(CUP22-00001 / D22-00001 / ADM21-00057)

CITY OF OCEANSIDE
ENGINEERING DIVISION

PRIORITY DEVELOPMENT PROJECT
STORM WATER QUALITY MANAGEMENT PLAN

FOR

EDDIE JONES INDUSTRIAL

ENGINEER OF WORK

PRELIMINARY

REGISTERED PROFESSIONAL ENGINEER
TYLER G LAWSON
No. 80356
Exp. 12/31/24
CIVIL
STATE OF CALIFORNIA

PREPARED FOR:

RAF PACIFICA GROUP

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How to Use This Template

This template, assembled by GHD Inc. on behalf of the City of Oceanside, is for the development of Storm Water Quality Management Plans (SWQMPs) for Priority Development Projects (PDPs) proposed within Oceanside, CA. It is based on requirements set forth in the Regional Water Quality Control Board's National Pollutant Discharge Elimination System MS4 Permit that covers the San Diego Region (Order No. R9-2013-0001).

All references within the template refer to the City of Oceanside BMP Design Manual dated February 2016 (Manual). Use of this template in conjunction with the Manual is intended to help a project applicant develop a SWQMP compliant with City of Oceanside and MS4 Permit requirements.

Template Date: February 16, 2016

Assembled By: GHD

Quick Reference Guide

Item	Project Information
Project Name	Eddie Jones Industrial
Application Number(s)	CUP22-00001 / D22-00001 / ADM21-00057
Project Address	250 Eddie Jones Way, Oceanside, CA 92058
Total Parcel Area	1,384,577 sq. ft.
Project Description	Project description should touch briefly on all of the following elements; • Project size: Our entire site is 31.79 Acres with our total disturbed area 30.19 Acres. • Existing site use and cover: Existing site use is an industrial building site with hardscape and amenities typical of this type of development. Existing Impervious area: 591,152 sq. ft. • Proposed site use and cover: Proposed site use is an industrial building larger than the previous development with a parking lot and floodwall wrapping the building site along with hardscape and amenities typical of this type of development. Proposed Impervious area: 1,034,986 sq. ft.
Proposed Disturbed Area	1,314,864 sq. ft.
Created or Replaced Impervious	1,034,986 sq. ft.
Project Hydrologic Unit Watershed	☐ Santa Maria ☒ San Luis Rey ☐ Carlsbad
Required to implement HMP	☐ Yes ☒ No

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CERTIFICATION PAGE

Project Name: [Eddie Jones Industrial]
Permit Application Number: [CUP22-00001 / D22-00001 / ADM21-00057]

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the City of Oceanside BMP Design Manual, which is based on the requirements of San Diego Regional Water Quality Control Board Order No. R9-2013-0001 (MS4 Permit).

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

As Engineer of Work, I agree to indemnify, defend, and hold harmless the City of Oceanside, its officers, agents, and employees from any and all liability, claims, damages, or injuries to any person or property which might arise from the negligent acts, errors, or omissions of the Engineer of Work, my employees, agents or consultants.

PRELIMINARY PE 80356 EXP 12/31/24

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

[Tyler G. Lawson]_

Print Name

[Pasco Laret Suiter & Associates]_

Company

06/04/2024

Date

Engineer's Seal:

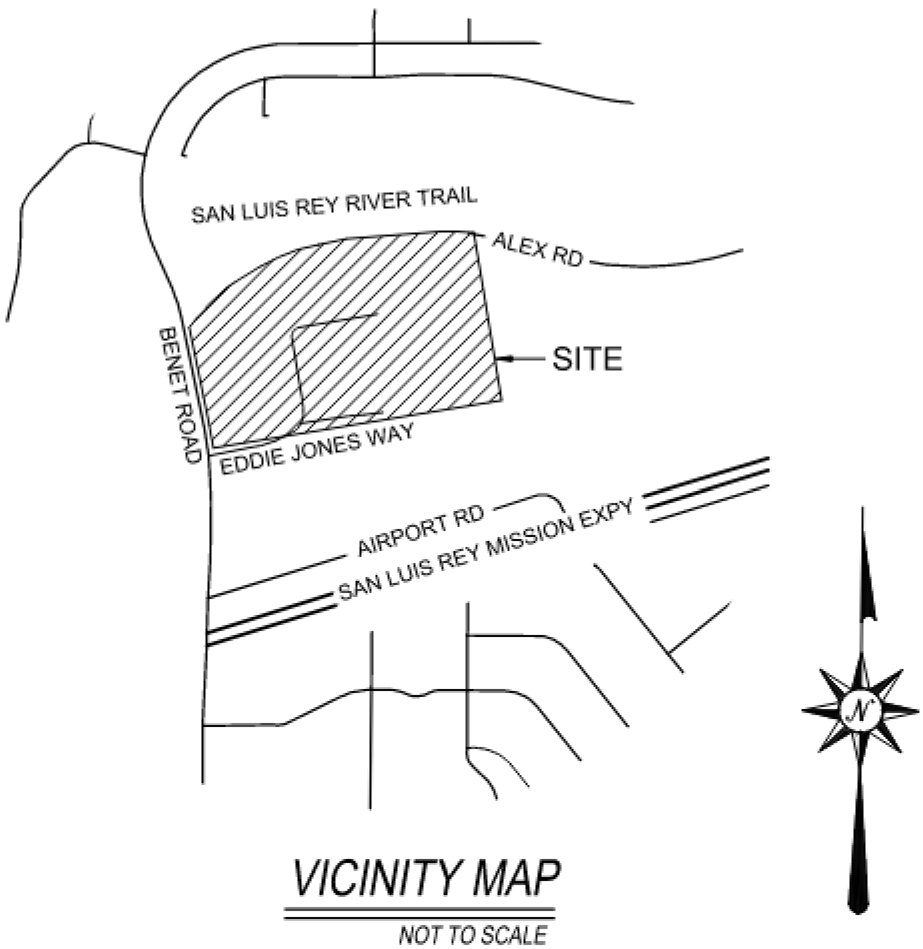
REGISTERED PROFESSIONAL ENGINEER
TYLER G LAWSON
No. 80356
Exp. 12/31/24
CIVIL
STATE OF CALIFORNIA

SUBMITTAL RECORD

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

Submittal Number	Date	Project Status	Changes
1	[06/04/24]	☒ Preliminary Design/ Planning/ CEQA ☐ Final Design	Initial Submittal
2	[xx/xx/xx]	☐ Preliminary Design/ Planning/ CEQA ☐ Final Design	xx
3	[xx/xx/xx]	☐ Preliminary Design/ Planning/ CEQA ☐ Final Design	xx
4	[xx/xx/xx]	☐ Preliminary Design/ Planning/ CEQA ☐ Final Design	xx
5	[xx/xx/xx]	☐ Preliminary Design/ Planning/ CEQA ☐ Final Design	xx

Project Vicinity Map



Applicability of Permanent, Post-Construction Storm Water BMP Requirements (Storm Water Intake Form for all Development Permit Applications)			Form I-1
Project Identification			
Project Name: Eddie Jones Industrial			
Permit Application Number: CUP22-00001 / D22-00001 / ADM21-00057			Date:01/14/22
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 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 exception to PDP definitions? To answer this item, see Section 1.4 of the manual *in its entirety* for guidance, AND complete Form I-2, Project Type Determination.	☐Standard Project	Stop. Standard Project requirements apply, including Standard Project SWQMP.	
	☒PDP	PDP requirements apply, including PDP SWQMP. Go to Step 3.	
	☐ Exception to PDP definitions	Stop. Standard Project requirements apply. Provide discussion and list any additional requirements below. Prepare Standard Project SWQMP.	
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:			

<table>
<tr><th colspan="3">Form I-1 Page 2 of 2</th></tr>
<tr><th>Step</th><th>Answer</th><th>Progression</th></tr>
<tr><td rowspan="2">Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval?
See Section 1.10 of the manual for guidance.</td><td>☐Yes</td><td>Consult the [City Engineer] to determine requirements.
Provide discussion and identify requirements below.
Go to Step 4.</td></tr>
<tr><td>☒No</td><td>BMP Design Manual PDP requirements apply.
Go to Step 4.</td></tr>
<tr><td colspan="3">Discussion / justification of prior lawful approval, and identify requirements (not required if prior lawful approval does not apply):</td></tr>
<tr><td rowspan="2">Step 4. Do hydromodification control requirements apply?
See Section 1.6 of the manual for guidance.</td><td>☐Yes</td><td>PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6).
Go to Step 5.</td></tr>
<tr><td>☒No</td><td>Stop.
PDP structural BMPs required for pollutant control (Chapter 5) only.
Provide brief discussion of exemption to hydromodification control below.</td></tr>
<tr><td colspan="3">Discussion / justification if hydromodification control requirements do <u>not</u> apply:
Per discussion with the city engineer our runoff will be HMP exempt. Discharge from our site enters private storm drain pipes which lead directly into the San Luis Rey River Trail (an HMP exempt) body of water that ultimately outlets to the Pacific Ocean.</td></tr>
<tr><td rowspan="2">Step 5. Does protection of critical coarse sediment yield areas apply?
See Section 6.2 of the manual for guidance.</td><td>☐Yes</td><td>Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2).
Stop.</td></tr>
<tr><td>☒No</td><td>Management measures not required for protection of critical coarse sediment yield areas.
Provide brief discussion below.
Stop.</td></tr>
<tr><td colspan="3">Discussion / justification if protection of critical coarse sediment yield areas does <u>not</u> apply:</td></tr>
</table>

Project Type Determination Checklist			**Form I-2**
Project Information			
Project Name: EDDIE JONES INDUSTRIAL			
Permit Application Number: CUP22-00001 / D22-00001 / ADM21-00057			
Project Type Determination: Standard Project or PDP			
The project is (select one): New Development ☑ Redevelopment			
The total proposed newly created or replaced impervious area is: 1,034,986 ft² (23.76) acres			
Is the project in any of the following categories, (a) through (f)?			
Yes ☐	No ☒	(a)	New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☒	No ☐	(b)	Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☒	No ☐	(c)	New and redevelopment projects that create 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses: (i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption SIC code 5812). (ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater. (iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. (iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

<table>
<tr><th colspan="4">Form I-2 Page 2 of 2</th></tr>
<tr><td>Yes
☒</td><td>No
☐</td><td>(d)</td><td>New or redevelopment projects that create or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharging directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands).
<u>Note: ESAs are areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and SDRWQCB; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and SDRWQCB; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. See manual Section 1.4.2 for additional guidance.</u></td></tr>
<tr><td>Yes
☐</td><td>No
☒</td><td>(e)</td><td>New development projects that support one or more of the following uses:
(i) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following SIC codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.
(ii) Retail gasoline outlets. This category includes retail gasoline outlets that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic of 100 or more vehicles per day.</td></tr>
<tr><td>Yes
☒</td><td>No
☐</td><td>(f)</td><td>New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction.
Note: See manual Section 1.4.2 for additional guidance.</td></tr>
<tr><td colspan="4">Does the project meet the definition of one or more of the PDP categories (a) through (f) listed above?
☐ No – the project is not a PDP (Standard Project).
☒ Yes – the project is a PDP.</td></tr>
<tr><td colspan="4">The following is for redevelopment PDPs only:

The area of existing (pre-project) impervious area at the project site is: 591,152 ft² (A)
The total proposed newly created or replaced impervious area is: 1,034,986 ft² (B)
Percent impervious surface created or replaced (A/B)*100: 57.1 %
The percent impervious surface created or replaced is (select one based on the above calculation):
☐ less than or equal to fifty percent (50%) – only new impervious areas are considered PDP
OR
☒ greater than fifty percent (50%) – the entire project site is a PDP</td></tr>
</table>

Site Information Checklist For PDPs	Form I-3B (PDPs)
Project Summary Information	
Project Name	EDDIE JONES INDUSTRIAL
Project Address	250 EDDIE JONES WAY, OCEANSIDE, CA 92058
Assessor's Parcel Number(s)	145-021-32, 30, & 29-00
Permit Application Number	CUP22-00001 / D22-00001 / ADM21-00057
Project Watershed (Hydrologic Unit)	Select One: ☐Santa Margarita 902 ☒San Luis Rey 903 ☐Carlsbad 904
Parcel Area (total area of Assessor's Parcel(s) associated with the project)	31.79 Acres (1,384,577 Square Feet)
Area to be disturbed by the project (Project Area)	30.19 Acres (1,314,864 Square Feet)
Project Proposed Impervious Area (subset of Project Area)	23.76 Acres (1,034,986 Square Feet)
Project Proposed Pervious Area (subset of Project Area)	7.59 Acres (330,589 Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.	

Hydrologic Unit	Hydrologic Area	Hydrologic Sub-Area
Santa Margarita 902.00	☐ Ysidora 902.10	☐ Lower Ysidora 902.11
San Luis Rey 903.00	☒ Lower San Luis 903.10	☒ Mission 903.11
		☐ Bonsall 903.12
Carlsbad 904.00	☐ Loma Alta 904.10	Not Applicable
	☐ Buena Vista Creek 904.20	☐ El Salto 904.21
		☐ Vista 904.22
	☐ Agua Hedionda 4.30	☐ Los Monos 904.31

Form I-3B Page 2 of 10
Description of Existing Site Condition and Drainage Patterns
Current Status of the Site (select all that apply): ☒Existing development ☐Previously graded but not built out ☐Agricultural or other non-impervious use ☐Vacant, undeveloped/natural Description / Additional Information: The existing site is home to an industrial use building with a parking lot and typical improvements that would qualify with this type of development.
Existing Land Cover Includes (select all that apply): ☒Vegetative Cover ☐Non-Vegetated Pervious Areas ☒Impervious Areas Description / Additional Information: Existing land cover includes landscaped areas, open pervious areas along with parking lots and two buildings onsite currently. Both buildings currently vacant but were used formerly for electronics manufacturing.
Underlying Soil belongs to Hydrologic Soil Group (select all that apply): ☒NRCS Type A ☐NRCS Type B ☐NRCS Type C ☒NRCS Type D
Approximate Depth to Groundwater: ☐Groundwater Depth < 5 feet ☒5 feet < Groundwater Depth < 10 feet ☐10 feet < Groundwater Depth < 20 feet ☐Groundwater Depth > 20 feet

Form I-3B Page 3 of 10
Description of Existing Site Topography and Drainage [How is storm water runoff conveyed from the site? At a minimum, this description should answer (1) whether existing drainage conveyance is natural or urban; (2) describe existing constructed storm water conveyance systems, if applicable; and (3) is runoff from offsite conveyed through the site? If so, describe]: (1) Existing drainage is both natural and urban, there are a host of landscaped and hardscaped areas all draining towards onsite storm drain inlets which head in 3 different directions. Subsequently, constituting 3 major drainage basins. Currently in the existing condition there is a section of the site north that drains northeast onto the adjacent property to the east. The next drainage basin is the majority of the site which all collects around the northern side and is routed to drain northwest into the San Luis Rey River basin through means of the pipe to the northwest. The last basin is on the southwestern portion of the site near the smaller building an area of runoff southwest to Benet Road. (2) The existing storm drain conveyance systems onsite are composed of hardscape, various types of gutters that drain to onsite storm drain inlets which have subterranean pipes attached that convey water offsite/to larger pipes. Additionally there is a headwall and 24" RCP pipe on the west side of the site that drains to Benet Road. And to the Northwest there is a 36" RCP which drains to the San Luis Rey River basin. (3) Runoff from offsite is not accepted on our site in the existing conditions.

Description of Proposed Site Development and Drainage Patterns
Project Description / Proposed Land Use and/or Activities: The proposed project includes the demolition of all onsite structures and improvements to make way for a new building. The proposed development consists of an industrial building located in the center of the site along with fire access driveways / circulation elements around the building.
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features): The proposed impervious features include fire access driveways, the roof of the industrial building, surrounding parking, dock ramps and hardscape surrounding the building.
List/describe proposed pervious features of the project (e.g., landscape areas): Landscaped areas will surround the building and parking lot with areas for amenity space.
Does the project include grading and changes to site topography? ☒Yes ☐No Description / Additional Information: The site will be graded to have all water drain away from the building onto the proposed surface improvements to eventually drain via surface flow to a series of inlets within the drive aisle. Additionally there are several soil burms surrounding the existing building, some of these will be cut into completely and removed others will stay where they are currently.
Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)? ☒Yes ☐No Description / Additional Information: We have proposed a new, buried storm water conveyance system that will route to vaults/treatment facilities that are subterranean and will be treated and flow will be mitigated to then be routed and discharged offsite.

Form I-3B Page 5 of 10
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

Form I-3B Page 6 of 10		
Identification of Receiving Water Pollutants of Concern		
Describe path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable): All storm water from the project site will travel 1 of 3 ways. In the first condition we are draining water to our adjacent eastern parcel of land. However, we are mitigating our site to have less area draining there than in the existing condition. The second condition we are taking water and draining to an existing storm drain system on Benet Road. And in the last condition we are having water drain directly into an existing storm water structure to the northwest side of the site which drains to the San Luis Rey River Basin.		
List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs for the impaired water bodies:		
303(d) Impaired Water Body	**Pollutant(s)/Stressor(s)**	**TMDLs**
San Luis Rey River Basin	Indicator Bacteria Nutrients Sedimentation / Siltation Toxicity	Yes Yes Yes Yes

Form I-3B Page 7 of 10			
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 expected from the project site based on all proposed use(s) of the site (see manual Appendix B.6):			
Pollutant	**Not Applicable to the Project Site**	**Expected from the Project Site**	**Also a Receiving Water Pollutant of Concern**
Sediment	X		
Nutrients	X		
Heavy Metals	X		
Organic Compounds	X		
Trash & Debris	X		
Oxygen Demanding Substances	X		
Oil & Grease	X		
Bacteria & Viruses	X		
Pesticides	X		

<u>Note:</u> Indicator Bacteria shall be addressed as a Pollutant of Concern (POC) for projects located in the Lower San Luis Hydrologic Area <u>and</u> for projects that discharge to the Pacific Ocean Shoreline within the boundaries of the City of Oceanside.

<u>Note:</u> Nutrients shall be addressed as a Pollutant of Concern (POC) for projects located in the Loma Alta Hydrologic Area.

Form I-3B Page 8 of 10
Hydromodification Management Requirements
Do hydromodification management requirements apply (see Section 1.6 of the manual)? ☐Yes, hydromodification management flow control structural BMPs required. ☐No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. ☒No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. ☐No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides. Description / Additional Information (to be provided if a 'No' answer has been selected above): The project site will discharge to existing storm drain structures on the northwest side of the site prior to discharging to the San Luis Rey River, which is an HMP exempt body of water that outlets directly to the Pacific Ocean.
Critical Coarse Sediment Yield Areas* ***This Section only required if hydromodification management requirements apply**
Based on the maps provided within the WMAA, do potential critical coarse sediment yield areas exist within the project drainage boundaries? ☐Yes ☒No, no critical coarse sediment yield areas to be protected based on WMAA maps If yes, have any of the optional analyses presented in Section 6.2 of the manual been performed? ☐6.2.1 Verification of GLUs Onsite ☐6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite ☐No optional analyses performed, the project will avoid critical coarse sediment yield areas identified based on WMAA maps If optional analyses were performed, what is the final result? ☐No critical coarse sediment yield areas to be protected based on verification of GLUs onsite. ☐Critical coarse sediment yield areas exist but additional analysis has determined that protection is not required. Documentation attached in Attachment 8 of the SWQMP. ☐Critical coarse sediment yield areas exist and require protection. The project will implement management measures described in Sections 6.2.4 and 6.2.5 as applicable, and the areas are identified on the SWQMP Exhibit. Discussion / Additional Information:

Form I-3B Page 9 of 10
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. N / A – project is exempt from HMP requirements. See previous discussion and map included in Attachment 2 of this report.
Has a geomorphic assessment been performed for the receiving channel(s)? ☒No, the low flow threshold is 0.1Q2 (default low flow threshold) ☐Yes, the result is the low flow threshold is 0.1Q2 ☐Yes, the result is the low flow threshold is 0.3Q2 ☐Yes, the result is the low flow threshold is 0.5Q2 If a geomorphic assessment has been performed, provide title, date, and preparer: Discussion / Additional Information: (optional)

Form I-3B Page 10 of 10
Other Site Requirements and Constraints
When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.
Optional Additional Information or Continuation of Previous Sections As Needed
This space provided for additional information or continuation of information from previous sections as needed.

Source Control BMP Checklist for All Development Projects (Standard Projects and PDPs)			Form I-4
Project Identification			
Project Name: EDDIE JONES INDUSTRIAL			
Permit Application Number: CUP22-00001 / D22-00001 / ADM21-00057			
Source Control BMPs			
All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the manual for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.			
Source Control Requirement	**Implemented?**		
SC-1 Prevention of Illicit Discharges into the MS4	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-1 not implemented:			
SC-2 Storm Drain Stenciling or Signage	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-2 not implemented: Proposed onsite storm drain inlets will be marked accordingly.			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-3 not implemented: Not applicable. No permanent outdoor materials storage areas proposed with this project.			

Form I-4 Page 2 of 3			
Source Control Requirement	**Implemented?**		
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-4 not implemented: Not applicable. No permanent outdoor materials storage areas proposed with this project.			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-5 not implemented:			

Form I-4 Page 3 of 3			
SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)	**Implemented?**		
Onsite 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 area	☒ Yes	☐ No	☐ N/A
Industrial processes	☒ Yes	☐ No	☐ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☒ N/A
Vehicle and equipment cleaning	☐ 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
Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.			

Site Design BMP Checklist for All Development Projects (Standard Projects and PDPs)			Form I-5
Project Identification			
Project Name: EDDIE JONES INDUSTRIAL			
Permit Application Number: CUP22-00001 / D22-00001 / ADM21-00057			
Site Design BMPs			
All development projects must implement site design BMPs SD-1 through SD-8 where applicable and feasible. See Chapter 4 and Appendix E of the manual for information to implement site design BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided.			
Site Design Requirement	**Applied?**		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-1 not implemented:			
SD-2 Conserve Natural Areas, Soils, and Vegetation	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-2 not implemented:			
SD-3 Minimize Impervious Area	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-3 not implemented:			
SD-4 Minimize Soil Compaction	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-4 not implemented:			

Form I-5 Page 2 of 2			
Site Design Requirement	**Applied?**		
SD-5 Impervious Area Dispersion	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-5 not implemented:			
SD-6 Runoff Collection	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-6 not implemented:			
SD-7 Landscaping with Native or Drought Tolerant Species	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-7 not implemented:			
SD-8 Harvesting and Using Precipitation	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-8 not implemented:			

Summary of PDP Structural BMPs	Form I-6 (PDPs)
Project Identification	
Project Name: EDDIE JONES INDUSTRIAL	
Permit Application Number: CUP22-00001 / D22-00001 / ADM21-00057	
PDP Structural BMPs	
All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the manual). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s). PDP structural BMPs must be verified by the local jurisdiction at the completion of construction. This may include requiring the project owner or project owner's representative to certify construction of the structural BMPs (see Section 1.12 of the manual). PDP structural BMPs must be maintained into perpetuity, and the local jurisdiction must confirm the maintenance (see Section 7 of the manual). 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 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 subject property currently has two main points of discharge from the site that connect to existing public storm drain prior to discharging to the San Luis Rey River. Infiltration testing was performed toward the southwest corner of the property near one of the site's main discharge locations as part of the feasibility analysis for structural BMP implementation. The project geotechnical engineer determined that infiltration will increase geotechnical hazards and as such, a no infiltration recommendation was given (see completed Worksheet C.4-1 included in this report). With the no infiltration condition for the property, traditional biofiltration BMP's were studied for pollutant control compliance before the applicant decided to proceed with implementing proprietary biofiltration BMP's. These are currently proposed near the project's two main discharge outlets, to be used in conjunction with an underground detention vault for mitigation of the 100-year, 6-hour storm peak flow generated by the proposed development. As mentioned throughout this report, the project discharges directly to the San Luis Rey River and is considered exempt from hydromodification management low-flow requirements. (Continue on page 2 as necessary.)	

Form I-6 Page 2 of 6
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)

(Continued from page 1)

The proposed systems at each outlet will consist of a detention storage vault (cistern), along with proprietary biofiltration BMP (Modular Wetland System or equivalent product), and a duplex pump system. For both systems at both discharge locations, the detention storage vault is proposed to be upstream of the Modular Wetlands System, and will handle the 100-year storm mitigation. The Modular Wetlands System (MWS) will handle the water quality treatment volume and pollutant control requirements. Since the MWS is downstream of the storage vault, a volume-based sizing approach is proposed for water quality, and the required treatment volume is based on the project DCV and drawdown time of the storage unit. Please refer to the sections sheet of our plan set for a more detailed view. Additionally, the project site will implement amended soils in proposed landscape areas to provide a volume retention component that is inherently present in traditional biofiltration BMP's but is foregone with the use of proprietary systems.

To treat the proposed improvements within the Benet Road right-of-way, tree wells are proposed in the parkway with curb cuts to receive surface drainage from Benet Road. The tree wells have been designed to treat the hardscape proposed and manage pollutant control in accordance with the USEPA Green Street Design Guidance. The tree well design conforms with the County of San Diego Green Street Design using modified GS-1.04a & GS-1.04b details as shown on the project discretionary plans.

To provide the volume retention requirements as a consequence of the proposed improvements, two planters are proposed within the curb areas. They will include 3" of amended soils and 3" of ponding to fully provide the retention volume required.

Form I-6 Page 3 of 6 (Copy as many as needed)	
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**	
Structural BMP ID No. BMP #1	
Construction Plan Sheet No.	
Type of structural BMP: ☐Retention by harvest and use (HU-1) ☐Retention by infiltration basin (INF-1) ☐Retention by bioretention (INF-2) ☐Retention by permeable pavement (INF-3) ☐Partial retention by biofiltration with partial retention (PR-1) ☐Biofiltration (BF-1) ☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☒Detention pond or vault for hydromodification management (PROJECT IS HMP EXEMPT) ☐Other (describe in discussion section below)	
Purpose: ☐Pollutant control only ☐Hydromodification control only ☐Combined pollutant control and hydromodification control ☐Pre-treatment/forebay for another structural BMP ☐Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)	PLSA Address: 1911 San Diego Ave. San Diego, CA 92117 Phone: (858)-259-4812
Who will be the final owner of this BMP?	RAF Pacifica, LLC
Who will maintain this BMP into perpetuity?	RAF Pacifica, LLC
What is the funding mechanism for maintenance?	RAF Pacifica, LLC

Form I-6 Page 4 of 6 (Copy as many needed)
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**
Discussion (as needed): This Structural BMP consists of an underground detention vault (cistern) to be used for compliance with flood control requirements (project is HMP exempt, and will outlet to the San Luis Rey River). This Structural BMP is located along the north side of the proposed industrial building in the NW corner of the property. The detention system proposed is a 9,300 SF vault (235-ft x 40-ft), 8-ft, 4-in tall StormTrap system consisting of pre-fabricated concrete modules. The total storage volume provided is 69,722 CF.

Form I-6 Page 5 of 6 (Copy as many as needed)
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**
Structural BMP ID No. BMP #1a
Construction Plan Sheet No.
Type of structural BMP: ☐Retention by harvest and use (HU-1) ☐Retention by infiltration basin (INF-1) ☐Retention by bioretention (INF-2) ☐Retention by permeable pavement (INF-3) ☐Partial retention by biofiltration with partial retention (PR-1) ☒Biofiltration (BF-1) ☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐Detention pond or vault for hydromodification management (PROJECT IS HMP EXEMPT) ☐Other (describe in discussion section below)
Purpose: ☒Pollutant control only ☐Hydromodification control only ☐Combined pollutant control and hydromodification control ☐Pre-treatment/forebay for another structural BMP ☐Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)	PLSA Address: 1911 San Diego Ave. San Diego, CA 92117 Phone: (858)-259-4812
Who will be the final owner of this BMP?	RAF Pacifica, LLC
Who will maintain this BMP into perpetuity?	RAF Pacifica, LLC
What is the funding mechanism for maintenance?	RAF Pacifica, LLC

Form I-6 Page 6 of 6 (Copy as many needed)
Structural BMP Summary Information (Copy this page as needed to provide information for each individual proposed structural BMP)
Discussion (as needed): This Structural BMP consists of 2x proprietary biofiltration BMP Modular Wetlands System (MWS) unit or equivalent product, and is proposed to comply with pollutant control requirements only (project is HMP exempt, and will outlet to the San Luis Rey River). This structural BMP is located along the north side of proposed industrial building in the RW corner of the property. The MWS unit is proposed to be an MWS-L-8-24 model.

Form I-6 Page 3 of 6 (Copy as many as needed)	
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**	
Structural BMP ID No. BMP #2	
Construction Plan Sheet No.	
Type of structural BMP: ☐Retention by harvest and use (HU-1) ☐Retention by infiltration basin (INF-1) ☐Retention by bioretention (INF-2) ☐Retention by permeable pavement (INF-3) ☐Partial retention by biofiltration with partial retention (PR-1) ☐Biofiltration (BF-1) ☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☒Detention pond or vault for hydromodification management (PROJECT IS HMP EXEMPT) ☐Other (describe in discussion section below)	
Purpose: ☐Pollutant control only ☐Hydromodification control only ☐Combined pollutant control and hydromodification control ☐Pre-treatment/forebay for another structural BMP ☐Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)	PLSA Address: 1911 San Diego Ave. San Diego, CA 92117 Phone: (858)-259-4812
Who will be the final owner of this BMP?	RAF Pacifica, LLC
Who will maintain this BMP into perpetuity?	RAF Pacifica, LLC
What is the funding mechanism for maintenance?	RAF Pacifica, LLC

Form I-6 Page 4 of 6 (Copy as many needed)
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**
Discussion (as needed): This Structural BMP consists of an underground detention vault (cistern) to be used for compliance with flood control requirements (project is HMP exempt, and will outlet to the San Luis Rey River). This Structural BMP is located along the south side of the proposed industrial building in the SW corner of the property. The detention system proposed is a 6,000 SF vault (150-ft x 40-ft), 15-ft tall StormTrap system consisting of pre-fabricated concrete modules. The total storage volume provided is 81,000 CF.

Form I-6 Page 5 of 6 (Copy as many as needed)
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**
Structural BMP ID No. BMP #2a
Construction Plan Sheet No.
Type of structural BMP: ☐Retention by harvest and use (HU-1) ☐Retention by infiltration basin (INF-1) ☐Retention by bioretention (INF-2) ☐Retention by permeable pavement (INF-3) ☐Partial retention by biofiltration with partial retention (PR-1) ☒Biofiltration (BF-1) ☐Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐Detention pond or vault for hydromodification management (PROJECT IS HMP EXEMPT) ☐Other (describe in discussion section below)
Purpose: ☒Pollutant control only ☐Hydromodification control only ☐Combined pollutant control and hydromodification control ☐Pre-treatment/forebay for another structural BMP ☐Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)	PLSA Address: 1911 San Diego Ave. San Diego, CA 92117 Phone: (858)-259-4812
Who will be the final owner of this BMP?	RAF Pacifica, LLC
Who will maintain this BMP into perpetuity?	RAF Pacifica, LLC
What is the funding mechanism for maintenance?	RAF Pacifica, LLC

Form I-6 Page 6 of 6 (Copy as many needed)
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**
Discussion (as needed): This Structural BMP consists of 1x proprietary biofiltration BMP Modular Wetlands System (MWS) unit or equivalent product, and is proposed to comply with pollutant control requirements only (project is HMP exempt, and will outlet to the San Luis Rey River). This structural BMP is located along the south side of proposed industrial building in the SW corner of the property. The MWS unit is proposed to be an MWS-L-8-24 model.

	City of Oceanside 300 N Coast Highway Oceanside, CA 92054	**Permanent BMP Construction** **Self Certification Form**	February 2016

Date Prepared: 01/14/22	Project No.: ADM21-00057
Project Applicant: Raf Pacifica, LLC.	Phone: (858)314-3116
Project Address: 250 Eddie Jones Way, Oceanside, CA 92058	
Project Engineer: Tyler G. Lawson	Phone: (858)259-8212

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

This form must be completed by the engineer and installing contractor and submitted prior to final inspection of the construction permit. Completion and submittal of this form is required for all new development and redevelopment projects in order to comply with the City's Storm Water ordinances and NDPES Permit Order No. R9-2013-0001. Final inspection for occupancy and/or release of grading or public improvement bonds may be delayed if this form is not submitted and approved by the City of Oceanside.

ENGINEER'S CERTIFICATION:

As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control and treatment control BMP's required per the approved SWQMP and Construction Permit No. Click here to enter text.; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and Order No. R9-2013-0001 of the San Diego Regional Water Quality Control Board.

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

Signature: ______________________________

Date of Signature: _ Click here to enter text. ___ **Printed Name:** _ Tyler G. Lawson ______ **Title:** _ Professional Engieer _______________ **Phone No.** _ (858)259-8212 __________ Engineer's Stamp
CONTRACTOR'S CERTIFICATION: As the professional in responsible charge for construction of the above project, I certify that all constructed Low Impact Development (LID) site design, source control and treatment control BMP's required per the approved SWQMP and Construction Permit No. Click here to enter text.; have been constructed in compliance with the approved plans and all applicable specifications, permits, and ordinances. I understand that this BMP certification statement does not constitute an operation and maintenance verification. **Signature:** __________________________________ **Date of Signature:** _ Click here to enter text. ___ **Printed Name:** _ Click here to enter text. ______ **Title:** _ Click here to enter text. _______________ **Phone No.** _ Click here to enter text. __________

ATTACHMENT 1

BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

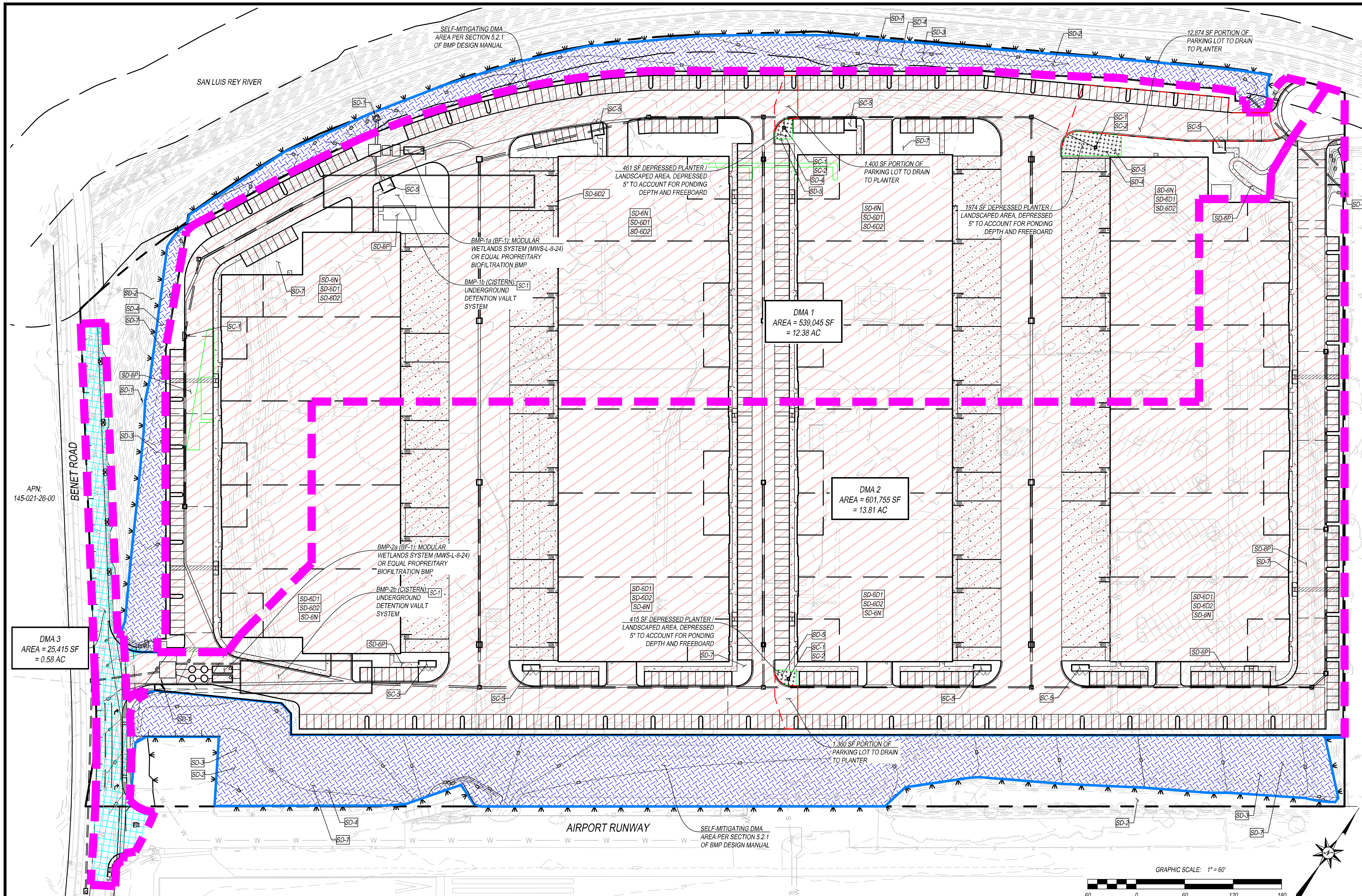
Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☒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	Design Capture Volume Worksheet	☒Included
Attachment 1d	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☒Included ☐Not included because the entire project will use infiltration BMPs
Attachment 1e	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	☒Included ☐Not included because the entire project will use harvest and use BMPs
Attachment 1f	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines	☒Included

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

The DMA Exhibit must identify:

☒Underlying hydrologic soil group
☒Approximate depth to groundwater
☒Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
☒Critical coarse sediment yield areas to be protected
☒Existing topography and impervious areas
☒Existing and proposed site drainage network and connections to drainage offsite
☒Proposed grading
☒Proposed impervious features
☒Proposed design features and surface treatments used to minimize imperviousness
☒Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
☒Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
☒Structural BMPs (identify location, type of BMP, and size/detail)



LEGEND

- PROPERTY BOUNDARY
- CENTERLINE OF ROAD
- ADJACENT PROPERTY LINE / RIGHT-OF-WAY
- EXISTING CONTOUR LINE
- EXISTING PATH OF TRAVEL
- EXISTING DIRECTION OF FLOW
- PROPOSED / REMOVED AND REPLACED IMPERVIOUS AREA WITHIN DISTURBED AREA OF SITE
- PROPOSED AMENDED SOILS / LANDSCAPE ARA USED FOR VOLUME RETENTION
- DMA DRAINAGE BASIN BOUNDARY
- PORTION OF IMPERVIOUS AREA TO BE ROUTED TO AMENDED SOILS
- SELF-MITIGATING AREA PER BMP DESIGN MANUAL SECTION 5.2.1
- PROPOSED IMPERVIOUS AREA WITHIN RIGHT-OF-WAY TO BE ROUTED TO TREE WELL BMPS OR COMPARABLE LID BMP FOR TREATMENT

DMA 1 - AREA CALCULATIONS

IMPERVIOUS AREA	(BUILDINGS / ROOF)	233,251 SF
	(MISC IMPROVEMENTS)	255,787 SF
	TOTAL	489,038 SF
PERVIOUS AREA	(LANDSCAPING)	50,007 SF
	TOTAL	50,007 SF

TOTAL BASIN AREA 539,045 SF

% IMPERVIOUS AREA 90.7%

DMA TABLE - TREATMENT (DMA 1)					
DMA / BMP	AREA (SF)	POST-PROJECT SURFACE TYPE	SURFACE RUNOFF FACTOR	ADJUSTMENT FACTOR	AREA X ADJUSTED RUNOFF (SF)
A	233251	ROOF	0.9	1	209926
B	255787	HARDSCAPE	0.9	1	230208
C	50007	LANDSCAPE	0.1	1	5001
TOTAL					445135

DCV CALCULATION - DMA 1

AREA TRIBUTARY TO BMP (A) = 539,045 SF (12.37 AC)

TOTAL DMA SIZE (Cx * Ax) = 445,135 SF
RUNOFF FACTOR (Cx) = 0.83
85TH PERCENTILE RAINFALL DEPTH (d) = 0.62 IN

DCV (C*D*A*3,630) = 23,107 CU FT

DMA 2 - AREA CALCULATIONS

IMPERVIOUS AREA	(BUILDINGS / ROOF)	260,387 SF
	(MISC IMPROVEMENTS)	285,561 SF
	TOTAL	545,948 SF
PERVIOUS AREA	(LANDSCAPING)	55,825 SF
	TOTAL	55,825 SF

TOTAL BASIN AREA 601,755 SF

% IMPERVIOUS AREA 90.7%

DMA TABLE - TREATMENT (DMA 2)					
DMA / BMP	AREA (SF)	POST-PROJECT SURFACE TYPE	SURFACE RUNOFF FACTOR	ADJUSTMENT FACTOR	AREA X ADJUSTED RUNOFF (SF)
A	260387	ROOF	0.9	1	234348
B	285561	HARDSCAPE	0.9	1	257005
C	55807	LANDSCAPE	0.1	1	5581
TOTAL					496934

DCV CALCULATION - DMA 2

AREA TRIBUTARY TO BMP (A) = 601,775 SF (13.81 AC)

TOTAL DMA SIZE (Cx * Ax) = 496,934 SF
RUNOFF FACTOR (Cx) = 0.83
85TH PERCENTILE RAINFALL DEPTH (d) = 0.62 IN

DCV (C*D*A*3,630) = 25,797 CU FT

PLAN VIEW - DMA EXHIBIT

SCALE: 1" = 60' HORIZONTAL

COARSE SEDIMENT YIELD

NO CRITICAL COARSE SEDIMENT YIELD AREAS TO BE PROTECTED ONSITE OR UPSTREAM OF SUBJECT PROPERTY. REFER TO PRIORITY DEVELOPMENT PROJECT SWQMP PREPARED BY PASCO, LARET, SUITER & ASSOCIATES

TREATMENT CONTROL BMPS

MODULAR WETLAND SYSTEM
PROPRIETARY BIOFILTRATION BF-3

SOIL TYPE INFORMATION

SOIL: CLASS A AND D HYDROLOGIC SOILS PER USGS WEB SOIL SURVEY

GROUNDWATER INFORMATION

GROUNDWATER ENCOUNTERED AT DEPTHS FROM 5 TO 10 FEET (ABOUT 7-7.5 FEET BELOW GROUND SURFACE) AT ELEVATIONS APPROXIMATELY 18.5 TO 20 FEET MSL PER "GEOTECHNICAL INVESTIGATION, PROPOSED INDUSTRIAL DEVELOPMENT, 250 EDDY JONES WAY, OCEANSIDE CA" PREPARED BY NOVA SERVICES DATED OCTOBER 22, 2021

BMP LEGEND

POST-CONSTRUCTION SITE DESIGN BMPs

- SD-1 MAINTAIN NATURAL DRAINAGE PATHWAYS AND HYDROLOGIC FEATURES
- SD-2 CONSERVE NATURAL AREAS, SOILS AND VEGETATION
- SD-3 MINIMIZE IMPERVIOUS AREA
- SD-4 MINIMIZE SOIL COMPACTION
- SD-5 IMPERVIOUS AREA DISPERSION
- SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

POST-CONSTRUCTION SOURCE CONTROL BMPs

- SC-1 PREVENTION OF ILLICIT DISCHARGE INTO THE MS4 YES
- SC-2 STORM DRAIN STENCILING AND POSTING OF SIGNAGE YES
- SC-3 PROTECTED OUTDOOR MATERIALS STORAGE AREAS N/A
- SC-4 PROTECT MATERIAL STORED IN OUTDOOR WORK AREAS N/A
- SC-5 PROTECT TRASH STORAGE AREAS YES
- SC-6 ADDITIONAL BMPs BASED ON POTENTIAL RUNOFF POLLUTANTS:
  - D1 NEED FOR FUTURE INDOOR & STR. PEST CONTROL YES
  - D2 LANDSCAPE / OUTDOOR PESTICIDE USE YES
  - N FIRE SPRINKLER TEST WATER YES
  - P PLAZAS, SIDEWALKS AND PARKING LOTS YES

PLANTER TREATMENT CALCULATIONS

TOTAL BASIN SIZE (DMA 1 + DMA 2): = 1,140,800 SF (26.19 AC)

PARKING LOT SF ROUTED TO PLANTER: = 1,360 + 1,400 + 12,874 SF
= 15,634 SF (0.359 AC)

85TH PERCENTILE RAINFALL DEPTH (d): = 0.62 IN

85TH PERCENTILE VOLUME ROUTED TO PLANTER = 15,634 SF * (0.62IN / 1FT / 12IN)
= 808 CU FT
*PROJECT VOLUME RETENTION REQUIREMENT PER WORKSHEET B.2

*CALCULATIONS PER WORKSHEET B.2 = 250 + 258 CU FT
= 508 CU FT

RETENTION VOLUME PROVIDED: 2,376 SF (PLANTER) * (3 IN)(1FT/12IN) (PONDING)
= 594 CU FT > 508 CU FT

* SEE DETAIL NEXT SHEET

SELF-MITIGATING DMA - DMA A & B

TOTAL BASIN SIZE = 175,979 SF (4.04 AC)

SELF-MITIGATING IMPERVIOUS AREA = 0 SF (PCC DRIVE AISLE)
% IMPERVIOUS = 0.0%

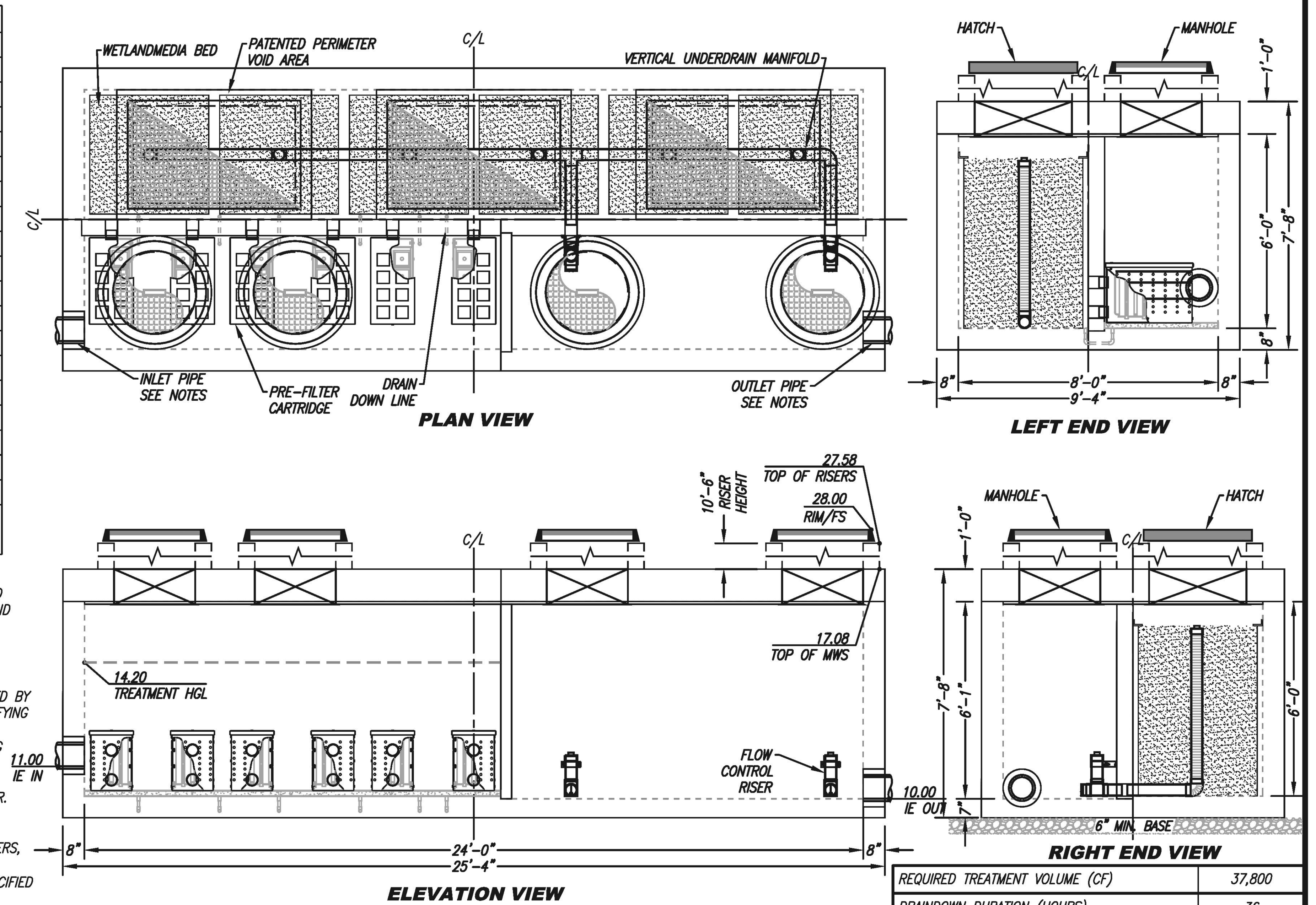
SECTION 5.2.1 OF CITY OF OCEANSIDE BMP DESIGN MANUAL ALLOWS FOR SELF-MITIGATING DMA AREAS THAT DRAIN DIRECTLY OFFSITE OR TO THE PUBLIC STORM DRAIN SYSTEM, WITH INCIDENTAL IMPERVIOUS AREAS THAT ARE LESS THAN 5% OF THE SELF-MITIGATING AREA.

DRAINAGE MANANGEMENT AREA EXHIBIT

250 EDDIE JONES WAY - CITY OF OCEANSIDE
SCALE: 1" = 60' HORIZONTAL

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

SITE SPECIFIC DATA			
PROJECT NUMBER		14664	
PROJECT NAME		EDDY JONES INDUSTRIAL	
PROJECT LOCATION		OCEANSIDE, CA	
STRUCTURE ID		DMA 1	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
37,800		N/A	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	11.00	PVC	8"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	10.00	PVC	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	28.00	28.00	28.00
SURFACE LOAD	PEDESTRIAN	PEDESTRIAN	PEDESTRIAN
FRAME & COVER	2EA ø30"	3EA 36" X 60"	2EA ø30"
WETLANDMEDIA VOLUME (CY)			15.97
ORIFICE SIZE (DIA. INCHES)			ø1.63 EA
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			



REQUIRED TREATMENT VOLUME (CF)	37,800
DRAINDOWN DURATION (HOURS)	36
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	130.54
OPERATING HEAD (FT)	4.20
WETLANDMEDIA INFILTRATION RATE (IN/HR)	35
OR	
WETLANDMEDIA LOADING RATE (GPM/SF)	0.35

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
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8/24/22 HAYDEN

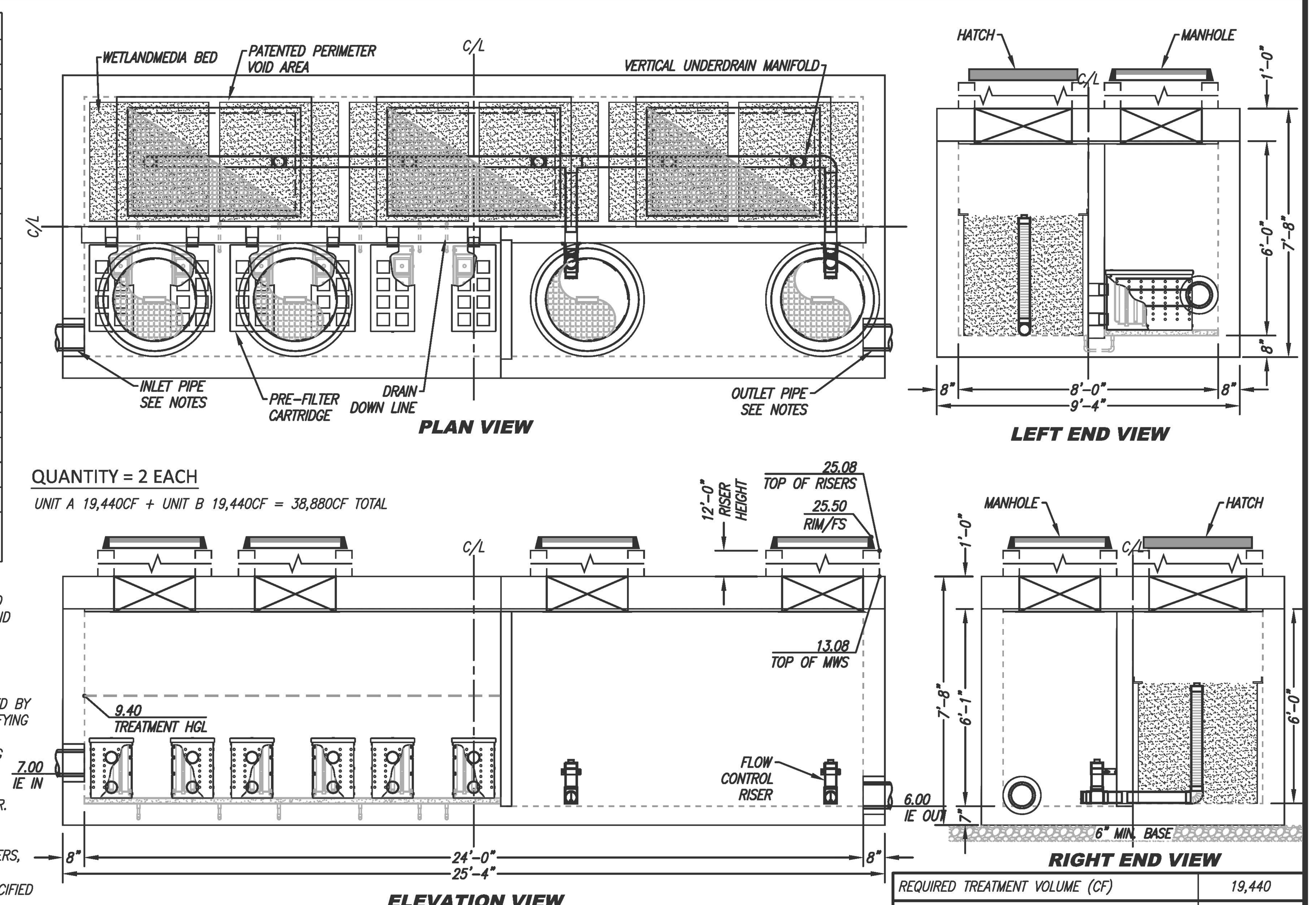
MODULAR WETLANDS

Bio Clean
A QUIKRETE® COMPANY

MWS-L-8-24-6'-0"-V-UG-HC
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER		14664	
PROJECT NAME		EDDY JONES INDUSTRIAL	
PROJECT LOCATION		OCEANSIDE, CA	
STRUCTURE ID		DMA 2	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
19,440		N/A	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	7.00	PVC	8"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	6.00	PVC	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	25.50	25.50	25.50
SURFACE LOAD	PEDESTRIAN	PEDESTRIAN	PEDESTRIAN
FRAME & COVER	2EA ø30"	3EA 36" X 60"	2EA ø30"
WETLANDMEDIA VOLUME (CY)			11.28
ORIFICE SIZE (DIA. INCHES)			ø1.23 EA
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			

QUANTITY = 2 EACH
UNIT A 19,440CF + UNIT B 19,440CF = 38,880CF TOTAL



REQUIRED TREATMENT VOLUME (CF)	19,440
DRAINDOWN DURATION (HOURS)	36
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	66.42
OPERATING HEAD (FT)	3.4
WETLANDMEDIA INFILTRATION RATE (IN/HR)	22
OR	
WETLANDMEDIA LOADING RATE (GPM/SF)	0.22

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8/24/22 HAYDEN

MODULAR WETLANDS

Bio Clean
A QUIKRETE® COMPANY

MWS-L-8-24-6'-0"-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SIZING OF VOLUME-BASED BIOFILTRATION BMP

DRAINAGE MANAGEMENT AREA	TOTAL AREA, (AC)	TOTAL IMPERVIOUS AREA (AC)	TOTAL PERVIOUS AREA (AC)	POST-DEV RUNOFF COEFF., C	INTENSITY, I (IN)	REQUIRED WQ TREATMENT VOLUME	PROVIDED WQ TREATMENT VOLUME	DMA TYPE	STRUCTURAL BMP TYPE	STRUCTURAL BMP ID	OWNED BY
DMA-1	12.37	11.23	1.15	0.83	0.20	34,661 CF	39,000 CF	DRAINS TO BMP	MODULAR WETLAND SYSTEM (PROPRIETARY BIOFILTRATION - BF-3)	BMP-1	RAF PACIFICA GROUP
DMA-2	13.81	12.53	1.28	0.83	0.20	38,696 CF	39,000 CF	DRAINS TO BMP	MODULAR WETLAND SYSTEM (PROPRIETARY BIOFILTRATION - BF-3)	BMP-2	RAF PACIFICA GROUP

NOTE:
1. RUNOFF FACTOR FOR IMPERVIOUS SURFACES = 0.9; RUNOFF FACTOR FOR AMENDED SOILS/LANDSCAPE = 0.1
2. REQUIRED WATER QUALITY TREATMENT FLOW, Q = 1.5xCIA.
3. REFER TO APPENDIX F.2.2 OF CITY OF OCEANSIDE STORM WATER STANDARDS MANUAL (FEBRUARY 2016) FOR SIZING OF FLOW-BASED COMPACT BIOFILTRATION BMP REQUIREMENTS.

