the Geotechnical Consultant, the Contractor should "shut down" or remove grading equipment from an area being tested.

The Geotechnical Consultant should maintain a plan with estimated locations of field tests. Unless the client provides for actual surveying of test locations, the estimated locations by the Geotechnical Consultant should only be considered rough estimates and should not be utilized for the purpose of preparing cross sections showing test locations or in any case for the purpose of after-the-fact evaluating of the sequence of fill placement.

Moisture

For field testing purposes, "near optimum" moisture will vary with material type and other factors including compaction procedures. "Near optimum" may be specifically recommended in Preliminary Investigation Reports and/or may be evaluated during grading.

Prior to placement of additional compacted fill following an overnight or other grading delay, the exposed surface or previously compacted fill should be processed by scarification, watered or dried as needed, thoroughly blended to near-optimum moisture conditions, then recompacted to a minimum of 90 percent of laboratory maximum dry density. Where wet or other dry or other unsuitable materials exist to depths of greater than 1 foot, the unsuitable materials should be over-excavated.

Following a period of flooding, rainfall or overwatering by other means, no additional fill should be placed until damage assessments have been made and remedial grading performed as described herein.

Fill Material

Excavated on-site materials which are acceptable to the Geotechnical Consultant may be utilized as compacted fill, provided trash, vegetation and other deleterious materials are removed prior to placement.

Where import materials are required for use on-site, the Geotechnical Consultant should be notified at least 72 hours in advance of importing, in order to sample and test materials from proposed borrow sites. No import materials should be delivered for use on-site without prior sampling and testing by Geotechnical Consultant.

Where oversized rock or similar irreducible material is generated during grading, it is recommended, where practical, to waste such material off-site or on-site in areas designated as "nonstructural rock disposal areas". Rock placed in disposal areas should be placed with sufficient fines to fill voids. The rock should be compacted in lifts to an unyielding condition. The disposal area should be covered with at least 3 feet of compacted fill which is free of oversized material. The upper 3 feet should be placed in accordance with the guidelines for compacted fill herein.

Rocks 8 inches in maximum dimension and smaller may be utilized within the compacted fill, provided they are placed in such a manner that nesting of the rock is avoided. Fill should be placed and thoroughly compacted over and around all rock. The amount of rock should not exceed 40 percent by dry weight passing the $^{3}/_{4}$-inch sieve size. The 12-inch and 40 percent recommendations herein may vary as field conditions dictate.

During the course of grading operations, rocks or similar irreducible materials greater than 8-inches maximum dimension (oversized material) may be generated. These rocks should not be placed within the compacted fill unless placed as recommended by the Geotechnical Consultant.

Where rocks or similar irreducible materials of greater than 8 inches but less than 4 feet of maximum dimension are generated during grading, or otherwise desired to be placed within an engineered fill, special handling in accordance with the accompanying Standard Details is recommended. Rocks greater than 4 feet should be broken down or disposed off-site. Rocks up to 4 feet maximum dimension should be placed below the upper 10 feet of any fill and should not be closer than 20-feet to any slope face. These recommendations could vary as locations of improvements dictate. Where practical, oversized material should not be placed below areas where structures or deep utilities are proposed.

Oversized material should be placed in windrows on a clean, over-excavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (S.E. 30 or higher) should be placed and thoroughly flooded over and around all windrowed rock, such that voids are filled. Windrows of oversized material should be staggered so that successive strata of oversized material are not in the same vertical plane.

It may be possible to dispose of individual larger rock as field conditions dictate and as recommended by the Geotechnical Consultant at the time of placement. Material that is considered unsuitable by the Geotechnical Consultant should not be utilized in the compacted fill.

During grading operations, placing and mixing the materials from the cut and/or borrow areas may result in soil mixtures which possess unique physical properties. Testing may be required of samples obtained directly from the fill areas in order to verify conformance with the specifications. Processing of these additional samples may take two or more working days. The Contractor may elect to move the operation to other areas within the project, or may continue placing compacted fill pending laboratory and field test results. Should he elect the second alternative, fill placed is done so at the Contractor's risk.

Any fill placed in areas not previously reviewed and evaluated by the Geotechnical Consultant, and/or in other areas, without prior notification to the Geotechnical Consultant may require removal and recompaction at the Contractor's expense. Determination of over-excavations should be made upon review of field conditions by the Geotechnical Consultant.

Fill Slopes

Unless otherwise recommended by the Geotechnical Consultant and approved by the regulating agencies, permanent fill slopes should not be steeper than 2:1 (horizontal to vertical).

Except as specifically recommended otherwise or as otherwise provided for in these grading guidelines (Reference Fill Materials), compacted fill slopes should be overbuilt and cut back to grade, exposing the firm, compacted fill inner core. The actual amount of overbuilding may vary as field conditions dictate. If the desired results are not achieved, the existing slopes should be over-excavated and reconstructed under the guidelines of the Geotechnical Consultant. The degree of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by the Contractor to provide thorough mechanical compaction to the outer edge of the overbuilt slope surface.

Although no construction procedure produces a slope free from risk of future movement, overfilling and cutting back of slope to a compacted inner core is, given no other constraints, the most desirable procedure. Other constraints, however, must often be considered. These constraints may include property line situations, access, the critical nature of the development and cost. Where such constraints are identified, slope face compaction may be attempted by conventional construction procedures including back rolling techniques upon specific recommendation by the Geotechnical Consultant.

As a second-best alternative for slopes of 2:1 (horizontal to vertical) or flatter, slope construction may be attempted as outlined herein. Fill placement should proceed in thin lifts, (i.e., 6 to 8-inch loose thickness). Each lift should be moisture conditioned and thoroughly compacted. The desired moisture condition should be maintained and/or reestablished, where necessary, during the period between successive lifts. Selected lifts should be tested to ascertain that desired compaction is being achieved. Care should be taken to extend compactive effort to the outer edge of the slope. Each lift should extend horizontally to the desired finished slope surface or more as needed to ultimately establish desired grades. Grade during construction should not be allowed to roll off at the edge of the slope. It may be helpful to elevate slightly the outer edge of the slope.

Slough resulting from the placement of individual lifts should not be allowed to drift down over previous lifts. At intervals not exceeding 4 feet in vertical slope height or the capability of available equipment, whichever is less, fill slopes should be thoroughly backrolled utilizing a conventional sheeps foot-type roller. Care should be taken to maintain the desired moisture conditions and/or reestablishing same as needed prior to backrolling. Upon achieving final grade, the slopes should again be moisture conditioned and thoroughly backrolled. The use of a side-boom roller will probably be necessary and vibratory methods are strongly recommended. Without delay, so as to avoid (if possible) further moisture conditioning, the slopes should then be grid-rolled to achieve a relatively smooth surface and uniformly compact condition.

In order to monitor slope construction procedures, moisture and density tests will be taken at regular intervals. Failure to achieve the desired results will likely result in a recommendation by the Geotechnical Consultant to over-excavate the slope surfaces followed by reconstruction of the slopes utilizing overfilling and cutting back procedures and/or further attempt at the conventional backrolling approach. Other recommendations may also be

provided which would be commensurate with field conditions.

Where placement of fill above a natural slope or above a cut slope is proposed, the fill slope configuration as presented in the accompanying Standard Details should be adopted.

For pad areas above fill slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm and pad gradients of at least 2 percent in soil areas.

Off-Site Fill

Off-site fill should be treated in the same manner as recommended in these specifications for site preparation, excavation, drains, compaction, etc.

Off-site canyon fill should be placed in preparation for future additional fill, as shown in the accompanying Standard Details.

Off-site fill subdrains temporarily terminated (up canyon) should be surveyed for future relocation and connection.

DRAINAGE

Canyon subdrain systems specified by the Geotechnical Consultant should be installed in accordance with the Standard Details.

Typical subdrains for compacted fill buttresses, slope stabilization or sidehill masses, should be installed in accordance with the specifications of the accompanying Standard Details.

Roof, pad and slope drainage should be directed away from slopes and areas of structures to suitable disposal areas via non-erodible devices (i.e., gutters, downspouts, concrete swales).