DCV REQUIREMENT - PROPRIETARY TREATMENT DMA 1

CALCULATIONS FROM PREVIOUS PAGE

AREA TRIBUTARY TO BMP (A)	=	539,045 SF (12.37 AC)
TOTAL DMA SIZE (Cx * Ax)	=	445,135 SF
RUNOFF FACTOR (Cx)	=	0.83
85TH PERCENTILE RAINFALL DEPTH (d)	=	0.62 IN
DCV (C*D*A*3,630)	=	23,107 CU FT

*PER CITY OF OCEANSIDE BMP DESIGN MANUAL APPENDIX F.2.2, PROPRIETARY BIOFILTRATION BMPS DESIGNED AS FLOW-BASED BMPS MUST TREAT 1.5 TIMES THE DCV

DCV TO MODULAR WETLANDS	=	23,107 CU FT X 1.5
	=	34,661 CU FT

*SEE VOLUME-BASED SIZING TABLE THIS SHEET

DCV REQUIREMENT - PROPRIETARY TREATMENT DMA 2

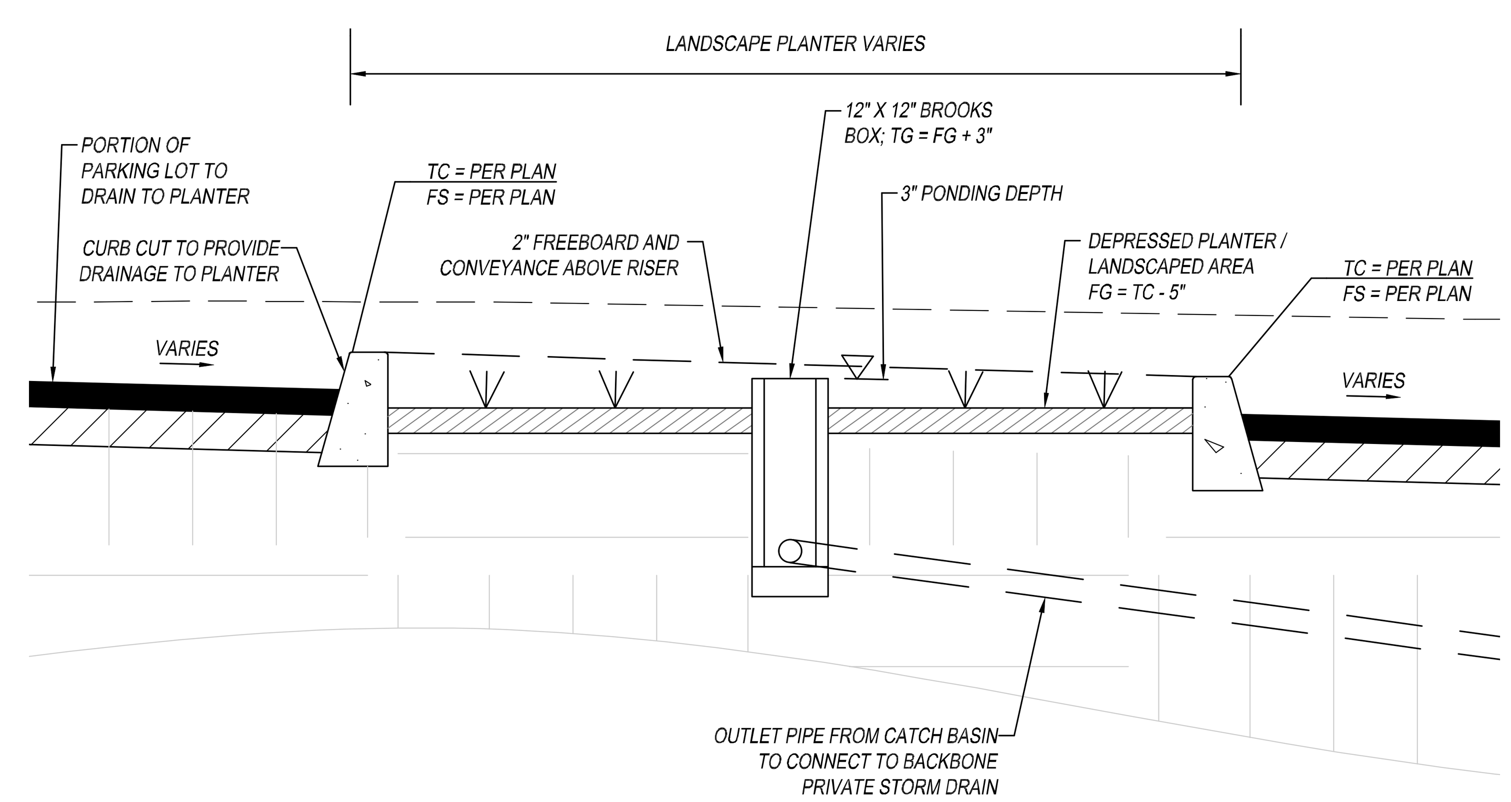
CALCULATIONS FROM PREVIOUS PAGE

AREA TRIBUTARY TO BMP (A)	=	601,775 SF (13.81 AC)
TOTAL DMA SIZE (Cx * Ax)	=	496,934 SF
RUNOFF FACTOR (Cx)	=	0.83
85TH PERCENTILE RAINFALL DEPTH (d)	=	0.62 IN
DCV (C*D*A*3,630)	=	25,797 CU FT

*PER CITY OF OCEANSIDE BMP DESIGN MANUAL APPENDIX F.2.2, PROPRIETARY BIOFILTRATION BMPS DESIGNED AS FLOW-BASED BMPS MUST TREAT 1.5 TIMES THE DCV

DCV TO MODULAR WETLANDS	=	25,797 CU FT X 1.5
	=	38,696 CU FT

*SEE VOLUME-BASED SIZING TABLE THIS SHEET



TYPICAL DETAIL - DEPRESSED PLANTER / LANDSCAPE AREA

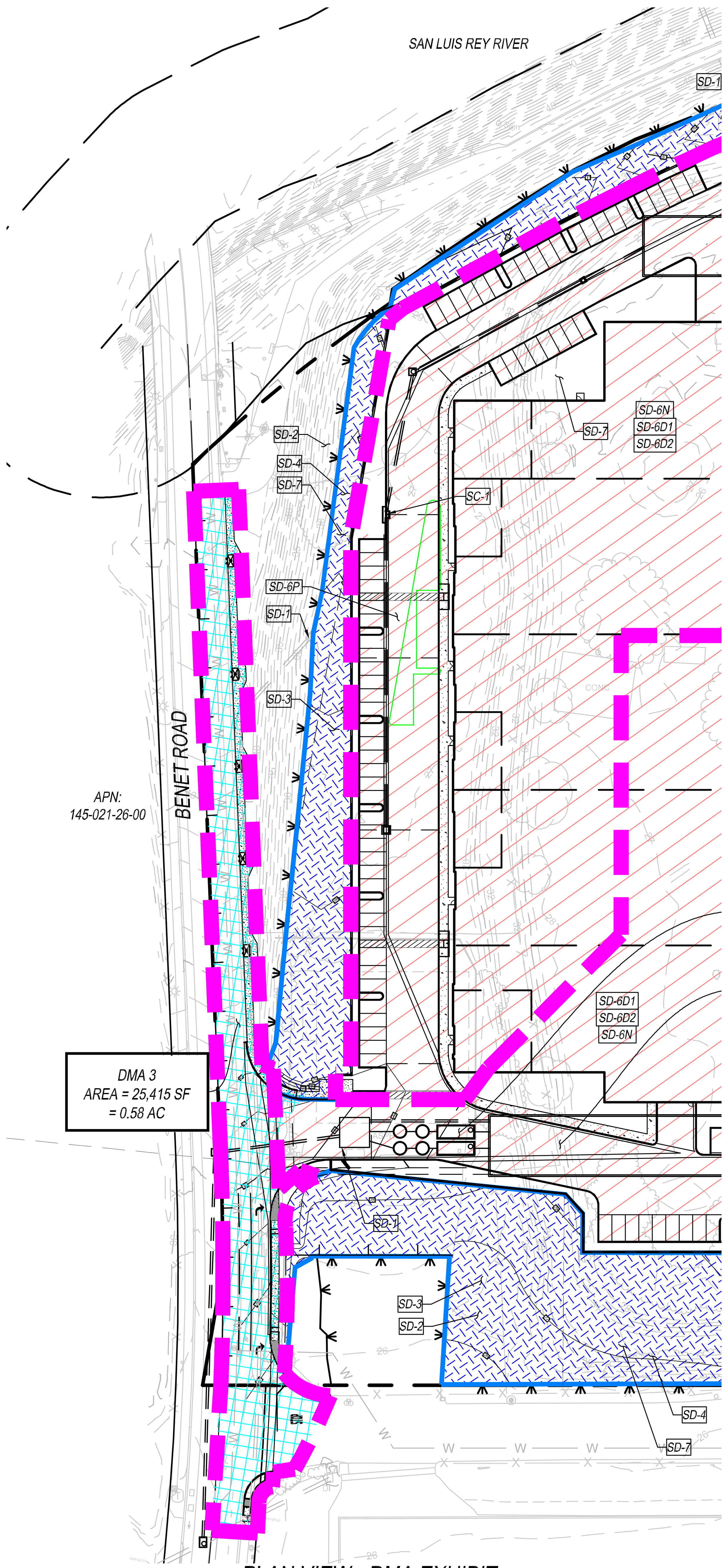
SCALE: NOT TO SCALE

NOTES:

1. ALL LANDSCAPE AREAS ARE TO BE DESIGNED WITH IMPERVIOUS AREA DISPERSION TO GREATEST EXTENT PRACTICABLE.
2. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING, AND AFTER CONSTRUCTION.

DRAINAGE MANANGEMENT AREA EXHIBIT
250 EDDIE JONES WAY - CITY OF OCEANSIDE

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



PLAN VIEW - DMA EXHIBIT

SCALE: 1" = 60' HORIZONTAL

GRAPHIC SCALE: 1" = 60'

60 0 60 120 180

LEGEND

PROPERTY BOUNDARY	
CENTERLINE OF ROAD	
RIGHT-OF-WAY	
ADJACENT PROPORTY LINE	
EXISTING CONTOUR LINE	140
PROPOSED CONTOUR LINE	140
PROPOSED DMA BASIN BOUNDARY	
PORTION OF IMPERVIOUS AREA TO BE ROUTED TO AMENDED SOILS	
PROPOSED / REMOVED AND REPLACED IMPERVIOUS AREA WITHIN DISTURBED AREA OF SITE	
PROPOSED SELF-MITIGATING DMA PER SECTION 5.2.1 OF CITY OF OCEANSIDE BMP DESIGN MANUAL	
PROPOSED AMENDED SOILS / LANDSCAPE AREA USED FOR VOLUME RETENTION	
PROPOSED IMPERVIOUS AREA WITHIN RIGHT-OF-WAY TO BE ROUTED TO TREE WELL BMPS OR COMPARABLE LID BMP FOR TREATMENT	

DCV CALCULATION - DMA 3

AREA TRIBUTARY TO BMP (A)	=	25,415 SF (0.58 AC)
TOTAL DMA SIZE (Cx * Ax)	=	20,586 SF
RUNOFF FACTOR (Cx)	=	0.81
85TH PERCENTILE RAINFALL DEPTH (d)	=	0.62 IN
DCV (C*D*A*3,630)	=	1,057 CU FT

COARSE SEDIMENT YIELD

NO CRITICAL COARSE SEDIMENT YIELD AREAS TO BE PROTECTED ONSITE OR UPSTREAM OF SUBJECT PROPERTY. REFER TO PRIORITY DEVELOPMENT PROJECT SWQMP PREPARED BY PASCO, LARET, SUITER & ASSOCIATES

TREATMENT CONTROL BMPS

MODULAR WETLAND SYSTEM

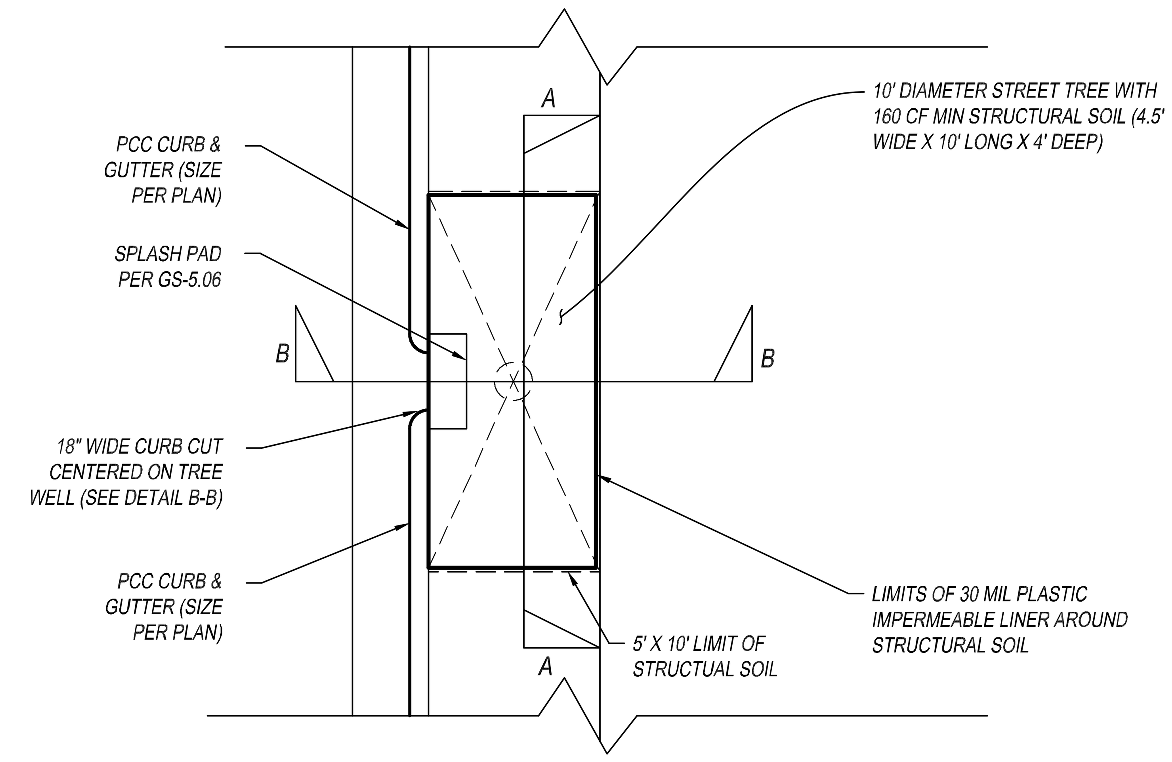
PROPRIETARY BIOFILTRATION BF-3

SOIL TYPE INFORMATION

SOIL: CLASS A AND D HYDROLOGIC SOILS PER USGS WEB SOIL SURVEY

GROUNDWATER INFORMATION

GROUNDWATER ENCOUNTERED AT DEPTHS FROM 5 TO 10 FEET (ABOUT 7-7.5 FEET BELOW GROUND SURFACE) AT ELEVATIONS APPROXIMATELY 18.5 TO 20 FEET MSL PER "GEOTECHNICAL INVESTIGATION, PROPOSED INDUSTRIAL DEVELOPMENT, 250 EDDY JONES WAY, OCEANSIDE CA" PREPARED BY NOVA SERVICES DATED OCTOBER 22, 2021



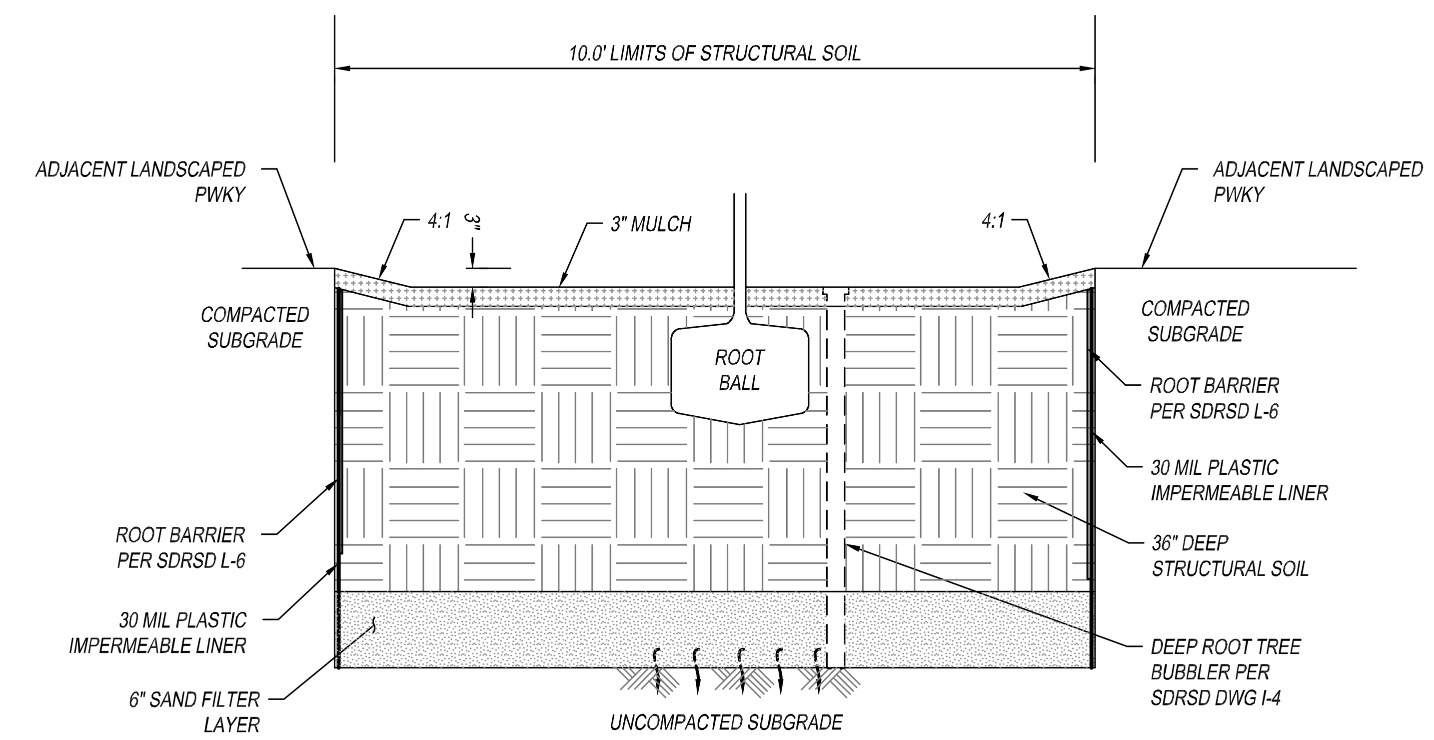
PLAN VIEW - TREE WELL W/O GRATE (AT BENET RD.)

MODIFIED SDC GS DS GS-1.04a + GS-1.04b

SCALE: NOT TO SCALE

STREET TREE NOTE:

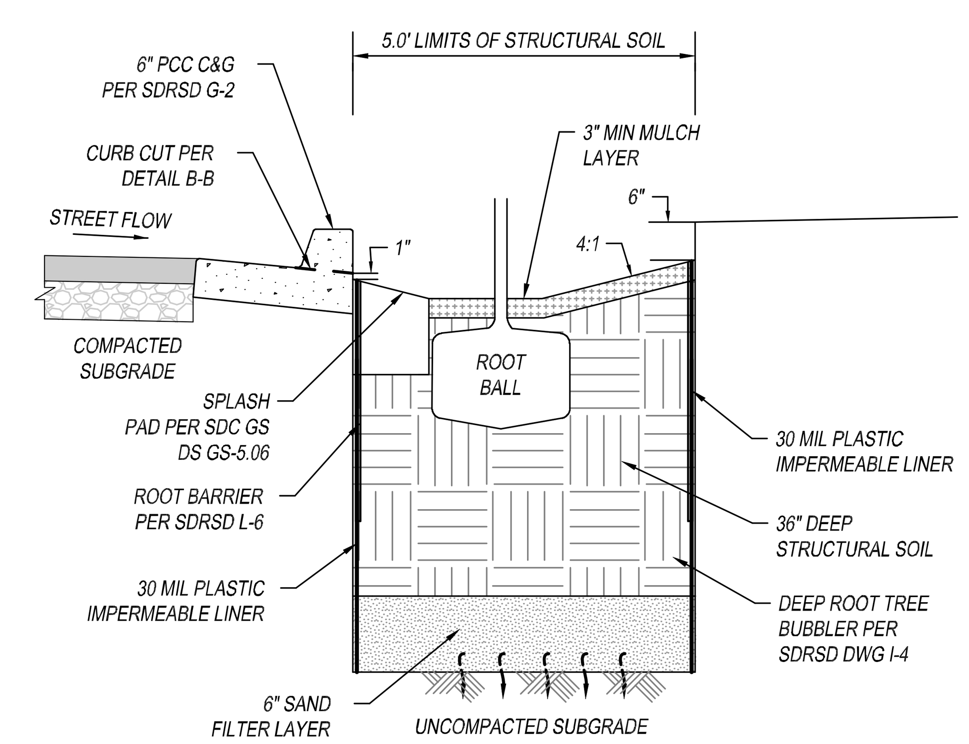
ALL STREET TREE DETAILS SHOWN HEREON ARE CONCEPTUAL. SPECIFIC DESIGN CRITERIA WILL BE DETERMINED AT FINAL ENGINEERING AND ARE SUBJECT TO APPROVAL BY THE CITY ENGINEER.



SECTION A-A - TREE WELL W/O GRATE (AT BENET RD.)

MODIFIED SDC GS DS GS-1.04a + GS-1.04b

SCALE: NOT TO SCALE



SECTION B-B - TREE WELL W/O GRATE (AT BENET RD.)

MODIFIED SDC GS DS GS-1.04a + GS-1.04b

SCALE: NOT TO SCALE

DRAINAGE MANANGEMENT AREA EXHIBIT

250 EDDIE JONES WAY - CITY OF OCEANSIDE

SCALE: 1" = 60' HORIZONTAL

PASCO LARET SUITER & ASSOCIATES

San Diego | Solana Beach | Orange County

Phone 858.259.8212 | www.plsaengineering.com

SITE SPECIFIC DATA

PROJECT NUMBER		14664	
PROJECT NAME		EDDY JONES INDUSTRIAL	
PROJECT LOCATION		OCEANSIDE, CA	
STRUCTURE ID		DMA 1	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
37,800		N/A	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	11.00	PVC	8"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	10.00	PVC	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	28.00	28.00	28.00
SURFACE LOAD	PEDESTRIAN	PEDESTRIAN	PEDESTRIAN
FRAME & COVER	2EA ø30"	3EA 36" X 60"	2EA ø30"
WETLANDMEDIA VOLUME (CY)			15.97
ORIFICE SIZE (DIA. INCHES)			ø1.63 EA

NOTES: PRELIMINARY NOT FOR CONSTRUCTION.

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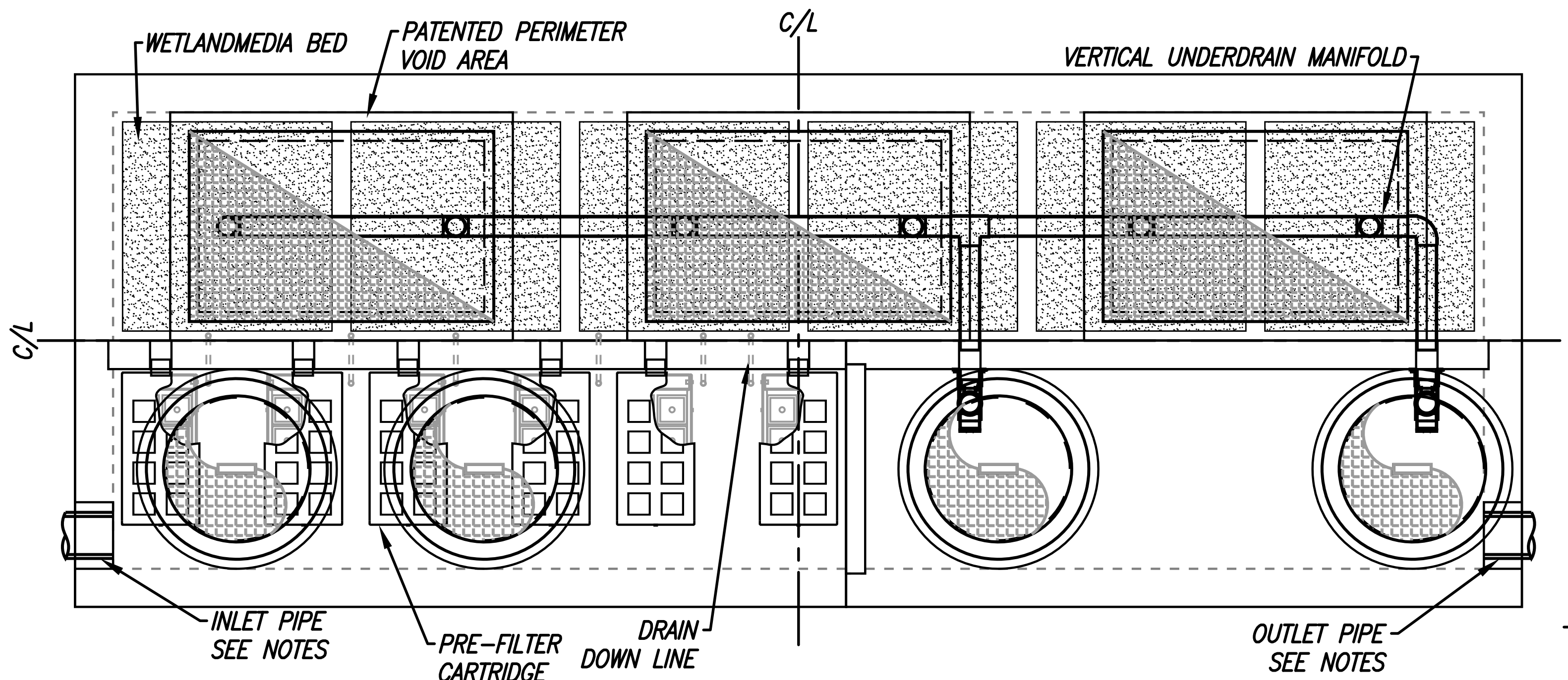
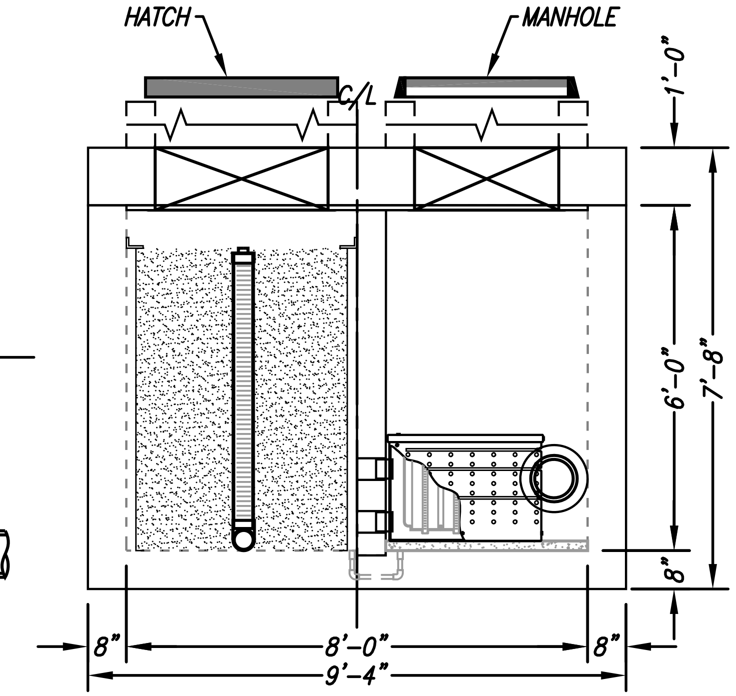
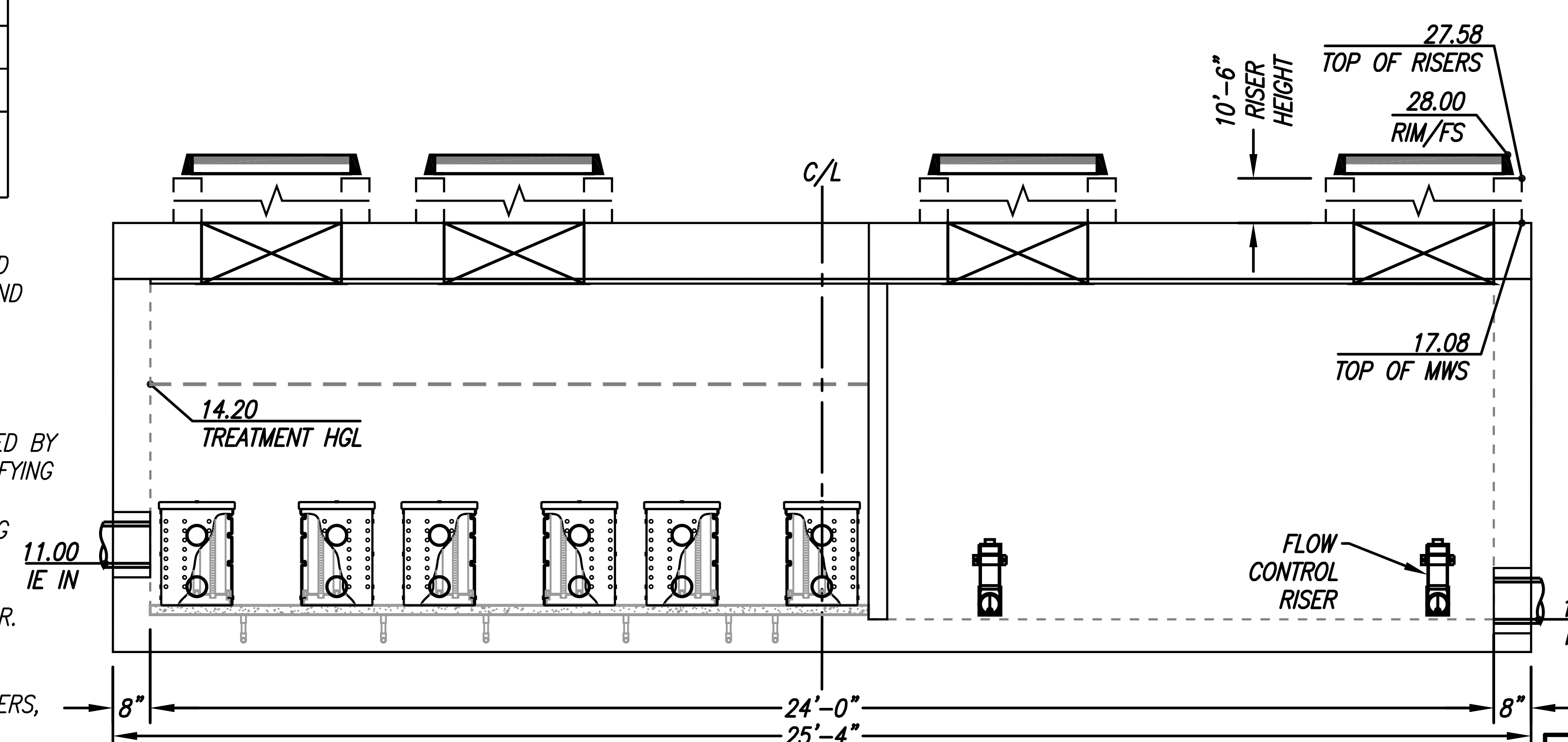


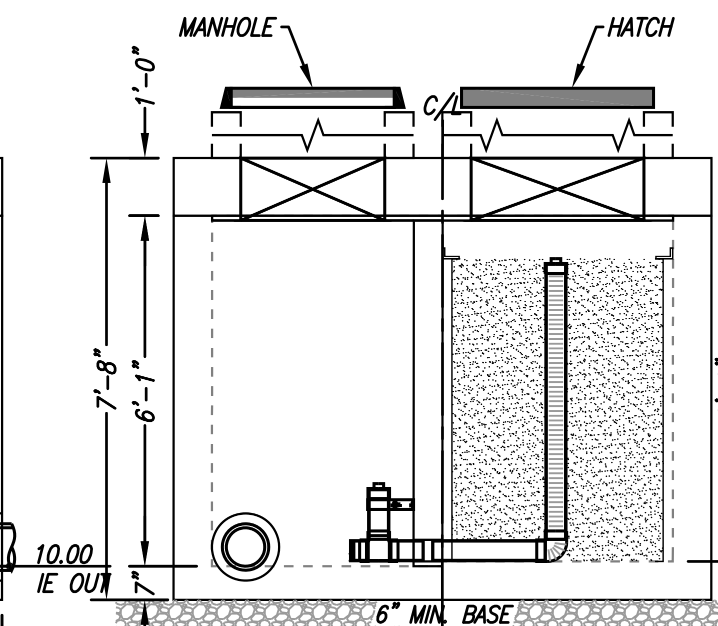
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

REQUIRED TREATMENT VOLUME (CF)		37,800
DRAINDOWN DURATION (HOURS)		36
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)		130.54
OPERATING HEAD (FT)		4.20
WETLANDMEDIA INFILTRATION RATE (IN/HR)	OR	35
WETLANDMEDIA LOADING RATE (GPM/SF)		0.35

MODULAR WETLANDS

Bio Clean
A QUIKRETE® COMPANY

MWS-L-8-24-6'-0"-V-UG-HC
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER	14664		
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PROJECT LOCATION	OCEANSIDE, CA		
STRUCTURE ID	DMA 2		
TREATMENT REQUIRED			
VOLUME BASED (CF)	FLOW BASED (CFS)		
19,440	N/A		
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	7.00	PVC	8"
INLET PIPE 2	N/A	N/A	N/A
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	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	25.50	25.50	25.50
SURFACE LOAD	PEDESTRIAN	PEDESTRIAN	PEDESTRIAN
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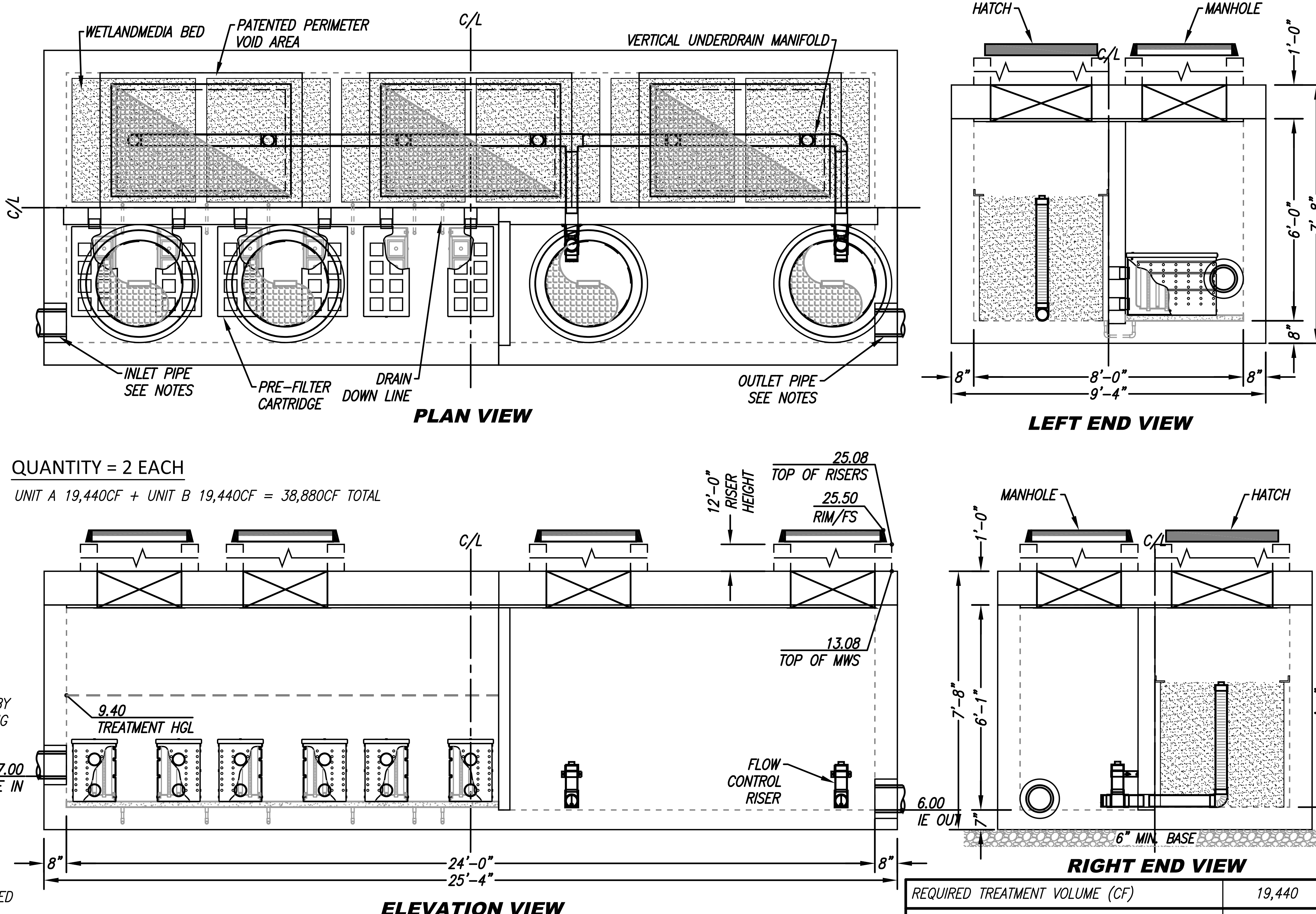

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AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	66.42
OPERATING HEAD (FT)	3.4
WETLANDMEDIA INFILTRATION RATE (IN/HR)	22
OR	
WETLANDMEDIA LOADING RATE (GPM/SF)	0.22

MODULAR WETLANDS

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

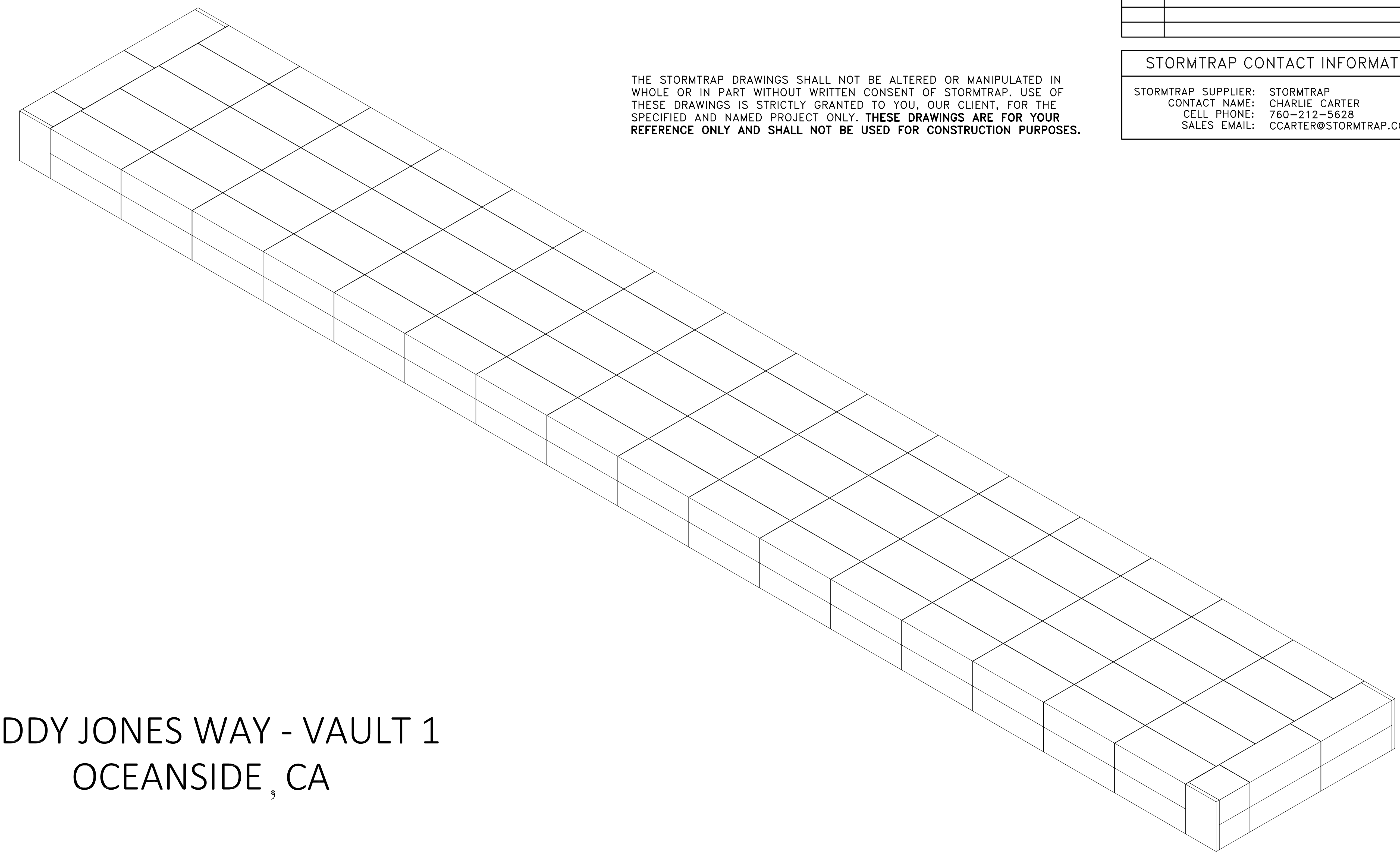
Bio Clean
A QUIKRETE® COMPANY

MWS-L-8-24-6'-0"-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

8/24/22 HAYDEN

StormTrap®

MODULAR CONCRETE
STORMWATER MANAGEMENT



THE STORMTRAP DRAWINGS SHALL NOT BE ALTERED OR MANIPULATED IN WHOLE OR IN PART WITHOUT WRITTEN CONSENT OF STORMTRAP. USE OF THESE DRAWINGS IS STRICTLY GRANTED TO YOU, OUR CLIENT, FOR THE SPECIFIED AND NAMED PROJECT ONLY. **THESE DRAWINGS ARE FOR YOUR REFERENCE ONLY AND SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.**

EDDY JONES WAY - VAULT 1
OCEANSIDE, CA

SHEET INDEX

STORMTRAP CONTACT INFORMATION

STORMTRAP SUPPLIER: STORMTRAP
CONTACT NAME: CHARLIE CARTER
CELL PHONE: 760-212-5628
SALES EMAIL: CCARTER@STORMTRAP.COM

StormTrap®

PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]

1287 WINDHAM PARKWAY
ROMEOVILLE, IL 60446
P:815-941-4549 / F:331-318-5347

ENGINEER INFORMATION:

PASCO LARET SUITER
& ASSOCIATES
119 ABERDEEN DRIVE
CARDIFF, CA
(858) 259-8212

PROJECT INFORMATION:

EDDY JONES WAY

VAULT 1

OCEANSIDE, CA

CURRENT ISSUE DATE:

8/9/2022

ISSUED FOR:

PRELIMINARY

REV.	DATE:	ISSUED FOR:	DWN BY:
3	8/9/2022	PRELIMINARY	KSD
2	4/26/2022	PRELIMINARY	JPH
1	2/4/2022	PRELIMINARY	KSD

SCALE:

NTS

SHEET TITLE:

COVER SHEET

SHEET NUMBER:

0.0

STRUCTURAL DESIGN LOADING CRITERIA

LIVE LOADING:	**AASHTO HS-20 HIGHWAY LOADING**
GROUND WATER TABLE:	20.00
SOIL BEARING PRESSURE:	3000PSF
SOIL DENSITY:	120 PCF
EQUIVALENT UNSATURATED LATERAL ACTIVE EARTH PRESSURE:	35 PSF / FT.
EQUIVALENT SATURATED LATERAL ACTIVE EARTH PRESSURE:	80 PSF/FT. (IF WATER TABLE PRESENT)
APPLICABLE CODES:	ASTM C857 ACI-318
BACKFILL TYPE:	SEE SHEET 4.0 FOR BACKFILL OPTIONS

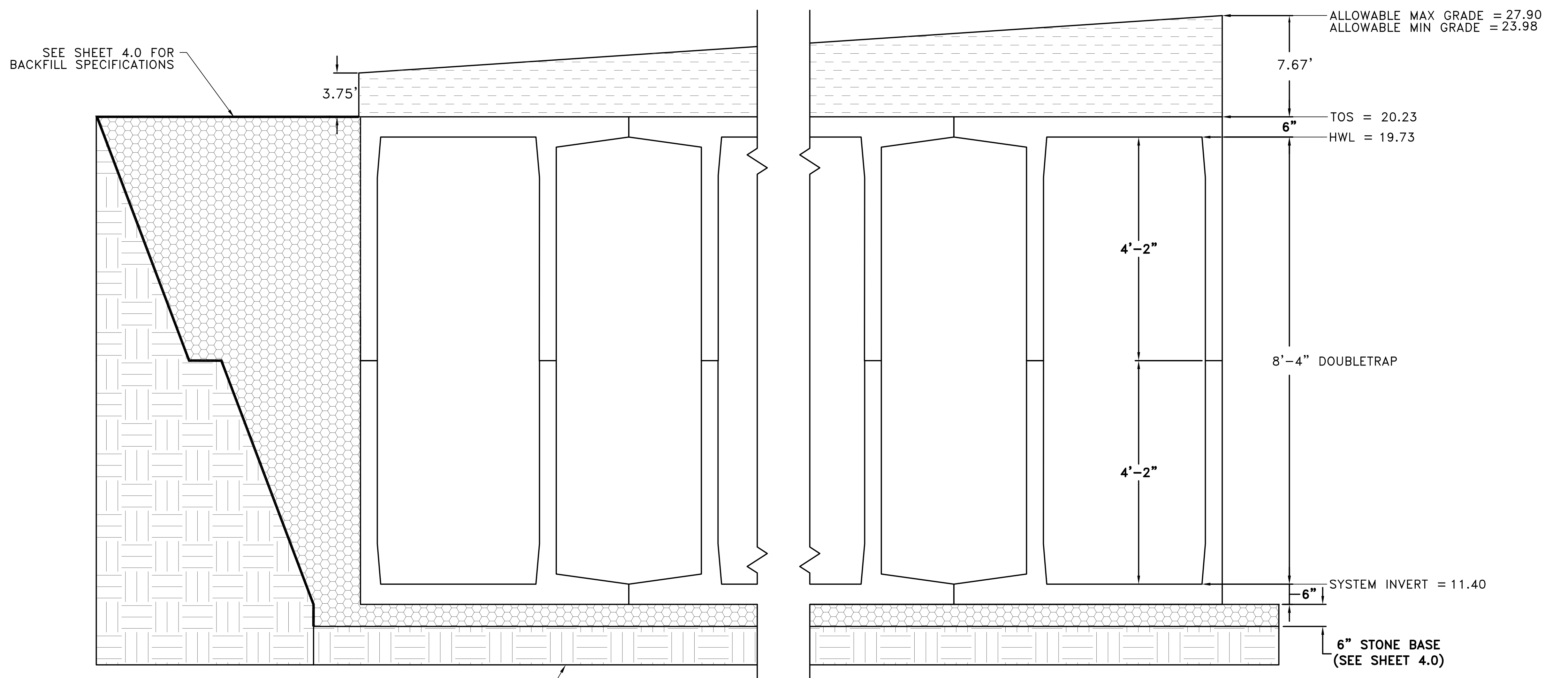
STORMTRAP SYSTEM INFORMATION

WATER STORAGE PROV:	76164.39 CUBIC FEET
UNIT HEADROOM:	8'-4" DOUBLETRAP

THE DESIGN HERE ASSUMES THAT NO VERTICAL LOADS, SURCHARGE LOADS, OR DIRECT LATERAL LOADS ARE EXERTED ON THE STORMTRAP SYSTEM BY NEARBY BUILDING STRUCTURES, FOUNDATION ELEMENTS, OR RETAINING WALLS. STORMTRAP RESERVES THE RIGHT TO MODIFY THE DESIGN, LAYOUT, AND ORIENTATION OF THE SYSTEM SHOWN HERE TO ADDRESS ANY ISSUES ASSOCIATED WITH NEARBY STRUCTURAL ITEMS. STORMTRAP MAKES NO GUARANTEE THAT ITS PRECAST MODULES CAN BE MODIFIED TO SUPPORT ADDITIONAL LOADS WHICH ARE LATER IDENTIFIED AND ATTRIBUTED TO SAID STRUCTURAL ITEMS.

SITE SPECIFIC DESIGN CRITERIA

1. STORMTRAP UNITS SHALL BE MANUFACTURED AND INSTALLED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER OF RECORD. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/OUTLET PIPE TYPES, SIZES, INVERT ELEVATIONS AND SIZE OF OPENINGS.
2. COVER RANGE: MIN. 3.75' MAX. 7.67' CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS.
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE REQUIRED TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.
4. FOR STRUCTURAL CALCULATIONS THE GROUND WATER TABLE IS ASSUMED TO BE 20.00 IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.
5. **SYSTEM DESIGN INTENT IS TO CONTAIN WATER AND / OR PREVENT GROUNDWATER MIGRATION INTO THE SYSTEM AND WILL NOT BE SUBJECT TO LEAKAGE TESTING. A THIRD PARTY WATER PROOFING SOLUTION IS REQUIRED FOR SEALING OF SYSTEM / MODULE JOINTS AND SEAMS. SOLUTION TO BE PROVIDED AND INSTALLED BY CONTRACTOR IN ACCORDANCE WITH THIRD PARTY WATER-PROOFING SUPPLIER'S PRODUCT SPECIFICATIONS.**



8'-4" DOUBLETRAP

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EDDY JONES WAY

VAULT 1

OCEANSIDE, CA

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SCALE:

NTS

SHEET TITLE:

DOUBLETRAP DESIGN CRITERIA

SHEET NUMBER:

1.0

BILL OF MATERIALS				
QTY.	UNIT TYPE	DESCRIPTION	TOP WEIGHT	BASE WEIGHT
48	I	8'-4" DOUBLETRAP	14984	14782
0	II	8'-4" DOUBLETRAP	0	0
35	III	8'-4" DOUBLETRAP	14358	14257
1	IV	8'-4" DOUBLETRAP	15283	15182
0	VII	8'-4" DOUBLETRAP	0	0
2	SPIV	8'-4" DOUBLETRAP	VARIES	VARIES
0	T2 PANEL	8" THICK PANEL	0	
4	T4 PANEL	8" THICK PANEL	6184	
0	T7 PANEL	8" THICK PANEL	0	
18	JOINT WRAP	150' PER ROLL		
64	JOINT TAPE	14.5' PER ROLL		
TOTAL PIECES = 172				
TOTAL PANELS = 4				
HEAVIEST PICK WEIGHT = 15283				

LOADING DISCLAIMER:

STORMTRAP IS NOT DESIGNED TO ACCEPT ANY ADDITIONAL LOADINGS FROM NEARBY STRUCTURES NEXT TO OR OVER THE TOP OF STORMTRAP. IF ADDITIONAL LOADING CONSIDERATIONS ARE REQUIRED FOR STRUCTURAL DESIGN OF STORMTRAP, PLEASE CONTACT STORMTRAP IMMEDIATELY.

TREE LOADING DISCLAIMER:

THE STORMTRAP SYSTEM HAS NOT BEEN DESIGNED TO SUPPORT THE ADDITIONAL WEIGHT OF ANY TREES. FURTHERMORE, THE ROOTS OF THE TREES MUST BE CONTAINED TO PREVENT FUTURE DAMAGE TO THE STORMTRAP SYSTEM. STORMTRAP ACCEPTS NO LIABILITY FOR DAMAGES CAUSED BY TREES OR OTHER VEGETATION PLACE AROUND OR ON TOP OF THE SYSTEM.

BUILDING PROXIMITY LOADING DISCLAIMER:

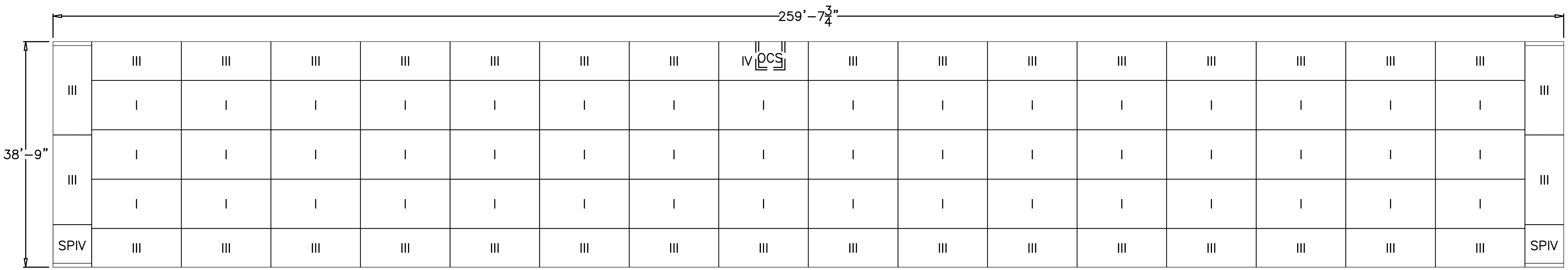
THESE DRAWINGS ARE NOT TO BE USED FOR BIDDING OR CONSTRUCTION PURPOSES. THIS DESIGN ASSUMES THAT NO VERTICAL LOADS, SURCHARGE LOADS, OR DIRECT LATERAL LOADS ARE EXERTED ON THE STORMTRAP SYSTEM BY BUILDING SUPERSTRUCTURES OR FOUNDATION ELEMENTS LOCATED IN PROXIMITY TO THE STORMTRAP SYSTEM. THESE DRAWINGS ARE GENERIC AND DO NOT ACCOUNT FOR SPECIAL CONSIDERATIONS – BE THEY STRUCTURAL OR OTHERWISE – ASSOCIATED WITH ANY BUILDING STRUCTURE OR COMPONENTS. FURTHERMORE, AT THE TIME THESE DRAWINGS WERE PRODUCED, STORMTRAP DID NOT HAVE ACCESS TO STRUCTURAL OR FOUNDATION PLANS FOR THE PROPOSED BUILDING(S) LOCATED ON-SITE. STORMTRAP REQUESTS THE OPPORTUNITY TO REVIEW SAID PLANS AND RELEVANT DRAWINGS WHEN THEY ARE MADE AVAILABLE. STORMTRAP RESERVES THE RIGHT TO MODIFY THE DESIGN SHOWN HERE TO ADDRESS ANY ISSUES ASSOCIATED WITH THE SYSTEM'S PROXIMITY TO ANY BUILDING STRUCTURE OR FOUNDATION ELEMENTS.

DESIGN CRITERIA

ALLOWABLE MAX GRADE = 27.90
ALLOWABLE MIN GRADE =23.98
INSIDE HEIGHT ELEVATION =19.73
SYSTEM INVERT = 11.40

NOTES:

1. DIMENSIONING OF STORMTRAP SYSTEM SHOWN BELOW ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
2. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
3. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.
4. SP – INDICATES A MODULE WITH MODIFICATIONS.
5. P – INDICATES A MODULE WITH A PANEL ATTACHMENT.
6. CONTRACTORS RESPONSIBILITY TO ENSURE CONSISTENCY/ACCURACY TO FINAL ENGINEER OF RECORD PLAN SET.
7. IF A WATERTIGHT SOLUTION IS REQUIRED FOR AN OUTLET CONTROL STRUCTURE, ALL EXTERIOR COLD JOINTS, INCLUDING JOINT BETWEEN TOP AND BASE MODULES, BETWEEN TOP AND BASE OF ADJOINING SYMONS WALLS, AND JOINTS BETWEEN MODULE AND ADJACENT END PANELS WILL BE THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO PROVIDE AND INSTALL THE WATERTIGHT APPLICATION PER THE EOR'S SPECIFICATION.



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SHEET TITLE:

DOUBLETRAP SYSTEM LAYOUT

SHEET NUMBER:

2.0

STORMTRAP INSTALLATION SPECIFICATIONS

1. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891, STANDARD FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES, THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS SHALL APPLY:

2. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT PROPER/ADEQUATE EQUIPMENT IS USED TO SET/INSTALL THE MODULES.

3. STORMTRAP MODULES CAN BE PLACED ON A LEVEL, 6" FOUNDATION OF ¾" AGGREGATE EXTENDING 2'-0" PAST THE OUTSIDE OF THE SYSTEM (SEE DETAIL 1) AND SHALL BE PLACED ON PROPERLY COMPACTED SOILS (SEE SHEET 1.0 FOR SOIL BEARING CAPACITY REQUIREMENTS), AND IN ACCORDANCE WITH ASTM C891 STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRECAST UTILITY STRUCTURES.

4. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED ¾" (SEE DETAIL 2). IF THE SPACE EXCEEDS ¾", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.

5. STORMTRAP MODULES ARE NOT WATERTIGHT. IF A WATERTIGHT SOLUTION IS REQUIRED, CONTACT STORMTRAP FOR RECOMMENDATIONS. THE WATERTIGHT APPLICATION IS TO BE PROVIDED AND IMPLEMENTED BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THE SELECTED WATERTIGHT SOLUTION PERFORMS AS SPECIFIED BY THE MANUFACTURER.

6. THE PERIMETER HORIZONTAL JOINT BETWEEN THE TOP AND BASE LEG CONNECTION OF THE STORMTRAP MODULES SHALL BE SEALED WITH PREFORMED MASTIC JOINT TAPE ACCORDING TO ASTM C891, 8.8 AND 8.12. (SEE DETAIL 3). THE MASTIC JOINT TAPE DOES NOT PROVIDE A WATERTIGHT SEAL.

7. ALL EXTERIOR ROOF AND EXTERIOR VERTICAL WALL JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH 8" WIDE PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC RESIN, BONDED TO A WOVEN , HIGHLY PUNCTURE RESISTANT POLYMER WRAP, CONFORMING TO ASTM C891 AND SHALL BE INTEGRATED WITH PRIMER SEALANT AS APPROVED BY STORMTRAP (SEE DETAILS 2, 4, & 5). THE JOINT WRAP DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT WRAP IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:

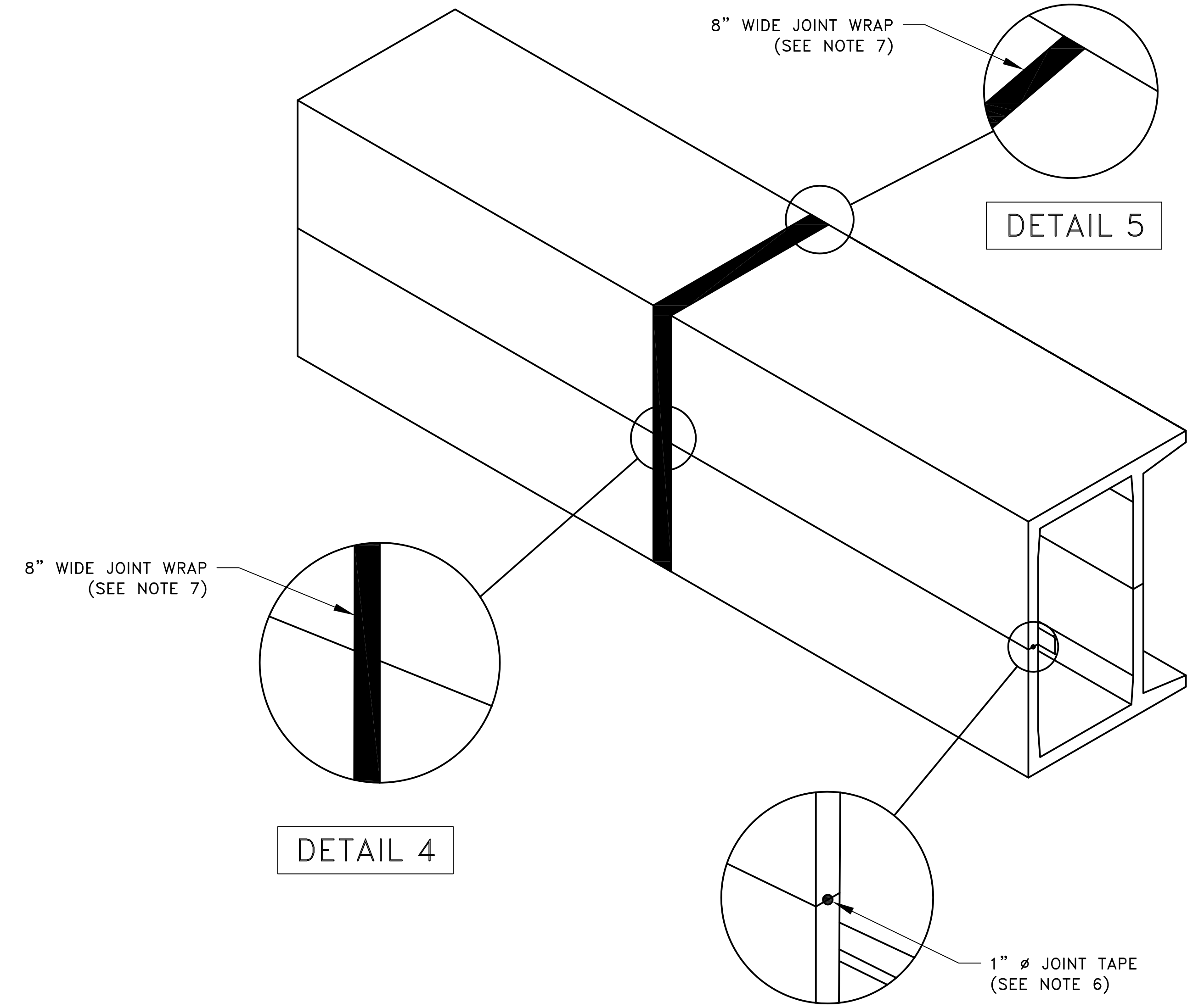
   7.1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE JOINT WRAP IS TO BE APPLIED.

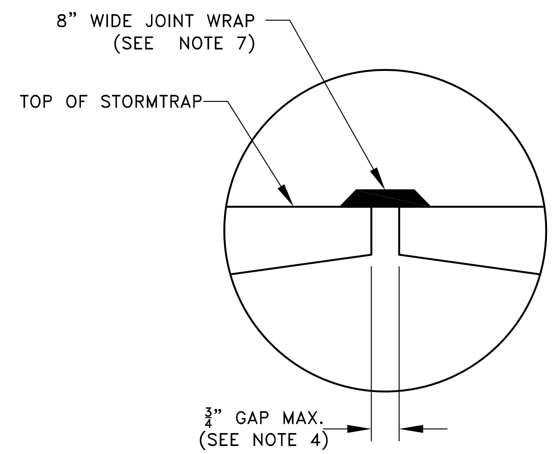
   7.2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE (ADHESIVE SIDE DOWN) AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.

8. IF THE CONTRACTOR NEEDS TO CANCEL ANY SHIPMENTS, THEY MUST DO SO 48 HOURS PRIOR TO THEIR SCHEDULED ARRIVAL AT THE JOB SITE. IF CANCELED AFTER THAT TIME, PLEASE CONTACT THE PROJECT MANAGER.

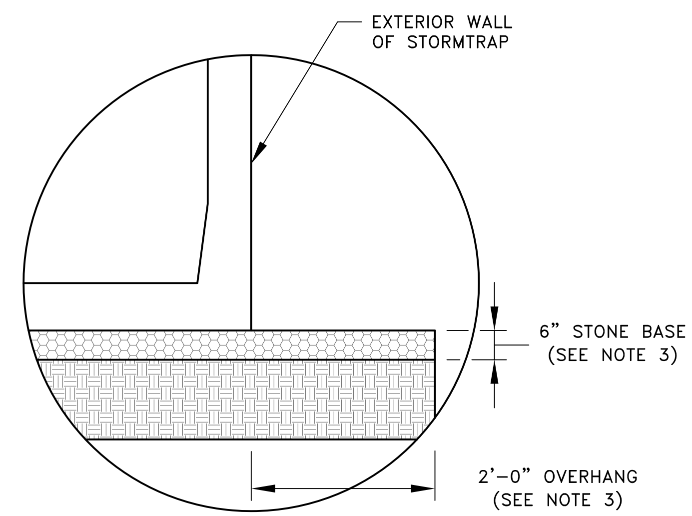
9. IF THE STORMTRAP MODULE(S) IS DAMAGED IN ANY WAY PRIOR, DURING, OR AFTER INSTALL, STORMTRAP MUST BE CONTACTED IMMEDIATELY TO ASSESS THE DAMAGE AND TO DETERMINE WHETHER OR NOT THE MODULE(S) WILL NEED TO BE REPLACED. IF ANY MODULE ARRIVES AT THE JOBSITE DAMAGED DO NOT UNLOAD IT; CONTACT STORMTRAP IMMEDIATELY. ANY DAMAGE NOT REPORTED BEFORE THE TRUCK IS UNLOADED WILL BE THE CONTRACTOR'S RESPONSIBILITY.

10. STORMTRAP MODULES CANNOT BE ALTERED IN ANY WAY AFTER MANUFACTURING WITHOUT WRITTEN CONSENT FROM STORMTRAP.





DETAIL 2



DETAIL 1

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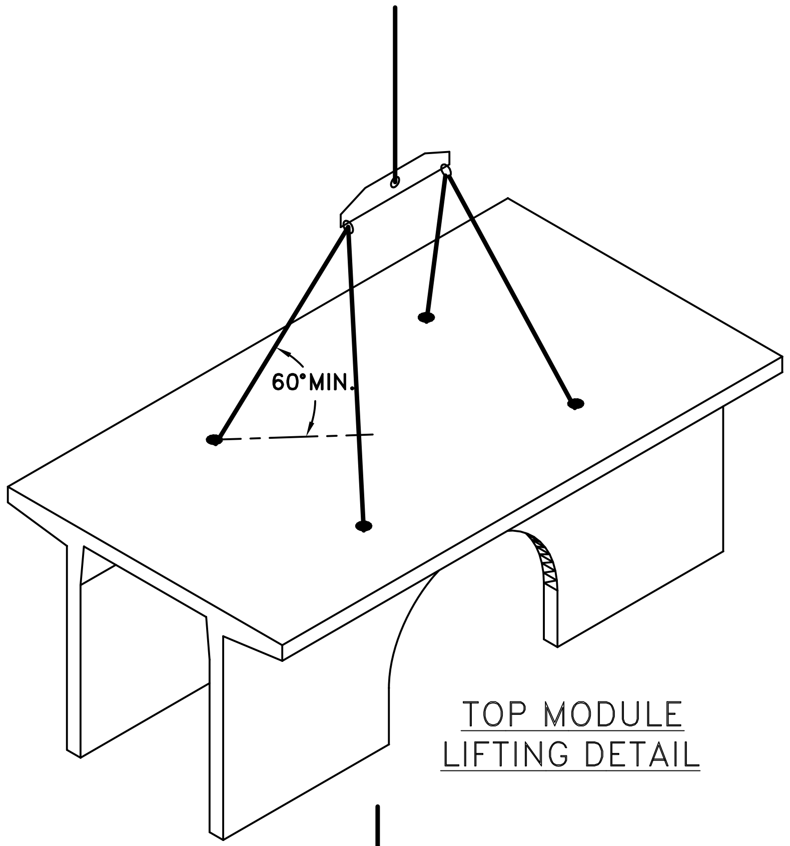
DOUBLETRAP INSTALLATION SPECIFICATIONS

SHEET NUMBER:

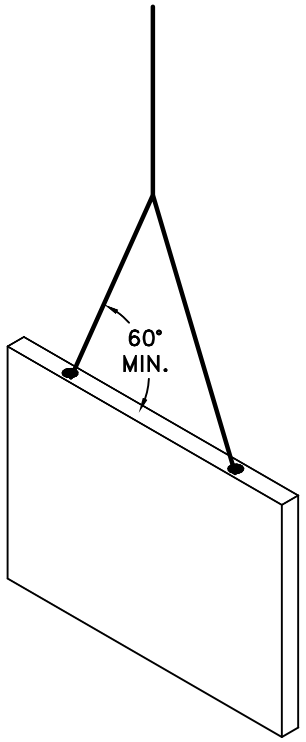
3.0

STORMTRAP MODULE LIFTING INSTALLATION NOTES

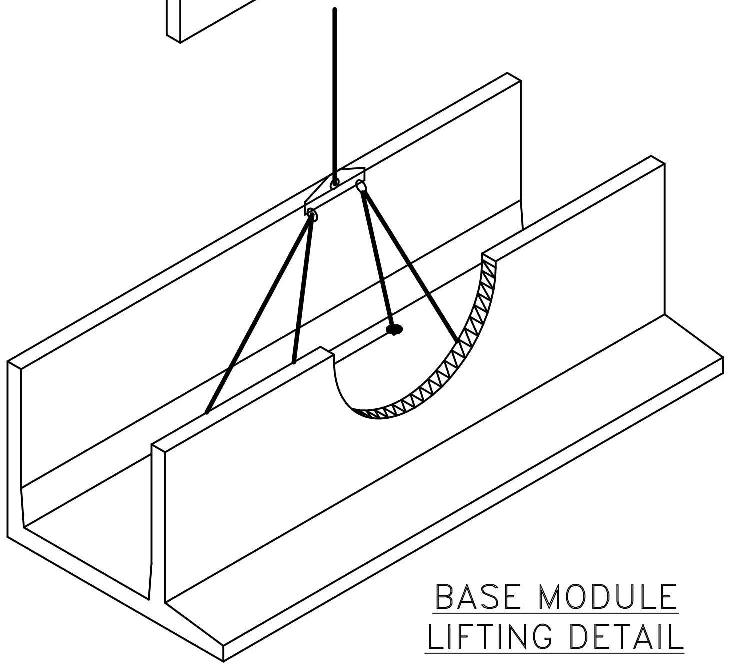
1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ALL (4) CHAINS/CABLES ARE SECURED PROPERLY TO THE LIFTING ANCHORS AND IN EQUAL TENSION WHEN LIFTING THE STORMTRAP MODULE (SEE RECOMMENDATIONS 2 & 3).
2. MINIMUM 7'-0" CHAIN/CABLE LENGTH TO BE USED TO LIFT STORMTRAP MODULES (SUPPLIED BY CONTRACTOR).
3. CONTRACTOR TO ENSURE MINIMUM LIFTING ANGLE IS 60° FROM TOP SURFACE OF STORMTRAP MODULE. SEE DETAIL.
4. IT IS UNDERSTOOD AND AGREED THAT AT ALL TIMES DURING WHICH HOISTING AND RIGGING EQUIPMENT IS BEING SUPPLIED TO THE PURCHASER, OPERATOR OF SUCH EQUIPMENT SHALL BE IN CHARGE OF HIS ENTIRE EQUIPMENT AND SHALL AT ALL TIMES BE THE JUDGE OF THE SAFETY AND PROPERTY OF ANY SUGGESTION TO HIM FROM THE SELLER, ITS AGENTS OR EMPLOYEES. PURCHASER AGREES TO SAVE, INDEMNIFY AND HOLD HARMLESS SELLER FROM ALL LOSS, CLAIMS, DEMANDS OR CAUSES OF ACTION, WHICH MAY ARISE FROM THE EXISTENCE OR OPERATION OF SAID EQUIPMENT.



TOP MODULE LIFTING DETAIL



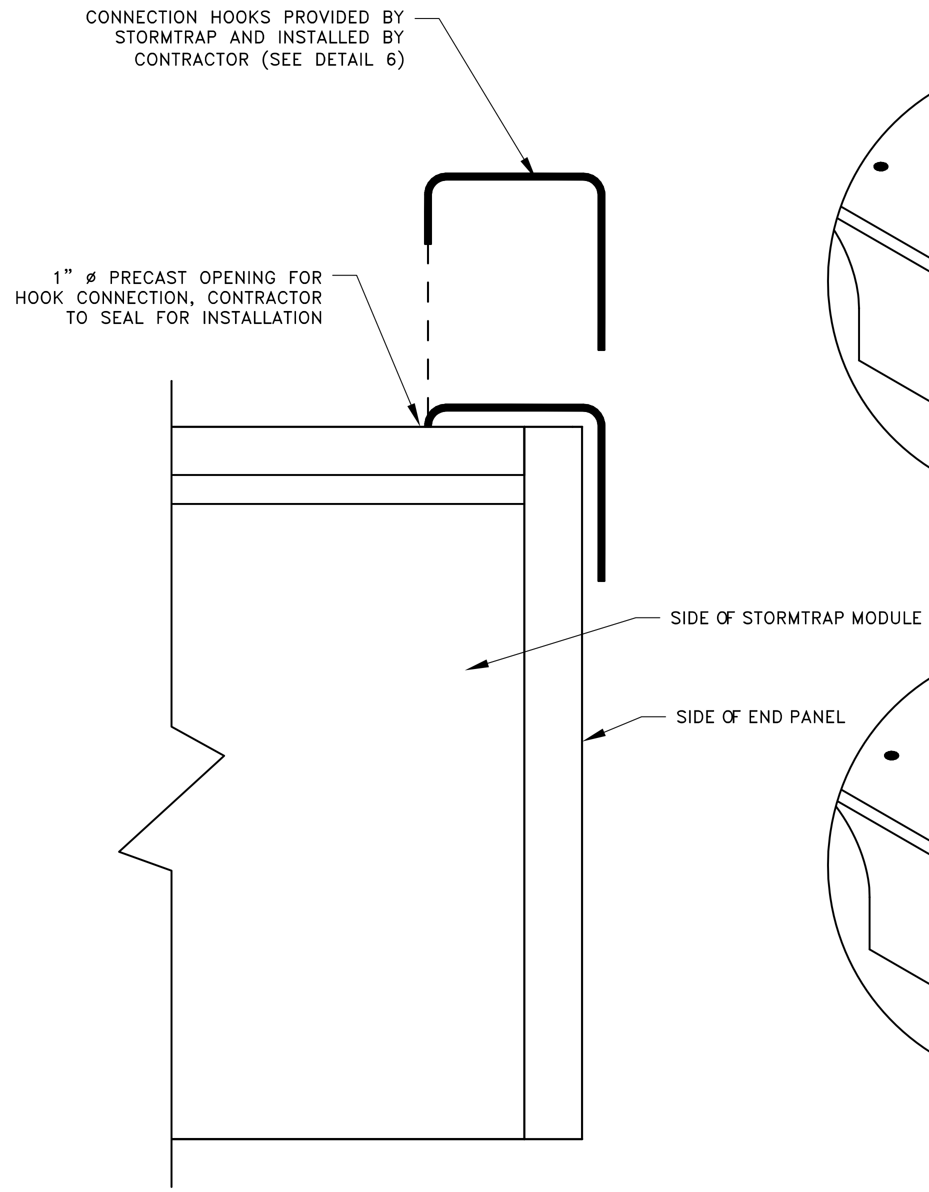
END PANEL LIFTING DETAIL



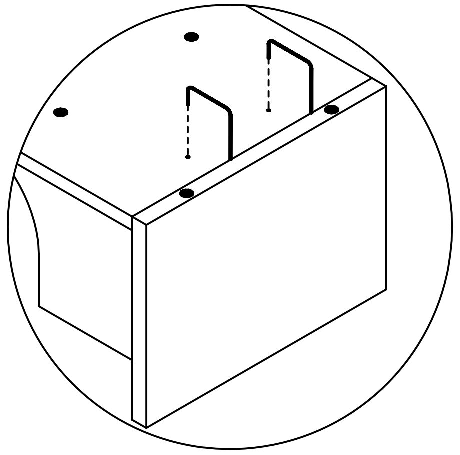
BASE MODULE LIFTING DETAIL

END PANEL ERECTION/INSTALLATION NOTES

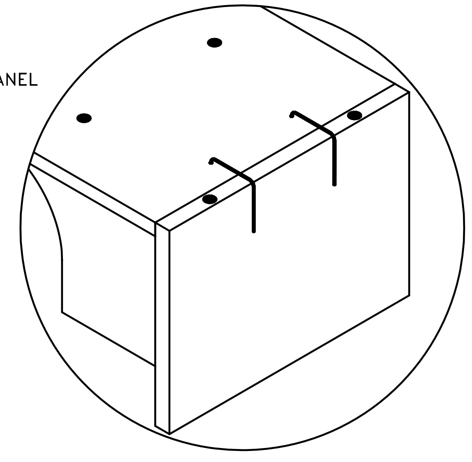
1. END PANELS WILL BE SUPPLIED TO CLOSE OFF OPEN ENDS OF ROWS.
2. PANELS SHALL BE INSTALLED IN A TILT UP FASHION DIRECTLY ADJACENT TO OPEN END OF MODULE (REFER TO SHEET 2.0 FOR END PANEL LOCATIONS).
3. CONNECTION HOOKS WILL BE SUPPLIED WITH END PANELS TO SECURELY CONNECT PANEL TO ADJACENT STORMTRAP MODULE (SEE PANEL CONNECTION ELEVATION VIEW).
4. ONCE CONNECTION HOOK IS ATTACHED, LIFTING CLUTCHES MAY BE REMOVED.
5. JOINT WRAP SHALL BE PLACED AROUND PERIMETER JOINT PANEL (SEE SHEET 3.0).



PANEL CONNECTION ELEVATION VIEW



STEP 1



STEP 2

DETAIL 6

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DOUBLETRAP INSTALLATION SPECIFICATIONS

SHEET NUMBER:

3.1

ZONE CHART		
ZONES	ZONE DESCRIPTIONS	REMARKS
ZONE 1	FOUNDATION AGGREGATE	#5 (¾") STONE AGGREGATE (SEE NOTE 4 FOR DESCRIPTION)
ZONE 2	BACKFILL	UNIFIED SOILS CLASSIFICATION (GW, GP, SW, SP) OR SEE BELOW FOR APPROVED BACKFILL OPTIONS
ZONE 3	FINAL COVER OVERTOP	MATERIALS NOT TO EXCEED 120 PCF

FILL DEPTH	TRACK WIDTH	MAX VEHICLE WEIGHT (KIPS)	MAX GROUND PRESSURE
12"	12"	51.8	1690 psf
	18"	56.1	1219 psf
	24"	68.1	1111 psf
	30"	76.7	1000 psf
	36"	85.0	924 psf

NOTE:
TRACK LENGTH NOT TO EXCEED 15'-4".
ONLY TWO TRACKS PER VEHICLE.

APPROVED ZONE 2 BACKFILL OPTIONS	
OPTION	REMARKS
¾" STONE AGGREGATE	THE STONE AGGREGATE SHALL CONSIST OF CLEAN AND FREE DRAINING ANGULAR MATERIAL. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL (ASTM SIZE #57) AS DETERMINED BY THE GEOTECHNICAL ENGINEER.
SAND	IMPORTED PURE SAND IS PERMITTED TO BE USED AS BACKFILL IF IT IS CLEAN AND FREE DRAINING. THE SAND USED FOR BACKFILLING SHALL HAVE LESS THAN 40% PASSING #40 SIEVE AND LESS THAN 5% PASSING #200 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE SAND BACKFILL.
CRUSHED CONCRETE AGGREGATE	CLEAN, FREE DRAINING CRUSHED CONCRETE AGGREGATE MATERIAL CAN BE USED AS BACKFILL FOR STORMTRAP'S MODULES. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL.
ROAD PACK	STONE AGGREGATE 100% PASSING THE 1-1/2" SIEVE WITH LESS THAN 12% PASSING THE #200 SIEVE (ASTM SIZE #467). GEOFABRIC AS PER GEOTECHNICAL ENGINEER RECOMMENDATION.

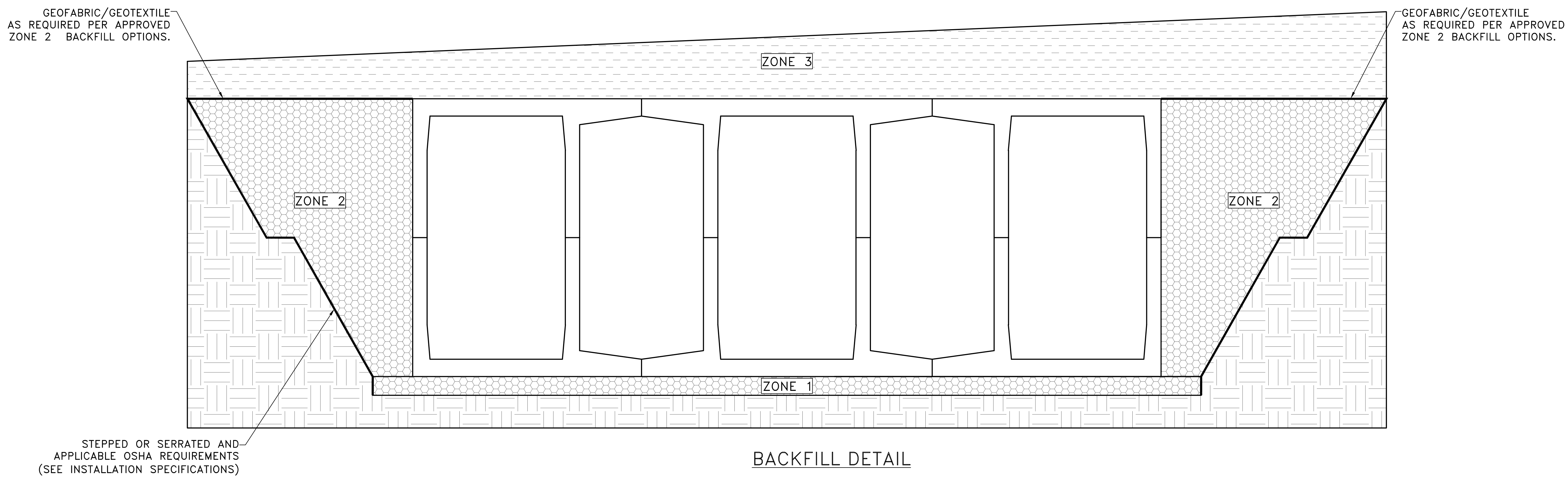
STORMTRAP ZONE INSTALLATION SPECIFICATIONS/PROCEDURES

1. THE FILL PLACED AROUND THE STORMTRAP MODULES MUST DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL EITHER BE COMPACTED AND/OR VIBRATED TO ENSURE THAT BACKFILL AGGREGATE/STONE MATERIAL IS WELL SEATED AND PROPERLY INTER LOCKED. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR SERRATED TO PREVENT WEDGING ACTION. CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MUST BE FREE-DRAINING MATERIAL. SEE ZONE 2 BACKFILL CHART ON THIS PAGE FOR APPROVED BACKFILL OPTIONS. IF NATIVE EARTH IS SUSCEPTIBLE TO MIGRATION, CONFIRM WITH GEOTECHNICAL ENGINEER AND PROVIDE PROTECTION AS REQUIRED (PROVIDED BY OTHERS).

2. DURING PLACEMENT OF MATERIAL OVERTOP THE SYSTEM, AT NO TIME SHALL MACHINERY BE USED OVERTOP THAT EXCEEDS THE DESIGN LIMITATIONS OF THE SYSTEM. WHEN PLACEMENT OF MATERIAL OVERTOP, MATERIAL SHALL BE PLACED SUCH THAT THE DIRECTION OF PLACEMENT IS PARALLEL WITH THE OVERALL LONGITUDINAL DIRECTION OF THE SYSTEM WHENEVER POSSIBLE.

3. THE FILL PLACED OVERTOP THE SYSTEM SHALL BE PLACED AT A MINIMUM OF 6" LIFTS. AT NO TIME SHALL MACHINERY OR VEHICLES GREATER THAN THE DESIGN HS-20 LOADING CRITERIA TRAVEL OVERTOP THE SYSTEM WITHOUT THE MINIMUM DESIGN COVERAGE. IF TRAVEL IS NECESSARY OVERTOP THE SYSTEM PRIOR TO ACHIEVING THE MINIMUM DESIGN COVER, IT MAY BE NECESSARY TO REDUCE THE ULTIMATE LOAD/BURDEN OF THE OPERATING MACHINERY SO AS TO NOT EXCEED THE DESIGN CAPACITY OF THE SYSTEM. IN SOME CASES, IN ORDER TO ACHIEVE REQUIRED COMPACTION, HAND COMPACTION MAY BE NECESSARY IN ORDER NOT TO EXCEED THE ALLOTTED DESIGN LOADING. SEE CHART FOR TRACKED VEHICLE WIDTH AND ALLOWABLE MAXIMUM PRESSURE PER TRACK.

4. STONE AGGREGATE FOUNDATION IN ZONE 1 IS RECOMMENDED FOR LEVELING PURPOSES ONLY (OPTIONAL).



BACKFILL DETAIL

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DOUBLETRAP BACKFILL SPECIFICATIONS

SHEET NUMBER:
4.0

RECOMMENDED ACCESS OPENING SPECIFICATION

1. A TYPICAL ACCESS OPENING FOR THE STORMTRAP SYSTEM ARE 2'-0" IN DIAMETER. ACCESS OPENINGS LARGER THAN 3'-0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP. ALL OPENINGS MUST RETAIN AT LEAST 1'-0" OF CLEARANCE FROM THE END OF THE STORMTRAP MODULE UNLESS NOTED OTHERWISE. ALL ACCESS OPENINGS TO BE LOCATED ON INSIDE LEG UNLESS OTHERWISE SPECIFIED.
2. PLASTIC COATED STEEL STEPS PRODUCED BY M.A. INDUSTRIES PART #PS3-PFC OR APPROVED EQUAL (SEE STEP DETAIL) ARE PROVIDED INSIDE ANY MODULE WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE MODULE IS TO BE PLACED A DISTANCE OF 1'-0" FROM THE INSIDE EDGE OF THE STORMTRAP MODULES. ALL ENSUING STEPS SHALL BE PLACED AT A DISTANCE BETWEEN 10" MIN AND 14" MAX BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE MODULE.
3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO AVOID INTERFERENCE WITH ACCESS OPENINGS OR THE CENTER OF GRAVITY OF THE MODULE AS NEEDED.
4. STORMTRAP ACCESS OPENINGS MAY BE RELOCATED TO AVOID INTERFERENCE WITH INLET AND/OR OUTLET PIPE OPENINGS SO PLACEMENT OF STEPS IS ATTAINABLE.
5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER TO MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST TWO ACCESS OPENINGS PER SYSTEM FOR ACCESS AND INSPECTION.
6. USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 2' TO USE PRECAST BARREL OR CONE SECTIONS. (PROVIDED BY OTHERS)

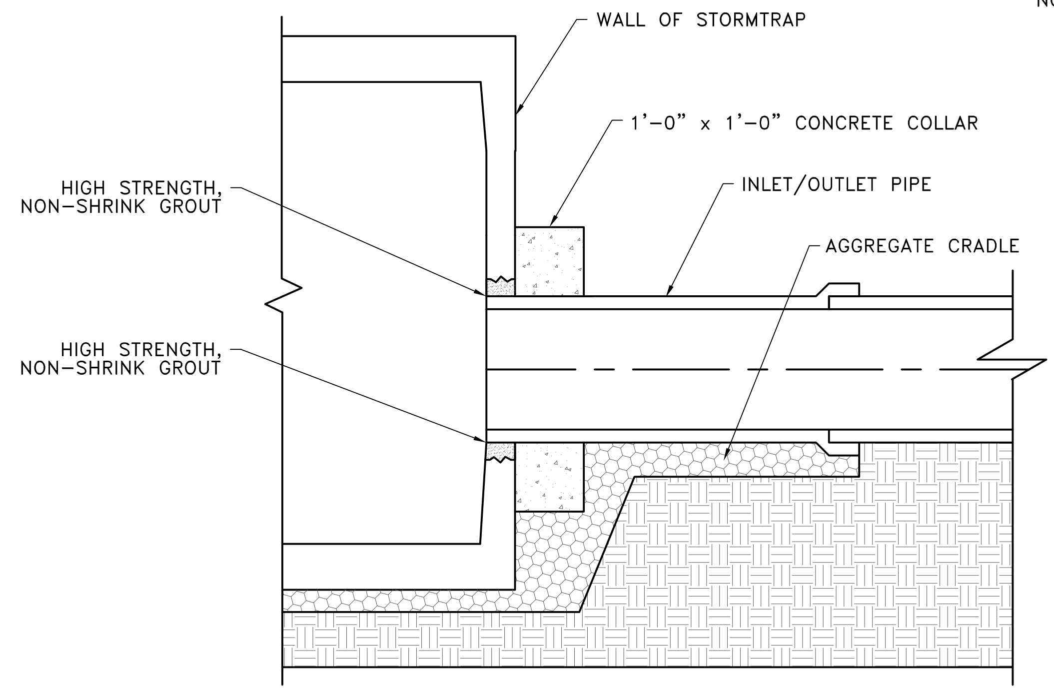
RECOMMENDED PIPE OPENING SPECIFICATION

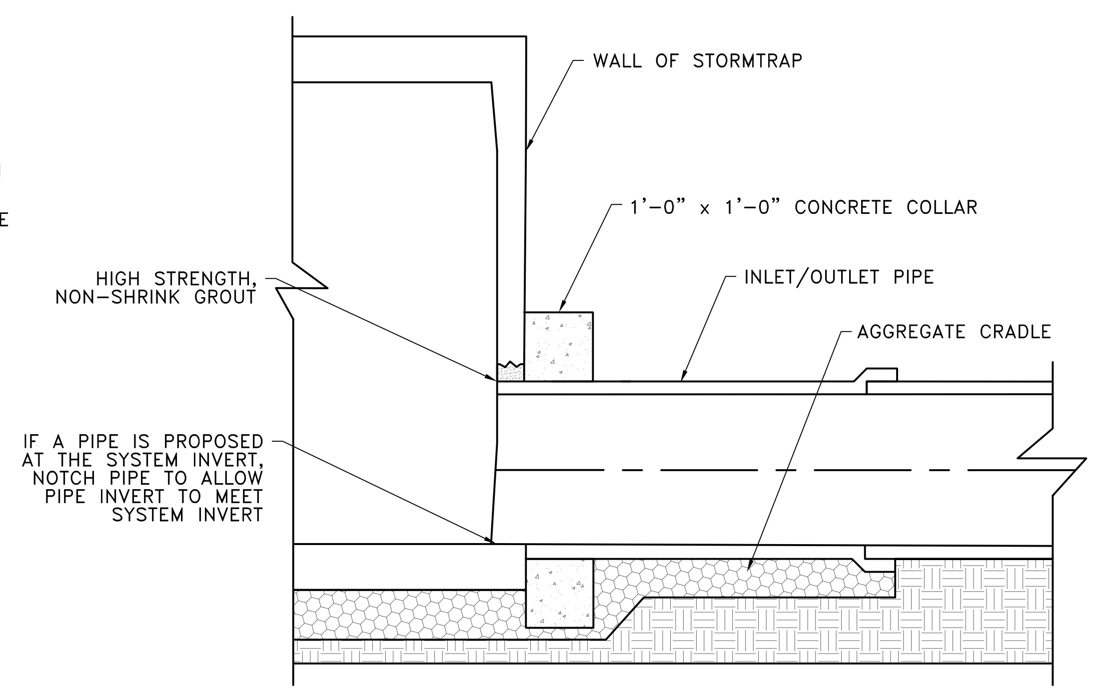
1. MINIMUM EDGE DISTANCE FOR AN OPENING ON THE OUTSIDE WALL SHALL BE NO LESS THAN 1'-0".
2. MAXIMUM OPENING SIZE TO BE DETERMINED BY THE MODULE HEIGHT. PREFERRED OPENING SIZE ø 36" OR LESS. ANY OPENING NEEDED THAT DOES NOT FIT THIS CRITERIA SHALL BE BROUGHT TO THE ATTENTION OF STORMTRAP FOR REVIEW.
3. CONNECTING PIPES SHALL BE INSTALLED WITH A 1'-0" CONCRETE COLLAR, AND AN AGGREGATE CRADLE FOR AT LEAST ONE PIPE LENGTH (SEE PIPE CONNECTION DETAIL). A STRUCTURAL GRADE CONCRETE OR HIGH STRENGTH, NON-SHRINK GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI SHALL BE USED.
4. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH HIGH STRENGTH NON-SHRINK GROUT.

RECOMMENDED PIPE INSTALLATION INSTRUCTIONS

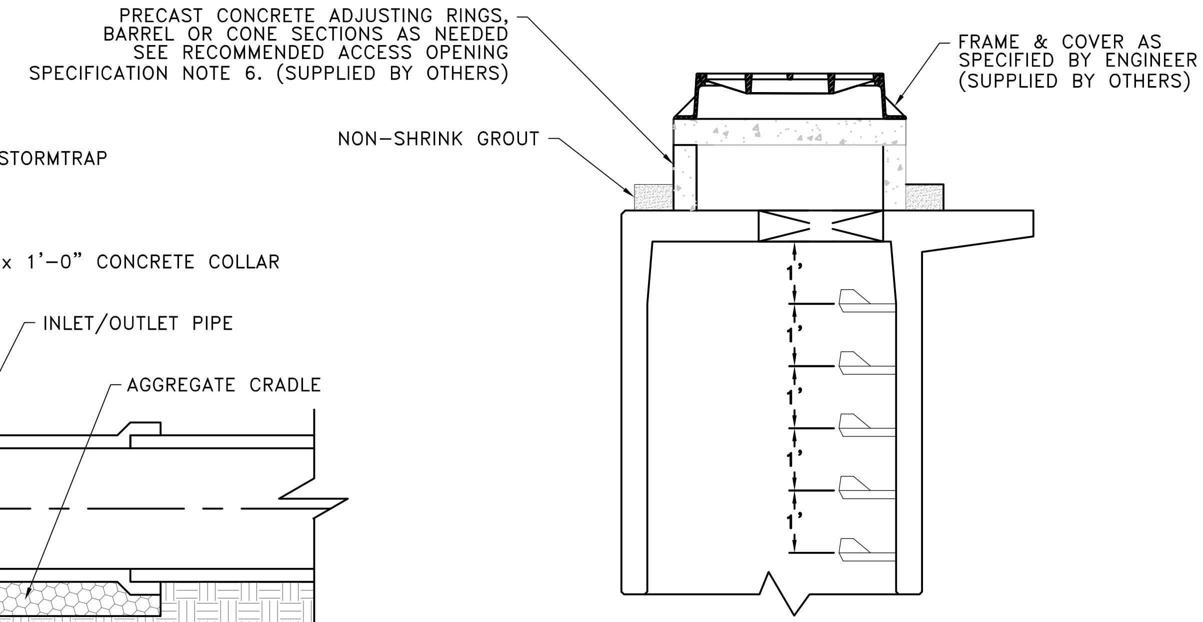
1. CLEAN AND LIGHTLY LUBRICATE ALL OF THE PIPE TO BE INSERTED INTO STORMTRAP.
2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.

NOTE: ALL ANCILLARY PRODUCTS/SPECIFICATIONS RECOMMENDED AND SHOWN ON THIS SHEET ARE RECOMMENDATIONS ONLY AND SUBJECT TO CHANGE PER THE INSTALLING CONTRACTOR AND/OR PER LOCAL MUNICIPAL CODE/REQUIREMENTS.

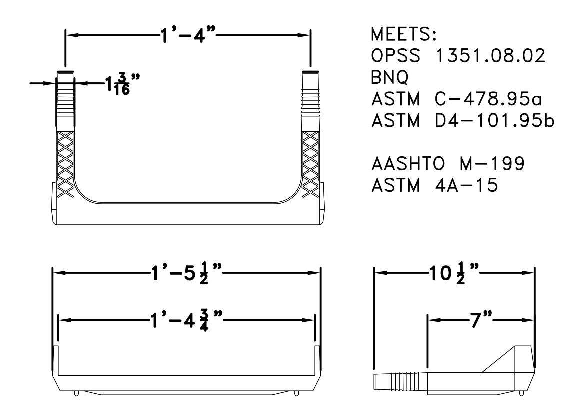




PIPE CONNECTION DETAIL



RISER / STAIR DETAIL



MEETS:
OPSS 1351.08.02
BNQ
ASTM C-478.95a
ASTM D4-101.95b

AASHTO M-199
ASTM 4A-15

STEP DETAIL

*** NOTICE *** 03-25-2022

DUE TO CURRENT INCONSISTENCIES IN THE 16" STEP SUPPLY, STORMTRAP MAY SUBSTITUTE THE 16" STEP WITH THE CLOSEST ALTERNATIVE LENGTH STEP UNTIL THE SUPPLY CHAIN ISSUE IS RESOLVED.

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ENGINEER INFORMATION:

PASCO LARET SUITER & ASSOCIATES
119 ABERDEEN DRIVE
CARDIFF, CA
(858) 259-8212

PROJECT INFORMATION:

EDDY JONES WAY

VAULT 1

OCEANSIDE, CA

CURRENT ISSUE DATE:

8/9/2022

ISSUED FOR:

PRELIMINARY

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SCALE:

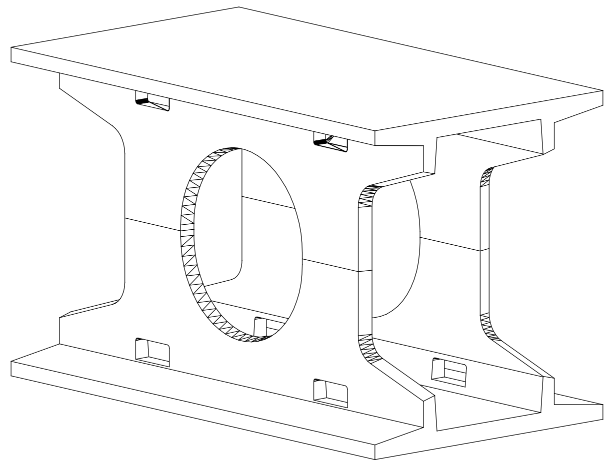
NTS

SHEET TITLE:

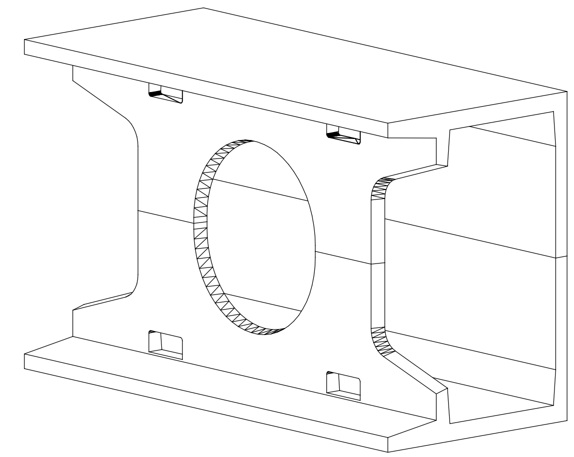
RECOMMENDED PIPE / ACCESS OPENING SPECIFICATIONS

SHEET NUMBER:

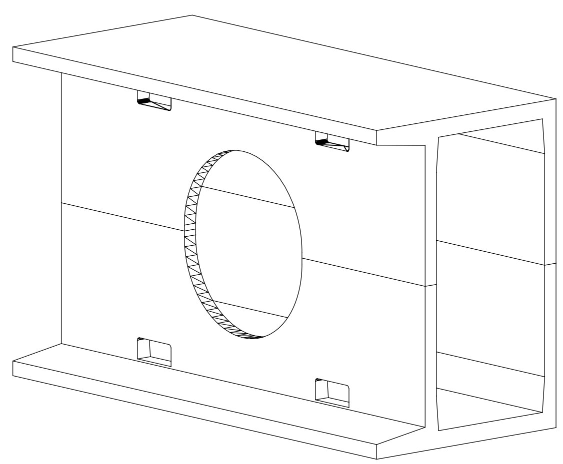
5.0



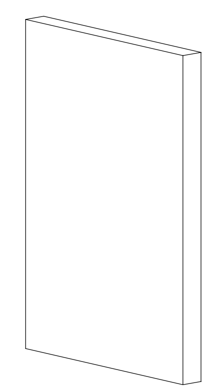
TYPE I



TYPE III



TYPE IV



TYPE IV
END PANEL

NOTES:
1. OPENING LOCATIONS AND SHAPES MAY VARY.
2. SP – INDICATES A MODULE WITH MODIFICATIONS.
3. P – INDICATES A MODULE WITH A PANEL ATTACHMENT.
4. POCKET WINDOW OPENINGS ARE OPTIONAL.

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SCALE:

NTS

SHEET TITLE:

DOUBLETRAP
MODULE TYPES

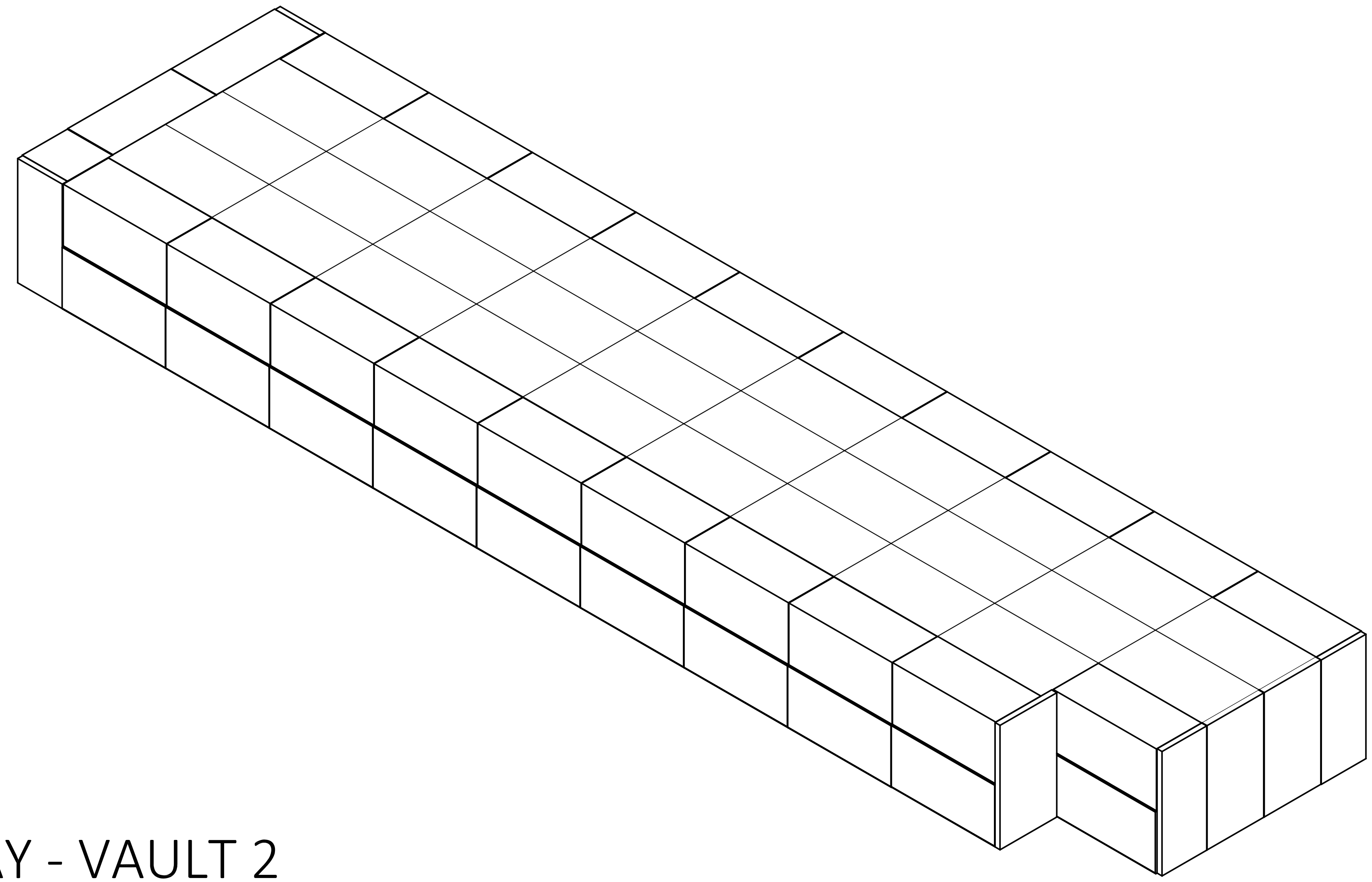
SHEET NUMBER:

6.0

StormTrap®

MODULAR CONCRETE
STORMWATER MANAGEMENT

THE STORMTRAP DRAWINGS SHALL NOT BE ALTERED OR MANIPULATED IN WHOLE OR IN PART WITHOUT WRITTEN CONSENT OF STORMTRAP. USE OF THESE DRAWINGS IS STRICTLY GRANTED TO YOU, OUR CLIENT, FOR THE SPECIFIED AND NAMED PROJECT ONLY. **THESE DRAWINGS ARE FOR YOUR REFERENCE ONLY AND SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.**



EDDY JONES WAY - VAULT 2
OCEANSIDE, CA

SHEET INDEX

STORMTRAP CONTACT INFORMATION

STORMTRAP SUPPLIER: STORMTRAP
CONTACT NAME: CHARLIE CARTER
CELL PHONE: 760-212-5628
SALES EMAIL: CCARTER@STORMTRAP.COM

StormTrap®

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SCALE:

NTS

SHEET TITLE:

COVER SHEET

SHEET NUMBER:

0.0

STRUCTURAL DESIGN LOADING CRITERIA

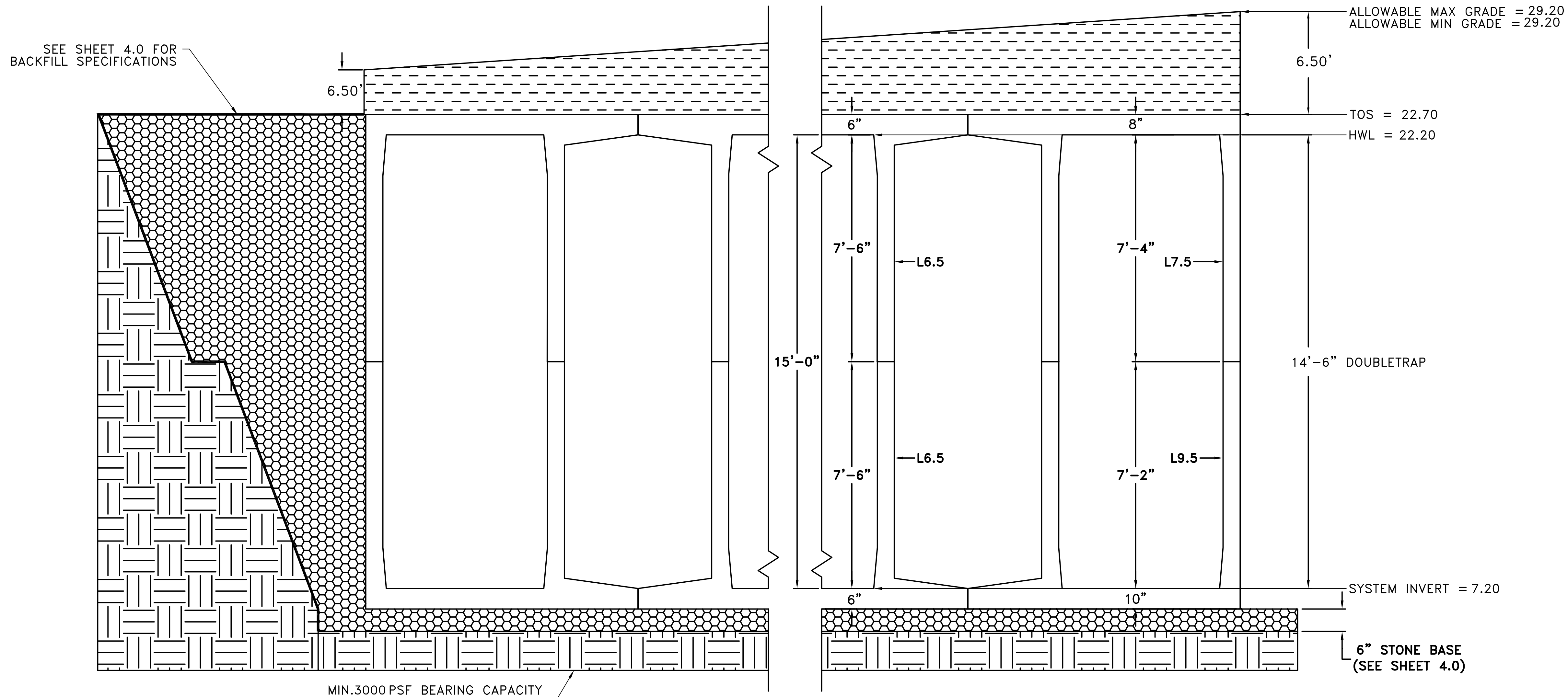
LIVE LOADING:	**AASHTO HS-20 HIGHWAY LOADING**
GROUND WATER TABLE:	20.00
SOIL BEARING PRESSURE:	3000PSF
SOIL DENSITY:	120 PCF
EQUIVALENT UNSATURATED LATERAL ACTIVE EARTH PRESSURE:	35 PSF / FT.
EQUIVALENT SATURATED LATERAL ACTIVE EARTH PRESSURE:	80 PSF/FT. (IF WATER TABLE PRESENT)
APPLICABLE CODES:	ASTM C857 ACI-318
BACKFILL TYPE:	SEE SHEET 4.0 FOR BACKFILL OPTIONS

STORMTRAP SYSTEM INFORMATION

WATER STORAGE PROV:	81492.08 CUBIC FEET
UNIT HEADROOM:	15'-0" DOUBLETRAP

SITE SPECIFIC DESIGN CRITERIA

1. STORMTRAP UNITS SHALL BE MANUFACTURED AND INSTALLED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER OF RECORD. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/OUTLET PIPE TYPES, SIZES, INVERT ELEVATIONS AND SIZE OF OPENINGS.
2. COVER RANGE: MIN. 6.50' MAX. 6.50' CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS.
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE REQUIRED TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.
4. FOR STRUCTURAL CALCULATIONS THE GROUND WATER TABLE IS ASSUMED TO BE 20.00 IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.
5. **SYSTEM DESIGN INTENT IS TO CONTAIN WATER AND / OR PREVENT GROUNDWATER MIGRATION INTO THE SYSTEM AND WILL NOT BE SUBJECT TO LEAKAGE TESTING. A THIRD PARTY WATER PROOFING SOLUTION IS REQUIRED FOR SEALING OF SYSTEM / MODULE JOINTS AND SEAMS. SOLUTION TO BE PROVIDED AND INSTALLED BY CONTRACTOR IN ACCORDANCE WITH THIRD PARTY WATER-PROOFING SUPPLIER'S PRODUCT SPECIFICATIONS.**



15'-0" DOUBLETRAP

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SCALE:

NTS

SHEET TITLE:

DOUBLETRAP DESIGN CRITERIA

SHEET NUMBER:

1.0

BILL OF MATERIALS

QTY.	UNIT TYPE	DESCRIPTION	TOP WEIGHT	BASE WEIGHT
27	I	15'-0" DOUBLETRAP	18998	19008
2	II	15'-0" DOUBLETRAP	23403	23414
18	III	15'-0" DOUBLETRAP	24092	29478
4	IV	15'-0" DOUBLETRAP	26238	31567
0	VII	15'-0" DOUBLETRAP	0	0
1	SPIV	15'-0" DOUBLETRAP	VARIES	VARIES
3	T2 PANEL	9" THICK PANEL	13466	
4	T4 PANEL	9" THICK PANEL	10600	
0	T7 PANEL	8" THICK PANEL	0	
13	JOINT WRAP	150' PER ROLL		
40	JOINT TAPE	14.5' PER ROLL		
TOTAL PIECES = 104				
TOTAL PANELS = 7				
HEAVIEST PICK WEIGHT = 31567				

LOADING DISCLAIMER:

STORMTRAP IS NOT DESIGNED TO ACCEPT ANY ADDITIONAL LOADINGS FROM NEARBY STRUCTURES NEXT TO OR OVER THE TOP OF STORMTRAP. IF ADDITIONAL LOADING CONSIDERATIONS ARE REQUIRED FOR STRUCTURAL DESIGN OF STORMTRAP, PLEASE CONTACT STORMTRAP IMMEDIATELY.