For drainage over soil areas immediately away from structures (i.e., within 4 feet), a minimum of 4 percent gradient should be maintained. Pad drainage of at least 2 percent should be maintained over soil areas. Pad drainage may be reduced to at least 1 percent for projects where no slopes exist, either natural or man-made, or greater than 10-feet in height and where no slopes are planned, either natural or man-made, steeper than 2:1 (horizontal to vertical slope ratio).

Drainage patterns established at the time of fine grading should be maintained throughout the life of the project. Property owners should be made aware that altering drainage patterns can be detrimental to slope stability and foundation performance.

STAKING

In all fill areas, the fill should be compacted prior to the placement of the stakes. This particularly is important on fill slopes. Slope stakes should not be placed until the slope is thoroughly compacted (backrolled). If stakes must be placed prior to the completion of compaction procedures, it must be recognized that they will be removed and/or demolished at such time as compaction procedures resume.

In order to allow for remedial grading operations, which could include over-excavations or slope stabilization, appropriate staking offsets should be provided. For finished slope and stabilization backcut areas, we recommend at least a 10-feet setback from proposed toes and tops-of-cut.

SLOPE MAINTENANCE

Landscape Plants

In order to enhance surficial slope stability, slope planting should be accomplished at the completion of grading. Slope planting should consist of deep-rooting vegetation requiring little watering. Plants native to the southern California area and plants relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A Landscape Architect would be the best party to consult regarding actual types of plants and planting configuration.

Irrigation

Irrigation pipes should be anchored to slope faces, not placed in trenches excavated into slope faces.

Slope irrigation should be minimized. If automatic timing devices are utilized on irrigation systems, provisions should be made for interrupting normal irrigation during periods of rainfall.

Though not a requirement, consideration should be given to the installation of near-surface moisture monitoring control devices. Such devices can aid in the maintenance of relatively uniform and reasonably constant moisture conditions.

Property owners should be made aware that overwatering of slopes is detrimental to slope stability.

Maintenance

Periodic inspections of landscaped slope areas should be planned and appropriate measures should be taken to control weeds and enhance growth of the landscape plants. Some areas may require occasional replanting and/or reseeding.

Terrace drains and down drains should be periodically inspected and maintained free of debris. Damage to drainage improvements should be repaired immediately.

Property owners should be made aware that burrowing animals can be detrimental to slope stability. A preventative program should be established to control burrowing animals.

As a precautionary measure, plastic sheeting should be readily available, or kept on hand, to protect all slope areas from saturation by periods of heavy or prolonged rainfall. This measure is strongly recommended, beginning with the period of time prior to landscape planting.

Repairs

If slope failures occur, the Geotechnical Consultant should be contacted for a field review of site conditions and development of recommendations for evaluation and repair.

If slope failures occur as a result of exposure to periods of heavy rainfall, the failure area and currently unaffected areas should be covered with plastic sheeting to protect against additional saturation.

In the accompanying Standard Details, appropriate repair procedures are illustrated for

superficial slope failures (i.e., occurring typically within the outer 1 foot to 3 feet of a slope face).

TRENCH BACKFILL

Utility trench backfill should, unless otherwise recommended, be compacted by mechanical means. Unless otherwise recommended, the degree of compaction should be a minimum of 90 percent of the laboratory maximum density.

Backfill of exterior and interior trenches extending below a 1:1 projection from the outer edge of foundations should be mechanically compacted to a minimum of 90 percent of the laboratory maximum density.

In cases where clean granular materials are proposed for use in lieu of native materials or where flooding or jetting is proposed, the procedures should be considered subject to review by the Geotechnical Consultant.

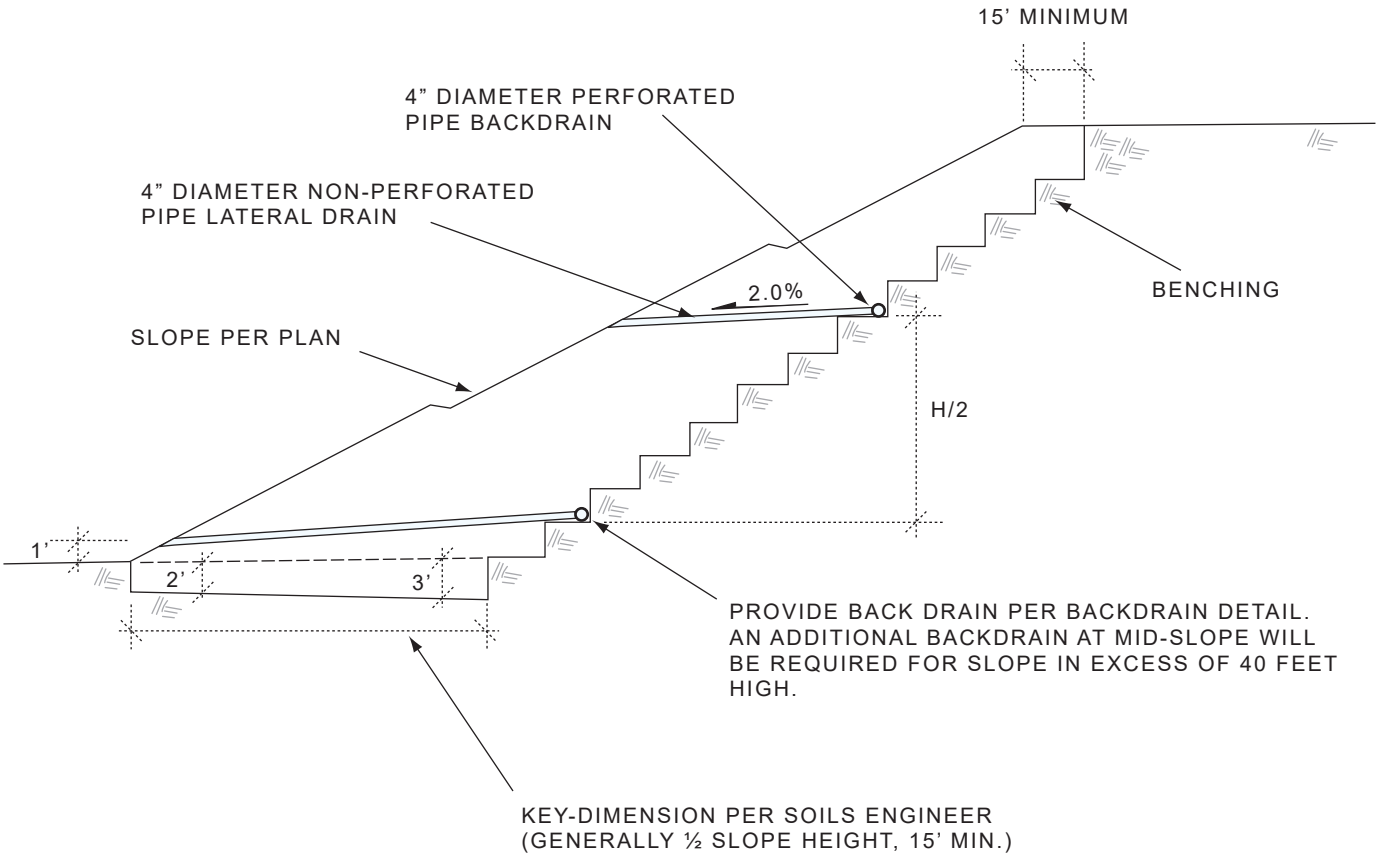
Clean Granular backfill and/or bedding are not recommended in slope areas unless provisions are made for a drainage system to mitigate the potential build-up of seepage forces.

STATUS OF GRADING

Prior of proceeding with any grading operation, the Geotechnical Consultant should be notified at least two working days in advance in order to schedule the necessary observation and testing services.

Prior to any significant expansion or cut back in the grading operation, the Geotechnical Consultant should be provided with adequate notice (i.e., two days) in order to make appropriate adjustments in observation and testing services.