TREE LOADING DISCLAIMER:

THE STORMTRAP SYSTEM HAS NOT BEEN DESIGNED TO SUPPORT THE ADDITIONAL WEIGHT OF ANY TREES. FURTHERMORE, THE ROOTS OF THE TREES MUST BE CONTAINED TO PREVENT FUTURE DAMAGE TO THE STORMTRAP SYSTEM. STORMTRAP ACCEPTS NO LIABILITY FOR DAMAGES CAUSED BY TREES OR OTHER VEGETATION PLACE AROUND OR ON TOP OF THE SYSTEM.

BUILDING PROXIMITY LOADING DISCLAIMER:

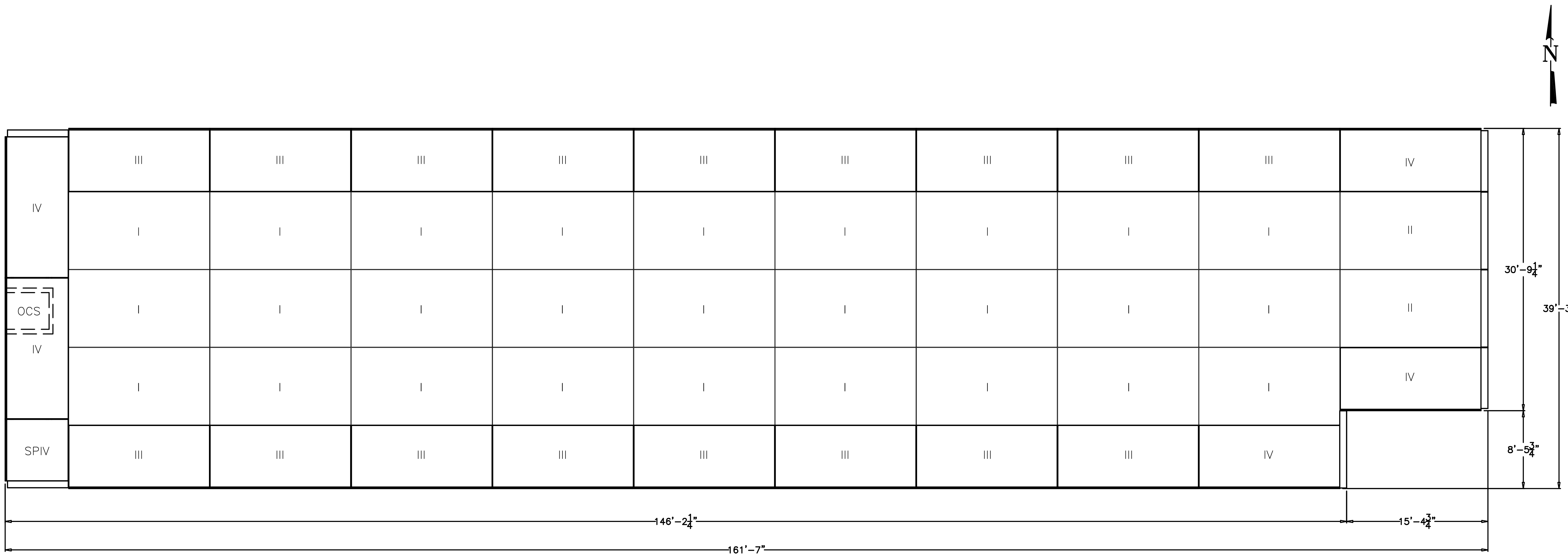
THESE DRAWINGS ARE NOT TO BE USED FOR BIDDING OR CONSTRUCTION PURPOSES. THIS DESIGN ASSUMES THAT NO VERTICAL LOADS, SURCHARGE LOADS, OR DIRECT LATERAL LOADS ARE EXERTED ON THE STORMTRAP SYSTEM BY BUILDING SUPERSTRUCTURES OR FOUNDATION ELEMENTS LOCATED IN PROXIMITY TO THE STORMTRAP SYSTEM. THESE DRAWINGS ARE GENERIC AND DO NOT ACCOUNT FOR SPECIAL CONSIDERATIONS – BE THEY STRUCTURAL OR OTHERWISE – ASSOCIATED WITH ANY BUILDING STRUCTURE OR COMPONENTS. FURTHERMORE, AT THE TIME THESE DRAWINGS WERE PRODUCED, STORMTRAP DID NOT HAVE ACCESS TO STRUCTURAL OR FOUNDATION PLANS FOR THE PROPOSED BUILDING(S) LOCATED ON-SITE. STORMTRAP REQUESTS THE OPPORTUNITY TO REVIEW SAID PLANS AND RELEVANT DRAWINGS WHEN THEY ARE MADE AVAILABLE. STORMTRAP RESERVES THE RIGHT TO MODIFY THE DESIGN SHOWN HERE TO ADDRESS ANY ISSUES ASSOCIATED WITH THE SYSTEM'S PROXIMITY TO ANY BUILDING STRUCTURE OR FOUNDATION ELEMENTS.

DESIGN CRITERIA

ALLOWABLE MAX GRADE = 29.20
ALLOWABLE MIN GRADE =29.20
INSIDE HEIGHT ELEVATION =22.20
SYSTEM INVERT = 7.20

NOTES:

1. DIMENSIONING OF STORMTRAP SYSTEM SHOWN BELOW ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
2. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
3. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.
4. SP – INDICATES A MODULE WITH MODIFICATIONS.
5. P – INDICATES A MODULE WITH A PANEL ATTACHMENT.
6. CONTRACTORS RESPONSIBILITY TO ENSURE CONSISTENCY/ACCURACY TO FINAL ENGINEER OF RECORD PLAN SET.
7. IF A WATERTIGHT SOLUTION IS REQUIRED FOR AN OUTLET CONTROL STRUCTURE, ALL EXTERIOR COLD JOINTS, INCLUDING JOINT BETWEEN TOP AND BASE MODULES, BETWEEN TOP AND BASE OF ADJOINING SYMONS WALLS, AND JOINTS BETWEEN MODULE AND ADJACENT END PANELS WILL BE THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO PROVIDE AND INSTALL THE WATERTIGHT APPLICATION PER THE EOR'S SPECIFICATION.



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VAULT 2

OCEANSIDE, CA

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SCALE:

NTS

SHEET TITLE:

DOUBLETRAP SYSTEM LAYOUT

SHEET NUMBER:

2.0

STORMTRAP INSTALLATION SPECIFICATIONS

1. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891, STANDARD FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES, THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS SHALL APPLY:

2. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT PROPER/ADEQUATE EQUIPMENT IS USED TO SET/INSTALL THE MODULES.

3. STORMTRAP MODULES CAN BE PLACED ON A LEVEL, 6" FOUNDATION OF $\frac{3}{4}$" AGGREGATE EXTENDING 2'-0" PAST THE OUTSIDE OF THE SYSTEM (SEE DETAIL 1) AND SHALL BE PLACED ON PROPERLY COMPACTED SOILS (SEE SHEET 1.0 FOR SOIL BEARING CAPACITY REQUIREMENTS), AND IN ACCORDANCE WITH ASTM C891 STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRECAST UTILITY STRUCTURES.

4. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED $\frac{3}{4}$" (SEE DETAIL 2). IF THE SPACE EXCEEDS $\frac{3}{4}$", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.

5. STORMTRAP MODULES ARE NOT WATERTIGHT. IF A WATERTIGHT SOLUTION IS REQUIRED, CONTACT STORMTRAP FOR RECOMMENDATIONS. THE WATERTIGHT APPLICATION IS TO BE PROVIDED AND IMPLEMENTED BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THE SELECTED WATERTIGHT SOLUTION PERFORMS AS SPECIFIED BY THE MANUFACTURER.

6. THE PERIMETER HORIZONTAL JOINT BETWEEN THE TOP AND BASE LEG CONNECTION OF THE STORMTRAP MODULES SHALL BE SEALED WITH PREFORMED MASTIC JOINT TAPE ACCORDING TO ASTM C891, 8.8 AND 8.12. (SEE DETAIL 3). THE MASTIC JOINT TAPE DOES NOT PROVIDE A WATERTIGHT SEAL.

7. ALL EXTERIOR ROOF AND EXTERIOR VERTICAL WALL JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH 8" WIDE PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC RESIN, BONDED TO A WOVEN , HIGHLY PUNCTURE RESISTANT POLYMER WRAP, CONFORMING TO ASTM C891 AND SHALL BE INTEGRATED WITH PRIMER SEALANT AS APPROVED BY STORMTRAP (SEE DETAILS 2, 4, & 5). THE JOINT WRAP DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT WRAP IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:

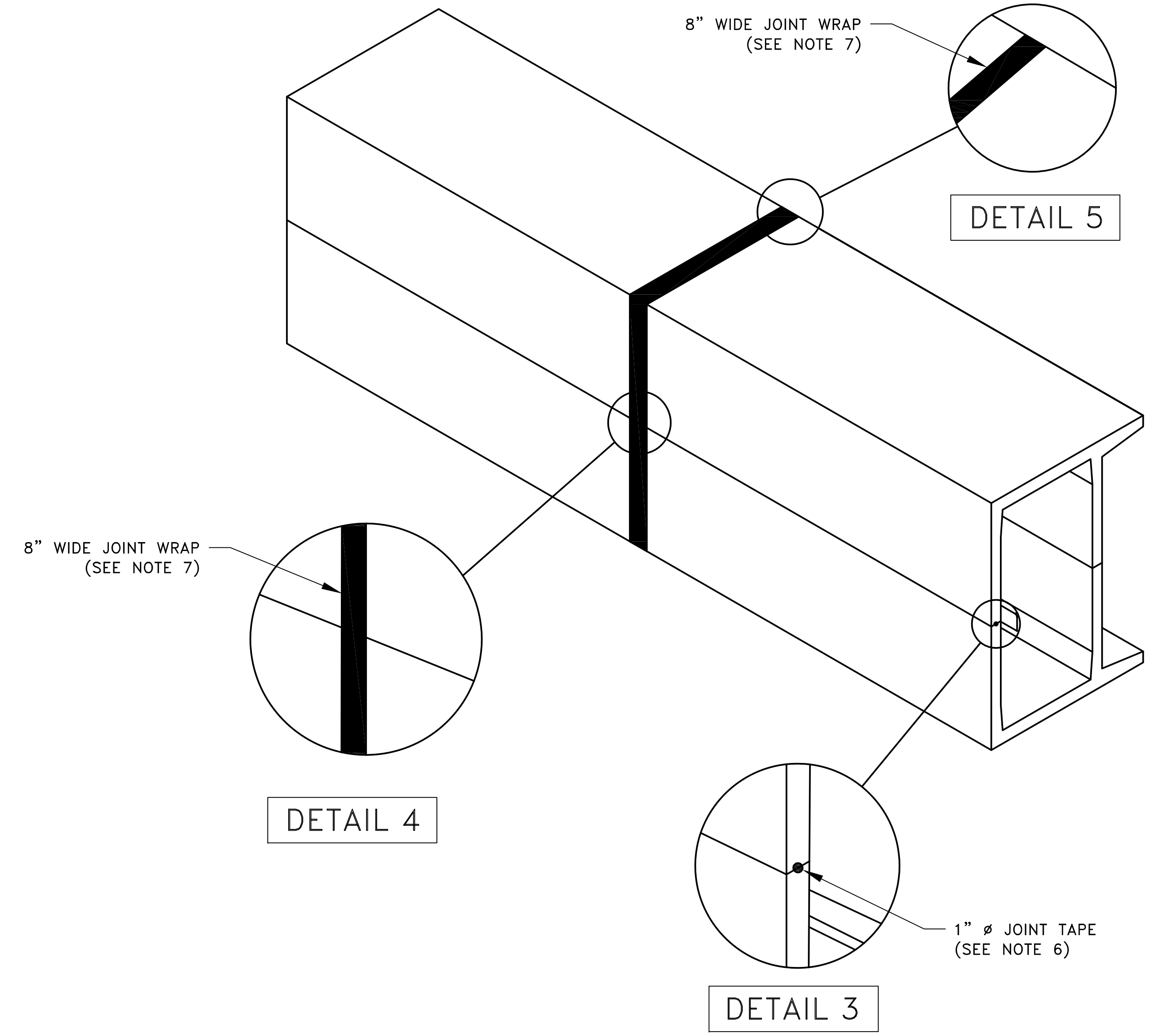
   7.1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE JOINT WRAP IS TO BE APPLIED.

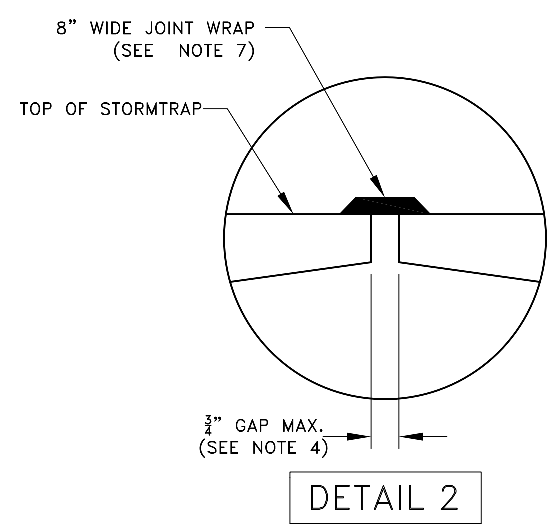
   7.2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE (ADHESIVE SIDE DOWN) AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.

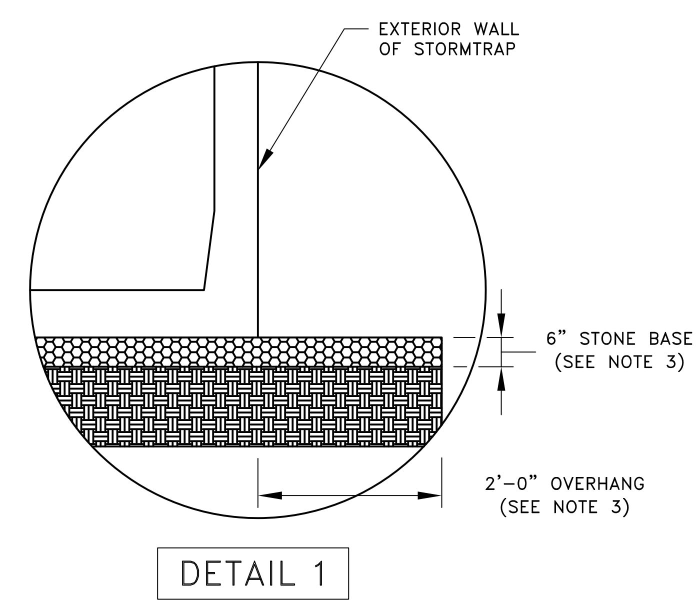
8. IF THE CONTRACTOR NEEDS TO CANCEL ANY SHIPMENTS, THEY MUST DO SO 48 HOURS PRIOR TO THEIR SCHEDULED ARRIVAL AT THE JOB SITE. IF CANCELED AFTER THAT TIME, PLEASE CONTACT THE PROJECT MANAGER.

9. IF THE STORMTRAP MODULE(S) IS DAMAGED IN ANY WAY PRIOR, DURING, OR AFTER INSTALL, STORMTRAP MUST BE CONTACTED IMMEDIATELY TO ASSESS THE DAMAGE AND TO DETERMINE WHETHER OR NOT THE MODULE(S) WILL NEED TO BE REPLACED. IF ANY MODULE ARRIVES AT THE JOBSITE DAMAGED DO NOT UNLOAD IT; CONTACT STORMTRAP IMMEDIATELY. ANY DAMAGE NOT REPORTED BEFORE THE TRUCK IS UNLOADED WILL BE THE CONTRACTOR'S RESPONSIBILITY.

10. STORMTRAP MODULES CANNOT BE ALTERED IN ANY WAY AFTER MANUFACTURING WITHOUT WRITTEN CONSENT FROM STORMTRAP.







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SHEET TITLE:

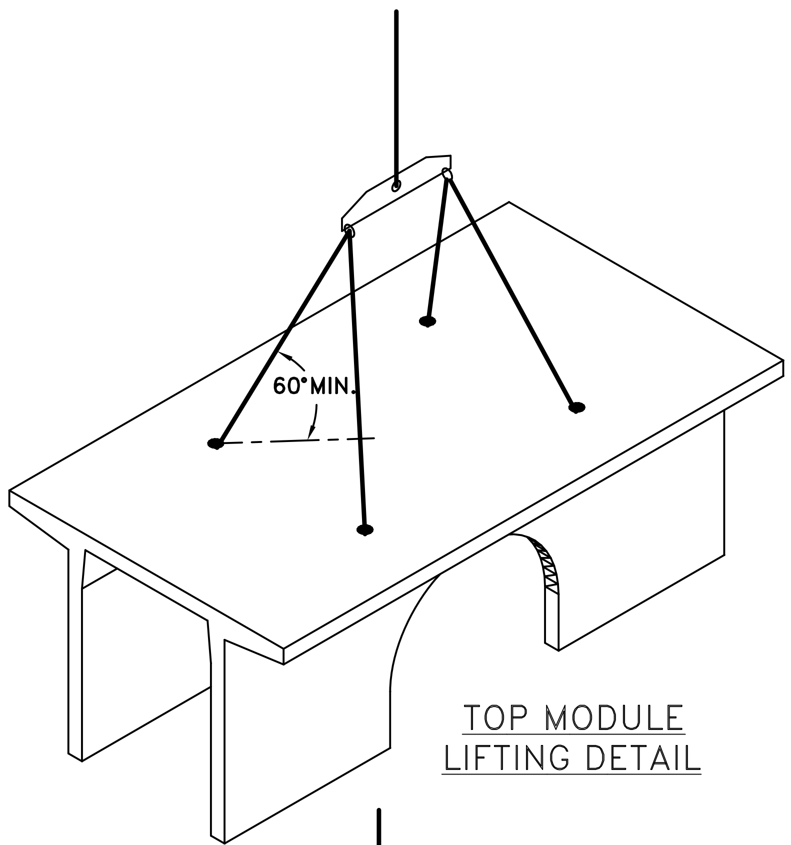
DOUBLETRAP INSTALLATION SPECIFICATIONS

SHEET NUMBER:

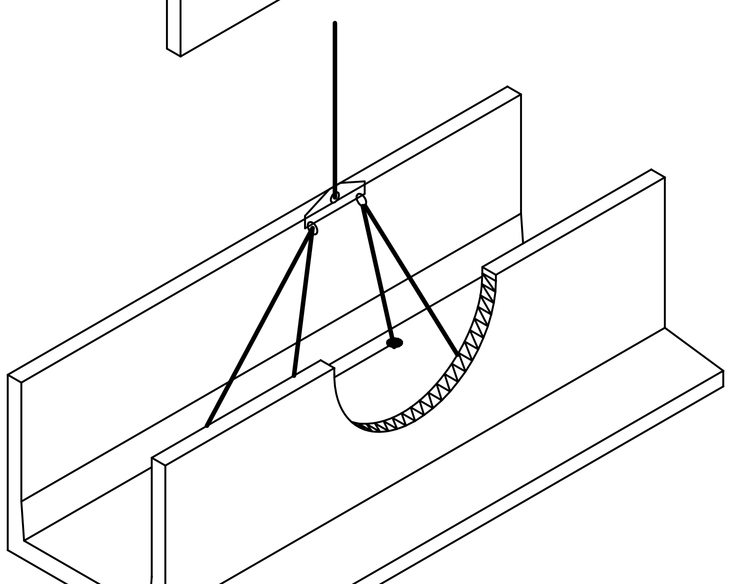
3.0

STORMTRAP MODULE LIFTING INSTALLATION NOTES

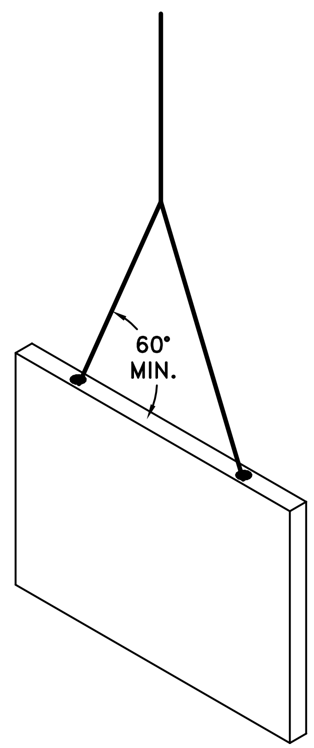
1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ALL (4) CHAINS/CABLES ARE SECURED PROPERLY TO THE LIFTING ANCHORS AND IN EQUAL TENSION WHEN LIFTING THE STORMTRAP MODULE (SEE RECOMMENDATIONS 2 & 3).
2. MINIMUM 7'–0" CHAIN/CABLE LENGTH TO BE USED TO LIFT STORMTRAP MODULES (SUPPLIED BY CONTRACTOR).
3. CONTRACTOR TO ENSURE MINIMUM LIFTING ANGLE IS 60° FROM TOP SURFACE OF STORMTRAP MODULE. SEE DETAIL.
4. IT IS UNDERSTOOD AND AGREED THAT AT ALL TIMES DURING WHICH HOISTING AND RIGGING EQUIPMENT IS BEING SUPPLIED TO THE PURCHASER, OPERATOR OF SUCH EQUIPMENT SHALL BE IN CHARGE OF HIS ENTIRE EQUIPMENT AND SHALL AT ALL TIMES BE THE JUDGE OF THE SAFETY AND PROPERTY OF ANY SUGGESTION TO HIM FROM THE SELLER, ITS AGENTS OR EMPLOYEES. PURCHASER AGREES TO SAVE, INDEMNIFY AND HOLD HARMLESS SELLER FROM ALL LOSS, CLAIMS, DEMANDS OR CAUSES OF ACTION, WHICH MAY ARISE FROM THE EXISTENCE OR OPERATION OF SAID EQUIPMENT.



TOP MODULE LIFTING DETAIL



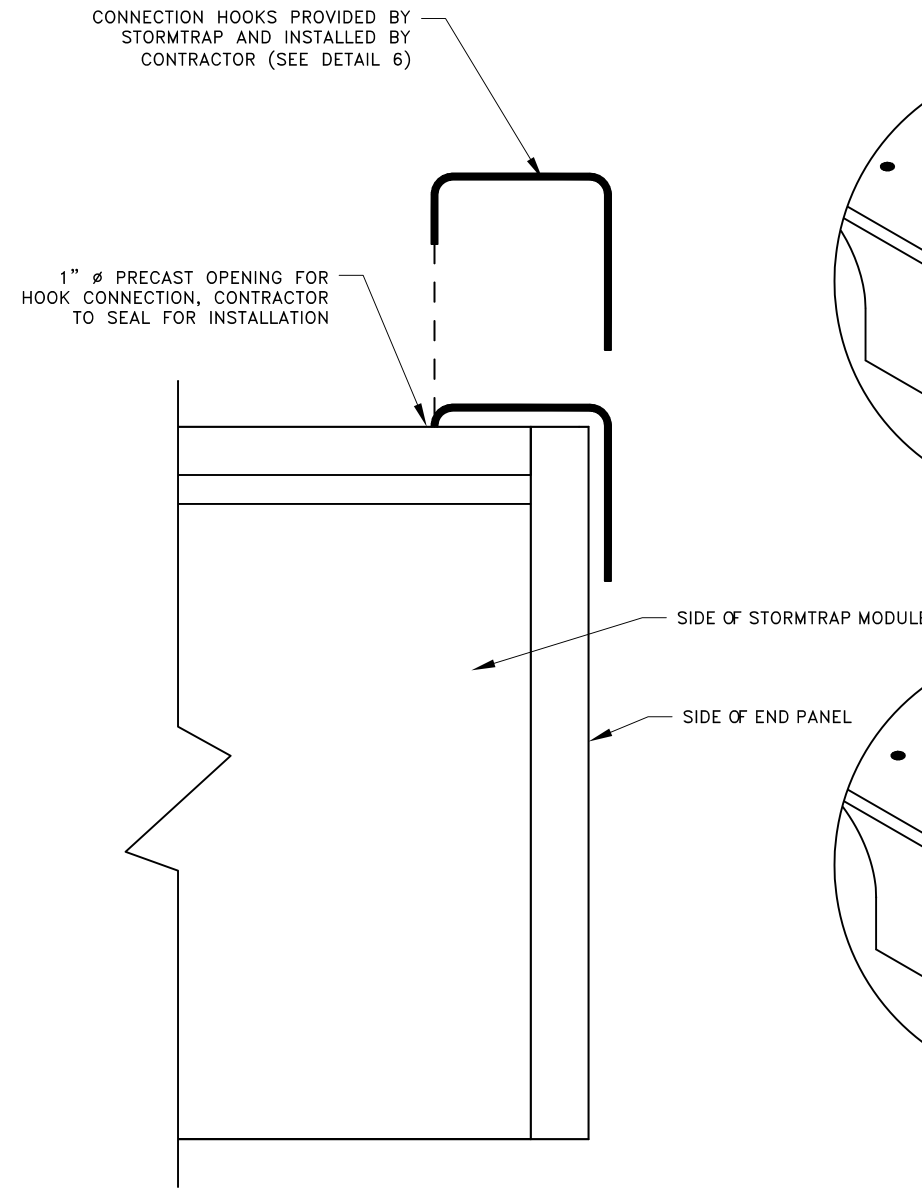
BASE MODULE LIFTING DETAIL



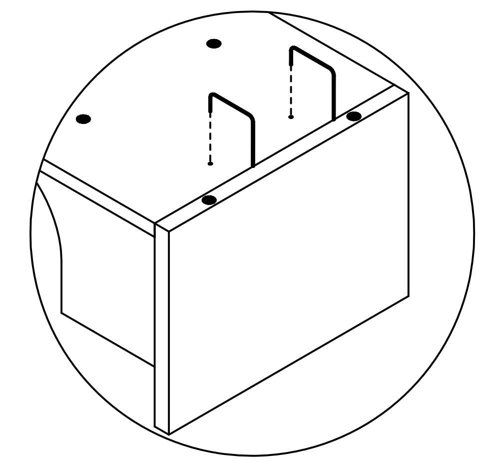
END PANEL LIFTING DETAIL

END PANEL ERECTION/INSTALLATION NOTES

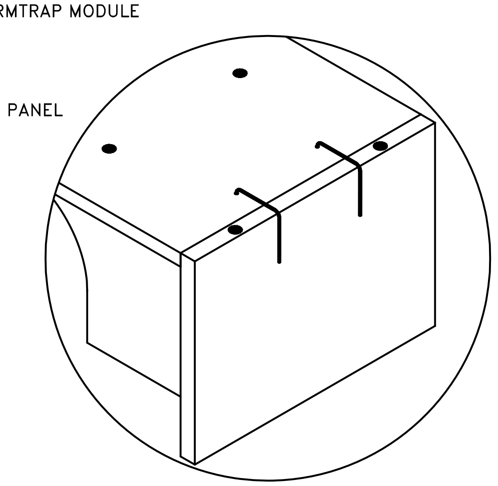
1. END PANELS WILL BE SUPPLIED TO CLOSE OFF OPEN ENDS OF ROWS.
2. PANELS SHALL BE INSTALLED IN A TILT UP FASHION DIRECTLY ADJACENT TO OPEN END OF MODULE (REFER TO SHEET 2.0 FOR END PANEL LOCATIONS).
3. CONNECTION HOOKS WILL BE SUPPLIED WITH END PANELS TO SECURELY CONNECT PANEL TO ADJACENT STORMTRAP MODULE (SEE PANEL CONNECTION ELEVATION VIEW).
4. ONCE CONNECTION HOOK IS ATTACHED, LIFTING CLUTCHES MAY BE REMOVED.
5. JOINT WRAP SHALL BE PLACED AROUND PERIMETER JOINT PANEL (SEE SHEET 3.0).



PANEL CONNECTION ELEVATION VIEW



STEP 1



STEP 2

DETAIL 6

StormTrap®

PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]

1287 WINDHAM PARKWAY
ROMEOVILLE, IL 60446
P:815-941-4549 / F:331-318-5347

ENGINEER INFORMATION:

PASCO LARET SUITER & ASSOCIATES
119 ABERDEEN DRIVE
CARDIFF, CA
(858) 259-8212

PROJECT INFORMATION:

EDDY JONES WAY
VAULT 2
OCEANSIDE, CA

CURRENT ISSUE DATE:

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SCALE:

NTS

SHEET TITLE:

DOUBLETRAP INSTALLATION SPECIFICATIONS

SHEET NUMBER:

3.1

ZONE CHART		
ZONES	ZONE DESCRIPTIONS	REMARKS
ZONE 1	FOUNDATION AGGREGATE	#5 (¾") STONE AGGREGATE (SEE NOTE 4 FOR DESCRIPTION)
ZONE 2	BACKFILL	UNIFIED SOILS CLASSIFICATION (GW, GP, SW, SP) OR SEE BELOW FOR APPROVED BACKFILL OPTIONS
ZONE 3	FINAL COVER OVERTOP	MATERIALS NOT TO EXCEED 120 PCF

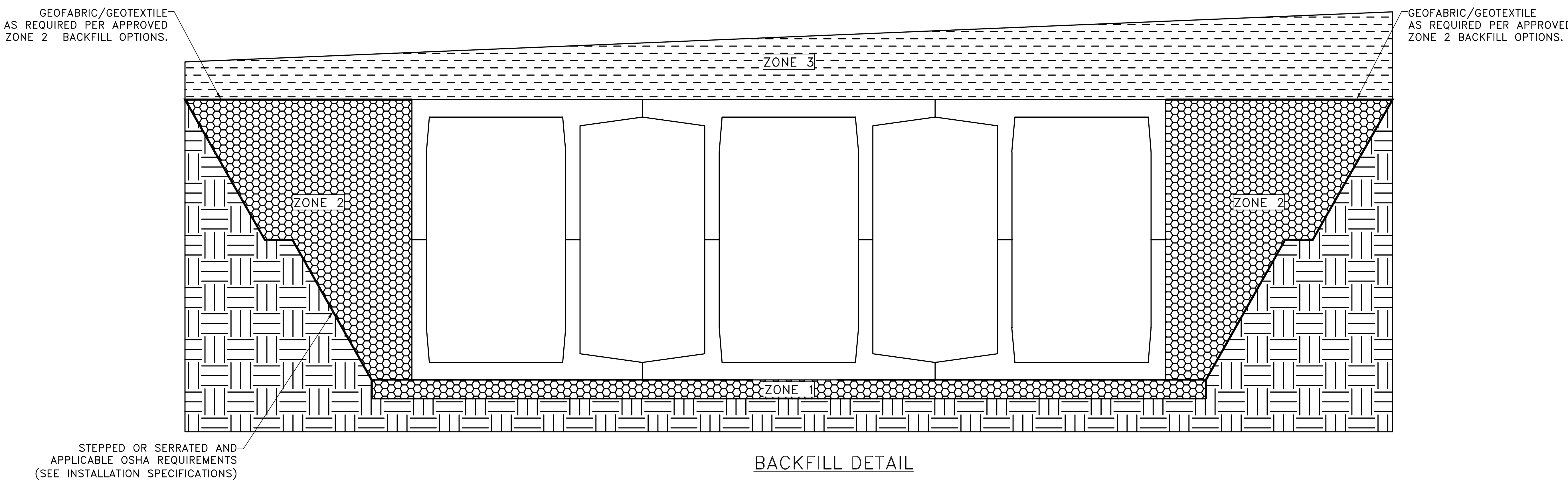
FILL DEPTH	TRACK WIDTH	MAX VEHICLE WEIGHT (KIPS)	MAX GROUND PRESSURE
12"	12"	51.8	1690 psf
	18"	56.1	1219 psf
	24"	68.1	1111 psf
	30"	76.7	1000 psf
	36"	85.0	924 psf

NOTE:
TRACK LENGTH NOT TO EXCEED 15'-4".
ONLY TWO TRACKS PER VEHICLE.

APPROVED ZONE 2 BACKFILL OPTIONS	
OPTION	REMARKS
¾" STONE AGGREGATE	THE STONE AGGREGATE SHALL CONSIST OF CLEAN AND FREE DRAINING ANGULAR MATERIAL. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL (ASTM SIZE #57) AS DETERMINED BY THE GEOTECHNICAL ENGINEER.
SAND	IMPORTED PURE SAND IS PERMITTED TO BE USED AS BACKFILL IF IT IS CLEAN AND FREE DRAINING. THE SAND USED FOR BACKFILLING SHALL HAVE LESS THAN 40% PASSING #40 SIEVE AND LESS THAN 5% PASSING #200 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE SAND BACKFILL.
CRUSHED CONCRETE AGGREGATE	CLEAN, FREE DRAINING CRUSHED CONCRETE AGGREGATE MATERIAL CAN BE USED AS BACKFILL FOR STORMTRAP'S MODULES. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL.
ROAD PACK	STONE AGGREGATE 100% PASSING THE 1-1/2" SIEVE WITH LESS THAN 12% PASSING THE #200 SIEVE (ASTM SIZE #467). GEOFABRIC AS PER GEOTECHNICAL ENGINEER RECOMMENDATION.

STORMTRAP ZONE INSTALLATION SPECIFICATIONS/PROCEDURES

1. THE FILL PLACED AROUND THE STORMTRAP MODULES MUST DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL EITHER BE COMPACTED AND/OR VIBRATED TO ENSURE THAT BACKFILL AGGREGATE/STONE MATERIAL IS WELL SEATED AND PROPERLY INTER LOCKED. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR SERRATED TO PREVENT WEDGING ACTION. CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MUST BE FREE-DRAINING MATERIAL. SEE ZONE 2 BACKFILL CHART ON THIS PAGE FOR APPROVED BACKFILL OPTIONS. IF NATIVE EARTH IS SUSCEPTIBLE TO MIGRATION, CONFIRM WITH GEOTECHNICAL ENGINEER AND PROVIDE PROTECTION AS REQUIRED (PROVIDED BY OTHERS).
2. DURING PLACEMENT OF MATERIAL OVERTOP THE SYSTEM, AT NO TIME SHALL MACHINERY BE USED OVERTOP THAT EXCEEDS THE DESIGN LIMITATIONS OF THE SYSTEM. WHEN PLACEMENT OF MATERIAL OVERTOP, MATERIAL SHALL BE PLACED SUCH THAT THE DIRECTION OF PLACEMENT IS PARALLEL WITH THE OVERALL LONGITUDINAL DIRECTION OF THE SYSTEM WHENEVER POSSIBLE.
3. THE FILL PLACED OVERTOP THE SYSTEM SHALL BE PLACED AT A MINIMUM OF 6" LIFTS. AT NO TIME SHALL MACHINERY OR VEHICLES GREATER THAN THE DESIGN HS-20 LOADING CRITERIA TRAVEL OVERTOP THE SYSTEM WITHOUT THE MINIMUM DESIGN COVERAGE. IF TRAVEL IS NECESSARY OVERTOP THE SYSTEM PRIOR TO ACHIEVING THE MINIMUM DESIGN COVER, IT MAY BE NECESSARY TO REDUCE THE ULTIMATE LOAD/BURDEN OF THE OPERATING MACHINERY SO AS TO NOT EXCEED THE DESIGN CAPACITY OF THE SYSTEM. IN SOME CASES, IN ORDER TO ACHIEVE REQUIRED COMPACTION, HAND COMPACTION MAY BE NECESSARY IN ORDER NOT TO EXCEED THE ALLOTTED DESIGN LOADING. SEE CHART FOR TRACKED VEHICLE WIDTH AND ALLOWABLE MAXIMUM PRESSURE PER TRACK.
4. STONE AGGREGATE FOUNDATION IN ZONE 1 IS RECOMMENDED FOR LEVELING PURPOSES ONLY (OPTIONAL).



BACKFILL DETAIL

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SHEET TITLE:

DOUBLETRAP BACKFILL SPECIFICATIONS

SHEET NUMBER:

4.0

RECOMMENDED ACCESS OPENING SPECIFICATION

1. A TYPICAL ACCESS OPENING FOR THE STORMTRAP SYSTEM ARE 2'-0" IN DIAMETER. ACCESS OPENINGS LARGER THAN 3'-0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP. ALL OPENINGS MUST RETAIN AT LEAST 1'-0" OF CLEARANCE FROM THE END OF THE STORMTRAP MODULE UNLESS NOTED OTHERWISE. ALL ACCESS OPENINGS TO BE LOCATED ON INSIDE LEG UNLESS OTHERWISE SPECIFIED.
2. PLASTIC COATED STEEL STEPS PRODUCED BY M.A. INDUSTRIES PART #PS3-PFC OR APPROVED EQUAL (SEE STEP DETAIL) ARE PROVIDED INSIDE ANY MODULE WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE MODULE IS TO BE PLACED A DISTANCE OF 1'-0" FROM THE INSIDE EDGE OF THE STORMTRAP MODULES. ALL ENSUING STEPS SHALL BE PLACED AT A DISTANCE BETWEEN 10" MIN AND 14" MAX BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE MODULE.
3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO AVOID INTERFERENCE WITH ACCESS OPENINGS OR THE CENTER OF GRAVITY OF THE MODULE AS NEEDED.
4. STORMTRAP ACCESS OPENINGS MAY BE RELOCATED TO AVOID INTERFERENCE WITH INLET AND/OR OUTLET PIPE OPENINGS SO PLACEMENT OF STEPS IS ATTAINABLE.
5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER TO MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST TWO ACCESS OPENINGS PER SYSTEM FOR ACCESS AND INSPECTION.
6. USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 2' TO USE PRECAST BARREL OR CONE SECTIONS. (PROVIDED BY OTHERS)

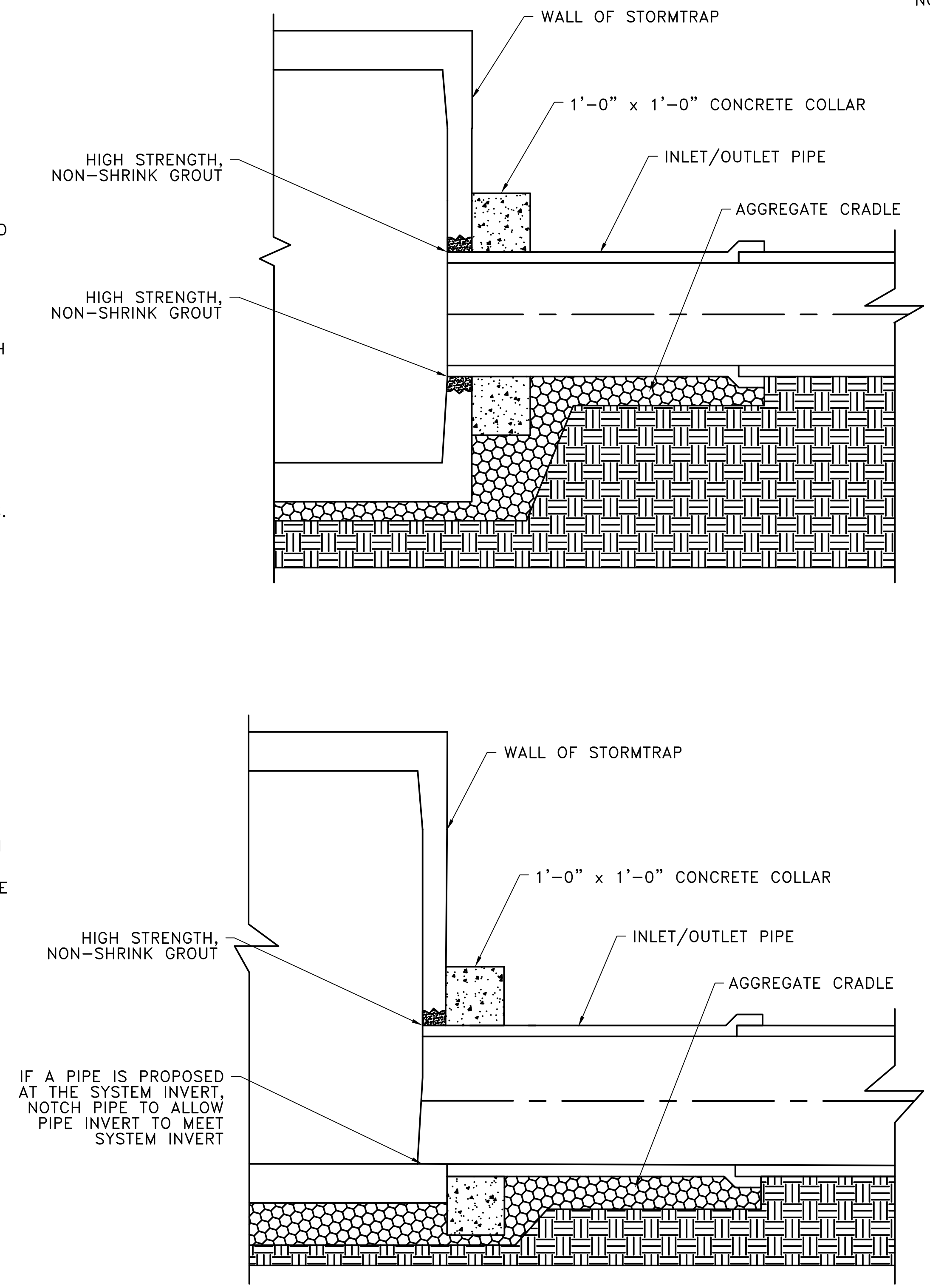
RECOMMENDED PIPE OPENING SPECIFICATION

1. MINIMUM EDGE DISTANCE FOR AN OPENING ON THE OUTSIDE WALL SHALL BE NO LESS THAN 1'-0".
2. MAXIMUM OPENING SIZE TO BE DETERMINED BY THE MODULE HEIGHT. PREFERRED OPENING SIZE ø 36" OR LESS. ANY OPENING NEEDED THAT DOES NOT FIT THIS CRITERIA SHALL BE BROUGHT TO THE ATTENTION OF STORMTRAP FOR REVIEW.
3. CONNECTING PIPES SHALL BE INSTALLED WITH A 1'-0" CONCRETE COLLAR, AND AN AGGREGATE CRADLE FOR AT LEAST ONE PIPE LENGTH (SEE PIPE CONNECTION DETAIL). A STRUCTURAL GRADE CONCRETE OR HIGH STRENGTH, NON-SHRINK GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI SHALL BE USED.
4. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH HIGH STRENGTH NON-SHRINK GROUT.

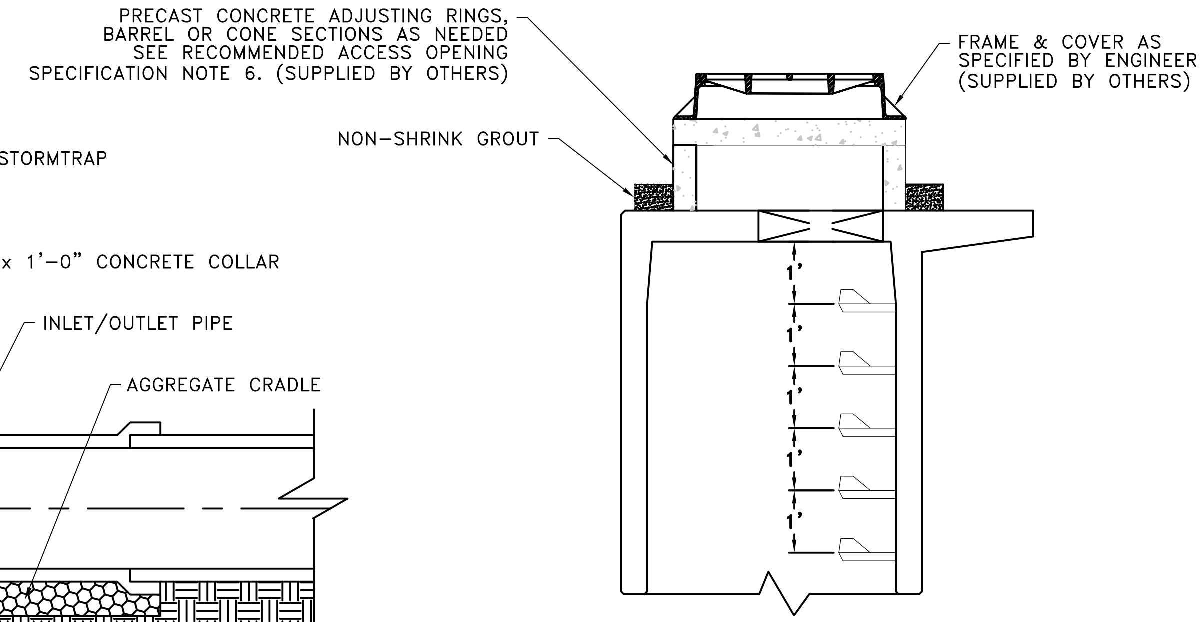
RECOMMENDED PIPE INSTALLATION INSTRUCTIONS

1. CLEAN AND LIGHTLY LUBRICATE ALL OF THE PIPE TO BE INSERTED INTO STORMTRAP.
2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.

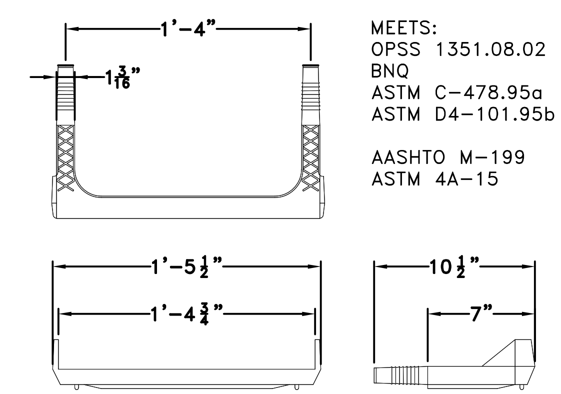
NOTE: ALL ANCILLARY PRODUCTS/SPECIFICATIONS RECOMMENDED AND SHOWN ON THIS SHEET ARE RECOMMENDATIONS ONLY AND SUBJECT TO CHANGE PER THE INSTALLING CONTRACTOR AND/OR PER LOCAL MUNICIPAL CODE/REQUIREMENTS.



PIPE CONNECTION DETAIL



RISER / STAIR DETAIL



STEP DETAIL

*** NOTICE *** 03-25-2022

DUE TO CURRENT INCONSISTENCIES IN THE 16" STEP SUPPLY, STORMTRAP MAY SUBSTITUTE THE 16" STEP WITH THE CLOSEST ALTERNATIVE LENGTH STEP UNTIL THE SUPPLY CHAIN ISSUE IS RESOLVED.

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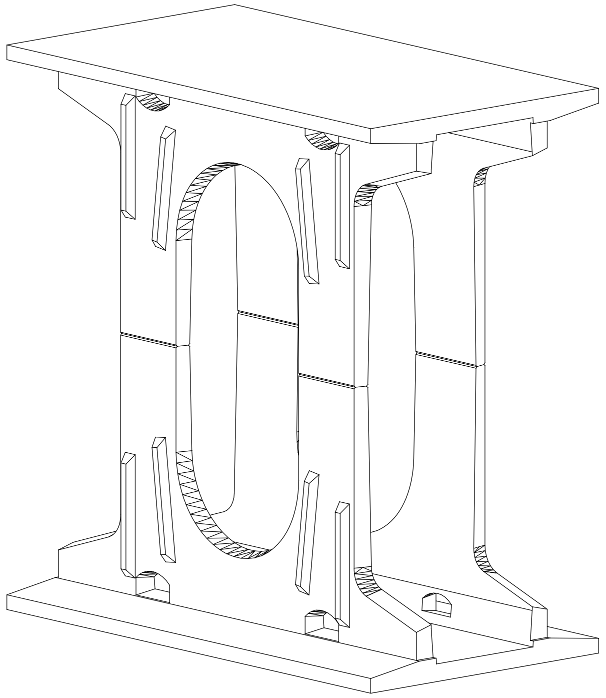
SHEET TITLE:

RECOMMENDED PIPE / ACCESS OPENING SPECIFICATIONS

SHEET NUMBER:

5.0



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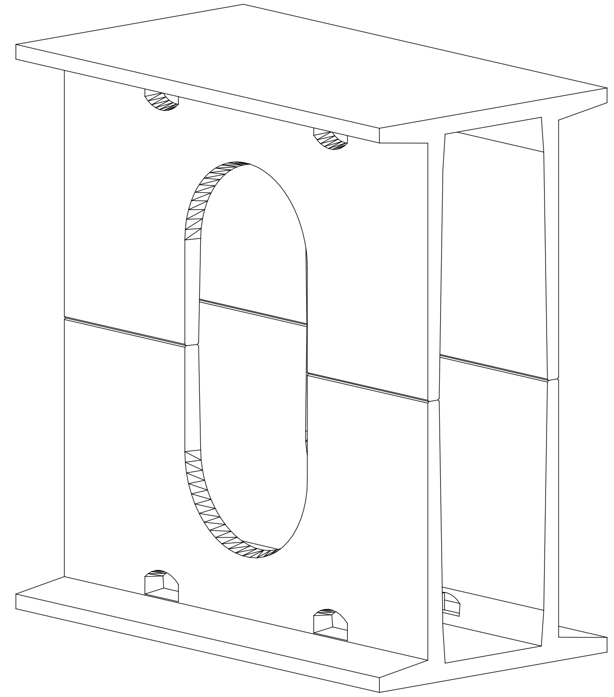
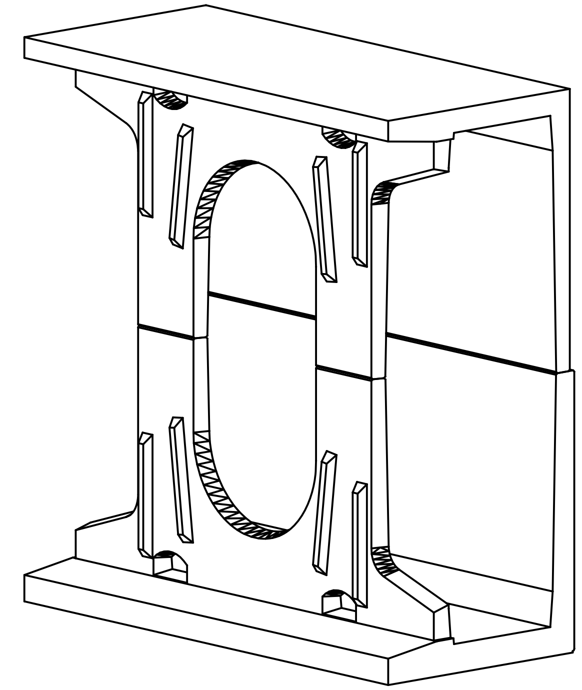
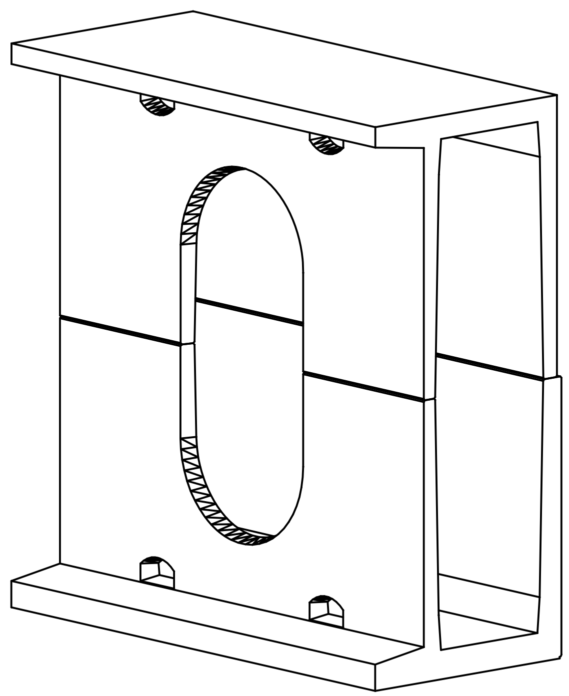


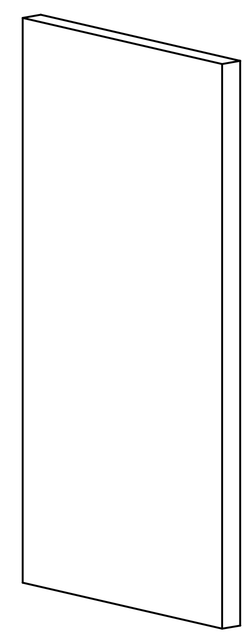
TYPE II



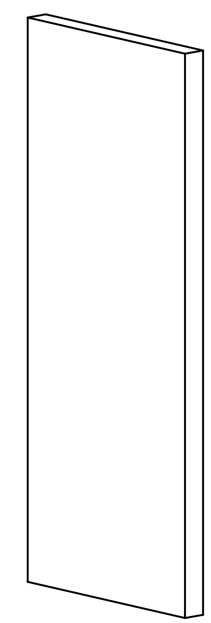
TYPE III



TYPE IV



TYPE II
END PANEL



TYPE IV
END PANEL

NOTES:
1. OPENING LOCATIONS AND SHAPES MAY VARY.
2. SP – INDICATES A MODULE WITH MODIFICATIONS.
3. P – INDICATES A MODULE WITH A PANEL ATTACHMENT.
4. POCKET WINDOW OPENINGS ARE OPTIONAL.