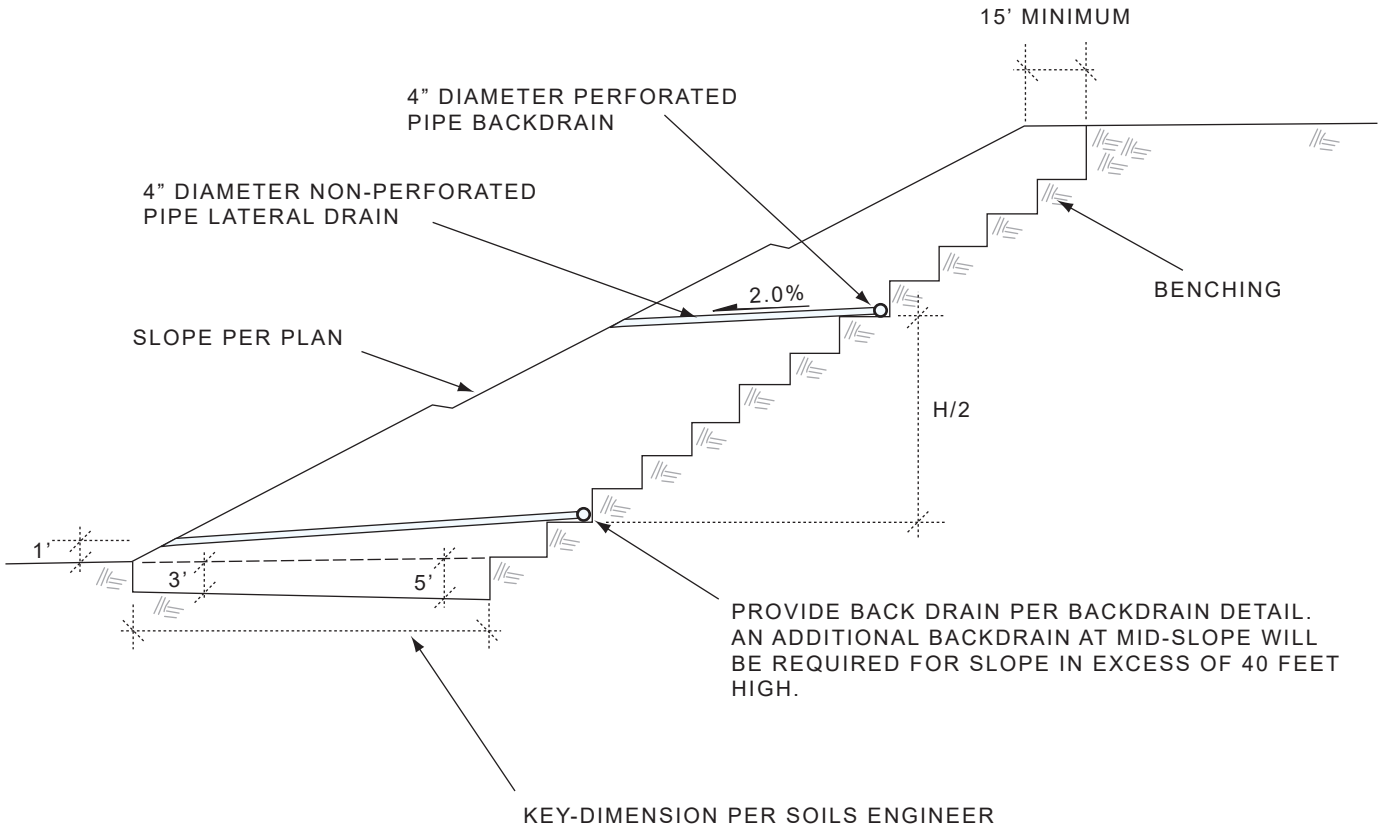
Following completion of grading operations and/or between phases of a grading operation, the Geotechnical Consultant should be provided with at least two working days notice in advance of commencement of additional grading operations.