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SHEET TITLE:

DOUBLETRAP
MODULE TYPES

SHEET NUMBER:

6.0

PACKAGE DUPLEX PUMP LIFT STATION - MANUFACTURED BY PACIFIC SOUTHWEST INDUSTRIES
250 EDDY JONES WAY - OCEANSIDE, CA

Furnish and install complete pre-packaged duplex Lift Station model #PLS051222 as manufactured by Pacific Southwest Industries (national phone # 800-358-9095)

This pre-packaged Lift Station shall incorporate a quick removal system manufactured by the pump manufacturer. The pump(s) shall be guided to the discharge base elbow by a single or double guide rail and shall be stainless steel. The rail diameter shall be specific to the pump and quick removal system and shall extend from the discharge base elbow to the upper guide bracket mounted on 1-5/8" x 1-5/8" stainless steel channel just below the basin cover. Stainless steel lifting chain or cable shall be supplied and properly installed to remove the pump from the wet well. The internal discharge piping shall be completely pre-plumbed in pressure rated PVC pipe and extend 12" beyond the wet well and valve vault side wall for contractor connection to the force main piping. The pump(s) discharge piping shall have a check and shut off valve(s) installed on each pump discharge. The Lift Station shall include control panel and level control floats. The control panel shall be suitable for surface mounting or free standing on a leg kit if the site conditions require it.

PUMP(S):
Furnish and install two DEMING Series 7365 Model D7365-10DL submersible pump(s). Each unit shall be capable of delivering 1750 GPM at 33.5 Feet TDH with a trimmed impeller to performance. The pump(s) shall be designed to pump waste water, sewage or effluent containing 4 inches diameter solids without damage during operation. The pump(s) shall be designed so that the shaft power required (BHP) shall not exceed the motor rated output throughout the entire operating range of the pump performance curve.

MATERIALS OF CONSTRUCTION:
Pump case, motor case, seal plate and adapter shall be ASTM A-48 Class 30 cast iron. Discharge flange shall be sized in accordance with standard flange designations and slotted to accommodate ANSI or ISO flanges. Impeller shall be ASTM A-156 ductile iron with a keyed, tapered shaft bore. The impeller shall be enclosed, solids handling type designed to pump industrial wastes and wastewater and be dynamically balanced to ISO G6.3 specifications. Shaft shall be constructed of 416 stainless steel and feature a tapered impeller end to automatically center and self seat the impeller for vibration free operation. All exposed hardware including oversized lifting bail shall be 300 series stainless steel.

PUMP MOTOR:
Motors shall be sized to operate pump without exceeding the nameplates rating. Motor shall be totally submersible and rated for continuous duty in 40 degree C (104 degree F) liquid continuous and 70 C (160 F) intermittently.
The motor shall have two mechanical seals installed in tandem with an oil chamber between the pump and motor. Motor shall have built in thermal overloads protection with automatic rest. The inner seal chamber shall have a moisture sensing probe with leads for connection to a relay with test button. Each motor shall be furnished with 30 feet for #2 Frame or 50 feet for #3,#4, and #5 frames, of multiconductor cable including power leads, ground wire thermal protection and moisture sensor leads. Motor shall be dielectric oil filled for optimum thermal management and maximum bearing life. Air filled motors with grease lubricated bearings will not be acceptable. The motor windings shall utilize spike resistant Class H varnish and magnet wire. The motor shall meet the NEMA design B standard.

QUICK REMOVAL SYSTEM:
The pumping unit(s) shall be equipped with quick removal system (QRS). The construction shall be such that the pump(s) will automatically connect to the discharge piping when lowered into place on the discharge connector. There shall be no need for personnel to enter the wet well to accomplish installation or removal of the pump(s). The pumping unit(s) shall be fitted with stainless steel lifting chain(s) of sufficient length and strength to permit the raising and lowering of the unit(s). The chain(s) shall be fastened at the top of the structure near the access opening. The need for a protective coating shall not be required. A sliding guide bracket shall be an integral part of the pumping unit and the pump casing shall have a machined connection with a bracket to connect with the discharge connection. Sealing of the pumping unit to the discharge connection shall be accomplished by a single linear downward motion of the pump with the entire weight of the pumping unit guided by a pawl, thereby wedging the pumping unit tightly against the discharge connector. No portion of the pump shall bear directly on the floor of the sump nor shall a rotary motion of the pump be required for sealing. All fasteners coming into contact with the pumpage shall be stainless steel. Two corrosion resistant guide pipes shall be furnished and installed for each pump to permit raising and lowering of the pump.

FIBERGLASS WET WELL:
The fiberglass wet well with an anti-flotation flange shall have the proper diameter and depth below the lowest inlet to promote proper cycling while maintaining the rim at grade. The fiberglass wet well shall be manufactured using a process that is filament wound and or chopped spray. The wet well shall be constructed with a anti flotation flange. Lifting lugs shall be required for those wet wells 48 inches in diameter and larger for setting of the wet well. The laminate shall have a Barco hardness of at least 90% of the resin manufactures minimum specified hardness for cured resin on both the interior and exterior surfaces. The minimum wall thickness of the wet well shall not be less than 1/4". Stainless steel studs will be encapsulated in the bottom of the wet well to allow the mounting of the quick removal system. The top rim flange will be a minimum of 2" wide to allow for the installation of the pedestrian rated aluminum cover to the rim flange or shall be rimless if the cover is specified for H20 off street locations. The wet well shall be provided with "unseal" fittings that can be installed in the field to insure proper elevation of the inlet, vent, and electrical on the side of the wet well. The wet well will house 2 - swing check valves, and 2 – shut off valves.

COVER(s)
The wet well cover shall always be gasketed and bolted to the rim flange of the fiber glass tank using 7/16" stainless steel hex head bolts unless the cover is to be in a H20 off street location. The type of material to be used for the cover shall be as indicated on this plan sheet.

DUPLEX ALTERNATING CONTROL PANEL:
The duplex control panel, as a minimum, shall include the appropriate enclosure type for the environment it is to be installed in and should include the following: Motor starters, motor circuit protectors or variable frequency drives (VFD), pump run indicator(s), operation selector switch(es), high water alarm and light, silence switch, dry contact for alarm, numbered terminals for all incoming power, pump motor(s) and level controls. The control panel shall be UL listed 508 or 913.

NEMA 4X ___ NEMA 3R _X_ LEG KIT _X_ ETM's ___ SEAL FAIL _X_ THERMAL CUTOUTS _X_ PHASE LOSS MONITOR _X_ SOFT START _X_ GENSET HOOKUP ___ DOOR IN DOOR DEAD FRONT _X_ THROUGH DOOR MAIN DISCONNECT _X_ TRANSDUCER OPERATED ___ FLOAT BACKUP ___ CURRENT CENSOR ___ AUTO DIALER ___ REDUNDANT OFF ___ INTRINSICALLY SAFE ___ SMART RELAY WHICH INCLUDES EXERCISER, RUN COUNT, ALARM COUNT AND FLOAT POSITION _X_

Pump Data Sheet - Crane Deming.60

Company: PSI PUMPS
Name: 250 EDDY JONES SYS2
Date: 08/08/2022

DEMING PUMPS

Pump:
Size: 10DL
Type: D7365 10" Demersible
Synch Speed: 900 rpm
Dia: 380 mm
Curve: ---
Dimensions: Suction: 10 in; Discharge: 10 in

Fluid:
Name: Water
SG: 1
Density: 62.4 lb/ft³
Viscosity: 1.1 cP
Temperature: 60 °F
Vapor Pressure: 0.256 psi a
Atm Pressure: 14.7 psi a
Margin Ratio: 1

Pump Limits:
Temperature: 104 °F
Wkg Pressure: ---
Sphere Size: 4 in

Search Criteria:
Flow: 1880 US gpm
Head: 34 ft
Near Miss: ---
Static Head: 30 ft

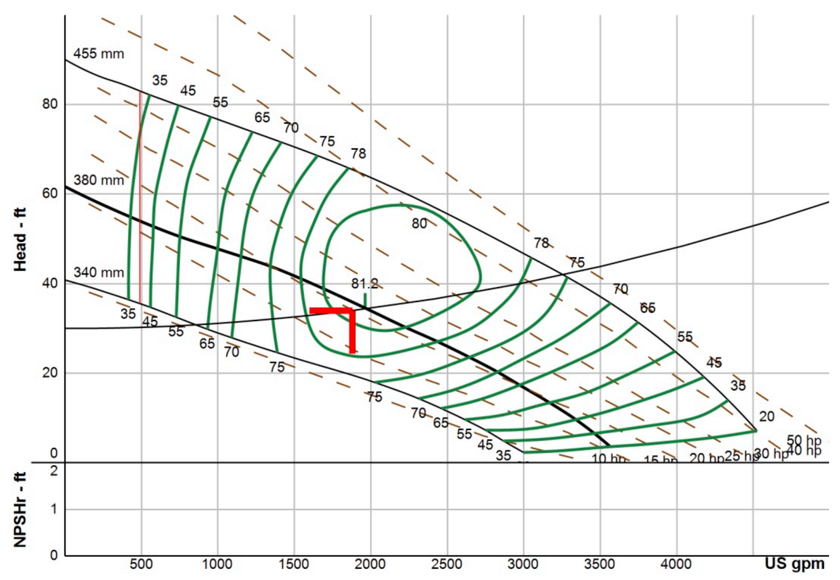
Motor:
Standard: NEMA
Enclosure: TEFC
Frame: 326T
Sizing Criteria: Max Power on Design Curve
Size: 25 hp
Speed: 900 rpm

Pump Selection Warnings:
None

--- Duty Point ---
Flow: 1972 US gpm
Head: 34.4 ft
Eff: 81.2%
Power: 21.1 hp
NPSHr: ---
Speed: 870 rpm

--- Design Curve ---
Shutoff Head: 61.7 ft
Shutoff dP: 26.7 psi
Min Flow: 490 US gpm
BEP: 81.2% @ 1962 US gpm
NOL Power:
21.3 hp @ 2436 US gpm

--- Max Curve ---
Max Power:
45.9 hp @ 3567 US gpm

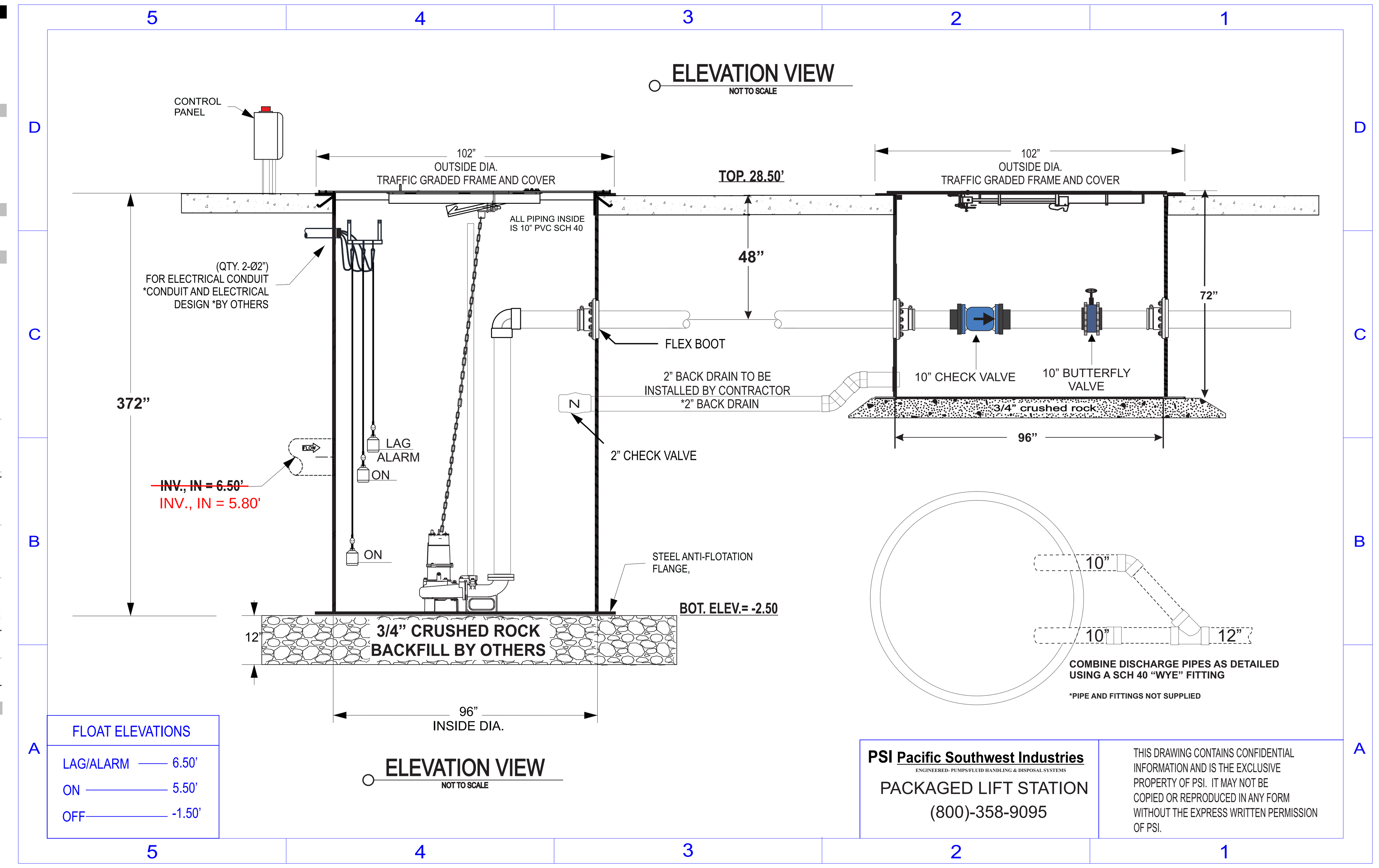


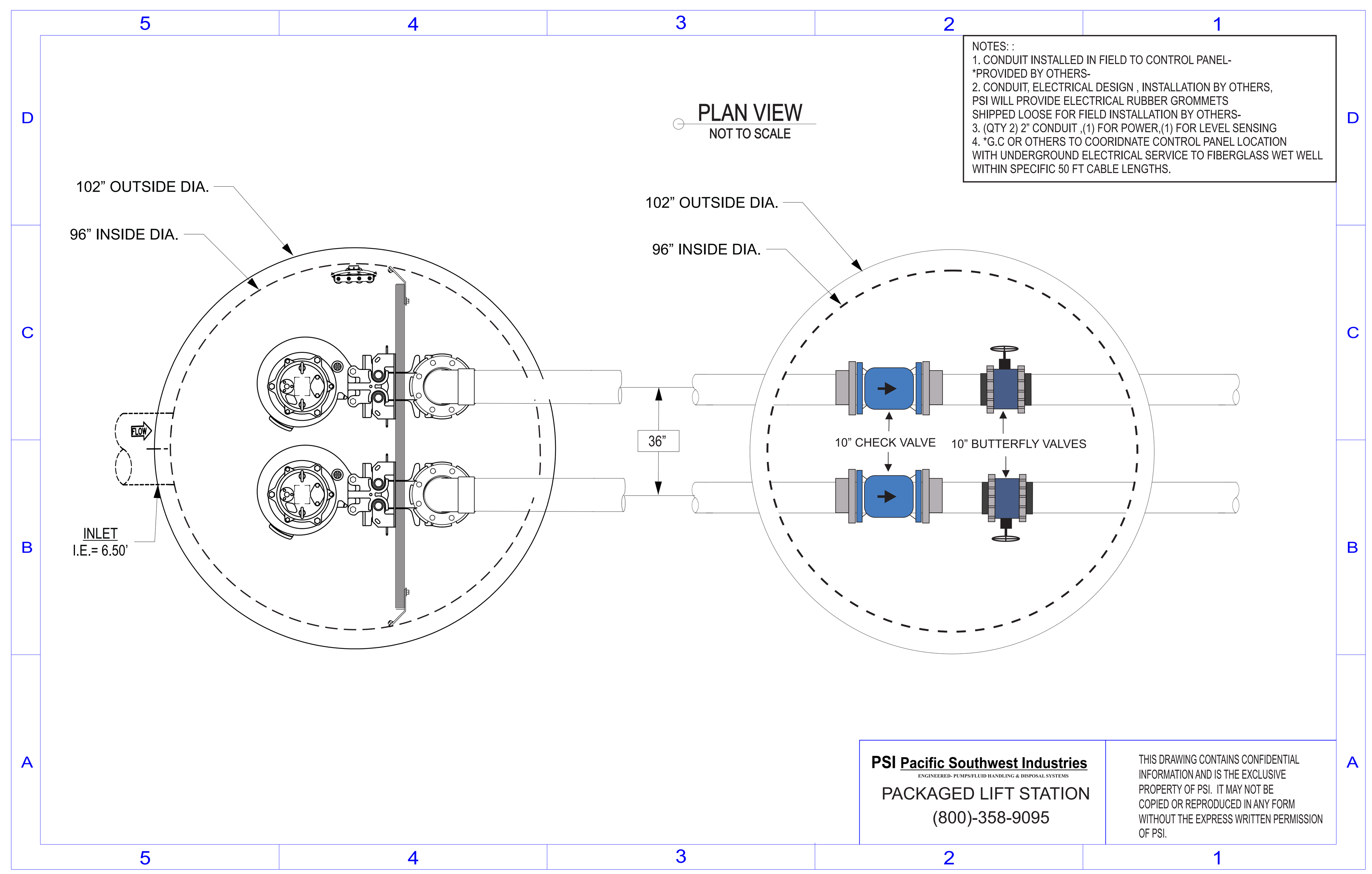
Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
2256	870	29.8	80	21.3	---
1880	870	35.9	81	21	---
1504	870	41.6	77	20.4	---
1128	870	46.3	69	19	---
752	870	50.5	55	17.4	---

HAZEN-WILLIAMS EQUATION/HEAD LOSS IN WATER PIPE	
$(f) = 0.2083\ (100 / c)^{1.852}\ q^{1.852} / dh^{4.8655}$	
c=	140 HDPE / PVC
q=	1880 GPM
dh=	10" SCH 40 = 10.02
10" FRICTION LOSS PER 100 FT =	1.75
c=	140 HDPE / PVC
q=	1880 GPM
dh=	12" SCH 40 = 11.94
12" FRICTION LOSS PER 100 FT =	0.74
Velocity (ft/s)	5.39

STORM LIFT STATION PROFILE & CALCULATIONS							
10" SCH 40 = 10.02 SCH 80 = 9.56							
10" PVC PIPE	(QTY)	31	x	1	FT		31 FT
10" PVC 90 ELBOW	(QTY)	1	x	26	FT		26 FT
10" PVC 45 BEND	(QTY)	0	x	13	FT		0 FT
10" PVC TEE	(QTY)	0	x	56	FT		0 FT
10" BALL VALVE	(QTY)	1	x	5.7	FT		5.7 FT
10" CHECK VALVE	(QTY)	1	x	65	FT		65 FT
TOTAL EQUIVALENT LENGTH							127.7 FT
FRICTION LOSS PER 100 FT 10" PVC	1880 GPM	1.75 FT			PER 100 FT		
FRICTION LOSS 10"	127.7	/	100	x	1.75	FT	2.23 FT
12" SCH 40 = 11.94 SCH 80 = 11.38							
12" PVC PIPE	(QTY)	75	x	1	FT		75 FT
12" PVC 90 ELBOW	(QTY)	2	x	32	FT		64 FT
12" PVC 45 BEND	(QTY)	1	x	15	FT		15 FT
12" PVC TEE	(QTY)	0	x	66	FT		0 FT
TOTAL EQUIVALENT LENGTH							154 FT
FRICTION LOSS PER 100 FT 12" PVC	1880 GPM	0.74 FT			PER 100 FT		
FRICTION LOSS 12"	154	/	100	x	0.74	FT	1.15 FT
TOTAL DYNAMIC HEAD							
10" FRICTION LOSS							2.23 FT
12" FRICTION LOSS							1.15 FT
COMBINED 10" AND 12" FRICTION LOSS							3.38 FT
STATIC HEAD						+	30.50 FT
PERFORMANCE	1880 GPM	@	33.88		FT TDH THROUGH 12" PVC LINE		





NOTE: VERIFY ALL ELVEATIONS PRIOR TO FABRICATION. OTHERS TO VERIFY ALL INLET/OUTLET ORIENTATIONS PRIOR TO FABRICATION AND INSTALLATION.
*ALL PIPE OPENINGS AND SEALING SHALL BE COMPLETED IN FIELD BY OTHERS.

LIFT STATION DETAILS

PSI Pacific Southwest Industries
ENGINEERED- PUMPS/FLUID HANDLING & DISPOSAL SYSTEMS
18541 COLLIER, , LAKE ELSINORE, CA 92530 PH: 800 358-9095

No.	Date	Description

LIFT STATION DETAILS
250 EDDY JONES WAY
OCEANSIDE, CA

Date:	05/12/22	Scale: NTS
Drawn by:	DM	Sheet No.
Checked by:		1 OF 1

LSD-1

250 EDDY JONES WAY - OCEANSIDE CA - PUMP STATION #1

OCEANSIDE, CA
STORM WATER PUMP SYSTEM - MANUFACTURED BY PACIFIC SOUTHWEST INDUSTRIES

SCOPE OF SUPPLY:

Furnish and install complete pre-packaged duplex Lift Station model #PSI-PLS080822 as manufactured by Pacific Southwest Industries (national phone # 800-358-9095)

This pre-packaged Lift Station, in it's entirety, is to be non-corrosive and shall incorporate a quick removal system manufactured by the pump manufacturer. The pump(s) shall be guided to the discharge base elbow by the use of two guide rails, SCH 40 PVC for those basins six feet or less in length. Seven feet and deeper basins shall use stainless steel guide rails. The rails shall be no less than 2" and shall extend from the discharge base elbow to the upper guide bracket mounted on 1-5/8" x 1-5/8" stainless steel channel just below the basin cover. Stainless steel lifting chain or cable shall be supplied and properly installed to remove the pump from the wet well. The internal discharge piping shall be completely pre-plumbed in schedule 40 PVC pipe and extend 12" beyond the wet well side wall for contractor connection to the force main piping. The pump(s) discharge piping shall have check and shutoff valves installed. The Lift Station shall include three pre-installed liquid level controls and transducer on a hanging float system. A control panel shall be supplied which offers a NEMA 3R enclosure suitable for surface mounting and or with optional floor stands.

PUMP(S):
Furnish and install two DEMING Series 7365 Model D7365 10DH submersible pump(s). Each unit shall be capable of delivering 1880 GPM at 22 Feet TDH at trim impeller to performance. The pump(s) shall be designed to pump waste water, sewage or effluent containing 3.5 inches diameter solids without damage during operation. The pump(s) shall be designed so that the shaft power required (BHP) shall not exceed the motor rated output throughout the entire operating range of the pump performance curve.

MATERIALS OF CONSTRUCTION:
Pump case, motor case, seal plate and adapter shall be ASTM A-48 Class 30 cast iron. Discharge flange shall be sized in accordance with standard flange designations and slotted to accommodate ANSI or ISO flanges. Impeller shall be ASTM A-156 ductile iron with a keyed, tapered shaft bore. The impeller shall be enclosed, solids handling type designed to pump industrial wastes and wastewater and be dynamically balanced to ISO G6.3 specifications. Shaft shall be constructed of 416 stainless steel and feature a tapered impeller end to automatically center and self seat the impeller for vibration free operation. All exposed hardware including oversized lifting bail shall be 300 series stainless steel.

PUMP MOTOR:
Motors shall be sized to operate pump without exceeding the nameplates rating. Motor shall be totally submersible and rated for continuous duty in 40 degree C (104 degree F) liquid continuous and 70 C (160 F) intermittently, on 15 HP 230 Volts 3 Phase.
The motor shall have two mechanical seals installed in tandem with an oil chamber between the pump and motor. Motor shall have built in thermal overloads protection with automatic rest. The inner seal chamber shall have a moisture sensing probe with leads for connection to a relay with test button. Each motor shall be furnished with 30 feet for #2 Frame or 50 feet for #3,#4, and #5 frames, of multiconductor cable including power leads, ground wire thermal protection and moisture sensor leads. Motor shall be dielectric oil filled for optimum thermal management and maximum bearing life. Air filled motors with grease lubricated bearings will not be acceptable. The motor windings shall utilize spike resistant Class H varnish and magnet wire. The motor shall meet the NEMA design B standard.

CONTROL PANEL w/ SOFT START MOTOR CONTACTS :
The control panel shall have a NEMA 3R Dead front door in door enclosure suitable for floor mounting. The outer face of the door shall have only the following: 3 run light, seal fail indicator light, 1 high water alarm light with silence/test switch and 1 buzzer. The inner workings of the control panel shall have no less than (3) soft start motor contactors and circuit protectors (overloads) that shall be adjustable, motor contactor, HOA selector switches, Smart relay, elapsed time meter, exercise timers cycle counter, circuit breakers, variable frequency drives, float operated level control system, dry contact connection, numbered terminal strips. The system will be controlled by a touch screen PLC. The controls will be equipped with tank monitoring relays and radio telemetry for communication with existing pump system. The controls will be manufactured and shall be listed by a U.L. 508 manufacture.

CONCRETE WET WELL AND VALVE VAULT:
The concrete wet well shall have a minimum inside dimension of 8'X12'WX22' deep and a wall thickness of 12" inches. The overall length of 22 FT to maintain the top slab approximately 12 inches below grade. The concrete wet well shall be manufactured to a ASTM-C478 standard and the seal fittings to an ASTM- C923. 5/8" x 5" Stainless steel studs will be anchored in the bottom of the concrete vault to allow the mounting of the quick removal system. The top slab will a minimum of 12" thick and the same OD of the shafting. The wet well shall be provided with Link or Press Seal fittings that can be installed in the field to insure proper elevation of the inlet, vent, and electrical on the side of the wet well. The valve vault will be a 10ft x 8ft inside dimension and be 8 ft of depth including the bottom and top slab. The top slab will be 12 inches below grade and have an access opening of 36" x 42". The discharge pipes will have (3) flanged swing check valves by Valmatic, and (3) flanged gate valves with gear operated wheel.

H20 TRAFFIC COVERS:
The wet well will be covered with a 36" x 42" hatch door 1/2" thick steel cover suitable for light duty traffic loads. The valve vault will be covered with a 36" x 48" hatch door 1/2 thick steel h20 cover suitable for light duty traffic loads. The cover will be solid with an opening hatch for easy access and maintenance. The cover swill be cast into the top slab at the determined locations for each individual pump. No covers using epoxy paint will be acceptable.

Pump Data Sheet - Crane Deming.60

Company: PSI PUMPS
Name: EDDY JONES WAY SYS1
Date: 08/08/2022

DEMING PUMPS

Pump:

Size:	10DH	Dimensions:	
Type:	D7365 10" Demersible	Suction:	10 in
Synch Speed:	900 rpm	Discharge:	10 in
Dia:	330 mm		
Curve:	---		

Fluid:

Name:	Water		
SG:	1	Vapor Pressure:	0.256 psi a
Density:	62.4 lb/ft³	Atm Pressure:	14.7 psi a
Viscosity:	1.1 cP		
Temperature:	60 °F	Margin Ratio:	1

Pump Limits:

Temperature:	104 °F	Sphere Size:	4 in
Wkg Pressure:	---		

Search Criteria:

Flow:	1880 US gpm	Near Miss:	---
Head:	21 ft	Static Head:	19 ft

Motor:

Standard:	NEMA	Size:	15 hp
Enclosure:	TEFC	Speed:	900 rpm
Frame:	286T		
Sizing Criteria:	Max Power on Design Curve		

Pump Selection Warnings:
None

--- Duty Point ---

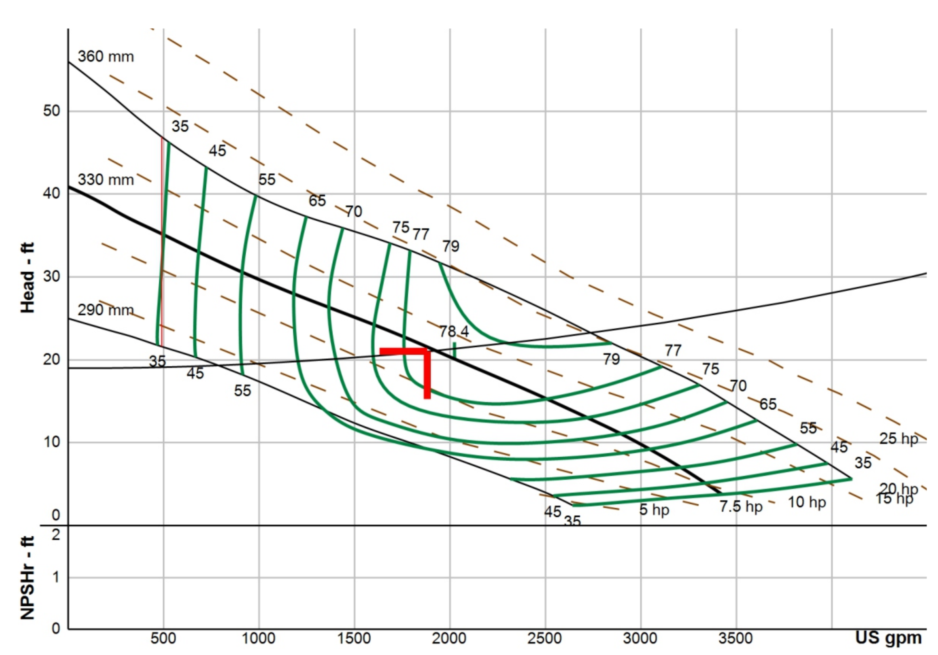
Flow:	1925 US gpm
Head:	21.1 ft
Eff:	77.9%
Power:	13.1 hp
NPSHr:	---
Speed:	870 rpm

--- Design Curve ---

Shutoff Head:	40.9 ft
Shutoff dP:	17.7 psi
Min Flow:	490 US gpm
BEP:	78.4% @ 2024 US gpm
NOL Power:	13.1 hp @ 1759 US gpm

--- Max Curve ---

Max Power:	20.6 hp @ 2464 US gpm

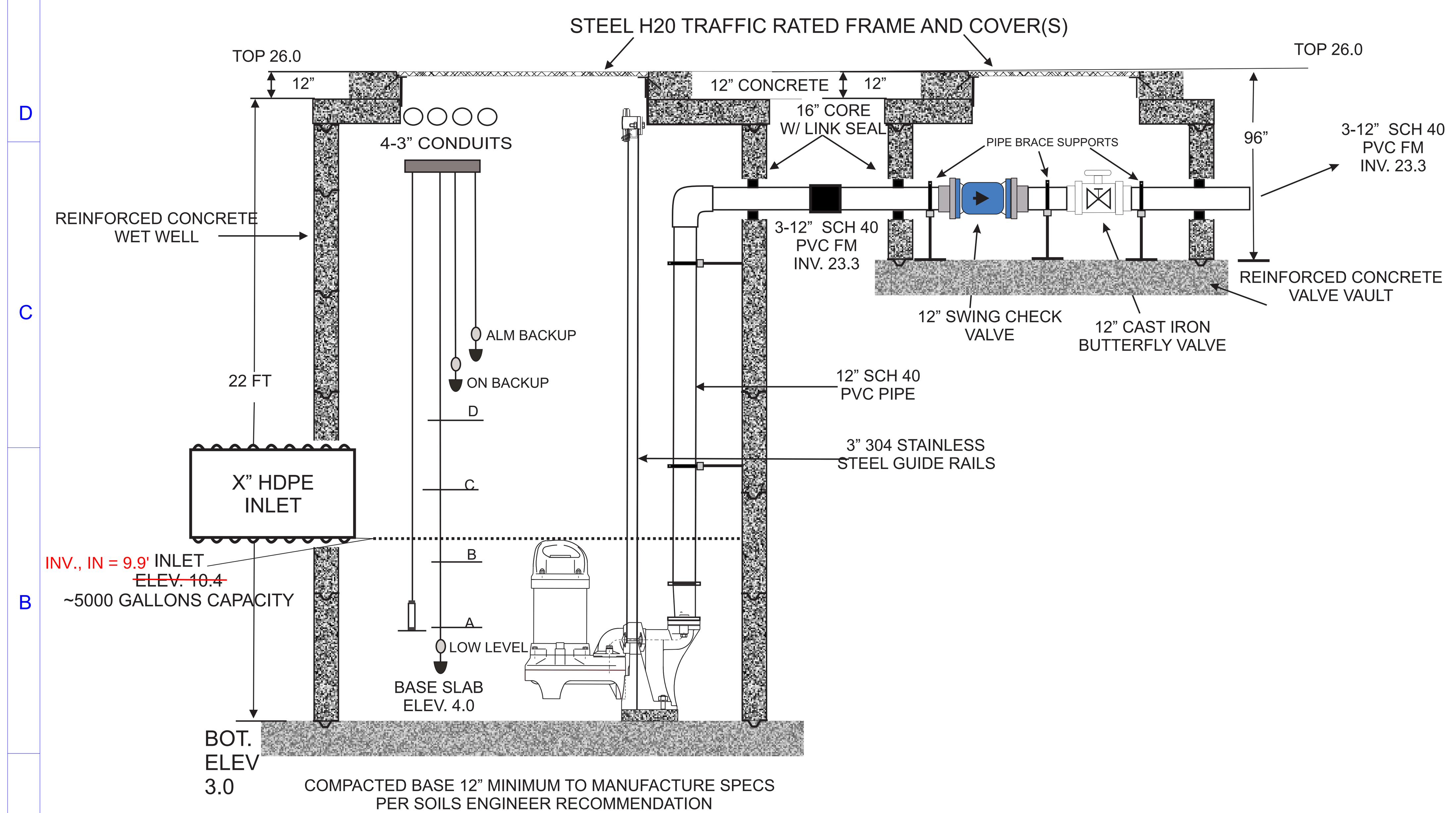


Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
2256	870	17.8	78	12.9	---
1880	870	21.6	78	13.1	---
1504	870	25.1	73	13	---
1128	870	28.5	63	12.8	---
752	870	32.3	48	12.7	---

LIFT STATION PROFILE & CALCULATIONS					
12" SCH 40 = 11.94 SCH 80 = 11.38					
12" PVC PIPE	(QTY)	50	x	1 FT	50 FT
12" PVC 90 ELBOW	(QTY)	1	x	32 FT	32 FT
12" PVC 45 BEND	(QTY)	0	x	15 FT	0 FT
12" PVC TEE	(QTY)	0	x	66 FT	0 FT
12" BALL VALVE	(QTY)	1	x	8 FT	8 FT
12" CHECK VALVE	(QTY)	1	x	78 FT	78 FT
TOTAL EQUIVALENT LENGTH					168 FT
FRICTION LOSS PER 100 FT 12" PVC	1880 GPM	0.7 FT		PER 100 FT	
FRICTION LOSS 12"	168 / 100	x	0.7	FT	1.25 FT
TOTAL DYNAMIC HEAD					
12" FRICTION LOSS					1.25 FT
STATIC HEAD				+	19.00 FT
PERFORMANCE	1880 GPM @	20.25	FT TDH THROUGH 12" PVC LINE		

HAZEN-WILLIAMS EQUATION/HEAD LOSS IN WATER PIPE	
$(f) = 0.2083\ (100 / c)^{1.852}\ q^{1.852} / dh^{4.8655}$	
c=	140 HDPE / PVC
q=	1880 GPM
dh=	12" SCH 40 = 11.94
FRICTION LOSS PER 100 FT f=	0.74
Velocity (ft/s) =	5.39



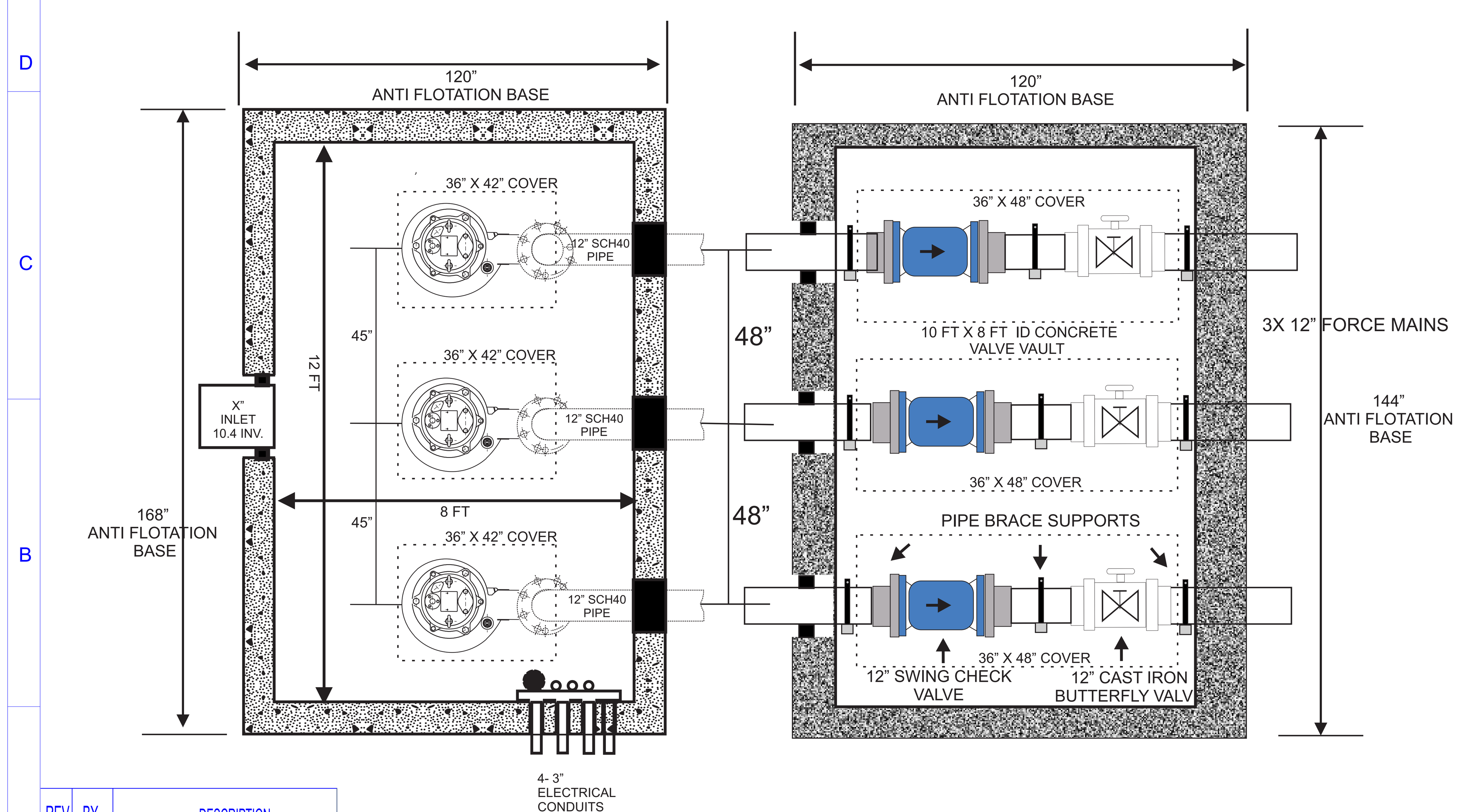
REV	BY	DESCRIPTION
A	SR	FIRST ISSUE

LEVEL SENSOR INPUT ELEVATIONS:

A=ALL PUMPS OFF	6.5
B=LEAD PUMP ON	9.0
C=LAG 1 PUMP ON	9.5
D=LAG 2 PUMP ON	10.4
E=ALL PUMPS ON W/ ALARM	11.0

PSI pacific southwest industries
ENGINEERED- PUMPS/FLUID HANDLING & DISPOSAL SYSTEMS
TRIPLEX STORM WATER PACKAGED LIFT STATION
TOLL FREE 800-358-9095

SCALE	DRAWN BY	DATE	PROJECT	DRAWING NO.	REV
NTS	OR	8/08/22	250 EDDY JONES WAY	PSI-PLS080822	A



REV	BY	DESCRIPTION
A	SR	FIRST ISSUE

LIFT STATION DETAILS

PSI pacific southwest industries
ENGINEERED- PUMPS/FLUID HANDLING & DISPOSAL SYSTEMS
18541 COLLIER AVE., LAKE ELSINORE, CA 92530 PH: 800 358-9095

No.	Date	Description
1	8/08/22	elevation and pump

LIFT STATION DETAILS
PERRIS LOGISTICS CENTER NORTH
PERRIS, CA

Date:	8/08/22
Drawn by:	OR
Checked by:	
Scale:	NTS
Sheet No.	1 OF 1

LSD-2

Placeholder – **Tabular Summary of DMAs (if separate from DMA Exhibit)**

Leave placeholder intact if not applicable.

☒Not Applicable – Tabular Summary included on DMA Exhibit

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

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1	
Part 1 - Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?**			
Criteria	Screening Question	**Yes**	**No**
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: *The infiltration rate of the existing soils at locations P-1 and P-2, based on the on-site infiltration study was calculated to be less than 0.5 inches per hour (0.45 and 0.12 inches per hour for P-1 and P-2, respectively) after applying a minimum factor of safety (F) of F=2.*			
2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X
Provide basis: *No. See Criterion 1.*			

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 2 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>3</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:
Water contamination was not evaluated by NOVA Services.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>4</td><td>Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td></td><td></td></tr>
<tr><td colspan="4">Provide basis:
The potential for water balance was not evaluated by NOVA Services.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>Part 1 Result*</td><td colspan="2">If all answers to rows 1 - 4 are “Yes” a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration

If any answer from row 1-4 is “No”, infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a “full infiltration” design. Proceed to Part 2</td><td>Proceed to Part 2</td></tr>
</table>

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

<table>
<tr><th colspan="4">Worksheet C.4-1 Page 3 of 4</th></tr>
<tr><td colspan="4"><u>Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria</u>

Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?</td></tr>
<tr><td>Criteria</td><td>Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>5</td><td>Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis:
The infiltration rate of the existing soils at locations P-1 and P-2, based on the on-site infiltration study was calculated to be less than 0.5 inches per hour and greater than 0.01 (0.45 and 0.12 inches per hour for P-1 and P-2, respectively) after applying a minimum factor of safety (F) of F=2.

The soil and geologic conditions allow for infiltration in an appreciable rate and volume, however, not without increasing geotechnical hazards.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>6</td><td>Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis:
C2.1 A geologic investigation was performed at the subject site. See NOVA 2021.
C2.2 Settlement and soil volume change due to stormwater infiltration is a concern with underlying soils with the potential for liquefaction.
C2.3 Infiltration has the potential to cause slope failures. BMPs are to be sited a minimum of 50 feet away from any slope.
C2.4 BMPs are to be sited a minimum of 10 feet away from all underground utilities.
C2.5 Stormwater infiltration can result in damaging ground water mounding during wet periods.
C2.6 Infiltration has the potential to increase lateral pressure and reduce soil strength which can impact foundations and retaining walls. BMPs are to be sited a minimum of 10 feet away from any foundations or retaining walls.
C2.7 Other Factors: The complete design is not known at this point. Based on the liquefaction potential of the underlying soils and proximity to groundwater, it is NOVA's judgment that the site is not suitable for permanent stormwater BMPs.</td></tr>
</table>

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: *Water contamination was not evaluated by NOVA Services.* Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	**Can infiltration be allowed without violating downstream water rights**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: *The potential for water balance was not evaluated by NOVA Services.* Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 5-8 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.** If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.**	*No Infiltration*	

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

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

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	1	2	3								unitless
	2	85th Percentile 24-hr Storm Depth	0.62	0.62	0.62								inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	489,038	545,948	20,586								sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)	50,007	55,807	4,829								sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No	No	No	No	No	yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A											#
	19	Average Mature Tree Canopy Diameter											ft
	20	Number of Rain Barrels Proposed per SD-E											#
	21	Average Rain Barrel Size											gal
Initial Runoff Factor Calculation	22	Total Tributary Area	539,045	601,755	25,415	0	0	0	0	0	0	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.83	0.83	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.83	0.83	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	26	Initial Design Capture Volume	23,116	25,805	985	0	0	0	0	0	0	0	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.83	0.83	0.75	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	23,116	25,805	985	0	0	0	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.83	0.83	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	36	Final Effective Tributary Area	447,407	499,457	19,061	0	0	0	0	0	0	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	23,116	25,805	985	0	0	0	0	0	0	0	cubic-feet

No Warning Messages

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

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Basic Analysis	1	Drainage Basin ID or Name	1	2	3	-	-	-	-	-	-	-	unitless
	2	85th Percentile Rainfall Depth	0.62	0.62	0.62	-	-	-	-	-	-	-	inches
	3	Predominant NRCS Soil Type Within BMP Location	A	A	A								unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted								unitless
	5	Nature of Restriction	Industrial	Industrial	Industrial								unitless
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	Yes								yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes								yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.000								in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	-	-	-	-	-	-	-	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	1.5%	1.5%	1.5%	-	-	-	-	-	-	-	percentage
	12	Fraction of DCV Requiring Retention	0.01	0.01	0.01	-	-	-	-	-	-	-	ratio
	13	Required Retention Volume	231	258	10	-	-	-	-	-	-	-	cubic-feet

Attention!

-Projects proposing buildings over 9 stories must perform a capture and use analysis evaluating the potential for toilet/landscape use of the DCV.

SEPARATE VOLUME RETENTION ON BENET ROAD

Total Retention Volume Required = 489 CF

Retention Volume Provided = 594 CF with 3" depth amended soils > 489 CF required

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

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
BMP Inputs	1	Drainage Basin ID or Name	1	2	3	-	-	-	-	-	-	-	sq-ft
	2	Design Infiltration Rate Recommended	0.000	0.000	0.000	-	-	-	-	-	-	-	in/hr
	3	Design Capture Volume Tributary to BMP	23,116	25,805	985	-	-	-	-	-	-	-	cubic-feet
	4	Is BMP Vegetated or Unvegetated?											unitless
	5	Is BMP Impermeably Lined or Unlined?											unitless
	6	Does BMP Have an Underdrain?											unitless
	7	Does BMP Utilize Standard or Specialized Media?											unitless
	8	Provided Surface Area											sq-ft
	9	Provided Surface Ponding Depth											inches
	10	Provided Soil Media Thickness											inches
	11	Provided Gravel Thickness (Total Thickness)											inches
	12	Underdrain Offset											inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)											inches
	14	Specialized Soil Media Filtration Rate											in/hr
	15	Specialized Soil Media Pore Space for Retention											unitless
	16	Specialized Soil Media Pore Space for Biofiltration											unitless
	17	Specialized Gravel Media Pore Space											unitless
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet
	19	Ponding Pore Space Available for Retention	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	unitless
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	23	Effective Retention Depth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	25	Calculated Retention Storage Drawdown Time	0	0	0	0	0	0	0	0	0	0	hours
	26	Efficacy of Retention Processes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	0	0	0	0	0	0	0	0	0	0	cubic-feet
	28	Design Capture Volume Remaining for Biofiltration	23,116	25,805	985	0	0	0	0	0	0	0	cubic-feet
Biofiltration Calculations	29	Max Hydromod Flow Rate through Underdrain	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	32	Soil Media Filtration Rate to be used for Sizing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	34	Ponding Pore Space Available for Biofiltration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	37	Effective Depth of Biofiltration Storage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	38	Drawdown Time for Surface Ponding	0	0	0	0	0	0	0	0	0	0	hours
	39	Drawdown Time for Effective Biofiltration Depth	0	0	0	0	0	0	0	0	0	0	hours
	40	Total Depth Biofiltered	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	34,674	38,708	1,478	0	0	0	0	0	0	0	cubic-feet
	42	Option 1 - Provided Biofiltration Volume	0	0	0	0	0	0	0	0	0	0	cubic-feet
	43	Option 2 - Store 0.75 DCV: Target Volume	17,337	19,354	739	0	0	0	0	0	0	0	cubic-feet
	44	Option 2 - Provided Storage Volume	0	0	0	0	0	0	0	0	0	0	cubic-feet
	45	Portion of Biofiltration Performance Standard Satisfied	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
Result	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	No	No	No	-	-	-	-	-	-	-	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	48	**Deficit of Effectively Treated Stormwater**	**-23,116**	**-25,805**	**-985**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	cubic-feet

Attention!

SHEET UNNECESSARY
(PROPRIETARY TREATMENT
SYSTEM UTILIZED)

-Minimum annual retention criteria are not satisfied for each individual drainage area. Implement additional site design elements, increase structural BMP retention capacity, or demonstrate that such requirements are satisfied at the project-level
-This BMP does not fully satisfy the performance standards for pollutant control for the drainage area

ATTACHMENT 2
BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

☒Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Indicate which Items are Included:

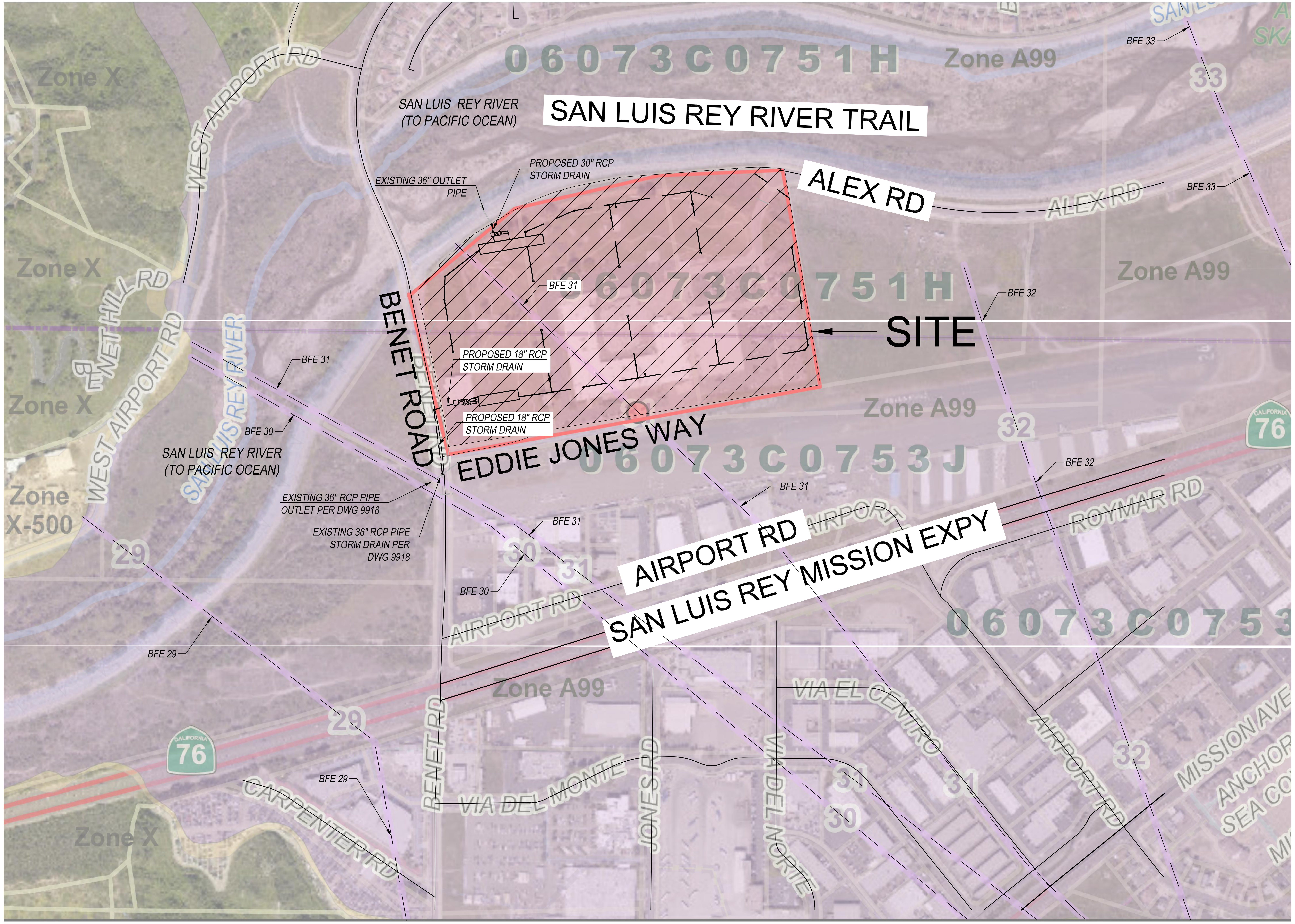
Attachment Sequence	Contents	Checklist
Attachment 2a	1. Hydromodification Management Exhibit (Required)	☐Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section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

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

The Hydromodification Management Exhibit must identify:

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

Please provide the Exhibit in 24”x36” format with map pocket, wet date, and stamp.