TYPICAL STABILIZATION FILL DETAIL

NOT TO SCALE

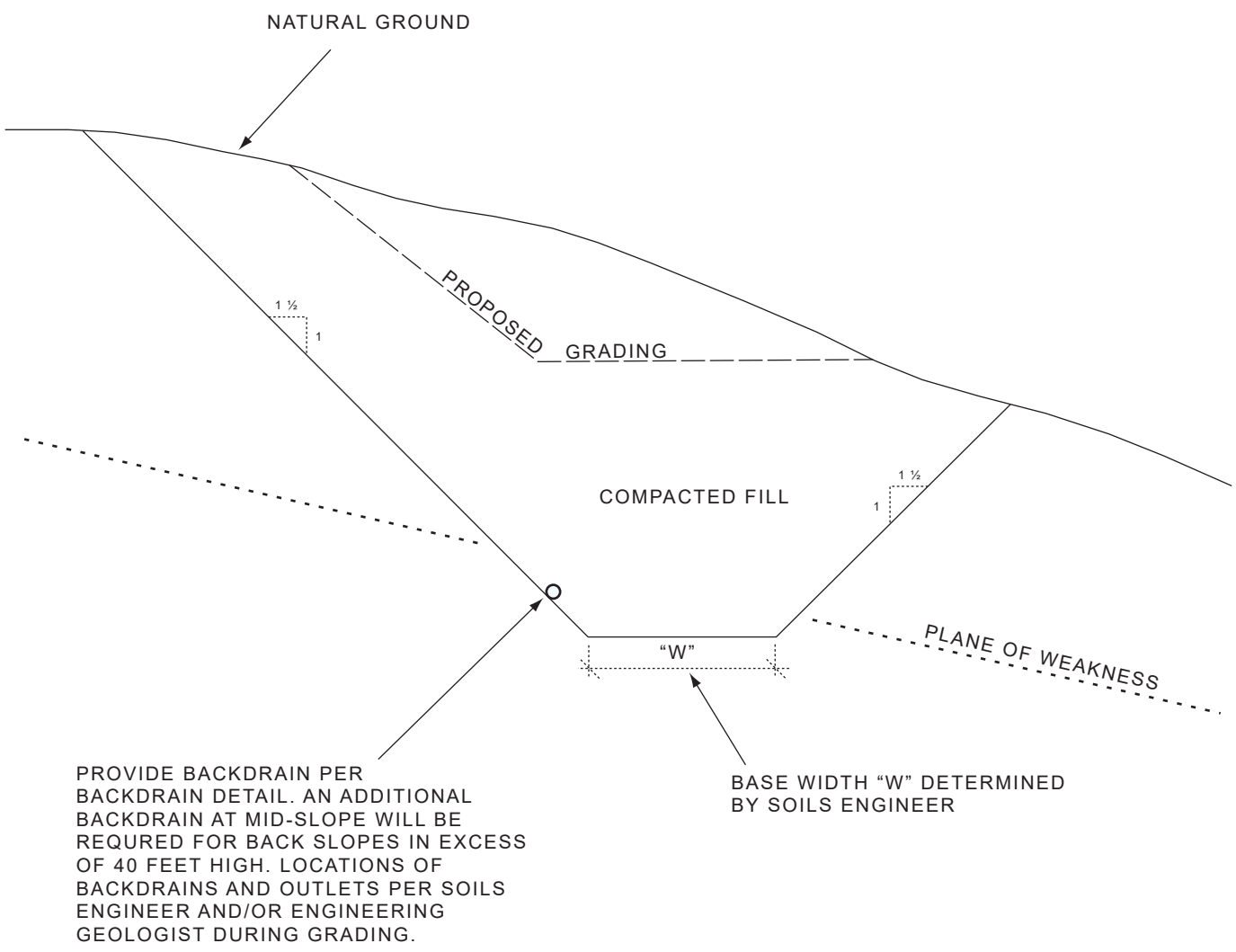
FIGURE 1



TYPICAL BUTTRESS FILL DETAIL

NOT TO SCALE

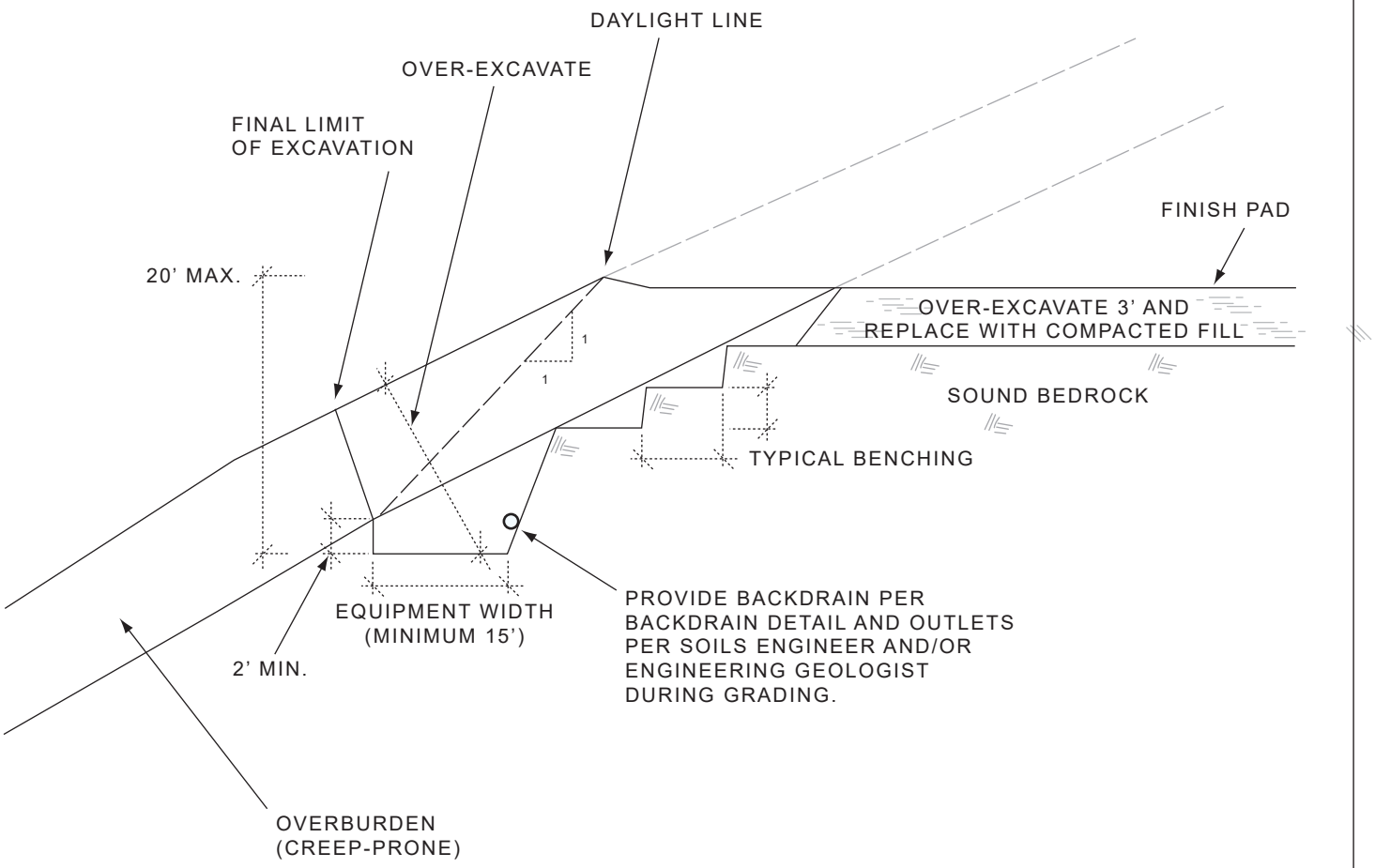
FIGURE 2



TYPICAL SHEAR KEY DETAIL

NOT TO SCALE

FIGURE 3

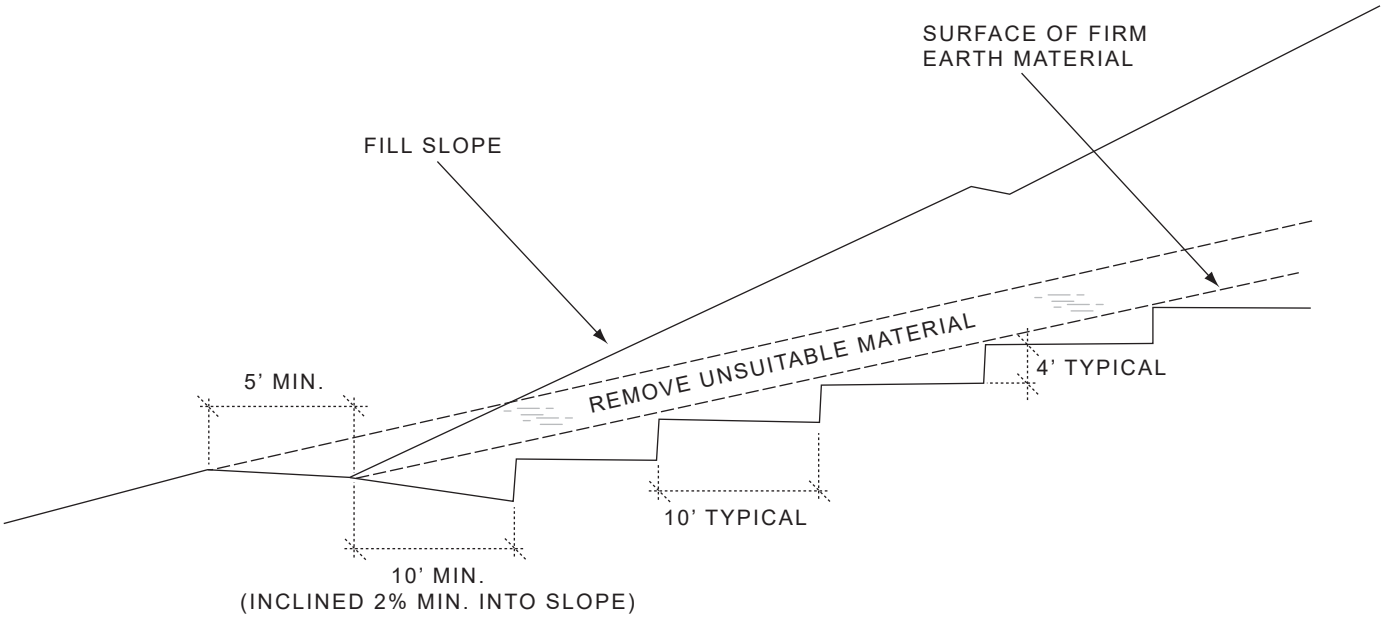


DAYLIGHT SHEAR KEY DETAIL

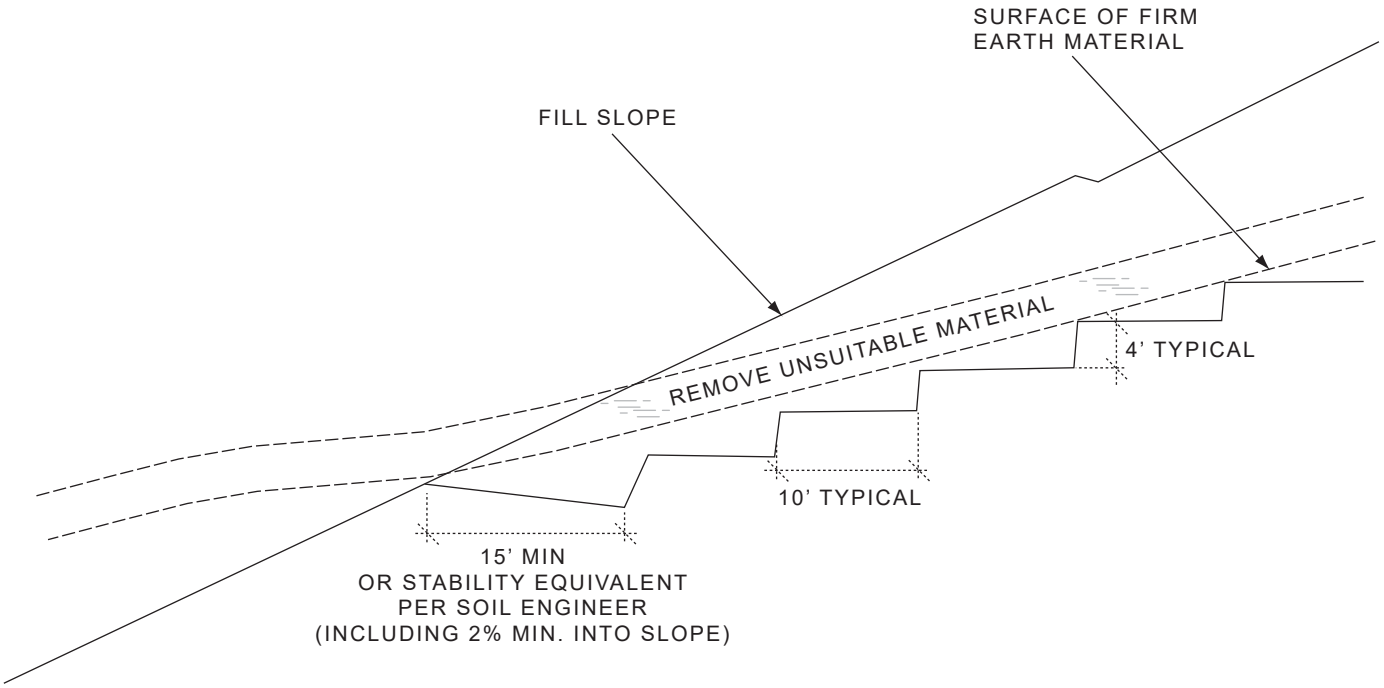
NOT TO SCALE

FIGURE 4

BENCHING FILL OVER NATURAL



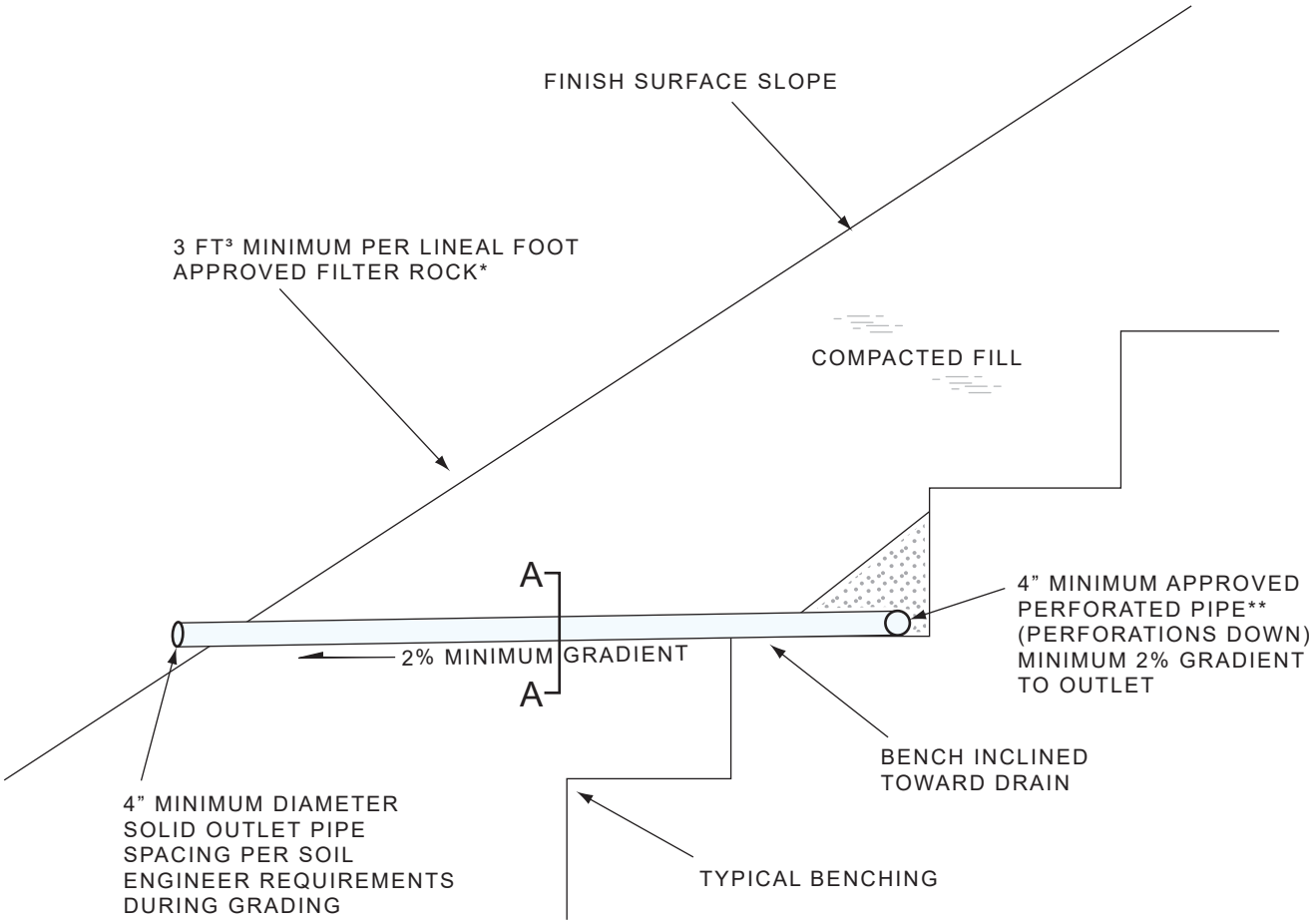
BENCHING FILL OVER CUT



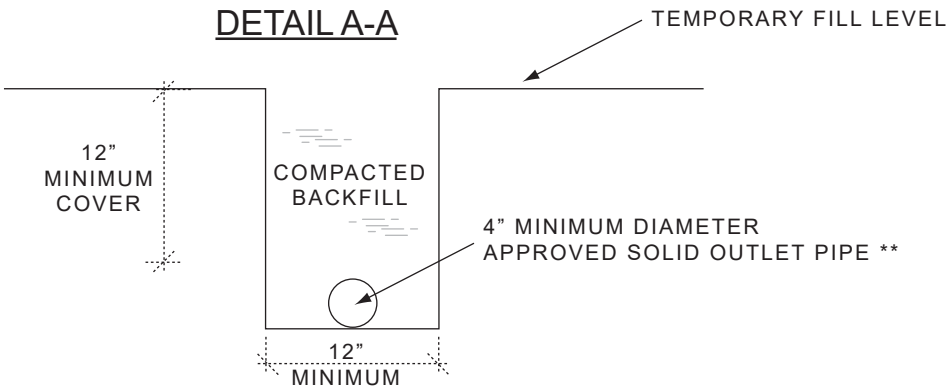
BENCHING FOR COMPACTED FILL DETAIL

NOT TO SCALE

FIGURE 5



DETAIL A-A



* Filter rock to meet following specifications or approved equal.

Sieve	% Passing
1"	100
3/4"	90-100
3/8"	40-100
No.4	25-40
No.30	5-15
No.50	0-7
No.200	0-3