September 23, 2021

*NOTE: BFE's SHOWN ARE IN NAVD 29 TO CONVERT TO NGVD 88 +2' TO BFE CONTOURS

GRAPHIC SCALE 1" = 200'

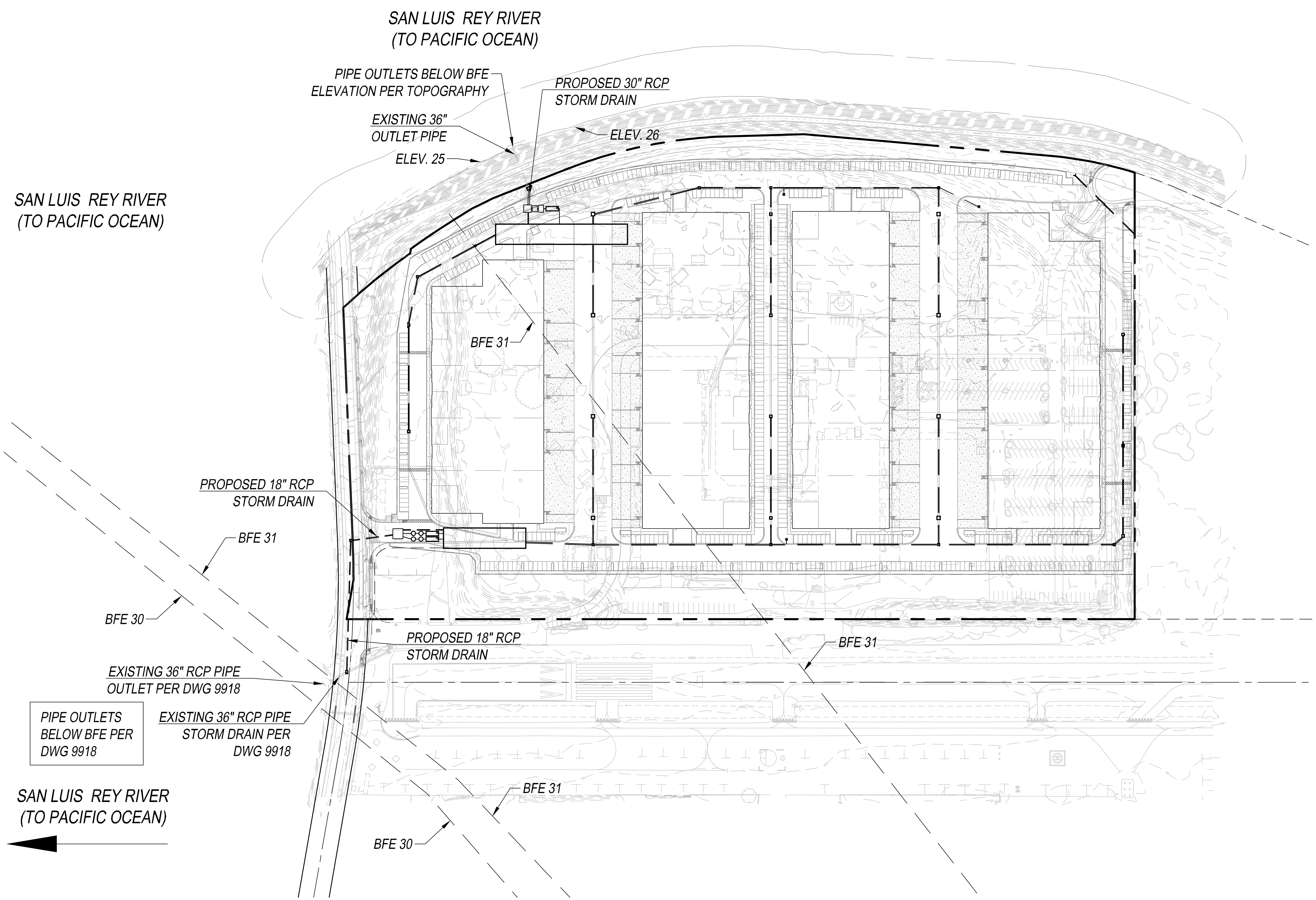
200 0 200 400 600

HYDROMODIFICATION EXEMPTION EXHIBIT

WHALEY STREET HOMES,
1728 WHALEY STREET
CITY OF OCEANSIDE, CA

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

PLSA 3512-01



*NOTE: BFE's SHOWN ARE IN NAVD 29 TO CONVERT TO NGVD 88 +2' TO BFE CONTOURS

GRAPHIC SCALE 1" = 200'

200 0 200 400 600

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CITY OF OCEANSIDE, CA

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San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

PLSA 3512-01

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

Replace placeholder with required calculations/documentation.

Leave placeholder intact if not applicable.

☒Not Applicable

Placeholder – **6.2.3 Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite** (Optional)

Replace placeholder with required calculations/documentation.

Leave placeholder intact if not applicable.

Not Applicable

Placeholder – **6.3.4 Geomorphic Assessment of Receiving Channels** (Optional)

Replace placeholder with required calculations/documentation.

Leave placeholder intact if not applicable.

Not Applicable

Placeholder - **Flow Control Facility Design and Structural BMP Drawdown Calculations**

Replace placeholder with required calculations/documentation.

See Chapter 6 and Appendix G of the BMP Design Manual

Placeholder – **Vector Control Plan** (required when structural BMPs will drain in 96 hours)

Replace placeholder with required documentation.

Leave placeholder intact if not applicable.

Not Applicable

ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	☒Included See Structural BMP Maintenance Information Checklist.
Attachment 3b	Draft Maintenance Agreement (when applicable)	☐Included ☐Not Applicable

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

Preliminary Design / Planning / CEQA level submittal:

- Attachment 3a must identify:

☒Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual

- Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

Final Design level submittal:

Attachment 3a must identify:

☐Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
☐How to access the structural BMP(s) to inspect and perform maintenance
☐Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
☐Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
☐Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
☐Recommended equipment to perform maintenance
☐When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

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

BMP Facilities Operation and Maintenance Schedule

1. Project Specific Information

City of Oceanside Project Number:	ADM21-00057
Project Name:	Eddy Jones Industrial
Owner / Responsible Party Name:	RAF Pacifica Group 315 S Coast Highway 101, Suite U-12 Encinitas, CA 92024
BMP Maintenance:	Property Owner
Site Address:	250 Eddy Jones Way, Oceanside, CA 92058

The project proposes a combination of Structural BMP's, Site Design BMP's, and Source Control BMP's to provide post-construction pollutant control according to requirements for Priority Development Projects (PDPs) identified in the City of Oceanside BMP Design Manual. These BMP's also serve to provide mitigation (flood control) for the 100-year, 6-hour design storm event.

2. Summary of Structural BMP's

In accordance with the City of Oceanside BMP Design Manual, Structural BMP's are implemented on this site in order to reduce the quantity of pollutants in stormwater discharges. The Structural BMP's implemented onsite include a privately maintained proprietary biofiltration treatment facilities (Modular Wetlands system by BioClean, or approved equal) as well as an underground tank storage facility / detention vault (pre-fabricated concrete by StormTrap or approved equal). These two systems used in conjunction serve to achieve reduction of pollutants, improve water quality, and minimize the potential of stormwater discharges into the MS4 from causing altered flow regimes and excessive downstream erosion in receiving waters.

3. Summary of Site Design BMP's

In accordance with the City of Oceanside BMP Design Manual, Site Design BMP's are implemented on this site in order to reduce the rate and volume of stormwater runoff. Site Design BMP's typically incorporate interception, storage, evaporation, evapotranspiration, infiltration, and /or filtration processes, and are required of all development projects, as applicable. The site design BMP's implemented onsite are the maintenance of natural drainage pathways, minimizing impervious area and soil compaction where practical, impervious area dispersion, and landscaping with native or drought tolerant species.

4. Summary of Source Control BMP's

In accordance with the City of Oceanside BMP Design Manual, Source Control BMP's are implemented on this site in order to assist with reducing pollutants in stormwater runoff. Source control BMP's are an activity that reduce the potential for stormwater runoff to come into contact with pollutants, and are required of all development projects, as applicable. The source control BMP's implemented onsite include the prevention of illicit discharges into the Municipal Separate Storm Sewer System (MS4), identification of the private storm drain system with stenciling or signage, and the protection of trash storage areas from rainfall by enclosing and covering the trash storage area.

5. BMP Inspection Frequency Summary

Modular Wetlands System - Linear

Routine Maintenance:	Inspect proprietary biofiltration treatment facility (Modular Wetlands system by BioClean, or approved equal) for accumulated materials such as sediment, trash or debris. See Attachment 2 for maintenance action items.
Post-Storm Maintenance:	Inspect BMPs for erosion due to concentrated storm water runoff flow, inspect obstructed inlets and outlet structures. See Attachment 2 for maintenance action items.
Annual Maintenance:	Inspect proprietary biofiltration treatment facility (Modular Wetlands system by BioClean, or approved equal) screening device for accumulated materials such as trash or debris. Inspect separation chamber for sediment and remove as necessary. Replace cartridge filter media and replace drain down filter media. Trim overgrown vegetation. See Attachment 2 for maintenance action items.

StormTrap – Underground tank storage facility

Routine Maintenance:	Inspect damaged inlet and outlet pipes, obstructions in the system or its inlet or outlet, and damaged joint sealant. See Attachment 2 for maintenance action items and procedures.

Post-Storm Maintenance:	Inspect BMP for floating debris, standing water, and sediment. Inspect obstructed inlets and outlet structures. See Attachment 2 for maintenance action items and procedures.
Annual Maintenance:	Inspect damaged inlet and outlet pipes, obstructions in the system or its inlet or outlet, and damaged joint sealant See Attachment 2 for maintenance action items and procedures.

Attachment 1 – Operation and Maintenance Site Map and Summary of BMP Maintenance Schedule

BMP MAINTENANCE THRESHOLDS

BMP DESCRIPTION

PROPRIETARY BIOFILTRATION TREATMENT (MWS LINEAR)	PRIVATE STORM WATER BEST MANAGEMENT PRACTICES (BMPS) MAINTENANCE AGREEMENT O&M RESPONSIBLE PARTY DESIGNEE: RAF PACIFICA GROUP

POST-CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS

MAINTENANCE INDICATORS	MAINTENANCE ACTION
ACCUMULATION OF SEDIMENT, LITTER, OR DEBRIS	REMOVE AND PROPERLY DISPOSE OF ACCUMULATED MATERIALS, WITHOUT DAMAGE TO THE VEGETATION
POOR VEGETATION ESTABLISHMENT	RE-SEED, RE-PLANT, OR RE-ESTABLISH VEGETATION PER ORIGINAL PLANS
OVERGROWN VEGETATION	MOW OR TRIM AS APPROPRIATE, BUT NOT LESS THAT THE DESIGN HEIGHT OF THE VEGETATION PER ORIGINAL PLANS AND SHOP DRAWINGS.
EROSION DUE TO CONCENTRATED IRRIGATION FLOW	N/A
EROSION DUE TO CONCENTRATED STORM WATER RUNOFF FLOW	N/A
STANDING WATER IN PROPRIETARY BIOFILTRATION AREAS	MAKE APPROPRIATE CORRECTIVE MEASURES SUCH AS REMOVING TRASH FROM SCREENING DEVICE, REMOVING SEDIMENT FROM SEPARATION CHAMBER, INSPECT SUBDRAIN INLETS / OUTLETS
OBSTRUCTED INLET OR OUTLET STRUCTURE	CLEAR OBSTRUCTIONS
DAMAGE TO INLET OR OUTLET STRUCTURE	REPAIR OR REPLACE AS APPLICABLE

MAINTENANCE EQUIPMENT AND ACCESS
USE LANDSCAPE EQUIPMENT FOR MAINTENANCE; ACCESS BMP FROM PRIVATE DRIVE AISLE ENTERING THE PROPERTY OFF OF BENET ROAD

INSPECTION FACILITATION
24" X 42" FRAME AND COVER HATCH TO PROVIDE OBSERVATION ACCESS FOR INSPECTION OF MAINTENANCE THRESHOLDS; MARKING TO BE PROVIDED ON BMP COMPONENTS TO DETERMINE HOW FULL BMP IS.

BMP MAINTENANCE THRESHOLDS

BMP DESCRIPTION

UNDERGROUND DETENTION VAULT (STORMTRAP)	PRIVATE STORM WATER BEST MANAGEMENT PRACTICES (BMPS) MAINTENANCE AGREEMENT O&M RESPONSIBLE PARTY DESIGNEE: RAF PACIFICA GROUP

POST-CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS

MAINTENANCE INDICATORS	**MAINTENANCE ACTION**
DAMAGED INLET AND OUTLET PIPES	REPAIR AND REPLACE AS NECESSARY
OBSTRUCTIONS IN THE SYSTEM OR ITS INLET OR OUTLET	REMOVE AND PROPERLY DISPOSE OF ACCUMULATED MATERIALS, WITHOUT DAMAGE TO THE STRUCTURE
EXCESSIVE ACCUMULATION OF FLOATABLES	REMOVE AND PROPERLY DISPOSE OF ACCUMULATED MATERIALS FOLLOWING LOCAL AND STATE REQUIREMENTS
EXCESSIVE ACCUMULATION OF SEDIMENT OF MORE THAN 6" IN DEPTH	REMOVE AND PROPERLY DISPOSE OF ACCUMULATED MATERIALS FOLLOWING LOCAL AND STATE REQUIREMENTS
DAMAGED JOINT SEALANT	REPAIR AS NECESSARY
STANDING WATER IN DETENTION VAULT AREAS	MAKE APPROPRIATE CORRECTIVE MEASURES SUCH AS REMOVING OBSTRUCTION OF DEBRIS OR CLEANING UNDERDRAINS

MAINTENANCE EQUIPMENT AND ACCESS
USE VACUUM TRUCK EQUIPMENT FOR MAINTENANCE; ACCESS VAULT FROM PRIVATE DRIVEWAY

INSPECTION FACILITATION
ACCESS MANHOLES TO PROVIDE OBSERVATION ACCESS FOR INSPECTION OF MAINTENANCE THRESHOLDS; MARKING TO BE PROVIDED ON VAULT TO DETERMINE HOW FULL VAULT IS.

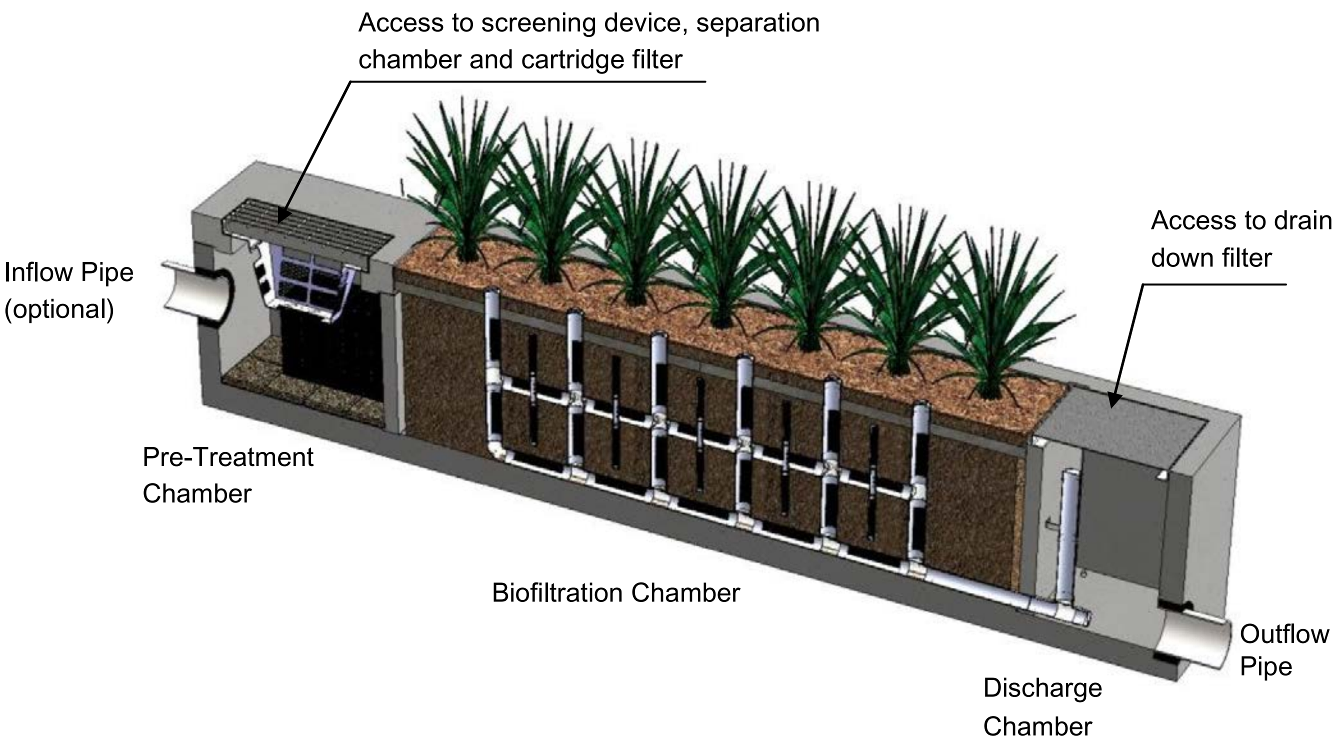
Attachment 2 – BMP Maintenance Fact Sheet (BioClean and Project Clean Water)

Maintenance Guidelines for
Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - (*5 minute average service time*).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - (*5 minute average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Bio Clean
A Forterra Company

Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration Chamber.

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

Maintenance Procedure Illustration

Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.

Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.

Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

A Forterra Company

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.

Attachment 3 – Inspection and Maintenance Log (BioClean)

Inspection Form

Bio Clean
P. 855-566-3938
F. 760-433-3176
E. Info@BioCleanEnvironmental.com

Bio Clean
A Forterra Company

Inspection Report
Modular Wetlands System

Project Name ______________________________

Project Address ______________________________ (city) (Zip Code)

Owner / Management Company ______________________________

Contact ______________________ Phone ( ) –

Inspector Name ______________________ Date ___/___/_____ Time __________ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition ______________________ Additional Notes ______________________

For Office Use Only
(Reviewed By)
(Date) Office personnel to complete section to the left.

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): __________ Size (22', 14' or etc.): __________

Structural Integrity:	Yes	No	Comments	
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?				
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?				
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?				
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?				
Working Condition:				
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?				
Is there standing water in inappropriate areas after a dry period?				
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?				
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.				Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:	
Any signs of improper functioning in the discharge chamber? Note issues in comments section.				
Other Inspection Items:				
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?				
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.				
Is there a septic or foul odor coming from inside the system?				

Waste:	Yes	No
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: ______________________________

Bio Clean
A Forterra Company

Maintenance Report

Bio Clean
P. 855-566-3938
F. 760-433-3176
E. Info@BioCleanEnvironmental.com

www.BioCleanEnvironmental.com

Bio Clean
A Forterra Company

Cleaning and Maintenance Report
Modular Wetlands System

For Office Use Only
(Reviewed By)
(Date) Office personnel to complete section to the left.

Project Name ____________________

Project Address ____________________ (city) (Zip Code)

Owner / Management Company ____________________

Contact ____________________ Phone (   )   –

Inspector Name ____________________ Date ____ / ____ / ______ Time ________ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition ____________________ Additional Notes ____________________

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

ATTACHMENT 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

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

The plans must identify:

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

D22-00001 / CUP22-00001
DEVELOPMENT PLAN / CONDITIONAL USE PERMIT
EDDIE JONES INDUSTRIAL - 250 EDDIE JONES WAY

LEGEND

- SUBJECT PROPERTY BOUNDARY
- RIGHT-OF-WAY
- CENTERLINE OF ROAD
- EXISTING EASEMENT
- EXISTING INTERIOR LEGAL LOT
- ADJACENT LOT LINE

EXISTING EASEMENT INFORMATION

REFER TO SHEET 2 FOR PLOTTING OF EXISTING EASEMENTS

**EXISTING EASEMENTS SHOWN IN ACCORDANCE WITH PRELIMINARY TITLE REPORT PREPARED BY CHICAGO TITLE INSURANCE COMPANY, ORDER NO. 00126233-987-OC1-K27, DATED EFFECTIVELY NOVEMBER 2, 2021

PROPOSED EASEMENT INFORMATION

NO PROPOSED EASEMENTS

UTILITIES

WATER	OCEANSIDE WATER DEPARTMENT
FIRE	OCEANSIDE FIRE DEPARTMENT
SEWER	OCEANSIDE WASTEWATER DIVISION
ELEMENTARY SCHOOL	MISSION ELEMENTARY SCHOOL DISTRICT
HIGH SCHOOL	OCEANSIDE HIGH SCHOOL DISTRICT

SETBACKS

FRONT YARD	(FYSB)	10' PER IL
REAR YARD	(RYSB)	0' PER IL
SIDE YARD SETBACK	(SYSB)	0' PER IL
INTERIOR SIDE YARD	(SYSB)	10' PER IL

AREA CALCULATIONS

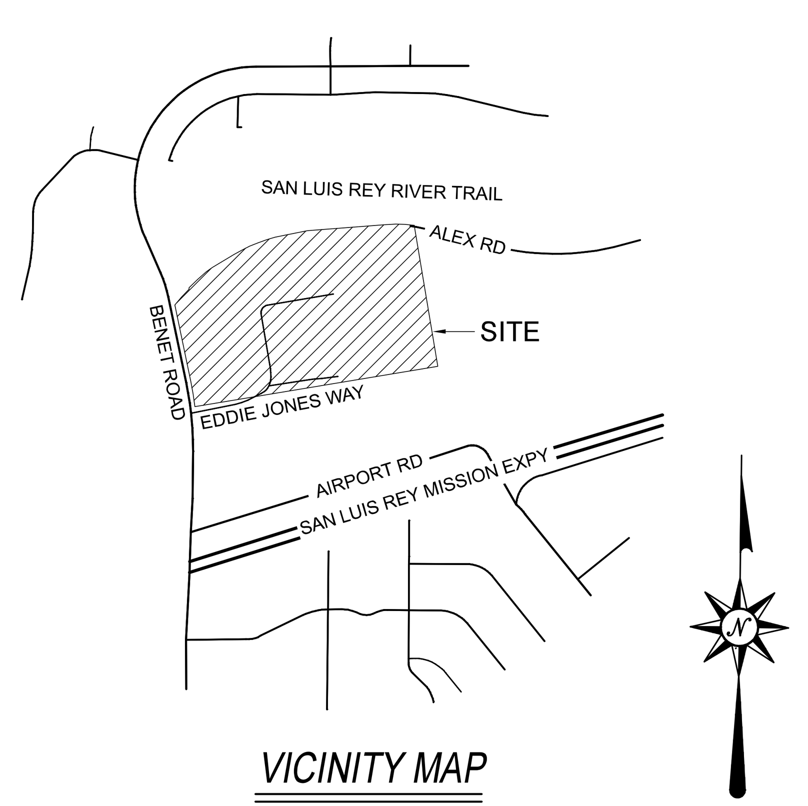
EXISTING IMPERVIOUS AREA (ONSITE):	591,152 SF
PROPOSED IMPERVIOUS AREA (ONSITE):	1,065,714 SF
INCREASE IMPERVIOUS AREA (ONSITE):	474,562 SF

ZONING INFORMATION

GENERAL PLAN DESIGNATION:	IL	EXISTING USE:	INDUSTRIAL
PRESENT ZONING REQUIREMENTS:	IL	PROPOSED USE:	INDUSTRIAL
HEIGHT:	80' FOR IL	TOTAL UNITS:	1
MAXIMUM LOT COVERAGE (PER ZONE):	75% FOR IL		

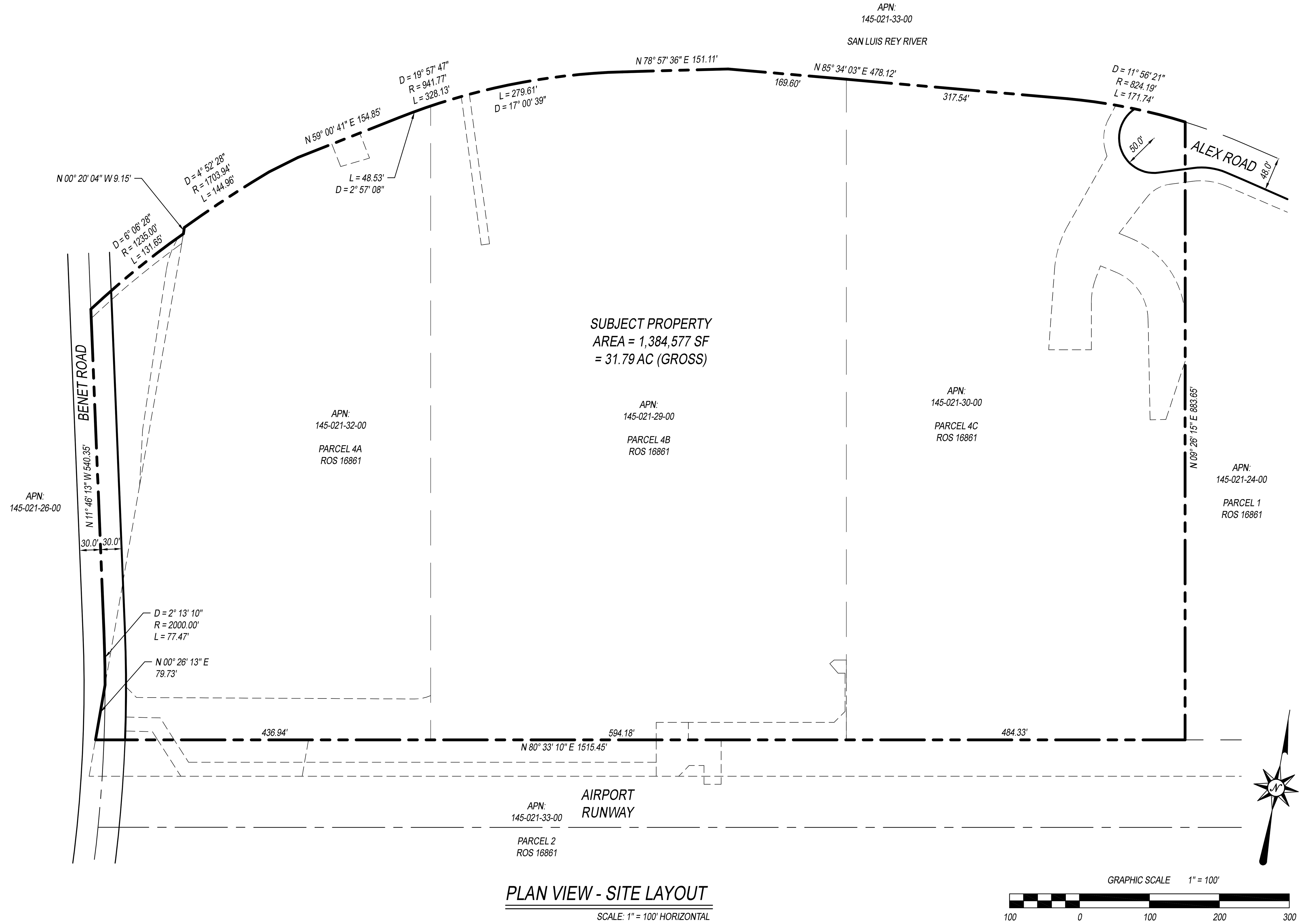
FEMA INFORMATION

FEMA ZONING DESIGNATION:	A99
FEMA FIRM PANEL NUMBER:	06073C0751H
DATE:	12/20/2019
BASE FLOOD ELEVATION:	BFE = 34.0
DATUM	NAVD88



VICINITY MAP

NOT TO SCALE



PLAN VIEW - SITE LAYOUT

SCALE: 1" = 100' HORIZONTAL

SITE AREA CALCULATIONS

TOTAL GROSS SITE AREA:	1,384,577 SF (31.79 AC)	EXISTING IMPERVIOUS AREA:	591,152 SF (13.58 AC)
AREA DISTURBED BY PROJECT:	1,334,568 SF (30.64 AC)	EXISTING PERVIOUS AREA:	793,405 SF (18.21 AC)
PROPOSED IMPERVIOUS AREA:	1,098,687 SF / 25.22 AC (79% OF SITE)		
PROPOSED PERVIOUS AREA :	235,881 SF / 5.42 AC (17% OF SITE)		
UNDISTURBED PERVIOUS AREA:	49,989 SF / 1.15 AC (4% OF SITE)		
*ADDT'L TREE CANOPY:	196,025 SF / 4.50 AC (14% OF SITE)		

*PER URBAN FORESTRY PROGRAM (ARTICLE 30, SECTION 3049), ADDITIONAL TREE CANOPY PERCENTAGE USED TO BE INCLUDED WITH TOTAL SITE PERMEABLE AREA AT A RATIO OF 1:1 TO MEET 22% PERMEABLE SURFACE REQUIREMENT; SEE LANDSCAPE SHEETS

SCOPE OF WORK

THE PROJECT PROPOSES TO SEEK APPROVAL TO DEMOLISH ALL EXISTING ONSITE STRUCTURES AND CONSTRUCT A SINGLE, APPROXIMATELY 540,000 SF INDUSTRIAL BUILDING, AND ASSOCIATED IMPROVEMENTS. A FLOOD WALL IS PROPOSED AROUND THE PERIMETER OF THE SITE WRAPPING THE PROPOSED PARKING AREA TO FLOOD PROOF THE PROPERTY. EARTHWORK QUANTITIES GENERATED BY THE PROPOSED PROJECT ARE ANTICIPATED TO EXCEED 4-FT OF FILL, 8-FT OF CUT. PROJECT SEEKS APPROVAL OF A DEVELOPMENT PLAN PURSUANT TO ARTICLE 43 OF THE ZONING ORDINANCE AND A CONDITIONAL USE PERMIT PURSUANT TO ARTICLE 41 OF THE ZONING ORDINANCE.

ACCESS

VEHICULAR ACCESS FROM BENET ROAD AND ALEX ROAD, PUBLIC ROADS

SHEET INDEX

OWNER INFORMATION

WE HEREBY CERTIFY THAT WE ARE THE RECORDED OWNERS OF THE PROPERTY SHOWN ON THE ATTACHED TENTATIVE PARCEL MAP AND THAT SAID MAP SHOWS THE ENTIRE CONTIGUOUS OWNERSHIP. I UNDERSTAND THAT PROPERTY IS CONSIDERED CONTIGUOUS EVEN IF IT IS SEPARATED BY ROADS, STREETS, UTILITY EASEMENTS, OR RAILROAD RIGHTS OF WAY.

OWNER: ______________________

TYCO ELECTRONICS CORPORATION, A PENNSYLVANIA CORPORATION
400 SOUTH HOPE STREET
LOS ANGELES, CA 90071

DEVELOPER INFORMATION

WE HEREBY CERTIFY THAT WE ARE THE RECORDED OWNERS OF THE PROPERTY SHOWN ON THE ATTACHED TENTATIVE PARCEL MAP AND THAT SAID MAP SHOWS THE ENTIRE CONTIGUOUS OWNERSHIP. I UNDERSTAND THAT PROPERTY IS CONSIDERED CONTIGUOUS EVEN IF IT IS SEPARATED BY ROADS, STREETS, UTILITY EASEMENTS, OR RAILROAD RIGHTS OF WAY.

DEVELOPER: ______________________

ADAM ROBINSON FOR: RAF PACIFICA, LLC
315 S. COAST HWY 101, SUITE U-12
ENCINITAS, CA 92024
PH: (858) 314-3116

LEGAL DESCRIPTION

PARCEL 4A: (APN: 145-021-32-00)

PARCEL 4B: (APN: 145-021-29-00)

PARCEL 4C: (APN: 145-021-30-00)

**SEE SHEET 2 FOR FULL LEGAL DESCRIPTION OF UNDERLYING LEGAL PARCELS

SITE ADDRESS

250 EDDIE JONES WAY
OCEANSIDE, CA 92058
APN: 145-021-29, -30, & -32-00

TOPOGRAPHY

TOPOGRAPHY OBTAINED BY AERIAL MAPPING METHODS FLOWN ON SEPTEMBER 27, 2021

PREPARED BY: PASCO, LARET, SUITER & ASSOCIATES
119 ABERDEEN DRIVE
CARDIFF-BY-THE-SEA, CA 92007

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA COORDINATE SYSTEM, NAD 83 (CCS83) EPOCH 2011, ZONE 6, AS DETERMINED LOCALLY BY A LINE BETWEEN FIRST ORDER CONTROL STATIONS 1015 AND 1018 BEING A GRID BEARING OF N 38°47'28" E AS DERIVED FROM GEODETIC VALUES SHOWN ON RECORD OF SURVEY 21787, CITY OF OCEANSIDE SURVEY CONTROL, FILED ON AUGUST 21, 2014 AS FILE NUMBER 2014-0361129 IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY.

BENCHMARK

ELEVATIONS SHOWN HEREON ARE BASED ON 3.5" DISK, "LS 5292", FOUND IN STANDARD M10 MONUMENT AT THE INTERSECTION OF WALA DR. AND TOWKISH DR., AS SHOWN ON ROS 21787 AS PT NO. 1018.

EL= 54.70'

VERTICAL DATUM = NAVD 88

EARTHWORK / PROJECT GRADING

CUT:	60,000 CY	MAX CUT HEIGHT:	11.5 FT
FILL:	40,000 CY	MAX FILL HEIGHT:	6 FT
EXPORT:	20,000 CY		
REMEDIAL:	___ CY		

*ESTIMATE DOES NOT INCLUDE STRIPPINGS OR UTILITY TRENCH VOLUMES, IF REQUIRED BY SITE CONDITIONS

CONTRACTOR SHALL SATISFY SELF THAT ESTIMATES ARE CORRECT PRIOR TO COMMENCEMENT OF WORK.

EARTHWORK QUANTITIES ARE ESTIMATED FOR PERMIT PURPOSES ONLY. (CALCULATED ON A THEORETICAL BASIS. ACTUAL QUANTITIES MAY VARY DUE TO SHRINKAGE OR SWELL FACTORS).

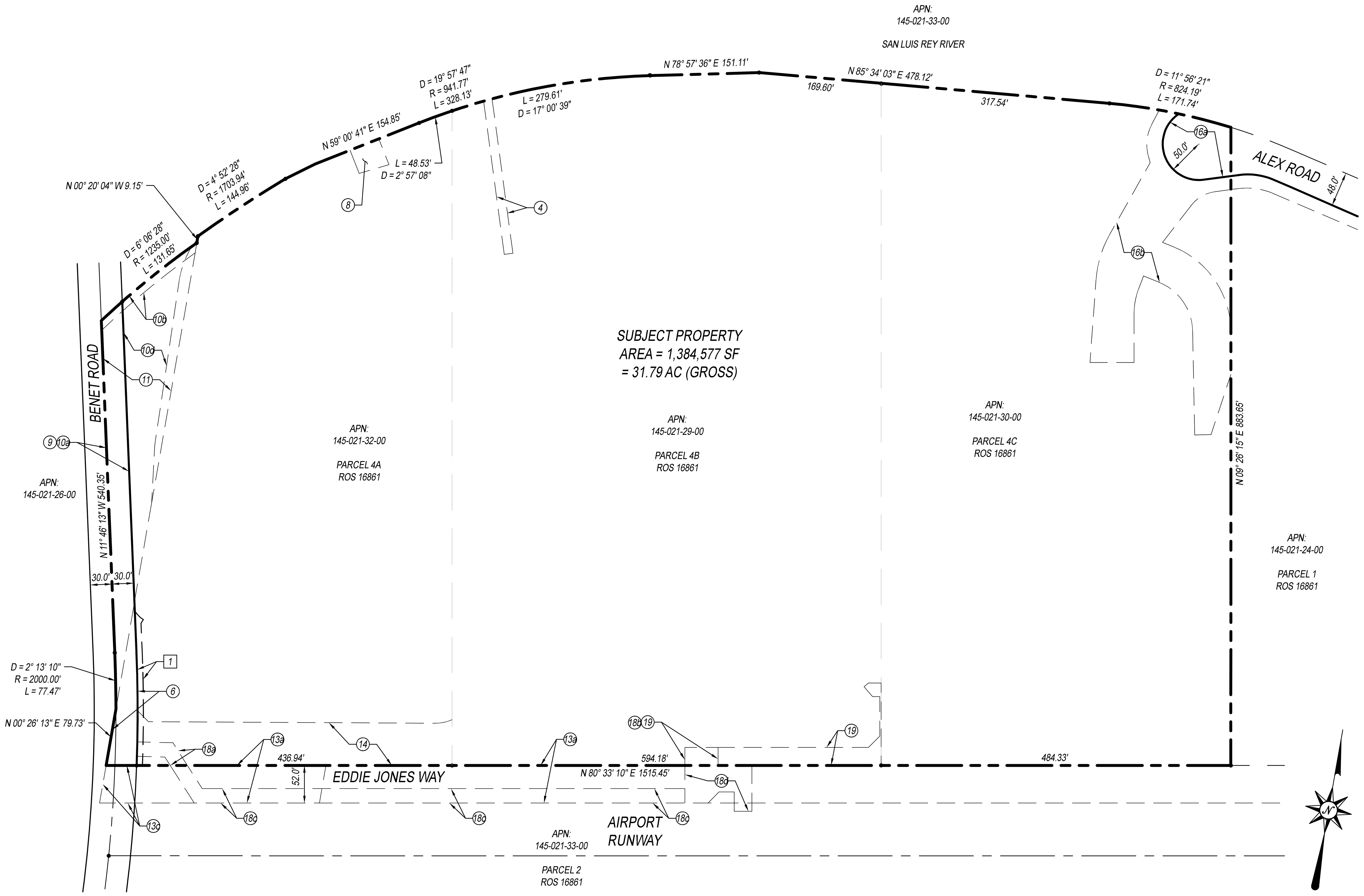
DEPTH & QUANTITY OF REMEDIAL GRADING IS SUBJECT TO FIELD VERIFICATION BY PROJECT SOILS ENGINEER IN FIELD DURING EXCAVATION.

ENGINEER OF WORK

TYLER LAWSON, PE #80356 DATE

REGISTERED PROFESSIONAL ENGINEER
TYLER G LAWSON
No. 80356
Exp. 12/31/22
CIVIL
STATE OF CALIFORNIA

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



PLAN VIEW - SITE LAYOUT

SCALE: 1" = 100' HORIZONTAL

GRAPHIC SCALE 1" = 100'

100 0 100 200 300

LEGEND

SUBJECT PROPERTY BOUNDARY	
RIGHT-OF-WAY	
CENTERLINE OF ROAD	
EXISTING EASEMENT	
PROPOSED EASEMENT	
EXISTING INTERIOR LEGAL LOT	
ADJACENT LOT LINE	

EXISTING EASEMENT INFORMATION

1. ITEMS I, II, III, IV, V, VI, VII, A, B, C, D, AND 1 ARE NON MAPPING ITEMS AND THEREFORE ARE NOT SHOWN HEREON.

2. EASEMENT FOR ROAD PURPOSES RECORDED DECEMBER 30, 1955 PER DOCUMENT NO 170314 OF OFFICIAL RECORDS. DOC ILLEGIBLE.

3. INTENTIONALLY DELETED.

4. SAN DIEGO GAS & ELECTRIC COMPANY HOLDER OF AN EASEMENT FOR PUBLIC UTILITIES, INGRESS AND EGRESS PURPOSES RECORDED FEBRUARY 14, 1969 PER DOCUMENT NO 27630 OF OFFICIAL RECORDS **TO BE QUITCLAIMED**.

5. LEO VITELLO HOLDER OF AN EASEMENT FOR INGRESS AND EGRESS RECORDED JULY 31, 1981 PER DOCUMENT NO 81-242890 OF OFFICIAL RECORDS. THE LOCATION OF SAID EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION .

6. AN IRREVOCABLE OFFER TO DEDICATE AND EASEMENT FOR PUBLIC HIGHWAY PURPOSES RECORDED OCTOBER 4, 1994 PER DOCUMENT NO 1994-0586624 OF OFFICIAL RECORDS.

7. CITY OF OCEANSIDE HOLDER OF AN EASEMENT FOR TEMPORARY CONSTRUCTION PURPOSES RECORDED OCTOBER 4, 1994 PER DOCUMENT NO 1994-0586624 OF OFFICIAL RECORD. EASEMENT HAS EXPIRED AND THEREFORE IS NOT SHOWN HEREON .

8. CITY OF OCEANSIDE HOLDER OF AN EASEMENT FOR STORM DRAIN PURPOSES RECORDED OCTOBER 14, 1994 PER DOCUMENT NO 1994-0604672 OF OFFICIAL RECORDS **TO REMAIN** .

9. CITY OF OCEANSIDE HOLDER OF AN EASEMENT FOR PUBLIC STREET AND APPURTENANT USE PURPOSES RECORDED MAY 8, 1995 PER DOCUMENT NO 1995-0192658 OF OFFICIAL RECORDS **TO REMAIN** .

10. CITY OF OCEANSIDE HOLDER OF AN EASEMENT FOR PUBLIC ROAD, UTILITIES, DRAINAGE, STORM DRAIN, TEMPORARY CONSTRUCTION, CONSTRUCTION AND MAINTENANCE OF SLOPES, AND PUBLIC INGRESS AND EGRESS PURPOSES RECORDED DECEMBER 28, 1995 PER DOCUMENT NO 1995-0592152 OF OFFICIAL RECORDS.

10a PARCEL 2 OF SAID DOC IS AN EASEMENT FOR PUBLIC ROAD, UTILITIES AND DRAINAGE PURPOSES.

10b PARCEL 3 OF SAID DOC IS AN EASEMENT FOR STORM DRAINAGE PURPOSES.

10c PARCEL 4 OF SAID DOC IS AN EASEMENT FOR TEMPORARY CONSTRUCTION PURPOSES. EASEMENT HAS EXPIRED AND THEREFOR IS NOT SHOWN HEREON.

10d PARCEL 5 OF SAID DOC IS AN EASEMENT FOR CONSTRUCTION AND MAINTENANCE OF SLOPE PURPOSES.

10e PARCEL 6 OF SAID DOC IS AN EASEMENT FOR PUBLIC INGRESS AND EGRESS PURPOSES. DOES NOT AFFECT SUBJECT PROPERTY AND THEREFOR IS NOT SHOWN HEREON.

11. SAID LAND IS SUBJECT TO THE OCEANSIDE MUNICIPAL AIRPORT CLEAR ZONE AS CONTAINED IN DEED RECORDED DECEMBER 28, 1995 PER DOCUMENT NO 1995-0592152 OF OFFICIAL RECORDS. DESCRIBED IN PARCEL 1.

12. INTENTIONALLY DELETED

13. VARIOUS CONDITIONS AFFECTING THE EASEMENTS RESERVED IN GRANT DEED RECORDED OCTOBER 14, 1999 AS INSTRUMENT NO 1999-0694332 OF OFFICIAL RECORDS.

13a (1) OF SAID DOC IS AN EASEMENT FOR ROAD PURPOSES.

13b (2) OF SAID DOC IS AN EASEMENT TO RETAIN IN PLACE, MAINTAIN, REPAIR, AND REPLACE THE ENGINEERED BLOCK WALL, TOGETHER WITH THE TREES AND LANDSCAPING.

13c (3) OF SAID DOC IS AN EASEMENT FOR DIRECT DRIVEWAY ACCESS PURPOSES.

14. A PROPOSED EASEMENT FOR PRIVATE ROAD PURPOSES OVER PARCEL 4A THAT WILL PROVIDE ACCESS TO PARCEL 4B IN THE EVENT THAT EASEMENT AA REFERRED TO HEREIN IS QUITCLAIMED AS PROVIDED FOR IN PARAGRAPH (1) OF DOCUMENT RECORDED OCTOBER 14, 1999 PER DOCUMENT NO 1999-0694332 OF OFFICIAL RECORDS **TO BE QUITCLAIMED.**

15. DISCREPANCIES, CONFLICTS IN BOUNDARY LINES, SHORTAGE IN AREA, ENCROACHMENTS, OR ANY OTHER MATTER SHOWN ON RECORD OF SURVEY MAP NO 16861.

16. CITY OF OCEANSIDE HOLDER OF AN EASEMENT FOR PUBLIC HIGHWAY AND GENERAL MAINTENANCE PURPOSES RECORDED AUGUST 2, 2002 PER DOCUMENT NO 2002-0652871 OF OFFICIAL RECORDS.

16a PARCEL A AN EASEMENT FOR PUBLIC HIGHWAY PURPOSES DESCRIBED AS ALEX ROAD.

16b PARCEL B AN EASEMENT FOR GENERAL MAINTENANCE PURPOSES. **PORTION EASEMENT LOCATED ON SUBJECT PROPERTY TO BE QUITCLAIMED.**

16c PARCEL C AN EASEMENT FOR TEMPORARY CONSTRUCTION PURPOSES. EASEMENT HAS EXPIRED AND THEREFORE IS NOT SHOWN HEREON.

17. COVENANTS, CONDITIONS AND RESTRICTIONS RECORDED DECEMBER 28, 2004 PER DOCUMENT NO 2004-1218146 OF OFFICIAL RECORDS.

18. A COVENANT AND AGREEMENT AND ESTABLISHMENT OF EASEMENTS FOR WATER PIPELINE PURPOSES RECORDED APRIL 25, 2006 PER DOCUMENT NO 2006-0287715 OF OFFICIAL RECORDS.

18a EXHIBIT C PARCEL 1 AN EASEMENT FOR WATER PIPELINE PURPOSES.

18b EXHIBIT C PARCEL 2 AN EASEMENT FOR WATER PIPELINE PURPOSES.

18c EXHIBIT D PARCEL 1 AN EASEMENT FOR WATER PIPELINE PURPOSES **TO REMAIN.**

18d EXHIBIT D PARCEL 2 AN EASEMENT FOR WATER PIPELINE PURPOSES.

19. A COVENANT AND AGREEMENT AND ESTABLISHMENT OF EASEMENTS FOR PRIVATE SANITARY SEWER AND WATER LINE IMPROVEMENT PURPOSES RECORDED APRIL 25, 2006 PER DOCUMENT NO 2006-0287716 OF OFFICIAL RECORDS.

20. STORM WATER FACILITIES MAINTENANCE AGREEMENT WITH EASEMENT AND COVENANT PURPOSES RECORDED MAY 23, 2006 PER DOCUMENT NO 2006-0362810 OF OFFICIAL RECORDS. EASEMENT IS BLANKET IN NATURE AND THEREFORE IS NO SHOWN HEREON.

ITEMS 21 AND 22 ARE NON MAPPING ITEMS AND THEREFOR ARE NOT SHOWN HEREON.

**EXISTING EASEMENTS SHOWN IN ACCORDANCE WITH PRELIMINARY TITLE REPORT PREPARED BY CHICAGO TITLE INSURANCE COMPANY, ORDER NO. 00126233-987-OC1-K27, DATED EFFECTIVELY NOVEMBER 2, 2021

PROPOSED EASEMENT INFORMATION

1 PUBLIC 8-FT WIDE PED PUBLIC ACCESS STREET EASEMENT GRANTED TO THE CITY OF OCEANSIDE.

FULL LEGAL DESCRIPTION

PARCEL 1 (APN: 145-021-32-00):
THAT PORTION OF THE SOUTH HALF OF THE NORTHEAST QUARTER AND THE NORTH HALF OF THE SOUTHEAST QUARTER, TOGETHER WITH A PORTION OF THE NORTH HALF OF THE SOUTHWEST QUARTER DESCRIBED AS PARCEL 1 IN A GRANT DEED RECORDED DECEMBER 28, 1995 AS INSTRUMENT NO. 1995-0592152 OF OFFICIAL RECORDS, ALL WITHIN SECTION 13, TOWNSHIP 11 SOUTH, RANGE 5 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF, BEING PARCEL 4A OF CERTIFICATE OF COMPLIANCE RECORDED DECEMBER 07, 1999 AS INSTRUMENT NO. 1999-0796385 OF OFFICIAL RECORDS, DESCRIBED AS A WHOLE AS FOLLOWS:
BEGINNING AT A POINT IN THE WEST LINE OF SAID SOUTHEAST QUARTER DISTANT SOUTH 00°23'25" WEST 794.57 FEET FROM THE CENTER OF SAID SECTION 13 SHOWN ON RECORD OF SURVEY NO. 13494, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY ON OCTOBER 31, 1991; THENCE NORTH 80°33'25" EAST 479.25 FEET; THENCE NORTH 09°26'35" WEST 906.49 FEET TO THE SOUTHERLY LINE OF PARCEL 1 DESCRIBED IN A FINAL ORDER OF CONDEMNATION ISSUED OUT OF THE SUPERIOR COURT OF THE STATE OF CALIFORNIA, IN AND FOR THE COUNTY OF SAN DIEGO, NORTH COUNTY BRANCH, AS CASE NO. N 51717, A CERTIFIED COPY OF WHICH WAS RECORDED OCTOBER 14, 1994 AS INSTRUMENT NO. 1994-0604672 OF OFFICIAL RECORDS OF SAN DIEGO COUNTY, AND THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 941.77 FEET TO WHICH A RADIAL LINE BEARS NORTH 28°02'18" WEST; THENCE SOUTHWESTERLY 48.72 FEET ALONG SAID CURVE AND SOUTHERLY LINE THROUGH A CENTRAL ANGLE OF 02°57'51"; THENCE SOUTH 58°59'51" WEST 155.19 FEET; THENCE SOUTH 54°01'29" WEST 46.25 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 1703.94 FEET TO WHICH A RADIAL LINE BEARS NORTH 40°18'45" WEST; THENCE SOUTHWESTERLY 144.55 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 04°51'38" TO SAID WEST LINE OF THE SOUTHEAST QUARTER OF SECTION 13; THENCE SOUTH 00°23'25" WEST 9.15 FEET ALONG SAID WEST LINE TO THE MOST NORTHERLY CORNER OF SAID PARCEL 1 DESCRIBED IN DOCUMENT RECORDED DECEMBER 28, 1995 AS INSTRUMENT NO. 1995-0592152 OF OFFICIAL RECORDS, AND THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 1235.00 FEET TO WHICH A RADIAL LINE BEARS NORTH 44°43'52" WEST; THENCE, LEAVING SAID WEST LINE AND FOLLOWING ALONG THE NORTHWESTERLY LINE OF SAID PARCEL 1, SOUTHWESTERLY 170.73 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 07°55'15" TO THE CENTERLINE OF THE BENET ROAD, 60 FEET WIDE, DESCRIBED AS PARCEL C IN RESOLUTION NO. R94-189 OF THE CITY COUNCIL OF THE CITY OF OCEANSIDE RECORDED MAY 08, 1995 AS INSTRUMENT NO. 1995-0192658 OF OFFICIAL RECORDS OF SAN DIEGO COUNTY; THENCE LEAVING SAID NORTHWESTERLY LINE OF PARCEL 1 AND FOLLOWING ALONG SAID CENTERLINE OF BENET ROAD, SOUTH 11°45'56" EAST 460.14 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE WESTERLY HAVING A RADIUS OF 200.00 FEET; THENCE SOUTHERLY 77.47 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 02°13'10"; THENCE SOUTH 00°23'25" WEST 79.75 FEET TO THE POINT OF BEGINNING.

PARCEL 2 (APN: 145-021-29-00):
THAT PORTION OF THE SOUTH HALF OF THE NORTHEAST QUARTER AND THE NORTH HALF OF THE SOUTHEAST QUARTER OF SECTION 13, TOWNSHIP 11 SOUTH, RANGE 5 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF, BEING PARCEL 4B OF CERTIFICATE OF COMPLIANCE RECORDED DECEMBER 07, 1999 AS INSTRUMENT NO. 1999-0796385 OF OFFICIAL RECORDS, DESCRIBED AS FOLLOWS: BEGINNING AT A POINT IN THE WEST LINE OF SAID SOUTHEAST QUARTER DISTANT SOUTH 00°23'25" WEST 794.57 FEET FROM THE CENTER OF SAID SECTION 13 SHOWN ON RECORD OF SURVEY NO. 13494, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY ON OCTOBER 31, 1991; THENCE NORTH 80°33'25" EAST 479.25 FEET TO THE TRUE POINT OF BEGINNING; THENCE CONTINUING NORTH 80°33'25" EAST 594.02 FEET; THENCE NORTH 09°26'35" WEST 944.68 FEET TO THE SOUTHERLY LINE OF PARCEL

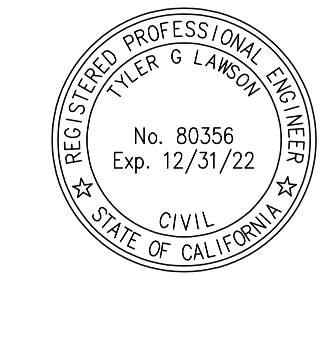
1 DESCRIBED IN A FINAL ORDER OF CONDEMNATION ISSUED OUT OF THE SUPERIOR COURT OF THE STATE OF CALIFORNIA, IN AND FOR THE COUNTY OF SAN DIEGO, NORTH COUNTY BRANCH, AS CASE NO. N 51717, A CERTIFIED COPY OF WHICH WAS RECORDED OCTOBER 14, 1994 AS INSTRUMENT NO. 1994-0604672 OF OFFICIAL RECORDS OF SAN DIEGO COUNTY; THENCE, FOLLOWING ALONG SAID SOUTHERLY LINE, SOUTH 85°34'12" WEST 169.60 FEET; THENCE SOUTH 78°57'38" WEST 151.05 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHERLY HAVING A RADIUS OF 941.77 FEET; THENCE WESTERLY 279.41 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 16°59'56" TO A POINT WHICH BEARS NORTH 09°26'35" WEST FROM THE TRUE POINT OF BEGINNING; THENCE, LEAVING SAID SOUTHERLY LINE, SOUTH 09°26'35" EAST 906.49 FEET TO THE TRUE POINT OF BEGINNING.

PARCEL 3 (APN: 145-021-30-00):
THAT PORTION OF THE SOUTH HALF OF THE NORTHEAST QUARTER AND THE NORTH HALF OF THE SOUTHEAST QUARTER OF SECTION 13, TOWNSHIP 11 SOUTH, RANGE 5 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF, BEING PARCEL 4C OF CERTIFICATE OF COMPLIANCE RECORDED DECEMBER 07, 1999 AS INSTRUMENT NO. 1999-0796385 OF OFFICIAL RECORDS, DESCRIBED AS FOLLOWS: BEGINNING AT A POINT IN THE WEST LINE OF SAID SOUTHEAST QUARTER DISTANT SOUTH 00°23'25" WEST 794.57 FEET FROM THE CENTER OF SAID SECTION 13 SHOWN ON RECORD OF SURVEY NO. 13494, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY ON OCTOBER 31, 1991; THENCE NORTH 80°33'25" EAST 1073.27 FEET TO THE TRUE POINT OF BEGINNING; THENCE CONTINUING NORTH 80°33'25" EAST 484.51 FEET; THENCE NORTH 09°26'35" WEST 883.65 FEET TO THE SOUTHERLY LINE OF PARCEL 1 DESCRIBED IN A FINAL ORDER OF CONDEMNATION ISSUED OUT OF THE SUPERIOR COURT OF THE STATE OF CALIFORNIA, IN AND FOR THE COUNTY OF SAN DIEGO, NORTH COUNTY BRANCH, AS CASE NO. N 51717, A CERTIFIED COPY OF WHICH WAS RECORDED OCTOBER 14, 1994 AS INSTRUMENT NO. 1994-0604672 OF OFFICIAL RECORDS OF SAN DIEGO COUNTY, AND THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHERLY HAVING A RADIUS OF 824.19 FEET TO WHICH RADIAL LINE BEARS NORTH 07°43'15" EAST; THENCE WESTERLY 171.75 FEET ALONG SAID CURVE AND SOUTHERLY LINE THROUGH A CENTRAL ANGLE OF 11°56'24"; THENCE SOUTH 85°34'12" WEST 317.54 FEET TO A POINT WHICH BEARS NORTH 09°26'35" WEST FROM THE TRUE POINT OF BEGINNING; THENCE, LEAVING SAID SOUTHERLY LINE, SOUTH 09°26'35" EAST 944.68 FEET TO THE TRUE POINT OF BEGINNING.