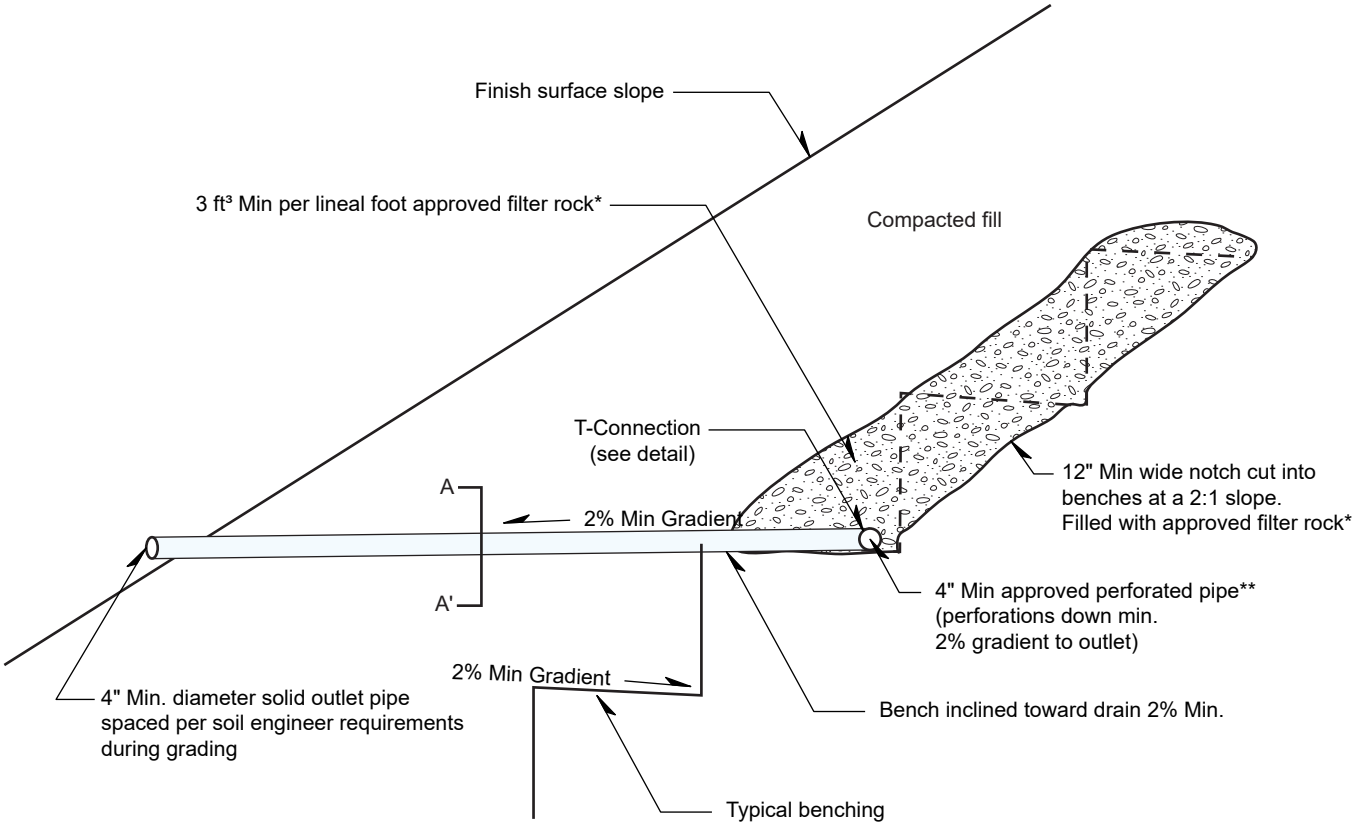
** APPROVED PIPE TYPE

Schedule 40 polyvinyl chloride (P.V.C.) or approved equal.
Min. crush strength 1000 PSI.

TYPICAL BACKDRAIN DETAIL

NOT TO SCALE

FIGURE 6



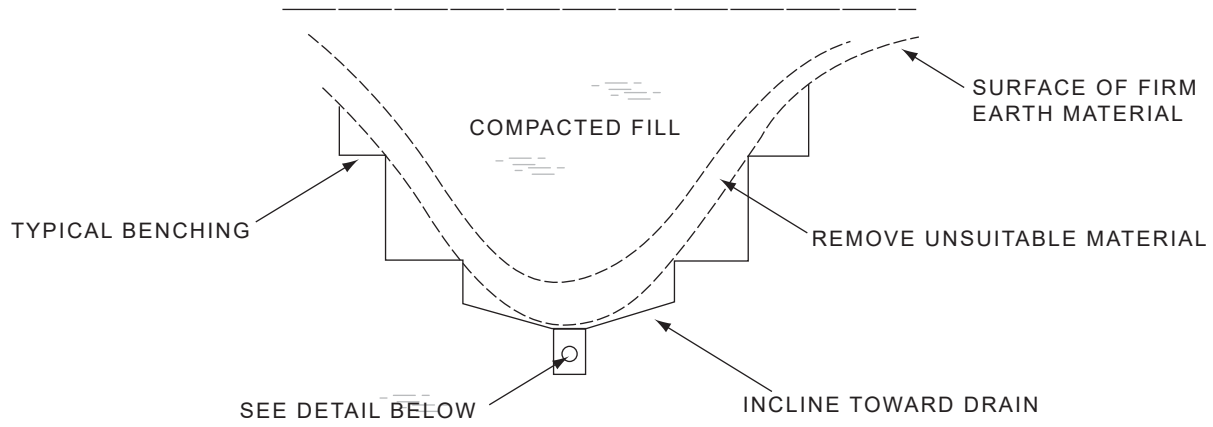
* Filter rock to meet following specifications or approved equal.

Sieve	% Passing
1"	100
3/4"	90-100
3/8"	40-100
No.4	25-40
No.30	5-15
No.50	0-7
No.200	0-3

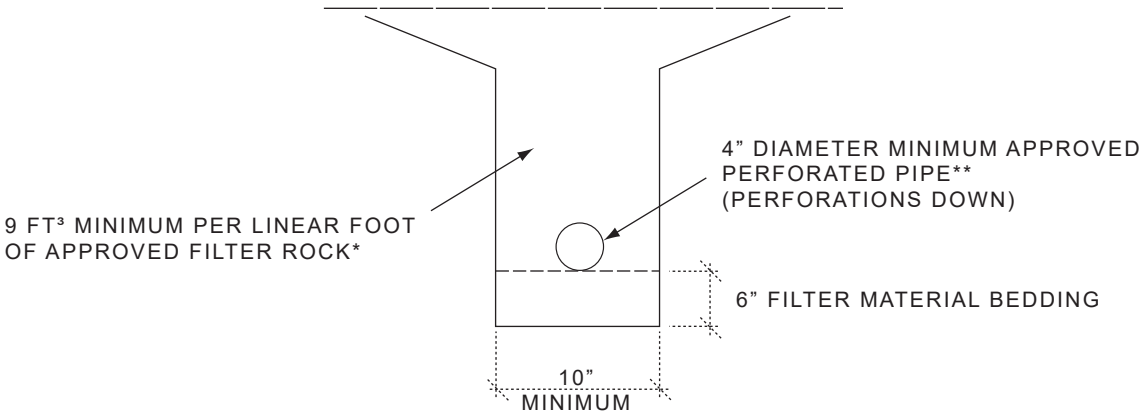
** Approved pipe type:
Schedule 40 polyvinyl chloride (P.V.C.) or approved equal.
Min. crush strength 1000 PSI.

BACKDRAIN DETAIL (GEOFABRIC)

FIGURE 7



DETAIL



* Filter rock to meet following specifications or approved equal.

Sieve	% Passing
1"	100
3/4"	90-100
3/8"	40-100
No.4	25-40
No.30	5-15
No.50	0-7
No.200	0-3

** APPROVED PIPE TYPE

Schedule 40 polyvinyl chloride (P.V.C.) or approved equal.
Min. crush strength 1000 PSI.

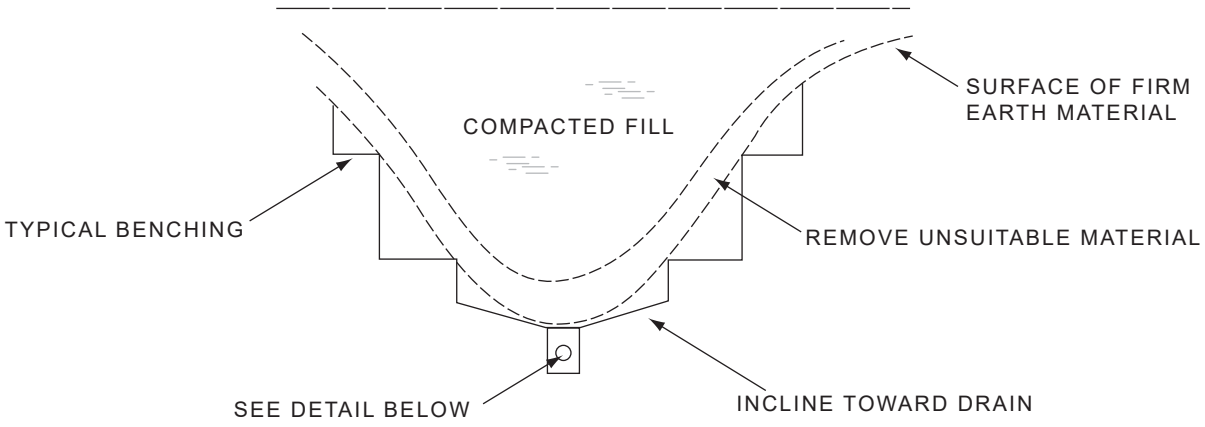
Pipe diameter to meet hte following criteria. Subject to field review based on actual geotechnical conditions encountered during grading.