PARCEL 4:
EXCLUSIVE EASEMENTS RESERVED IN GRANT DEED RECORDED OCTOBER 14, 1999 AS INSTRUMENT NO. 1999-0694332 OF OFFICIAL RECORDS, UPON AND SUBJECT TO ALL THE PROVISIONS CONTAINED THEREIN, OVER THE FOLLOWING DESCRIBED PROPERTY:
THAT PORTION OF THE NORTH HALF OF THE SOUTHEAST QUARTER OF SECTION 13, TOWNSHIP 11 SOUTH, RANGE 5 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF, DESCRIBED AS FOLLOWS:
BEGINNING AT A POINT IN THE WEST LINE OF SAID SOUTHEAST QUARTER DISTANT SOUTH 00°23'25" WEST 794.57 FEET FROM THE CENTER OF SAID SECTION 13 SHOWN ON RECORD OF SURVEY NO. 13494, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY ON OCTOBER 31, 1991; THENCE NORTH 80°33'25" EAST 2384.40 FEET TO THE WESTERLY LINE OF PARCEL 1 DESCRIBED IN A FINAL ORDER OF CONDEMNATION ISSUED OUT OF THE SUPERIOR COURT OF THE STATE OF CALIFORNIA, IN AND FOR THE COUNTY OF SAN DIEGO, NORTH COUNTY BRANCH, AS CASE NO. N 51717, A CERTIFIED COPY OF WHICH RECORDED OCTOBER 14, 1994 AS INSTRUMENT NO. 1994-0604672 OF OFFICIAL RECORDS OF SAN DIEGO COUNTY; THENCE SOUTH 02°37'51" WEST 53.18 FEET ALONG SAID WESTERLY LINE TO THE SOUTHERLY LINE OF THAT CERTAIN PARCEL OF LAND DESCRIBED IN A GRANT DEED RECORDED SEPTEMBER 01, 1966 AS INSTRUMENT NO. 142881 OF OFFICIAL RECORDS; THENCE SOUTH 80°33'25" WEST 2382.29 FEET ALONG SAID SOUTHERLY LINE AND

THE WESTERLY PROLONGATION THEREOF, AS DESCRIBED IN A DEED TO THE CITY OF OCEANSIDE RECORDED JUNE 04, 1962 AS INSTRUMENT NO. 94349 OF OFFICIAL RECORDS, TO SAID WEST LINE OF THE SOUTHEAST QUARTER OF SECTION 13; THENCE NORTH 00°23'25" EAST 52.78 FEET TO THE POINT OF BEGINNING.

APN: 145-021-29-00 (AFFECTS PARCEL 4B)
145-021-30-00 (AFFECTS PARCEL 4C)
145-021-32-00 (AFFECTS PARCEL4A)



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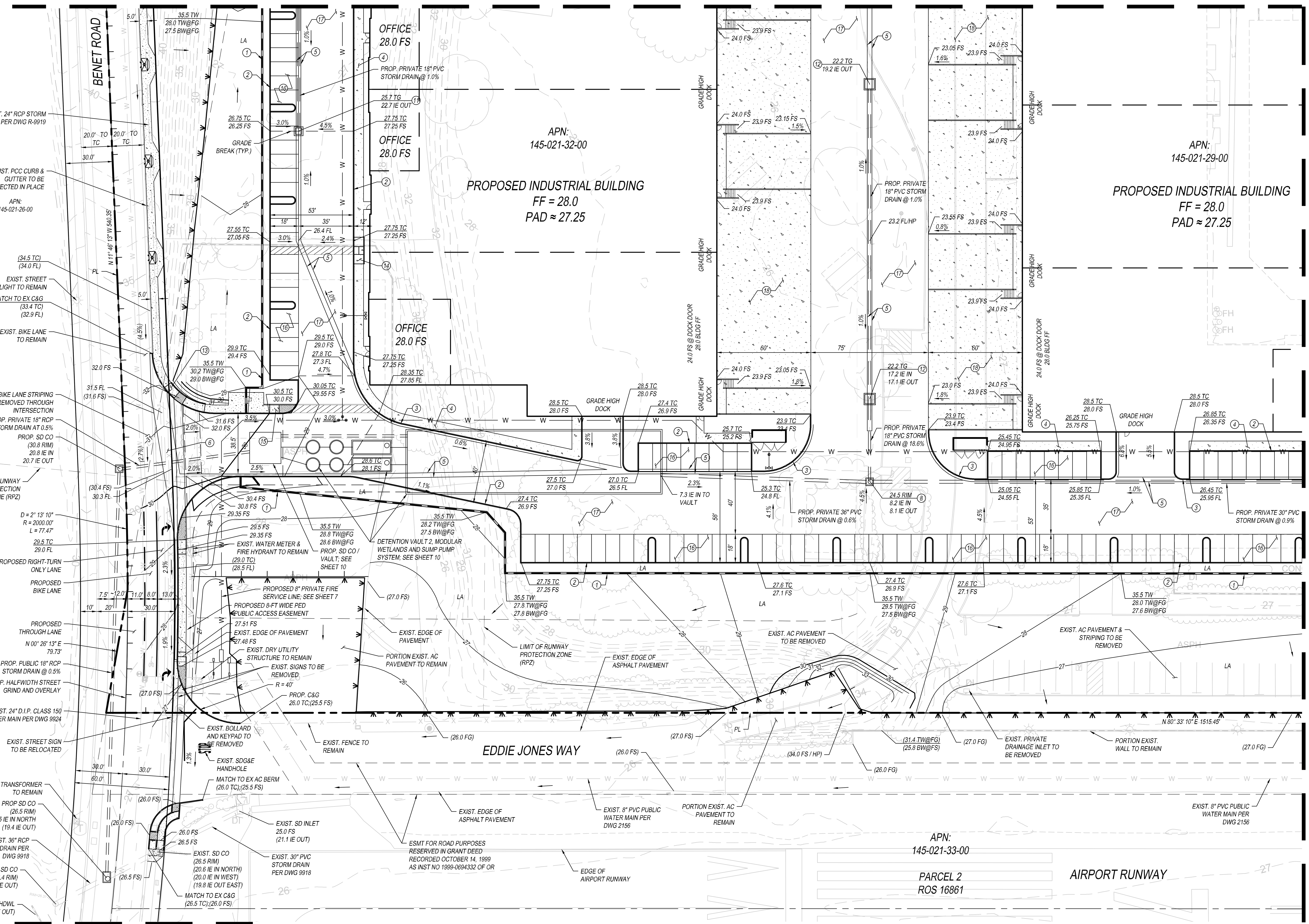
MATCHLINE: SEE SHEET 6



MATCHLINE: SEE SHEET 4

SEE SHEET 7 FOR CONTINUATION OF OFFSITE UTILITIES

LEGEND

- PROPERTY BOUNDARY
- PROPERTY BOUNDARY (PROPOSED)
- PROPERTY LINE / RIGHT-OF-WAY
- ADJACENT PROPERTY LINE
- CENTERLINE OF ROAD
- EXISTING EASEMENT
- EXISTING CONTOUR LINE — 64
- PROPOSED CONTOUR LINE — 64
- PROPOSED LIMIT OF GRADING
- PROPOSED FLOOD WALL
- EXISTING FENCE — X
- EXISTING WATER MAIN (SIZE PER PLAN) — W
- EXISTING SEWER MAIN (SIZE PER PLAN) — S
- EXISTING GAS MAIN (SIZE PER PLAN) — G
- EXISTING OVERHEAD ELECTRIC UTILITIES — OE
- EXISITNG STORM DRAIN (SIZE PER PLAN)
- PROPOSED STORM DRAIN (SIZE PER PLAN)

CONSTRUCTION NOTES

1. PROPOSED STRUCTURAL FLOOD WALL PER SPECIAL DESIGN TO FLOOD PROOF PROPERTY
2. PROPOSED 6" PCC CURB PER SDRSD G-1
3. PROPOSED 6" PCC CURB & GUTTER PER SDRSD G-2
4. PROPOSED 5' WIDE, 4" THICK PCC SIDEWALK PER SDRSD G-7
5. PROPOSED 3-FT WIDE RIBBON GUTTER PER DETAIL SHEET 9
6. PROPOSED PCC CROSS GUTTER PER SDRSD G-12
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9. INSTALL TYPE-A CURB INLET PER SDRSD D-1
10. INSTALL 12"X12" BROOKS BOX STORM DRAIN INLET OR APPROVED EQUAL
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12. INSTALL 36"X36" BROOKS BOX STORM DRAIN INLET OR APPROVED EQUAL
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17. PROPOSED 5" AC PAVEMENT OVER 7" CLASS II AB PER GEOTECH RECOMMENDATION
18. PROPOSED 6.5" THICK PCC PAVEMENT OVER 12" COMPACTED SUBGRADE PER GEOTECH RECOMMENDATION

GRAPHIC SCALE: 1" = 30'

30 0 30 60 90

PLAN VIEW - PRELIMINARY GRADING PLAN

SCALE: 1" = 30' HORIZONTAL

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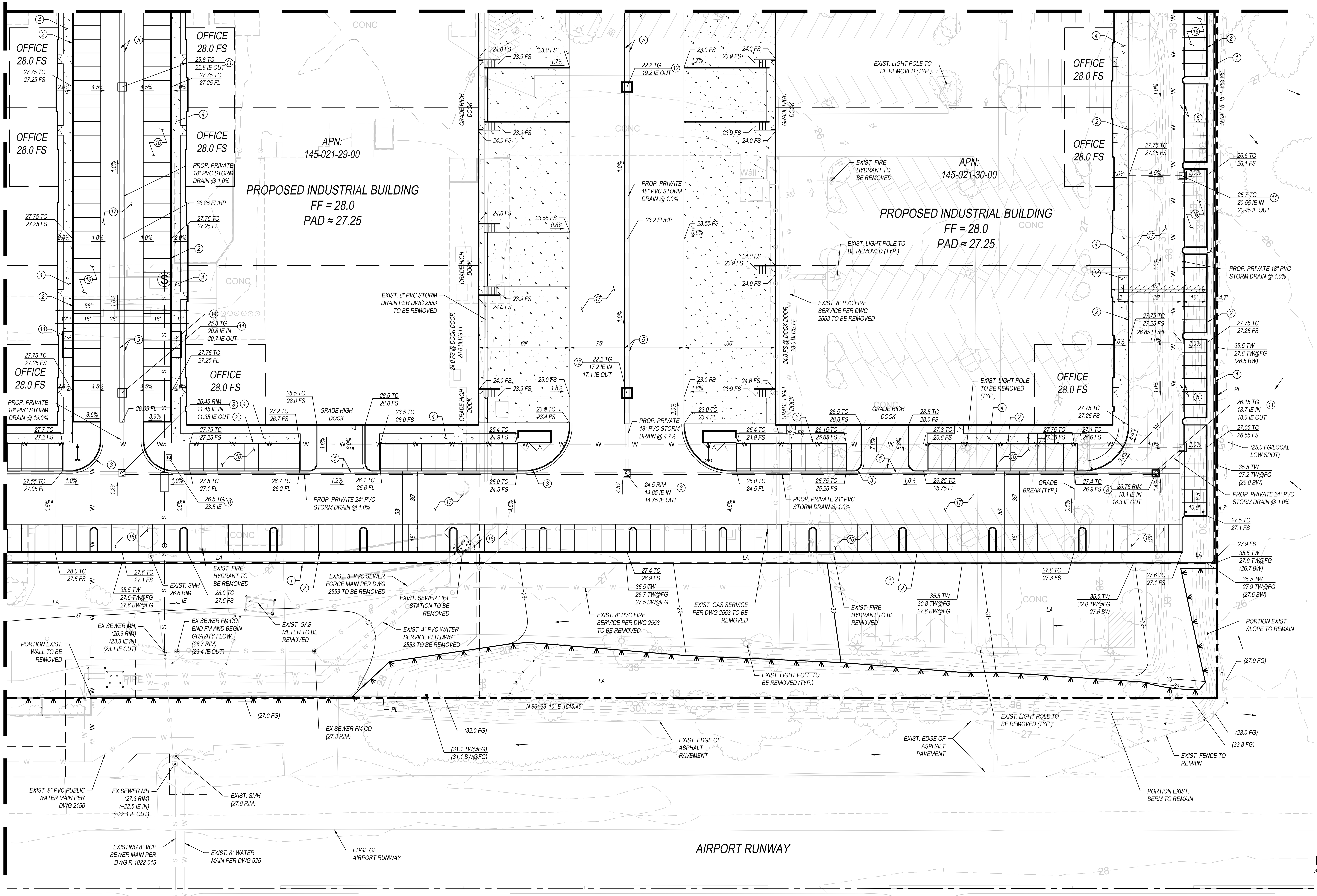
MATCHLINE: SEE SHEET 5

MATCHLINE: SEE SHEET 3



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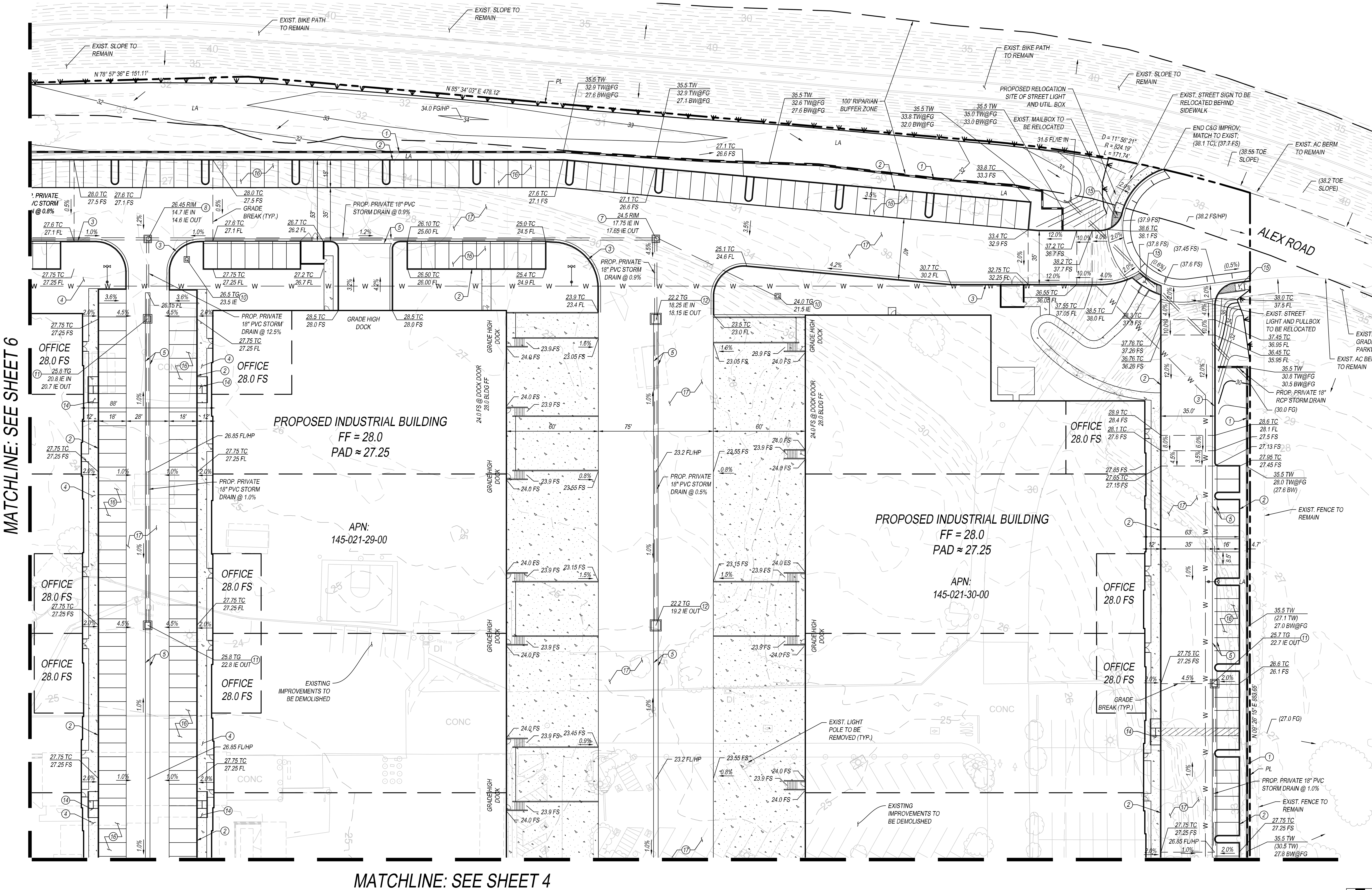

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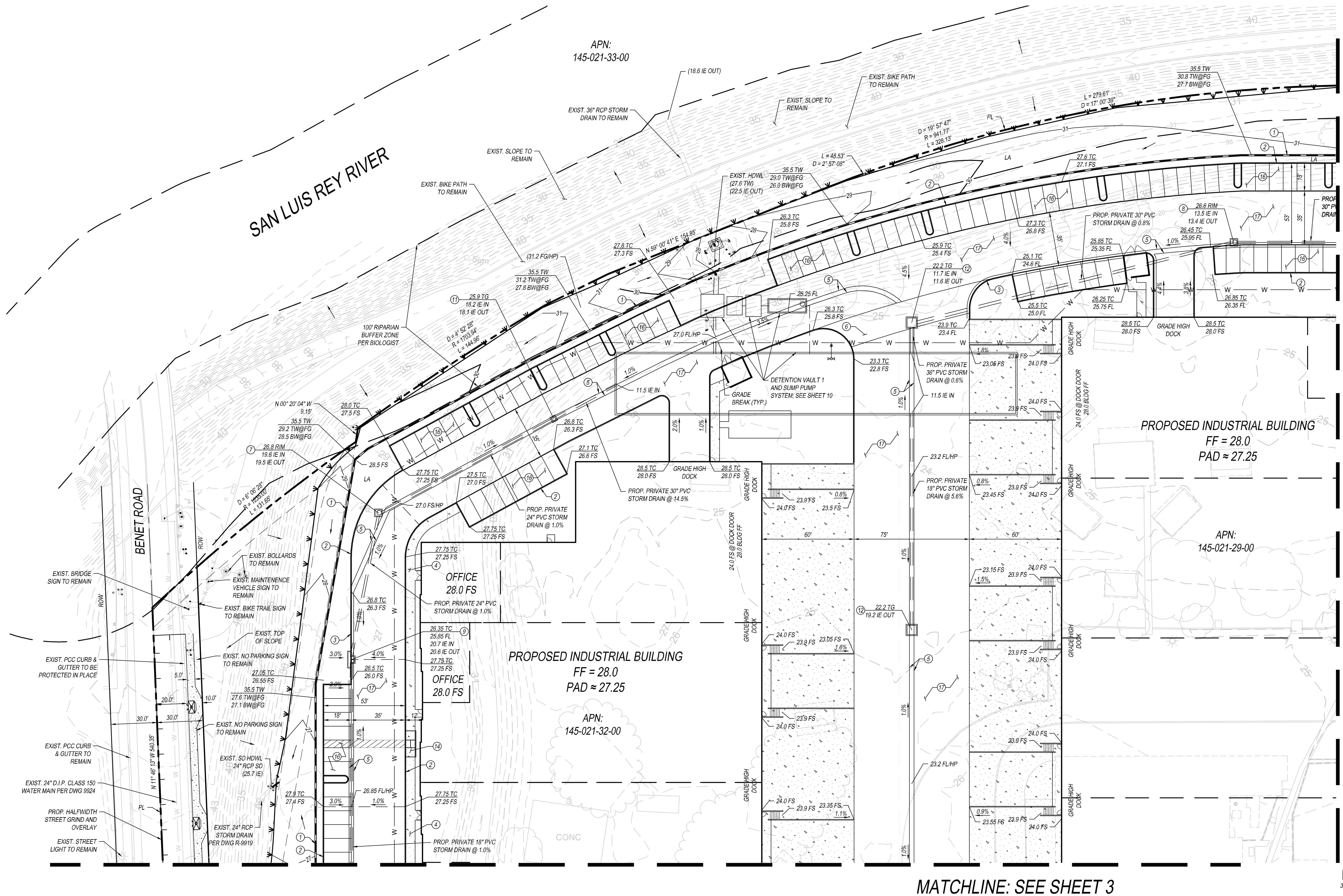

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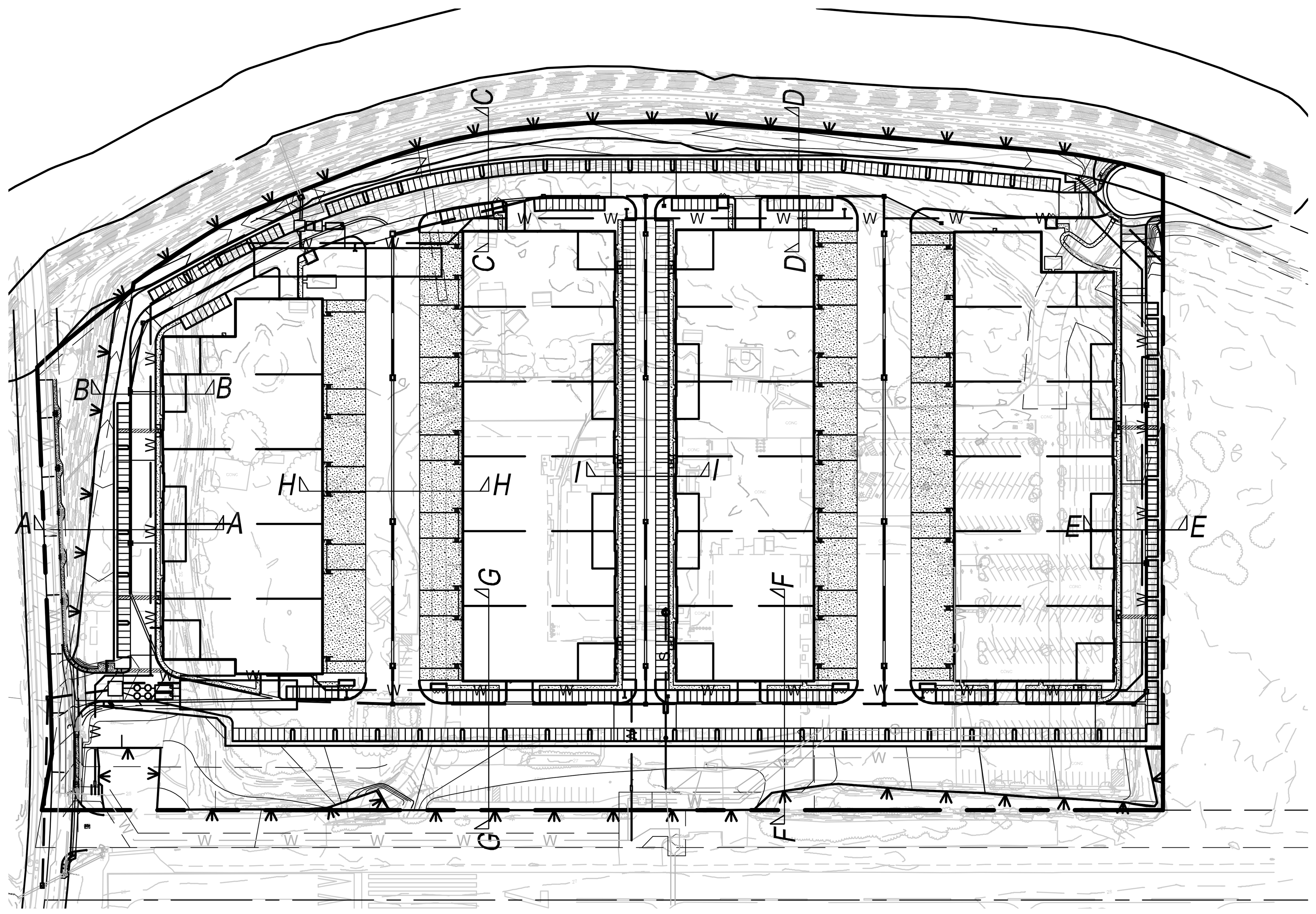
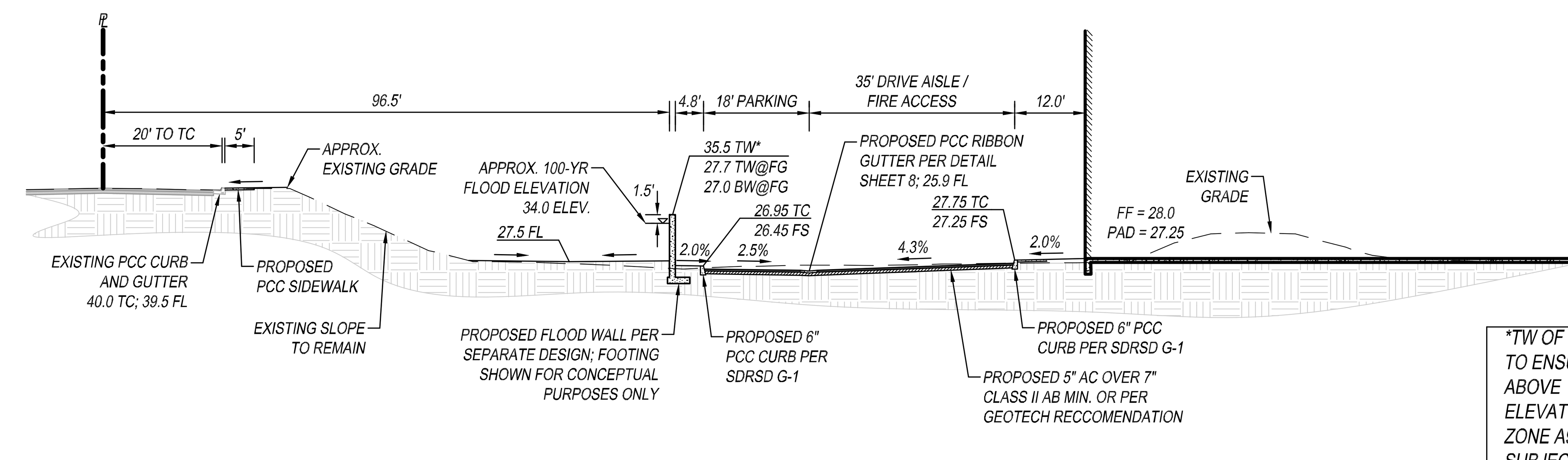


PLAN VIEW - SITE SECTIONS KEY MAP

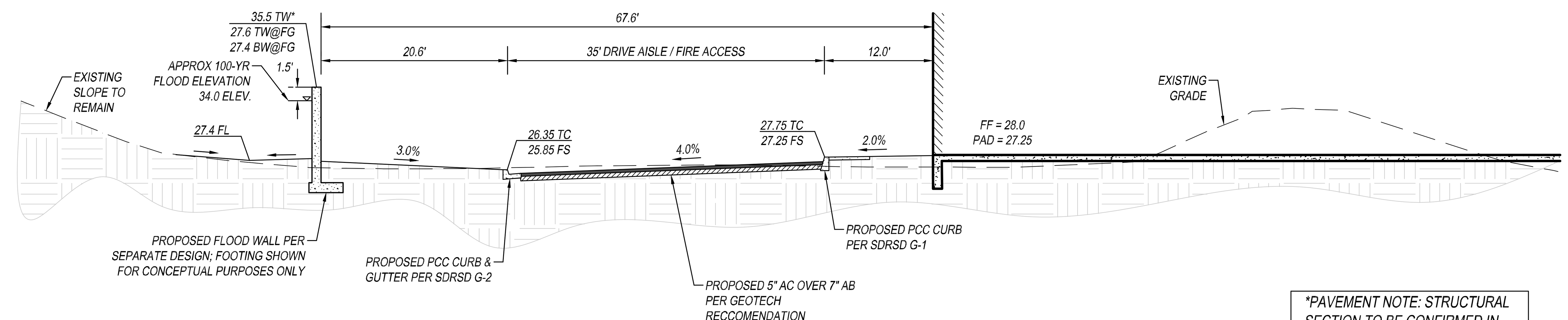
SCALE: NTS



*TW OF PROPOSED FLOOD WALL TO ENSURE MINIMUM FREEBOARD ABOVE 100-YEAR FLOOD ELEVATION / BFE WITHIN FEMA ZONE A99 TO FLOOD PROOF SUBJECT PROPERTY

SECTION A-A

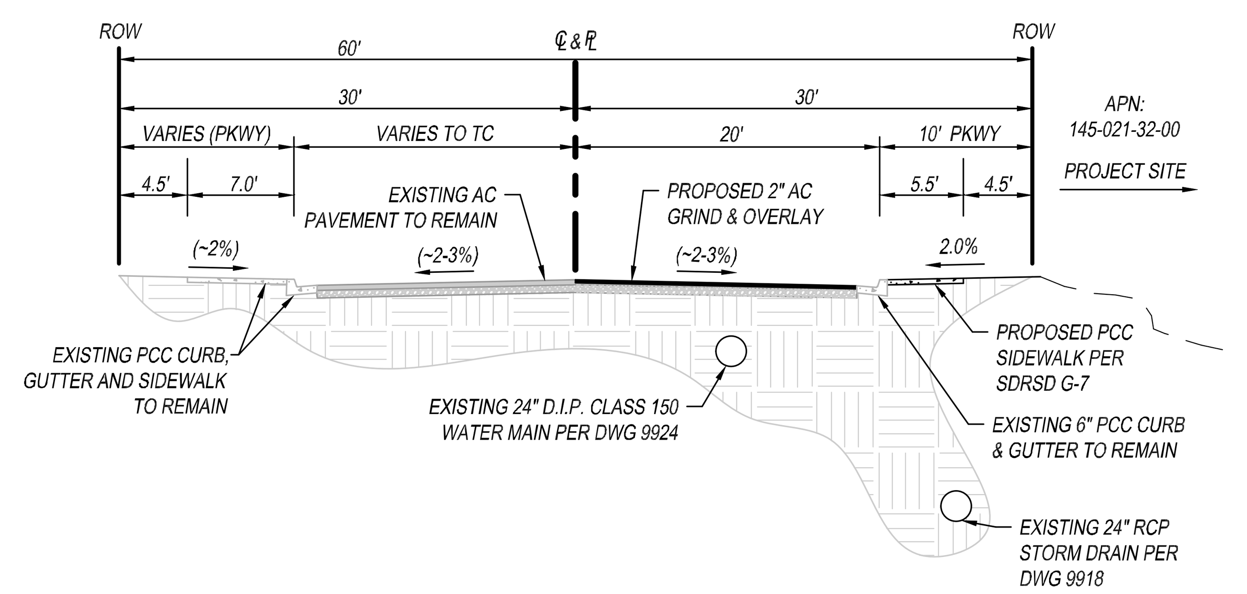
NOT TO SCALE



SECTION B-B

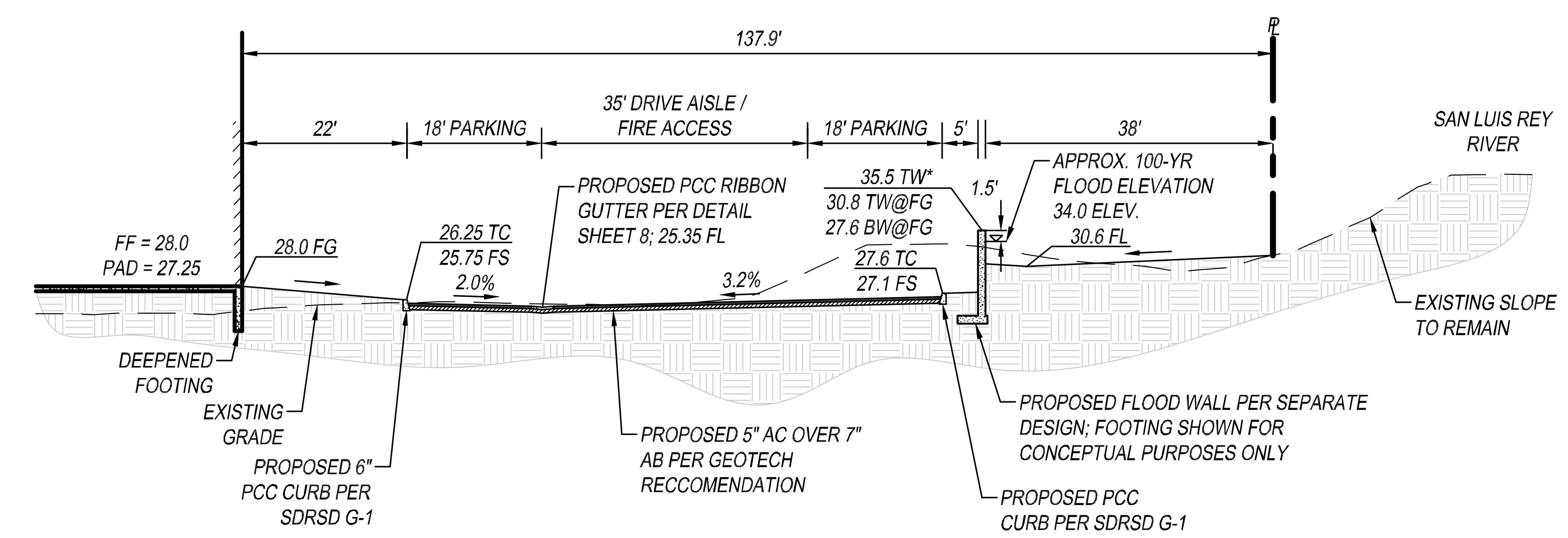
NOT TO SCALE

*PAVEMENT NOTE: STRUCTURAL SECTION TO BE CONFIRMED IN FIELD BY GEOTECHNICAL ENGINEER BASED ON OBSERVED R-VALUES / TESTING



TYPICAL SECTION - BENET ROAD

NOT TO SCALE



SECTION C-C

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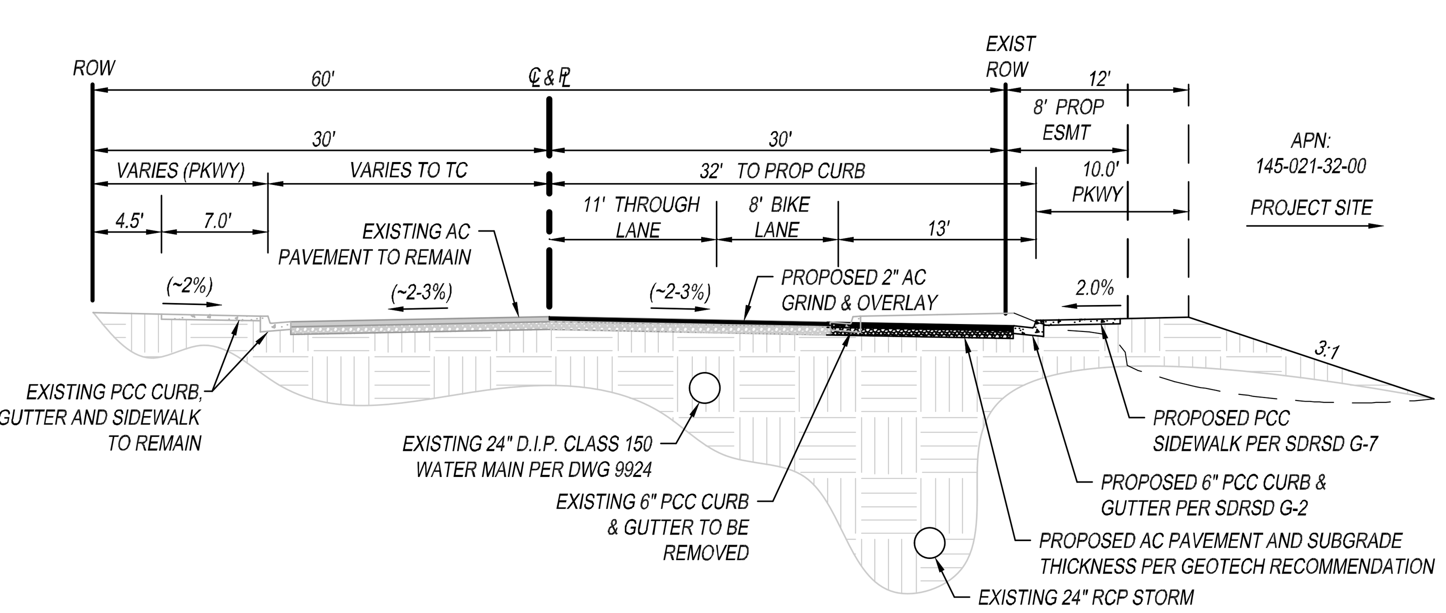

TYPICAL SECTION - BENET ROAD @ RIGHT-TURN POCKET

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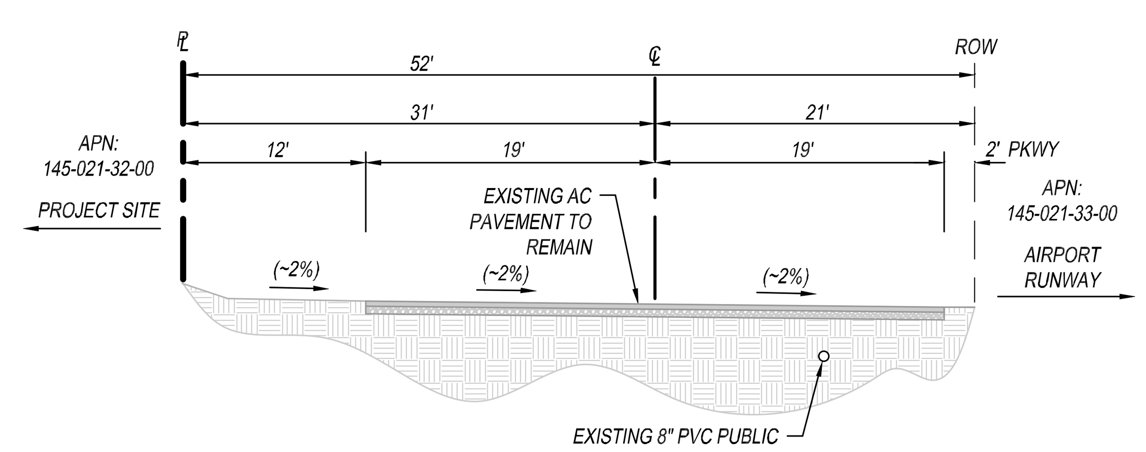
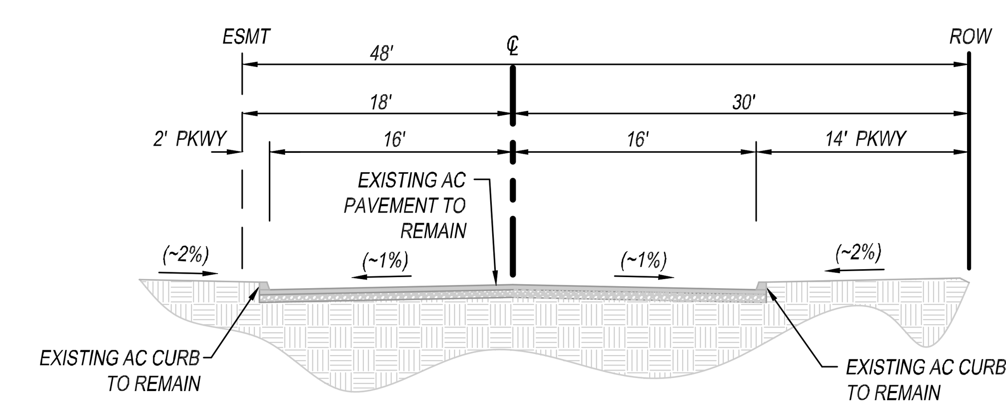


TYPICAL SECTION - EDDIE JONES WAY

NOT TO SCALE



TYPICAL SECTION - ALEX ROAD

NOT TO SCALE

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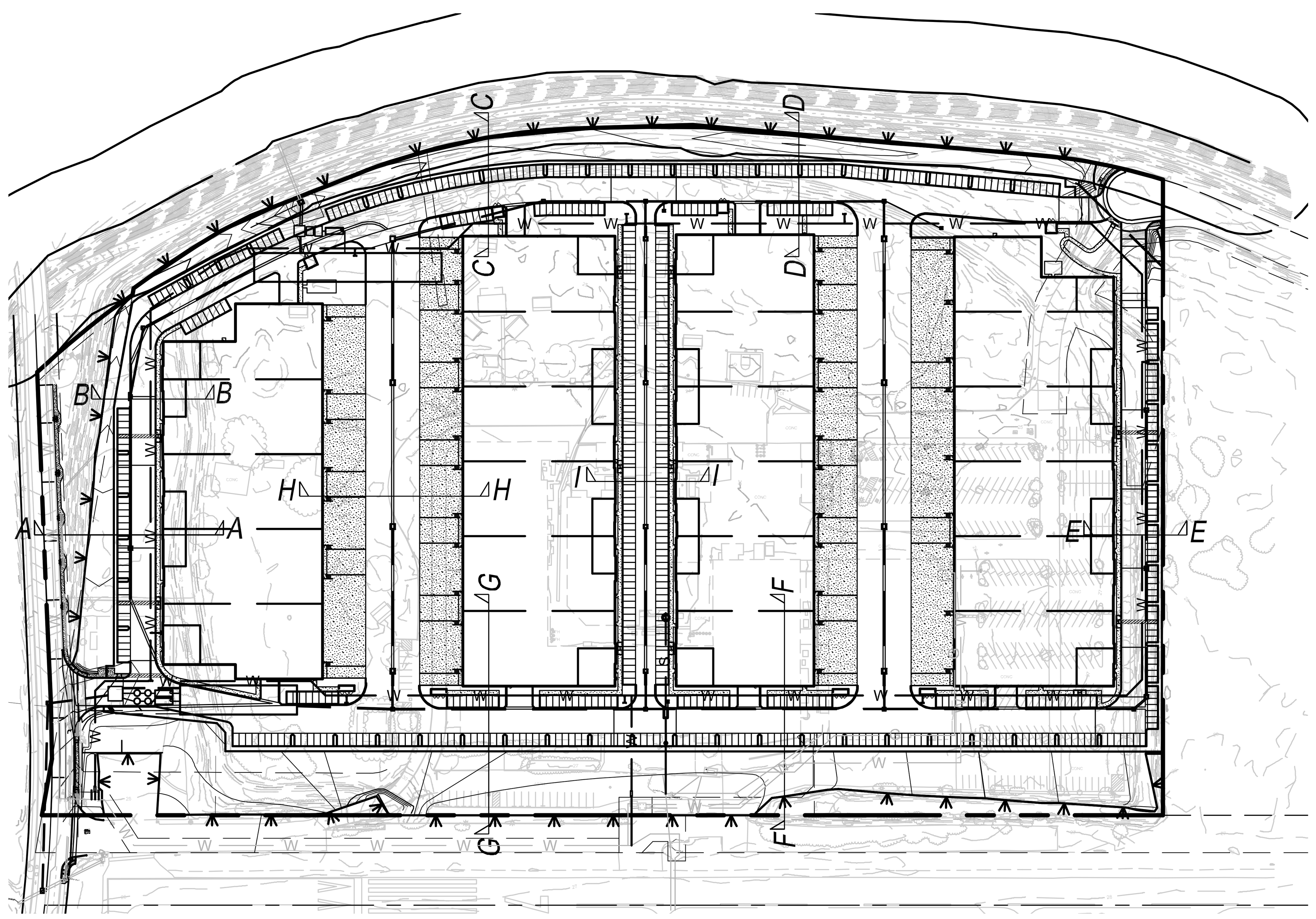
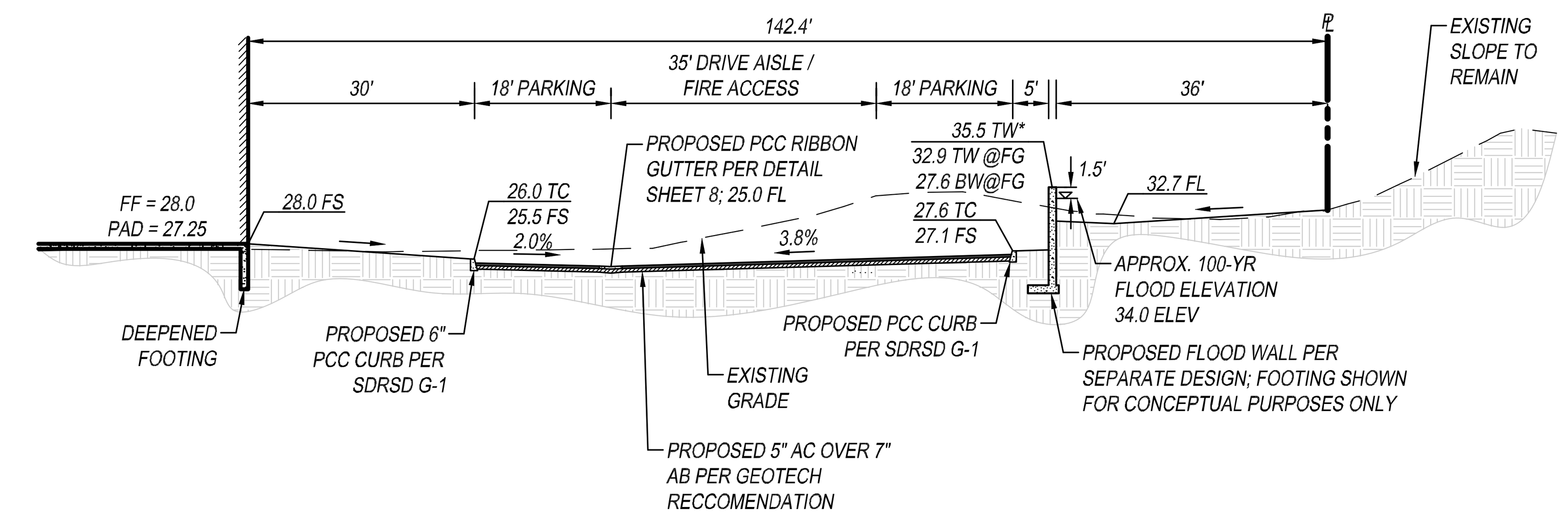


PLAN VIEW - SITE SECTIONS KEY MAP

SCALE: NTS



SECTION D-D

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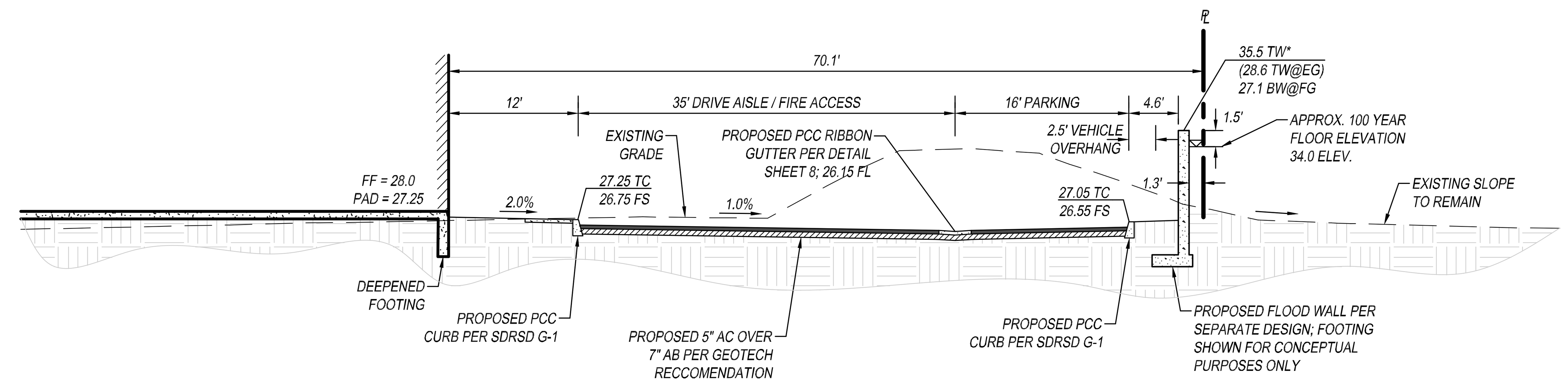
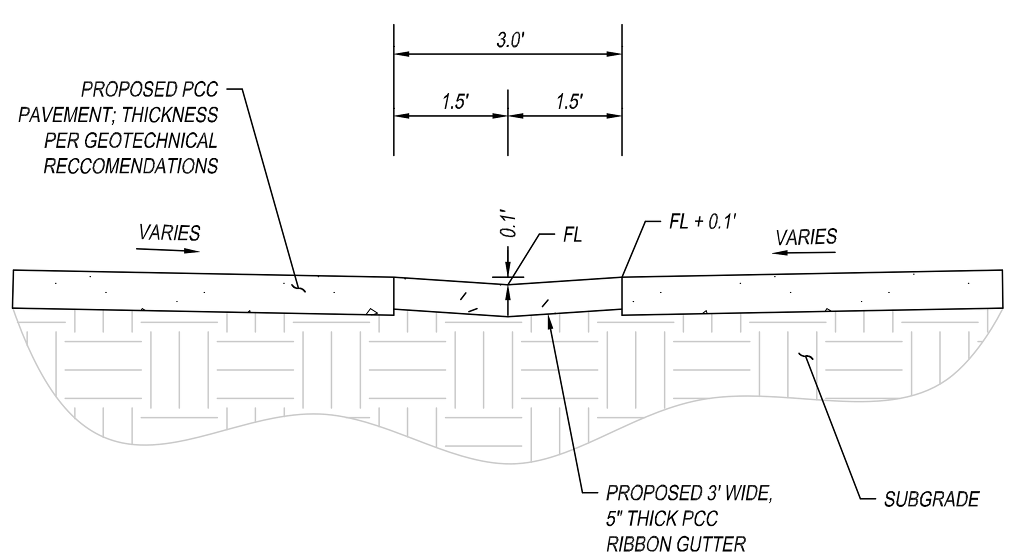


SECTION E-E

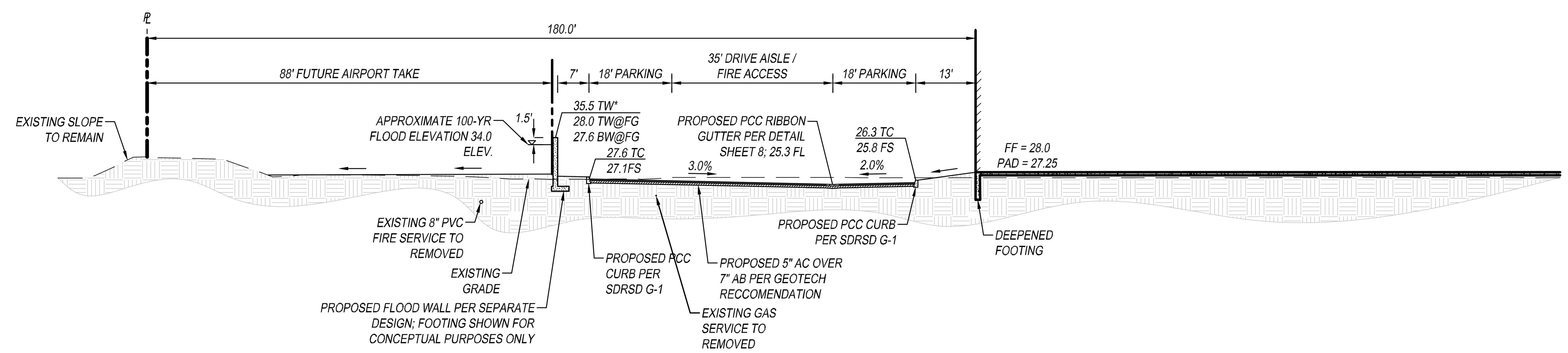
NOT TO SCALE

*PAVEMENT NOTE: STRUCTURAL SECTION TO BE CONFIRMED IN FIELD BY GEOTECHNICAL ENGINEER BASED ON OBSERVED R-VALUES / TESTING



TYPICAL DETAIL - RIBBON GUTTER

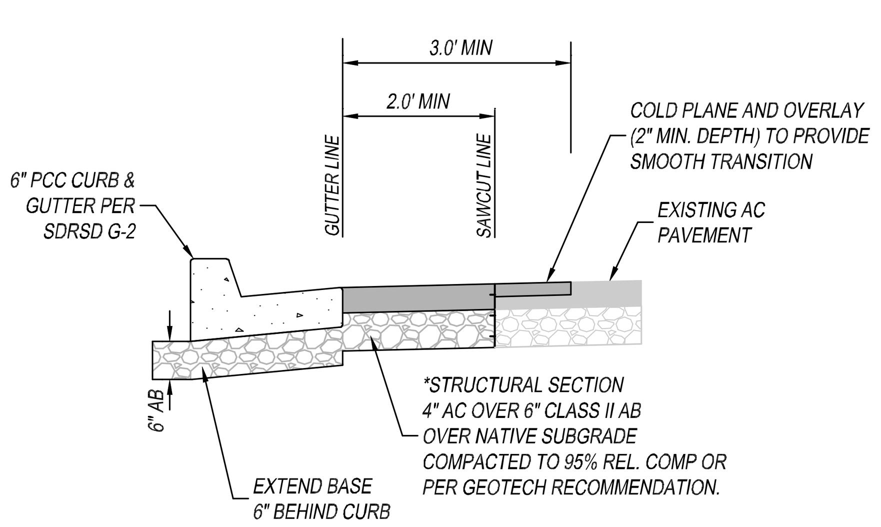
NOT TO SCALE



SECTION F-F

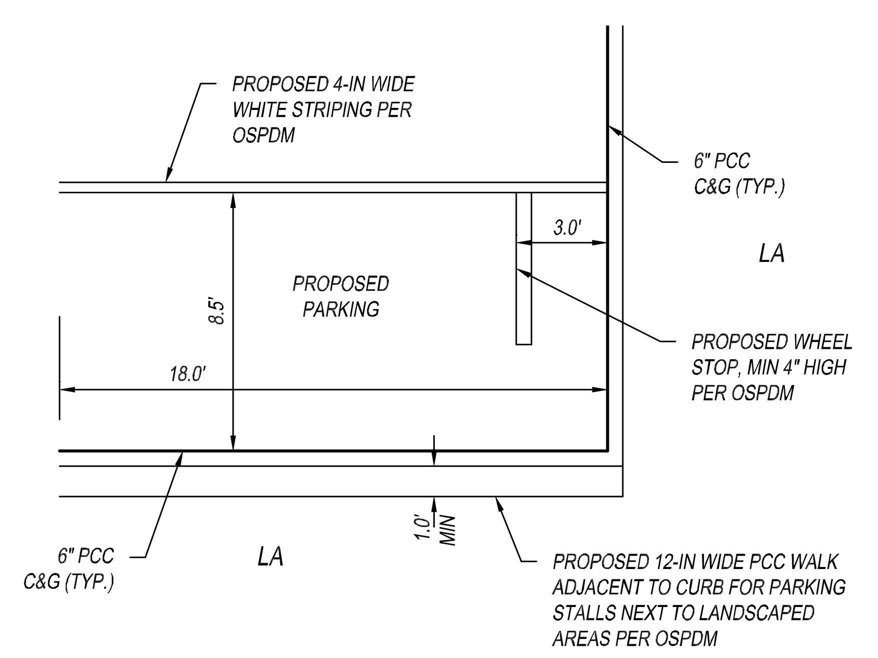
NOT TO SCALE

*TW OF PROPOSED FLOOD WALL TO ENSURE MINIMUM FREEBOARD ABOVE 100-YEAR FLOOD ELEVATION / BFE WITHIN FEMA ZONE A99 TO FLOOD PROOF SUBJECT PROPERTY