Length of Run	Pipe Diameter
Upper 500'	4"
Next 1000'	6"
>1500'	8"

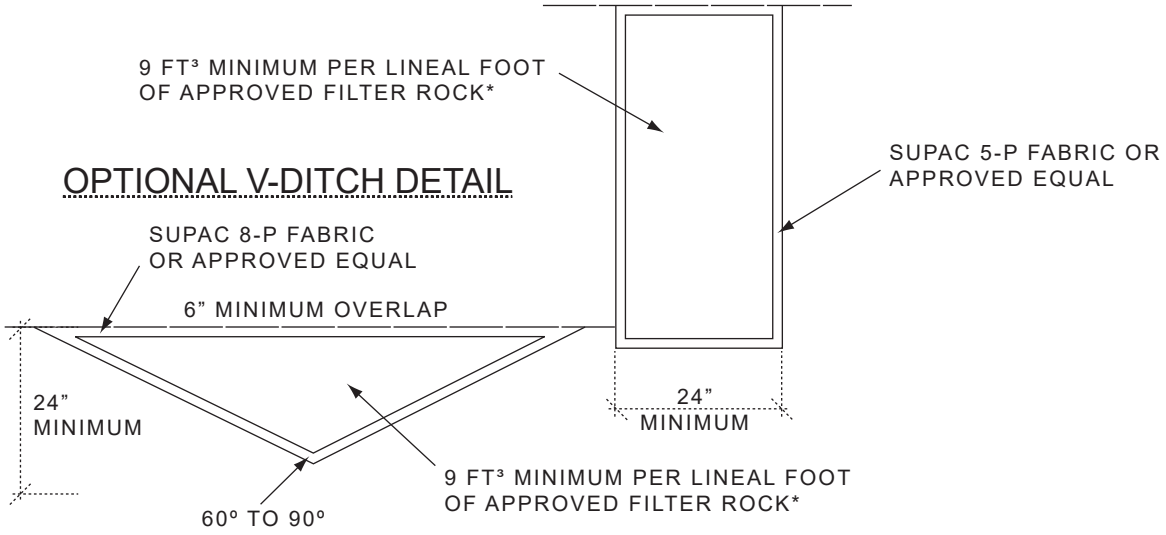
TYPICAL CANYON SUBDRAIN DETAIL

NOT TO SCALE

FIGURE 8



TRENCH DETAIL



OPTIONAL V-DITCH DETAIL

* Drainage material to meet following specifications or approved equal.

Sieve	% Passing
1 ½"	88-100
1"	5-40
3/4"	0-17
3/8"	0-7
No.200	0-3

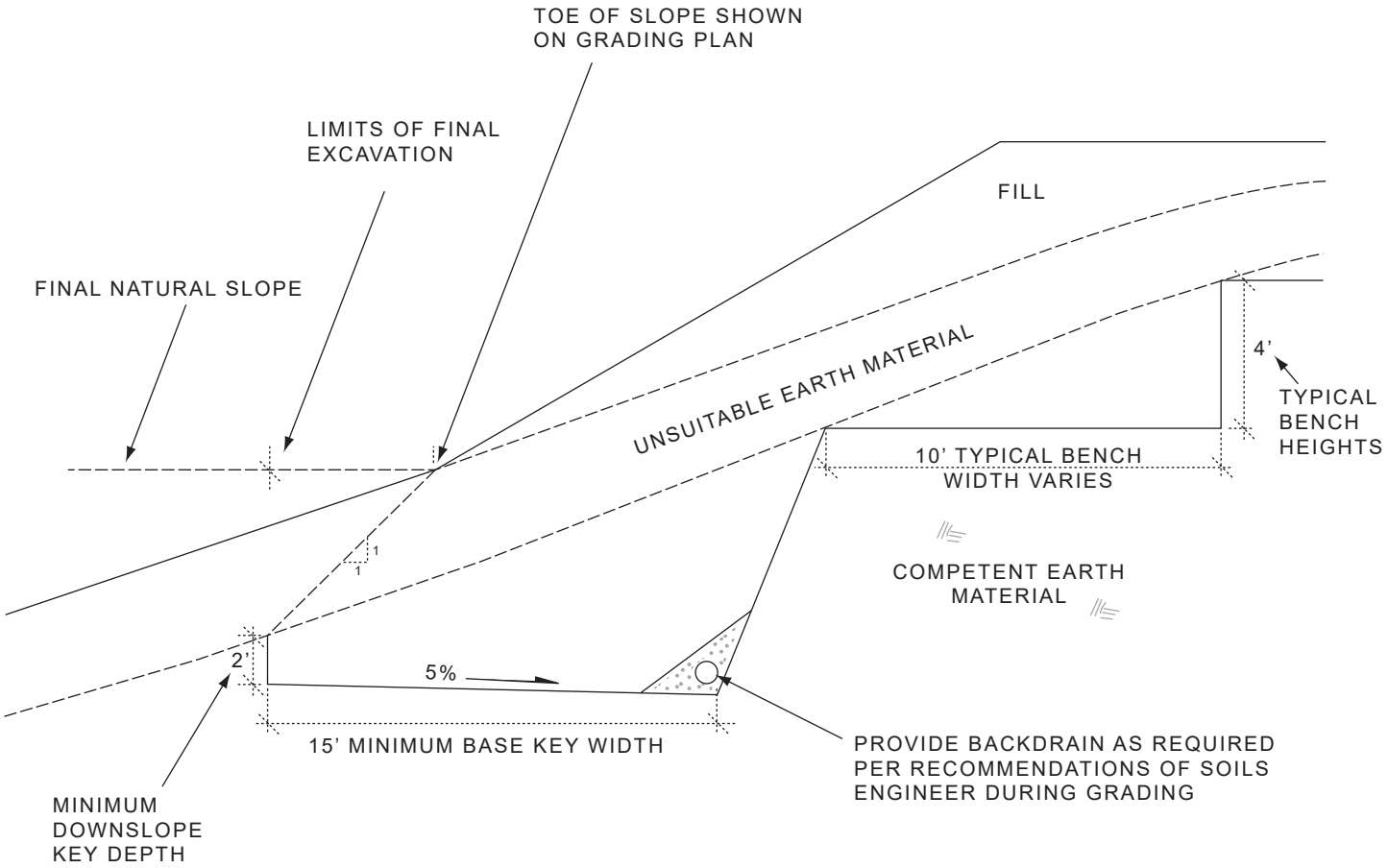
ADD MINIMUM 4" DIAMETER APPROVED PERFORATED PIPE WHEN GRADIENT IS LESS THAN 2%

APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYL-CHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 psi.

GEOFABRIC SUBDRAIN

NOT TO SCALE

FIGURE 9

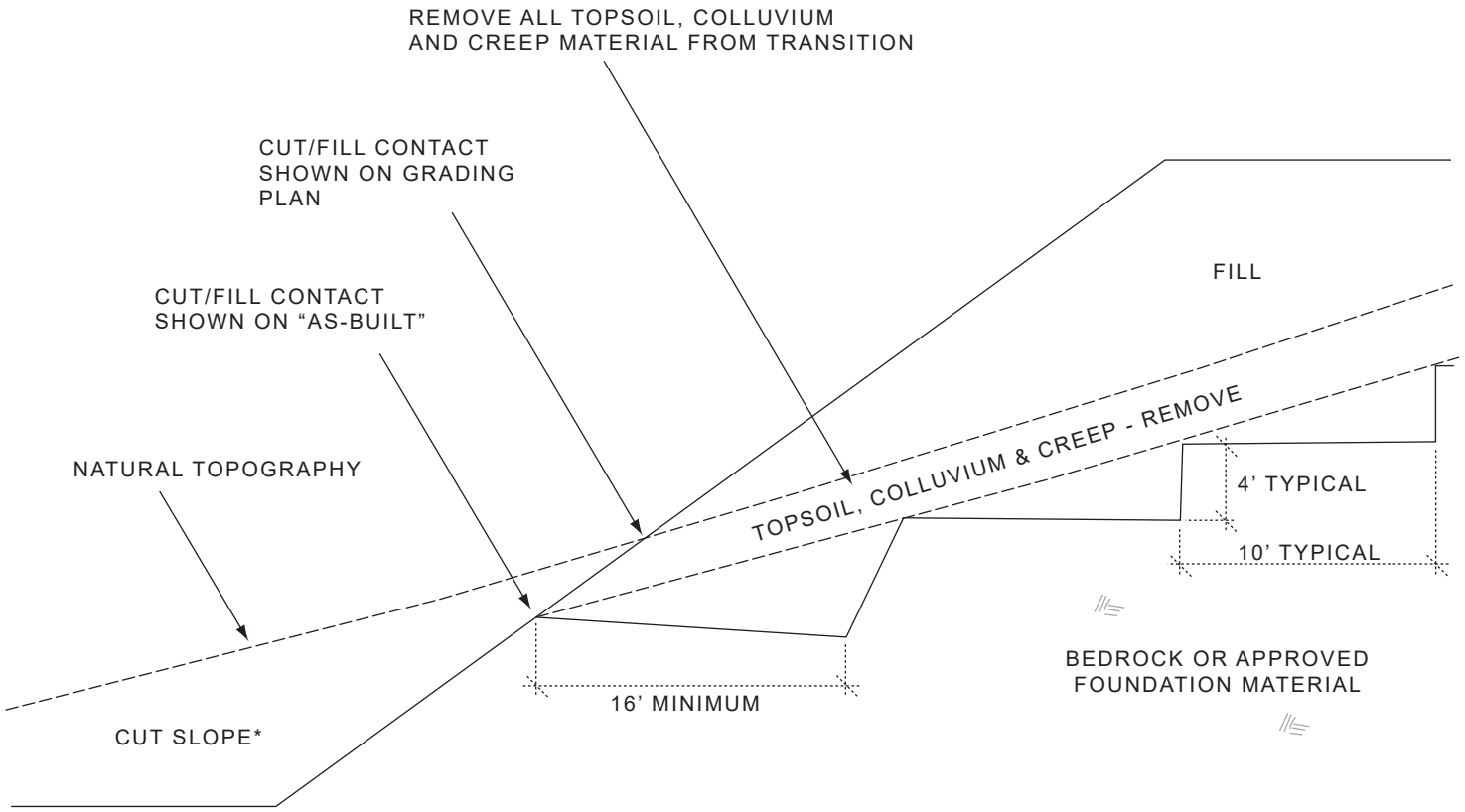


WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, BENCHING IS NOT NECESSARY. HOWEVER, FILL IS NOT TO BE PLACED ON COMPRESSIBLE OR UNSUITABLE MATERIAL.

FILL SLOPE ABOVE NATURAL GROUND DETAIL

NOT TO SCALE

FIGURE 10



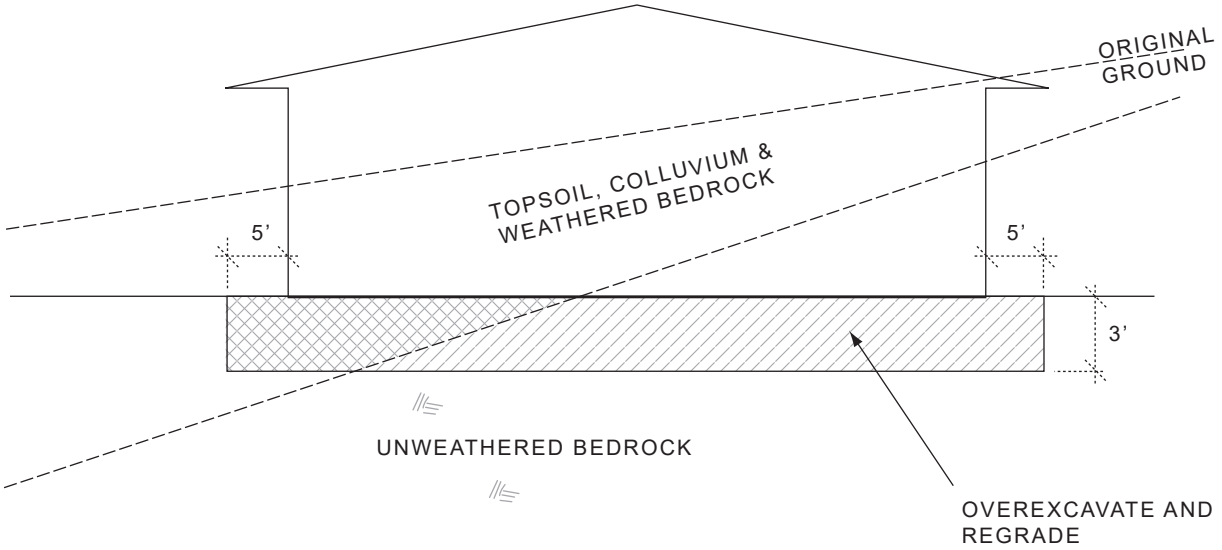
NOTE:
CUT SLOPE PORTION SHALL BE MADE
PRIOR TO PLACEMENT OF FILL

FILL SLOPE ABOVE CUT SLOPE DETAIL

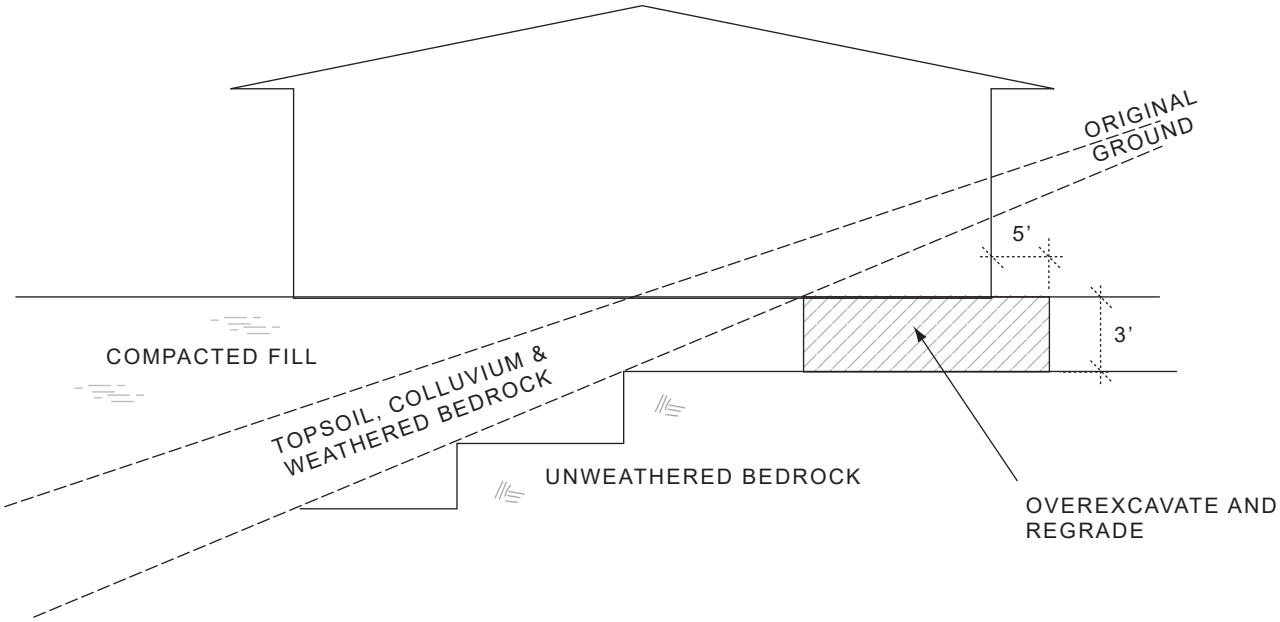
NOT TO SCALE

FIGURE 11

CUT LOT



CUT/FILL LOT (TRANSITION)



TRANSITION LOT DETAIL

NOT TO SCALE

FIGURE 12