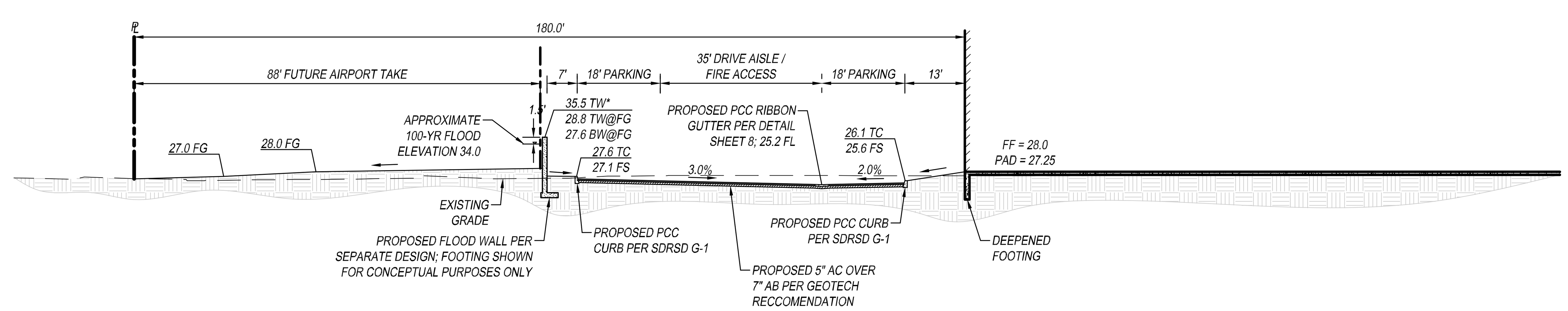
TYPICAL DETAIL - SAWCUT AC PAVEMENT

NOT TO SCALE



TYPICAL DETAIL - WHEELSTOP AND PARKING STALL

NOT TO SCALE



SECTION G-G

NOT TO SCALE

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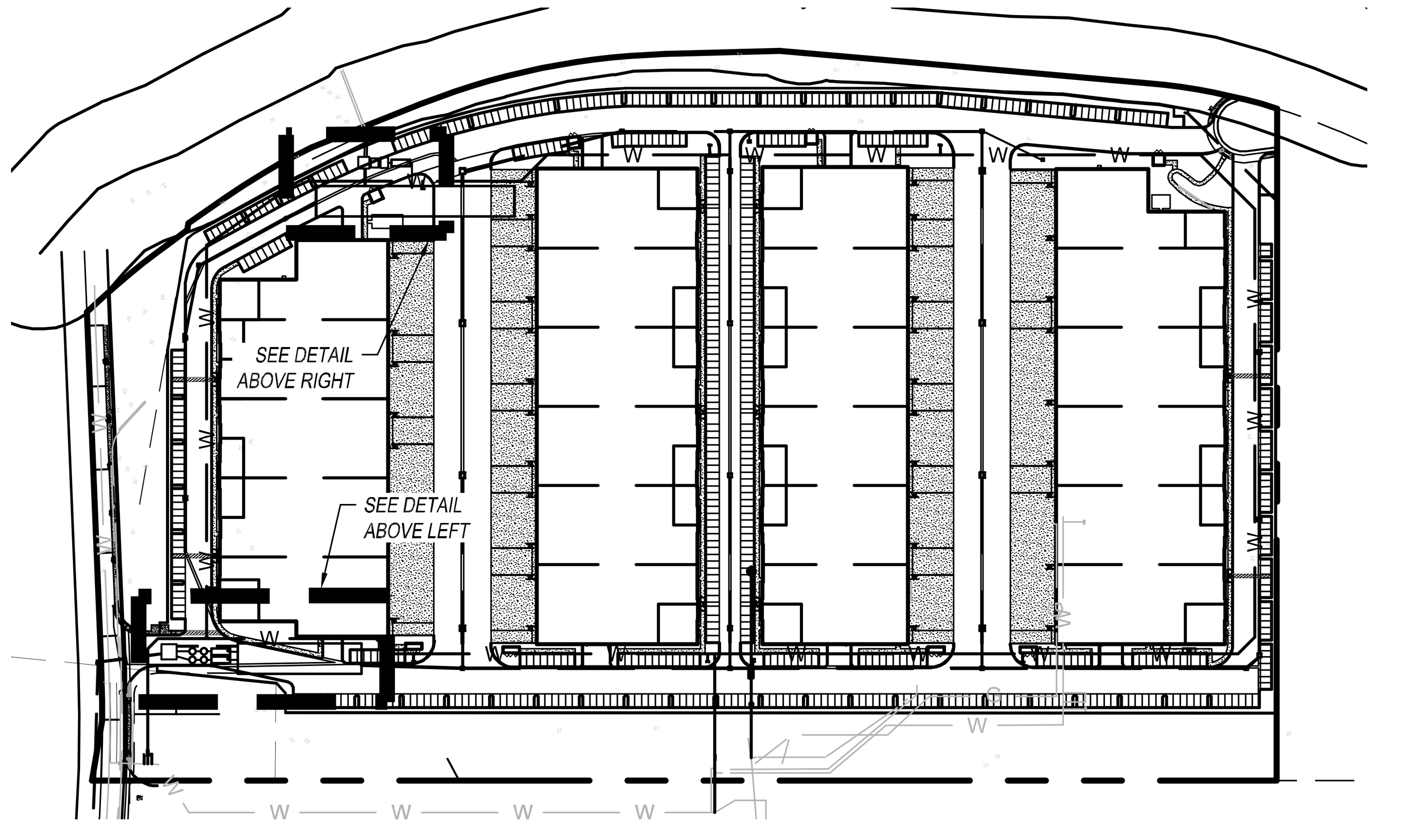
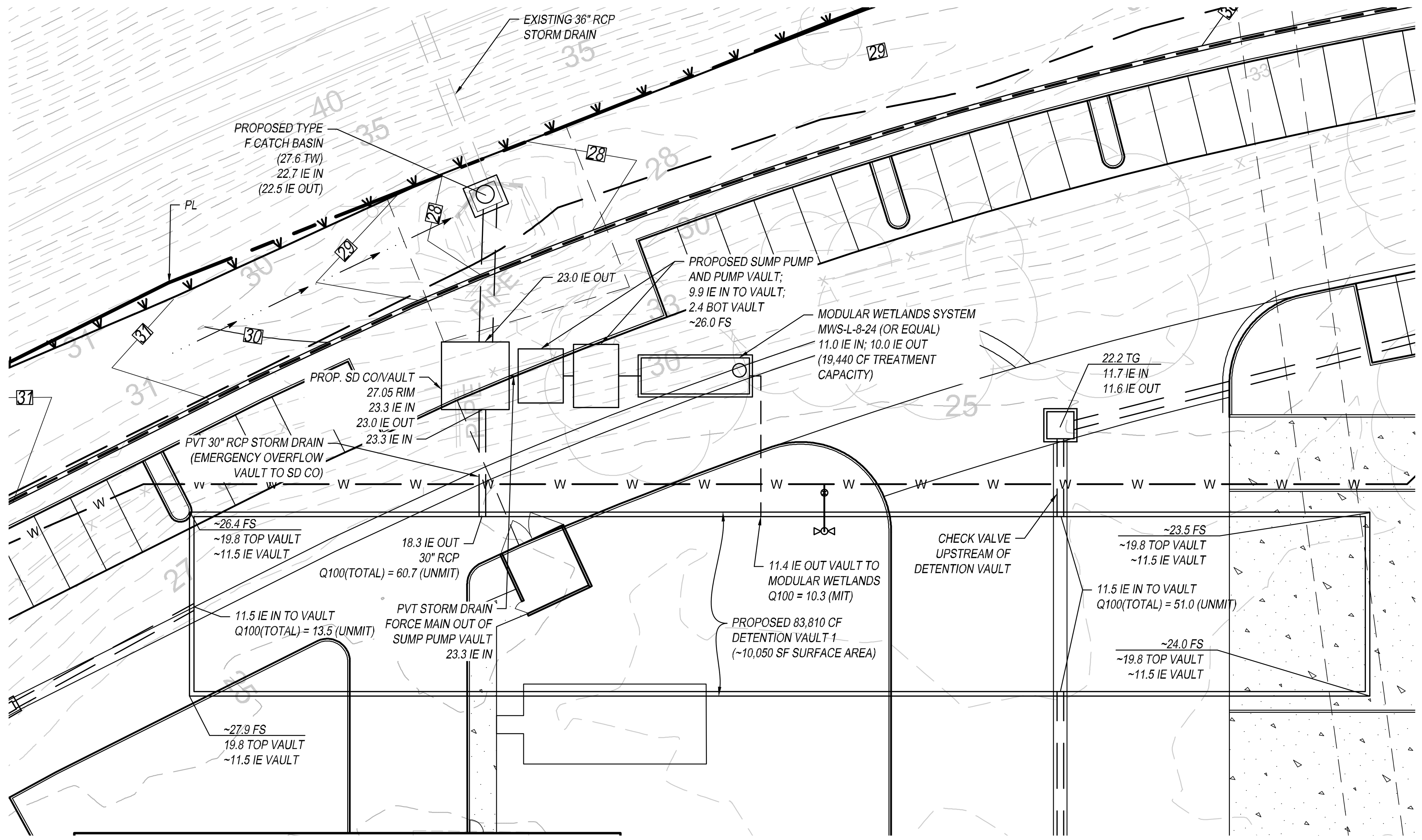
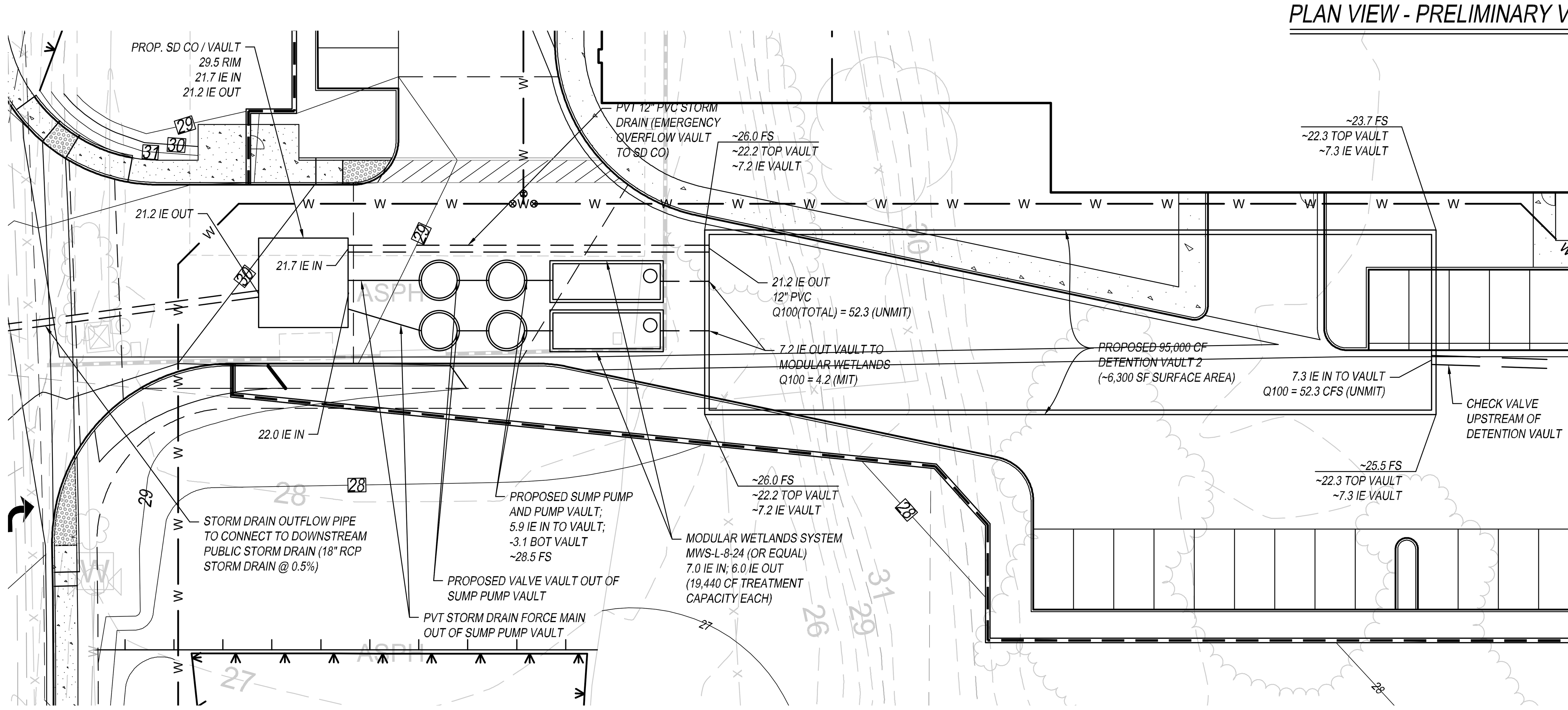


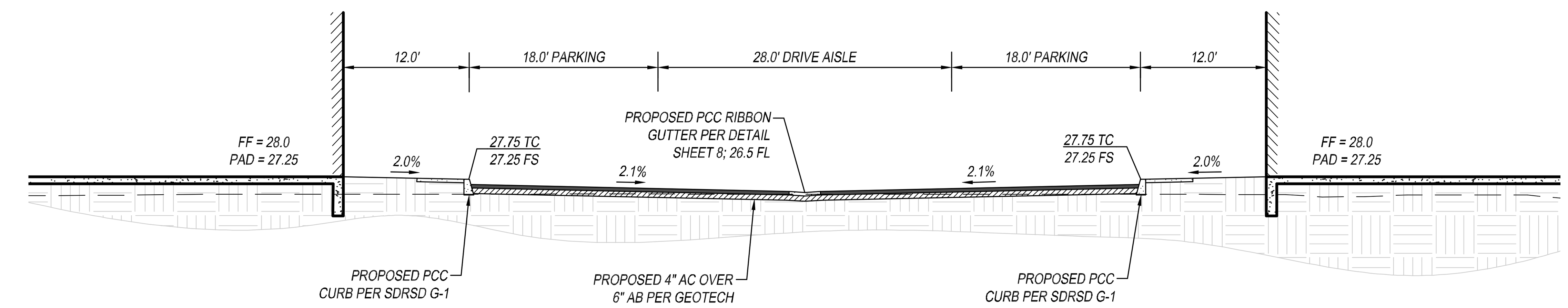
PLAN VIEW - DETENTION KEY MAP
SCALE: NTS



PLAN VIEW - PRELIMINARY VAULT AND PUMP DESIGN
SCALE: 1" = 20' HORIZONTAL

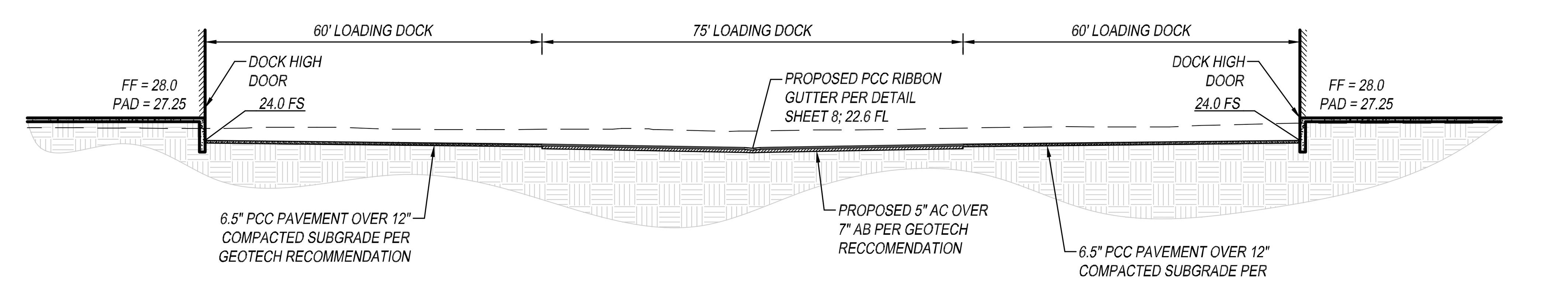


PLAN VIEW - PRELIMINARY VAULT AND PUMP DESIGN
SCALE: 1" = 20' HORIZONTAL



*PAVEMENT NOTE: STRUCTURAL SECTION TO BE CONFIRMED IN FIELD BY GEOTECHNICAL ENGINEER BASED ON OBSERVED R-VALUES / TESTING

SECTION I-I
NOT TO SCALE



SECTION H-H
NOT TO SCALE

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EMERGENCY VEHICLE TRUCK TURNING TEMPLATE

CALTRANS TEMPLATE 404.5-F
(TRASH, DELIVERY, AND FIRE TRUCKS)
SCALE: NOT TO SCALE

PLAN VIEW - TRUCK TURNING EXHIBIT

SCALE: 1" = 60' HORIZONTAL

TRUCK TURNING EXHIBIT

250 EDDIE JONES WAY - CITY OF OCEANSIDE
SCALE: 1" = 60' HORIZONTAL

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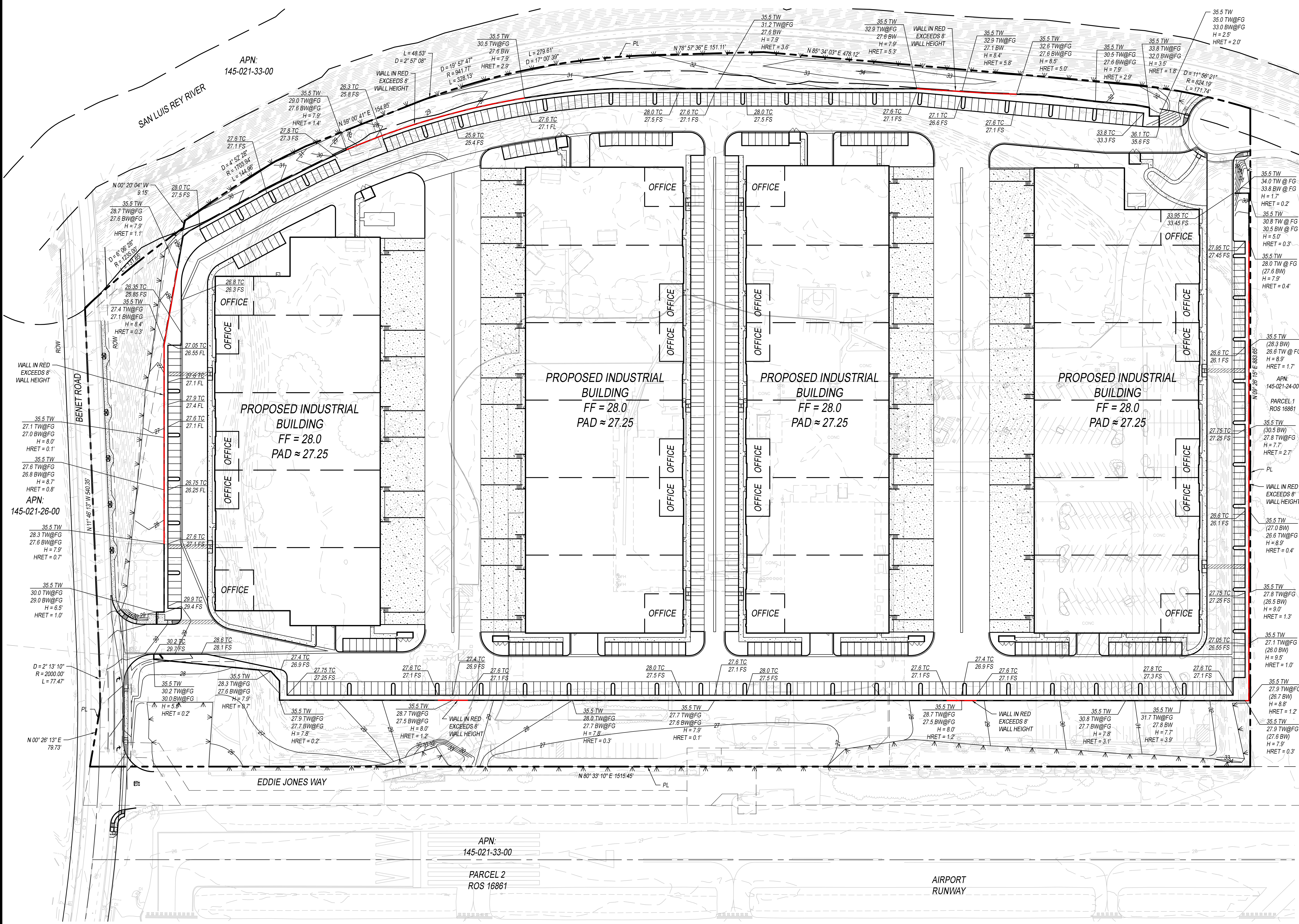

LEGEND

PROPERTY BOUNDARY	
PROPERTY BOUNDARY (PROPOSED)	
PROPERTY LINE / RIGHT-OF-WAY	
ADJACENT PROPERTY LINE	
CENTERLINE OF ROAD	
PROPOSED EASEMENT	
EXISTING EASEMENT	
EXISTING CONTOUR LINE	64
PROPOSED CONTOUR LINE	64
PROPOSED LIMIT OF GRADING	
PROPOSED FLOOD WALL	
PROPOSED FLOOD WALL (EXCEEDING 8' IN EXPOSED WALL HEIGHT)	
EXISTING FENCE	X
EXISTING WATER MAIN (SIZE PER PLAN)	W
EXISTING SEWER MAIN (SIZE PER PLAN)	S
EXISTING GAS MAIN (SIZE PER PLAN)	G
EXISTING OVERHEAD ELECTRIC UTILITIES	OE
EXISITNG STORM DRAIN (SIZE PER PLAN)	

FLOOD WALL NOTES

ALL WALL HEIGHTS "H" SHOWN HEREON ARE THE GIVEN MAXIMUM EXPOSED WALL HEIGHT. ALL HEIGHTS "HRET" DELINIATE THE MAXIMUM RETAINED WALL HEIGHT.

PLAN VIEW - FLOOD WALL EXHIBIT

SCALE: 1" = 60' HORIZONTAL

PRELIMINARY WALL EXHIBIT

250 EDDIE JONES WAY - CITY OF OCEANSIDE
SCALE: 1" = 60' HORIZONTAL

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ATTACHMENT 5
Drainage Report

This is the cover sheet for Attachment 5.

PRELIMINARY

PRELIMINARY HYDROLOGY STUDY

FOR

DISCRETIONARY APPROVAL – DEVELOPMENT PLAN, CONDITIONAL USE PERMIT
250 EDDIE JONES WAY, OCEANSIDE CA

PLANNING CASE NO: D22-00001 / CUP22-00001

CITY OF OCEANSIDE, CA

PREPARED FOR:

RAF PACIFICA GROUP
315 S. COAST HWY 101, SUITE U-12
ENCINITAS, CA 92024
PH: (760) 473-8838

PREPARED BY:

PASCO LARET SUITER & ASSOCIATES, INC.
1911 SAN DIEGO AVENUE, SUITE 100
SAN DIEGO, CA 92110
PH: (858) 259-8212

Prepared: June 2024
Revised: _________

PRELIMINARY
TYLER G. LAWSON, RCE 80356 DATE

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

1.1 Introduction

This Preliminary Hydrology Study for the proposed development at 250 Eddie Jones Way has been prepared to analyze the hydrologic and hydraulic characteristics of the existing and proposed project site. This report intends to present both the methodology and the calculations used for determining the runoff from the project site in both the pre-developed (existing) conditions and the post-developed (proposed) conditions produced by the 100-year, 6-hour storm. For hydromodification management and compliance including analysis up to the 10-year, 6-hour storm event, refer to the project Storm Water Quality Management Plan (SWQMP) prepared by Pasco, Laret, Suiter & Associates under separate cover.

1.2 Existing Conditions

The subject property is located just northeast of the intersection of Eddie Jones Way and Benet Road in the City of Oceanside. The site is bordered directly to the north by the San Luis Rey River and river trail, as well as directly to the south by the Bob Maxwell Memorial Field Oceanside Municipal Airport. To the east of the subject property is a vacant, undeveloped parcel that has been previously graded. The project site has a General Plan Land Use designation of Limited Industrial (LI) and is in the Limited Industrial (IL) Zoning District. The existing site consists of an existing industrial building that is currently vacant but was formerly used for electronics manufacturing. The site contains various surface and drainage improvements typical of this type of development including onsite parking, drive aisles, and landscaping to support the previous use. The site is located within the Mission Hydrologic Sub-Area of the Lower San Luis Hydrologic Area within the San Luis Rey Watershed (903.11), as well as within flood plain Zone A99 per the FEMA Flood Insurance Rate Map (FIRM) panel 06073C0751H.

The existing site is comprised of approximately 31.7 gross acres. The site is relatively flat with minimal elevation change across the depth of the property considering the site area. Runoff through the site primarily flows to three different discharge locations from the property, one in the southwest corner to Benet Road, one in the northwest corner to the San Luis Rey River, and one in the northeast corner to the adjacent parcel. Runoff primarily flows through the site via sheet flow methods, though previous development on the site including a molding assembly plant and associated surface improvements to support this use resulted in the installation of private storm drain infrastructure to convey drainage through the site as well. A study of the existing conditions and site topography shows that an earthen flood levee wrapping the property was previously constructed to protect the site from flooding in the San Luis Rey River.

As such, the southwestern-most portion of the site between the toe of slope at the bottom of Benet Road and the flood levee is conveyed generally southwest to either existing public storm drain piping or on the surface to an existing storm drain inlet located adjacent the airport runway. This runoff all ultimately collects in storm drain within Benet Road before discharging to the San Luis Rey River not far downstream. From there, the river conveys drainage west to the outlet at the Pacific Ocean near Oceanside Harbor Beach. A majority of the site contained within the flood levee appears to drain on the surface towards a series of storm drain inlets located north of the existing buildings. As-builts for the site show small pump stations within each inlet convey water to the northwest corner of the site and an existing headwall structure / sump inlet that feeds a 36” RCP storm drain. This storm drain travels under the San Luis Rey River Trail to discharge to the adjacent San Luis Rey River. Once in the river, runoff continues west downstream to confluence with runoff leaving the property from the southwest corner.

A review of the site topography offsite revealed that the existing improvements to the north, including the San Luis Rey River Trail, prevent additional runoff from entering the site from the river in a non-flood condition. Additionally, the Oceanside Municipal Airport to the south is downstream of the subject property and appears to drain west and south to Benet Road. For the purpose of the analysis, the analyzed point of compliance for each discharge location is just outside of the limits of the property. Additional runoff from the airport and Benet Road enter the public storm drain system, but the limits were contained to the subject property only in order to size onsite flood control measures accordingly and perform all the mitigation for the increased impervious footprint onsite. A further analysis of the larger drainage basin was not performed.

Per the Web Soil Survey application available through the United States Department of Agriculture, the area is generally categorized to have majority group A soils. A portion of the site is also mapped as Type D, but an overview of the larger surrounding properties also indicates majority Type A soils in the area containing Tujunga sand (TuB). In an effort to perform a more conservative analysis, Type A soils is used throughout to mitigate the proposed development to a lower peak flow rate in the pre-project condition. Based upon soil type and the amount of existing impervious area onsite, a runoff coefficient of 0.50 was calculated for the existing site using the methodology described in section 3.1.2 of the San Diego County Hydrology Manual and the formula provided therein. This runoff coefficient was applied to each drainage basin for use in determining peak runoff leaving the site from the property discharge location. Using the Rational Method Procedure outlined in the San Diego County Hydrology Manual, a peak flow rate and time of concentration was calculated for the analyzed basin for the 100-year, 6-hour storm event. Table 1 below summarizes the results of the Rational Method calculations.

EXISTING DRAINAGE FLOWS			
DRAINAGE AREA	DRAINAGE AREA (ACRES)	Q_{100} (CFS)	I_{100} (IN/HR)
EX-1	25.94 Ac	37.2	2.87
EX-2	3.52 Ac	6.4	3.61
EX-3	1.89 Ac	2.4	2.51

Table 1. Existing Condition Peak Drainage Flow Rates

Table 1 above lists the peak flow rates for the project site in the existing condition for the respective rainfall events. The peak flow rate for the 100-year, 6-hour storm for Basin EX-1 was determined to be 37.2 cfs with a time of concentration of 21.6 minutes, discharging from the northwest corner of the site, 6.4 cfs with a time of concentration of 15.2 minutes for Basin EX-2 discharging from the southwest corner of the site, and 2.4 cfs with a time of concentration of 26.6 minutes discharging from the northeast corner of the site. Refer to pre-development hydrology calculations included in Section 3.1 of this report for a detailed analysis of the existing drainage basin, as well as a pre-development hydrology node map included in the appendix of this report for pre-development drainage basin delineation and discharge locations leaving the subject property.

1.3 Proposed Project

The proposed project includes the demolition of all onsite structures and improvements and the construction of four new ~489,780 total square foot industrial buildings, along with a fire access lane / circulation driveway, loading docks, flat-bed trailer parking, and various surface, grading, and utility improvements typical of this type of construction. The proposed building finished floor elevation is 28.0 and building height will be in compliance with restrictions of the Oceanside Municipal Airport Land Use Compatibility Plan. Additional information can be seen on the project Preliminary Grading Plan submitted as part of the Conditional Use Permit and Development Plan application under separate cover.

The proposed development consists of four industrial buildings located in the center of the site, along with fire access driveways / circulation elements around the building. The proposed surface improvements and proposed development will primarily drain away from the building and dock high doors via surface flow to a series of inlets located within the drive aisle. These inlets will route runoff to a proposed private buried storm drain system that convey drainage to a storm water treatment and flood control mitigation system prior to leaving the site. This system, located at each discharge point from the property, consists of an underground detention vault to reduce peak flows generated by the 100-year, 6-hour storm event to pre-development conditions, a duplex sump pump system, proprietary biofiltration BMP's, and an outlet pipe to then gravity flow offsite after detention, treatment, and mechanical pumping methods.

As in the existing condition, the project site will not accept any offsite runon from the adjacent San Luis Rey River to the north of the San Luis Rey River Trail, or from Benet Road to the west, the airport to the south, and vacant lot to the east. Similar to the existing condition, the analyzed watershed can be broken down into three major drainage basins with three separate discharge locations from the site, one from the northwest corner of the site, one from the southwest corner of the site, and one from the northeast corner of the site. These discharge locations both outlet to the San Luis Rey River and continue downstream to the west, ultimately confluencing and discharging at the river outlet to the Pacific Ocean near Oceanside Harbor Beach. Basin PR-1 consists of roughly half of the property and is approximately 13.04 acres in size. This drainage area consists of the northern and western portions of the site, including a portion of the building roofs, and is ultimately collected and routed to the northwest discharge location. Basin PR-2 consists of roughly the remaining half of the property and is approximately 17.98 acres in size. This drainage area consists of the eastern and southern portions of the site, including the remaining portion of the building roofs, and is routed to the southwest discharge location. Basin PR-3 comprises the remaining area of the site, 0.33 acres, included in this analysis that will be swale-graded to continue flowing east to the Basin EX-3 discharge location in the existing condition. A culvert is proposed under the private driveways entering the site from Alex Road so as to not impede the flow of drainage to the ultimate point of discharge.

Based on the proposed land use and soil type of the subject property, runoff coefficients for this site were determined using Table 3-1 Runoff Coefficients for Urban Areas of the San Diego County Hydrology Manual. Refer to section 3.2 of this report, as well as the post-development hydrology map included in Appendix A, for additional analysis and a summary of runoff coefficients used. Using the Rational Method Procedure outlined in the San Diego County Hydrology Manual, a peak flow rate and time of concentration were calculated for the 100-year, 6-hour storm event for each of the drainage basins in the proposed condition. Table 2 below summarizes the results of the Rational Method calculations.

PROPOSED DRAINAGE FLOWS			
DRAINAGE AREA	DRAINAGE AREA (ACRES)	Q_{100} (CFS)	I_{100} (IN/HR)
PR-1	13.04 Ac	61.7	6.83
PR-2	17.98 Ac	62.8	5.83
PR-3	0.33 Ac	0.15	2.23

Table 2. Proposed Condition Peak Drainage Flow Rates

The results above show the undetained peak flows leaving the subject property at the three (3) main points of discharge in the proposed condition, in order to compare to pre-developed conditions. Refer to Section 3.3 of this report for a full discussion of the routing analysis performed for the project in order to size the onsite detention facilities to mitigate peak flows to pre-project conditions. Refer to post-development hydrology calculations included in Section 3.2 of this report for detailed analyses of the proposed drainage basins as well as a post-development hydrology node map included in Appendix A of this report for post-development drainage delineation and discharge locations.

COMPARISON DRAINAGE FLOWS			
DRAINAGE AREA	DRAINAGE AREA (ACRES)	Q_{100} (CFS)	I_{100} (IN/HR)
EX-1	25.94 Ac	37.2	2.87
PR-1	13.04 Ac	61.7	6.83
EX-2	3.52 Ac	6.4	3.61
PR-2	17.98 Ac	62.8	5.83
EX-3	1.89 Ac	2.4	2.51
PR-3	0.33 Ac	0.15	2.23

Table 3. Comparison Peak Drainage Flow Rates

As this section of the report only serves to analyze the total, unmitigated peak runoff generated from the proposed project, refer to Section 3.3 of this report for a discussion of the detention components of the site. This analysis takes into account the proposed flood control mitigation facilities proposed onsite, which include underground concrete storage vaults. The results of the detention analysis provide a resultant, mitigated peak runoff leaving the site in addition to the detained time to peak (see Appendix B for results of the dynamic detention analysis performed using HydroCAD-10 software).

In an effort to comply with the City of Oceanside's Stormwater standards, all runoff generated onsite will be conveyed to an onsite biofiltration facility for treatment and pollutant removal. For a discussion regarding hydromodification management requirements and compliance, refer to the project Storm Water Quality Management Plan (SWQMP) under separate cover. The property was deemed infeasible to infiltrate by the project geotechnical engineer in accordance with "Report of Limited Geotechnical Investigation for Proposed Storm Water Infiltration BMPs" dated March 10, 2021 prepared by NOVA Services, and as such, proprietary biofiltration treatment is proposed to satisfy pollutant removal requirements of the Regional MS4 Permit.

In an effort to comply with the City of Oceanside's storm water standards for all development projects, the project site will implement source control and site design BMP's in addition to the proposed biofiltration treatment control BMP where feasible and applicable in accordance with the City of Oceanside's BMP Design Manual, February 2016 edition. Proposed impervious area and soil compaction are minimized to the greatest extent feasible, and dispersion is promoted as well. Partial infiltration and evapotranspiration in landscaped areas will assist in slowing peak discharges and in reducing total volume generated during storm events, while in addition serving to comply with volume retention requirements of the project. The onsite landscaped areas will assist to remove sediment and particulate-bound pollutants from storm water prior to leaving the project site.

1.4 Conclusions

Based upon the hydrology calculations performed for the project site, there is an increase in peak runoff in the post-developed condition compared to the existing condition as a direct result of the increase in impervious area. For a discussion on the detention analysis performed for the project site, refer to Section 3.3 below as well as the Appendix of this report. Based on the analysis included in this report, the proposed onsite detention facilities accommodate the increase in peak runoff generated in the proposed condition, mitigating peak flows to below pre-developed conditions. The site has been designed and graded in a way to minimize earthwork to the greatest extent feasible and maintain historic drainage patterns. Water leaving the subject property will continue to do so from the same points of discharge as in the existing condition. Thus, water will not be diverted away from existing drainage patterns, and the proposed development and resulting peak runoff will not have an adverse effect on the downstream watershed and existing infrastructure.

1.5 References

"San Diego County Hydrology Manual", revised June 2003, County of San Diego, Department of Public Works, Flood Control Section.

"San Diego County Hydraulic Design Manual", revised September 2014, County of San Diego, Department of Public Works, Flood Control Section

"Master Plan of Drainage, Update 2013", revised October 2013, City of Oceanside, prepared by Tory R. Walker Engineering, Inc.

"*City of Oceanside BMP Design Manual for Permanent Site Design, Storm Water Treatment and Hydromodification Management*", revised February 2016, City of Oceanside, prepared by GHD

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov.

2.0 METHODOLOGY

2.1 Introduction

The hydrologic model used to perform the hydrologic analysis presented in this report utilizes the Rational Method (RM) equation, Q = CIA. The RM formula estimates the peak rate of runoff based on the variables of area, runoff coefficient, and rainfall intensity. The rainfall intensity (I) is equal to:

$$I = 7.44 \times P_6 \times D^{-0.645}$$

Where:

I = Intensity (in/hr)
P_6 = 6-hour precipitation (inches)
D = duration (minutes – use Tc)

Using the Time of Concentration (Tc), which is the time required for a given element of water that originates at the most remote point of the basin being analyzed to reach the point at which the runoff from the basin is being analyzed. The RM equation determines the storm water runoff rate (Q) for a given basin in terms of flow (typically in cubic feet per second (cfs) but sometimes as gallons per minute (gpm)). The RM equation is as follows:

$$Q = CIA$$

Where:

Q = flow (in cfs)
C = runoff coefficient, ratio of rainfall that produces storm water runoff (runoff vs. infiltration/evaporation/absorption/etc)
I = average rainfall intensity for a duration equal to the Tc for the area, in inches per hour.
A = drainage area contributing to the basin in acres.

The RM equation assumes that the storm event being analyzed delivers precipitation to the entire basin uniformly, and therefore the peak discharge rate will occur when a raindrop that falls at the most remote portion of the basin arrives at the point of analysis. The RM also assumes that the fraction of rainfall that becomes runoff or the runoff coefficient C is not affected by the storm intensity, I, or the precipitation zone number.

2.2 County of San Diego Criteria

As defined by the County Hydrology Manual dated June 2003, the rational method is the preferred equation for determining the hydrologic characteristics of basins up to approximately one square mile in size. The County of San Diego has developed its own tables, nomographs, and methodologies for analyzing storm water runoff for areas within the county. The County has also developed precipitation isopluvial contour maps that show even lines of rainfall anticipated from a given storm event (i.e. 100-year, 6-hour storm).

One of the variables of the RM equation is the runoff coefficient, C. The runoff coefficient is dependent only upon land use and soil type and the County of San Diego has developed a table of Runoff Coefficients for Urban Areas to be applied to basin located within the County of San Diego. The table categorizes the land use, the associated development density (dwelling units per acre) and the percentage of impervious area. Each of the categories listed has an associated runoff coefficient, C, for each soil type class.

The County has also illustrated in detail the methodology for determining the time of concentration, in particular the initial time of concentration. The County has adopted the Federal Aviation Agency's (FAA) overland time of flow equation. This equation essentially limits the flow path length for the initial time of concentration to lengths under 100 feet, and is dependent on land use and slope.

2.3 City of Oceanside Standards

The City of Oceanside has additional information, overview, analysis, and findings for watersheds located within the City which are outlined in the Master Plan of Drainage, 2013 Update. Please refer to this manual for reference and further details.

2.4 Runoff Coefficient Determination

As stated in section 2.2, the runoff coefficient is dependent only upon land use and soil type and the County of San Diego has developed a table of Runoff Coefficients for Urban Areas to be applied to basin located within the County of San Diego. The table, included at the end of this section, categorizes the land use, the associated development density (dwelling units per acre) and the percentage of impervious area.

2.5 AES Rational Method Computer Model

The Rational Method computer program developed by Advanced Engineering Software (AES) satisfies the County of San Diego design criteria, therefore it is the computer model used for this study. The AES hydrologic model is capable of creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points to determine peak flow rates. The program utilizes base information input by the user to perform calculations for up to 15 hydrologic processes. The required base information includes drainage basin area, storm water facility locations and sizes, land uses, flow patterns, and topographic elevations. The hydrologic conditions were analyzed in accordance with the 2003 County of San Diego Hydrology Manual criteria as follows:

Design Storm	100-year, 6-hour
100-year, 6-hour Precipitation	2.8 inches
Rainfall Intensity	Based on the 2003 County of San Diego Hydrology Manual criteria
Runoff Coefficient	Weighted Runoff Coefficients per Section 3.1, 3.2 of this report and Table 3-2 of SDHDM

2.5.1 AES Computer Model Code Information

0: Enter Comment
2: Initial Subarea Analysis
3: Pipe/Box/Culvert Travel Time
5: Open Channel Travel Time
7: User-Specified hydrology data at Node
8: Addition of sub-area runoff to Main Stream
10: Copy Main Stream data onto a Memory Bank
11: Confluence Memory Bank data with Main Stream
13: Clear the Main Stream

3.0 HYDROLOGY MODEL OUTPUT

3.1 Pre-Developed Hydrologic Model Output (100 Year Event)

Pre-Development:

$Q = CIA$ *Rational Method Equation
$P_{100} = 2.8$ *100-Year, 6-Hour Rainfall Precipitation

Entire Disturbed Area (Onsite Drainage Basin)

Total Area = 1,365,575 sf ➔ 31.35 Acres
Impervious Area = 591,152 sf ➔ 13.57 Ac
Pervious Area = 774,423 sf ➔ 17.78 Ac

Cn, Weighted Runoff Coefficient,
- 0.20, Cn value for natural ground, Type A Soils
  *Per San Diego Hydrology Design Manual (SDHDM) Section 3.1.2
- 0.90, Cn value for developed/impervious surface
  *Per SDHDM Section 3.1.2

$$Cn = \frac{0.90 \text{ x } 591{,}152 \text{ sf} + 0.20 \text{ x } 774{,}423 \text{ sf}}{1{,}365{,}575 \text{ sf}} = 0.50$$

Cn = 0.50 *Weighted Runoff Coefficient for Site

Basin EX-1 (Discharging to the Northwest of the site to San Luis Rey River)

Total Area = 1,129,995 sf ➔ 25.94 Acres
Cn = 0.50 *Weighted Runoff Coefficient for Site

$Q = Cn \text{ x } I_{100} \text{ x } A$ *Q based on flow to outlet location

Entering the existing headwall and 36" RCP storm drain pipe
T_C = 21.6 min (See attached AES calculations)
Q_{100} = 37.2 cfs (See attached AES calculations)

Basin EX-2 (Discharging to the Southwest of the site)

Total Area = 153,118 sf ➔ 3.52 Acres
Cn = 0.50 *Weighted Runoff Coefficient for Site

$Q = Cn \times I_{100} \times A$ *Q based on flow to outlet location

Discharging from the site to the southwest corner entering the existing inlet
T_C = 15.2 min (See attached AES calculations)
Q_{100} = 6.4 cfs (See attached AES calculations)

Basin EX-3 (Discharging to the Northeast of the site to adjacent property)

Total Area = 82,422 sf ➔ 1.89 Acres
Cn = 0.50 *Weighted Runoff Coefficient for Site

$Q = Cn \times I_{100} \times A$ *Q based on flow to outlet location

Discharging from the site to the northeast corner
T_C = 26.6 min (See attached AES calculations)
Q_{100} = 2.4 cfs (See attached AES calculations)

Pre-Development – Total Site Runoff

Pre-Development (Basin EX-1)
Q_{100} = 37.2 cfs

Pre-Development (Basin EX-2)
Q_{100} = 6.4 cfs

Pre-Development (Basin EX-3)
Q_{100} = 2.4 cfs

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

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

                            Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* 250 EDDIE JONES WAY, OCEANSIDE CA                                        *
* PLSA 3751 - PRE-DEVELOPMENT HYDROLOGICAL STUDY                           *
*                                                                          *
 **************************************************************************

  FILE NAME: 3751PRE.DAT
  TIME/DATE OF STUDY: 11:37 04/12/2024
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.800
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

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

```
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     32.00
  DOWNSTREAM ELEVATION(FEET) =     26.90
  ELEVATION DIFFERENCE(FEET) =      5.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.959
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    90.20
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.588
  SUBAREA RUNOFF(CFS) =      0.79
  TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      0.79

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     26.90  DOWNSTREAM(FEET) =     23.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   876.00   CHANNEL SLOPE =  0.0043
  CHANNEL BASE(FEET) =   50.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.872
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.81
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.93
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =  15.63
  Tc(MIN.) =   21.59
  SUBAREA AREA(ACRES) =    11.33       SUBAREA RUNOFF(CFS) =   16.27
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.500
  TOTAL AREA(ACRES) =       11.6         PEAK FLOW RATE(CFS) =      16.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     976.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.872
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5000
  SUBAREA AREA(ACRES) =   13.70   SUBAREA RUNOFF(CFS) =   19.67
  TOTAL AREA(ACRES) =       25.3   TOTAL RUNOFF(CFS) =      36.28
  TC(MIN.) =   21.59

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.872
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5000
  SUBAREA AREA(ACRES) =    0.67   SUBAREA RUNOFF(CFS) =    0.96
  TOTAL AREA(ACRES) =       25.9   TOTAL RUNOFF(CFS) =      37.24
  TC(MIN.) =   21.59

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     30.10
  DOWNSTREAM ELEVATION(FEET) =     29.70
  ELEVATION DIFFERENCE(FEET) =      0.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.621
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.837
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.22

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     29.70  DOWNSTREAM(FEET) =     26.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   288.00   CHANNEL SLOPE =  0.0115
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.606
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.87
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   5.55
  Tc(MIN.) =   15.17
  SUBAREA AREA(ACRES) =     1.84       SUBAREA RUNOFF(CFS) =    3.32
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.500
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       3.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   1.04
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     388.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.606
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5000
  SUBAREA AREA(ACRES) =    1.59   SUBAREA RUNOFF(CFS) =    2.87
  TOTAL AREA(ACRES) =        3.5   TOTAL RUNOFF(CFS) =       6.35
  TC(MIN.) =   15.17

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     31.30
  DOWNSTREAM ELEVATION(FEET) =     31.10
  ELEVATION DIFFERENCE(FEET) =      0.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.621
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
```

```
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.837
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     31.10  DOWNSTREAM(FEET) =     29.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   417.00   CHANNEL SLOPE =  0.0048
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 417.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.691
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.49
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =  14.26
  Tc(MIN.) =   23.88
  SUBAREA AREA(ACRES) =     1.10       SUBAREA RUNOFF(CFS) =    1.48
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.500
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       1.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   0.58
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     517.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    29.10  DOWNSTREAM(FEET) =    28.30
  FLOW LENGTH(FEET) =    57.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.86
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.61
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   24.08
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     574.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     28.30  DOWNSTREAM(FEET) =     27.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   116.00   CHANNEL SLOPE =  0.0078
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.509
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.76
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   2.54
  Tc(MIN.) =   26.62
  SUBAREA AREA(ACRES) =     0.69       SUBAREA RUNOFF(CFS) =    0.87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.500
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       2.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   0.80
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =     690.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.9  TC(MIN.) =     26.62
  PEAK FLOW RATE(CFS)   =       2.37
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

3.2 Post-Developed Hydrologic Model Output (100-Year Event)

<u>Post-Development:</u>

Q = CIA	*Rational Method Equation
P_{100} = 2.8	*100-Year, 6-Hour Rainfall Precipitation

<u>Entire Disturbed Area (Onsite Drainage Basin)</u>

Total Area = 1,384,577 sf ➔ 31.79 Acres
Total Drainage Area = 1,365,575 sf ➔ 31.35 Acres
Total Disturbed Area = 1,314,864 sf ➔ 30.19 Acres
Impervious Area = 1,034,986 sf ➔ 23.76 Ac
Pervious Area = 330,589 sf ➔ 7.59 Ac

Cn, Weighted Runoff Coefficient,
- 0.20, Cn value for natural ground, Type A Soils
  *Per San Diego Hydrology Design Manual (SDHDM) Section 3.1.2
- 0.90, Cn value for developed/impervious surface
  *Per SDHDM Section 3.1.2

$$Cn = \frac{0.90 \text{ x } 1{,}034{,}986 \text{ sf} + 0.20 \text{ x } 330{,}589 \text{ sf}}{1{,}384{,}577 \text{ sf}} = 0.72$$

Cn = 0.72	*Weighted Runoff Coefficient for Site

<u>Basin PR-1 (Discharging to the Northwest of the site to San Luis Rey River)</u>

Total Area = 568,200 sf ➔ 13.04 Acres	
Cn = 0.72	*Weighted Runoff Coefficient for Site
Q = Cn x I_{100} x A	*Q based on flow to proposed BMP

<u>Entering the proposed catch basin and existing 36" RCP storm drain pipe</u>
T_C = <u>5.6 min</u> (See attached AES calculations)
Q_{100} = <u>61.7 cfs</u> (See attached AES calculations)

<u>Basin PR-2 (Discharging to the Southwest corner of the site)</u>

Total Area = 783,146 sf ➔ 17.98 Acres
Cn = 0.72 *Weighted Runoff Coefficient for Site

$Q = Cn \times I_{100} \times A$ *Q based on flow to proposed BMP

<u>Discharging from the site through prop. RCP Storm Drain, ex. to the southwest corner entering the existing inlet</u>
T_C = <u>7.2 min</u> (See attached AES calculations)
Q_{100} = <u>62.8 cfs</u> (See attached AES calculations)

<u>Basin PR-3 (Discharging to the Northeast corner of the site)</u>

Total Area = 14,229 sf ➔ 0.33 Acres
Cn = 0.72 *Weighted Runoff Coefficient for Site

$Q = Cn \times I_{100} \times A$ *Q based on flow to proposed BMP

<u>Discharging from the site through prop. RCP Storm Drain, ex. to the southwest corner entering the existing inlet</u>
T_C = <u>32.2 min</u> (See attached AES calculations)
Q_{100} = <u>0.15 cfs</u> (See attached AES calculations)

Total Q_{100} for Proposed Development = PR-1 + PR-2 + PR-3
= 61.7 + 62.8 + 0.15 cfs
= 124.7 cfs

<u>Pre-Development vs. Post-Development (Undetained – Total Site Runoff)</u>

<u>Pre-Development (Basin EX-1)</u>	<u>Post-Development (PR-1)</u>	<u>Delta</u>
Q_{100} = 37.2 cfs	**Q_{100} = 61.7 cfs**	**24.5 cfs**
<u>Pre-Development (Basin EX-2)</u>	<u>Post-Development (PR-2)</u>	<u>Delta</u>
Q_{100} = 6.4 cfs	**Q_{100} = 62.8 cfs**	**56.4 cfs**
<u>Pre-Development (Basin EX-3)</u>	<u>Post-Development (PR-3)</u>	<u>Delta</u>
Q_{100} = 2.4 cfs	**Q_{100} = 0.15 cfs**	**-2.25 cfs**

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

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

                            Analysis prepared by:






 ************************* DESCRIPTION OF STUDY **************************
* 250 EDDY JONES WAY, OCEANSIDE, CA                                        *
* PLSA 3751 - POST DEVELOPMENT UNDETAINED HYDROLOGICAL STUDY                *
*                                                                          *
 **************************************************************************

  FILE NAME: 3751POST.DAT
  TIME/DATE OF STUDY: 12:22 06/03/2024
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.800
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======   ===== ====== ===== =======
  1   17.5     12.5    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  9.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

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

```
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     38.00
  DOWNSTREAM ELEVATION(FEET) =     30.60
  ELEVATION DIFFERENCE(FEET) =      7.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.418
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    94.80
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.70
  TOTAL AREA(ACRES) =      0.32   TOTAL RUNOFF(CFS) =      1.70

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   30.60  DOWNSTREAM ELEVATION(FEET) =   22.20
  STREET LENGTH(FEET) =   216.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.50

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.36
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.79
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.77
  STREET FLOW TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    4.16
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.720
  SUBAREA AREA(ACRES) =    2.13      SUBAREA RUNOFF(CFS) =   11.31
  TOTAL AREA(ACRES) =        2.5        PEAK FLOW RATE(CFS) =      13.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.91
  FLOW VELOCITY(FEET/SEC.) =  5.56   DEPTH*VELOCITY(FT*FT/SEC.) =   2.36
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     316.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7200
  SUBAREA AREA(ACRES) =    1.84   SUBAREA RUNOFF(CFS) =    9.77
  TOTAL AREA(ACRES) =        4.3   TOTAL RUNOFF(CFS) =      22.79
  TC(MIN.) =    4.16

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    18.20  DOWNSTREAM(FEET) =    17.75
  FLOW LENGTH(FEET) =    47.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.20
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.79
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    4.25
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     363.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    17.65  DOWNSTREAM(FEET) =    14.70
  FLOW LENGTH(FEET) =   328.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.2 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.99
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.79
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =    4.94
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     691.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7200
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    4.78
  TOTAL AREA(ACRES) =        5.2   TOTAL RUNOFF(CFS) =      27.57
  TC(MIN.) =    4.94

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7200
  SUBAREA AREA(ACRES) =    1.32   SUBAREA RUNOFF(CFS) =    7.01
  TOTAL AREA(ACRES) =        6.5   TOTAL RUNOFF(CFS) =      34.58
  TC(MIN.) =    4.94

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    14.60  DOWNSTREAM(FEET) =    13.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.26
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.58
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =    5.22
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =     830.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.40  DOWNSTREAM(FEET) =    11.70
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.31
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.58
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =    5.64
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =    1042.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.825
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7200
  SUBAREA AREA(ACRES) =    1.59   SUBAREA RUNOFF(CFS) =    7.81
  TOTAL AREA(ACRES) =        8.1   TOTAL RUNOFF(CFS) =      39.80
  TC(MIN.) =    5.64

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.825
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7200
  SUBAREA AREA(ACRES) =    1.82   SUBAREA RUNOFF(CFS) =    8.94
  TOTAL AREA(ACRES) =        9.9   TOTAL RUNOFF(CFS) =      48.75
  TC(MIN.) =    5.64

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.64
  RAINFALL INTENSITY(INCH/HR) =   6.83
  TOTAL STREAM AREA(ACRES) =     9.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     48.75

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7400
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     29.50
  DOWNSTREAM ELEVATION(FEET) =     26.80
  ELEVATION DIFFERENCE(FEET) =      2.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.084
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    77.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.87
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.87

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   26.80  DOWNSTREAM ELEVATION(FEET) =   25.70
  STREET LENGTH(FEET) =   109.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.50

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.34
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
```

```
    HALFSTREET FLOOD WIDTH(FEET) =   11.30
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.40
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
  STREET FLOW TRAVEL TIME(MIN.) =   0.76   Tc(MIN.) =    4.84
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.723
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    4.94
  TOTAL AREA(ACRES) =        1.1        PEAK FLOW RATE(CFS) =       5.81

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.13
  FLOW VELOCITY(FEET/SEC.) =  2.75   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    122.00 =     209.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    22.70  DOWNSTREAM(FEET) =    20.70
  FLOW LENGTH(FEET) =   207.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.74
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.81
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =    5.44
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    123.00 =     416.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.984
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7217
  SUBAREA AREA(ACRES) =    0.74   SUBAREA RUNOFF(CFS) =    3.72
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       9.22
  TC(MIN.) =    5.44

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.60  DOWNSTREAM(FEET) =    19.60
  FLOW LENGTH(FEET) =    93.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.77
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.22
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    5.67
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    125.00 =     509.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    126.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    19.50  DOWNSTREAM(FEET) =    18.20
  FLOW LENGTH(FEET) =   126.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.65
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.22
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    5.99
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    126.00 =     635.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.567
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7213
  SUBAREA AREA(ACRES) =    0.62   SUBAREA RUNOFF(CFS) =    2.93
  TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =      11.61
  TC(MIN.) =    5.99

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    18.10  DOWNSTREAM(FEET) =    11.50
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.7 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.08
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.61
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.03
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    128.00 =     680.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.03
  RAINFALL INTENSITY(INCH/HR) =   6.54
  TOTAL STREAM AREA(ACRES) =     2.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.61

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       48.75     5.64        6.825          9.92
      2       11.61     6.03        6.540          2.45

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       59.61     5.64       6.825
      2       58.31     6.03       6.540

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.61   Tc(MIN.) =    5.64
  TOTAL AREA(ACRES) =       12.4
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    128.00 =    1042.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.825
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6935
  SUBAREA AREA(ACRES) =    0.67   SUBAREA RUNOFF(CFS) =    0.91
```

```
  TOTAL AREA(ACRES) =       13.0   TOTAL RUNOFF(CFS) =      61.72
  TC(MIN.) =    5.64

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7400
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     37.50
  DOWNSTREAM ELEVATION(FEET) =     27.30
  ELEVATION DIFFERENCE(FEET) =     10.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.008
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.20
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      1.20

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   27.30  DOWNSTREAM ELEVATION(FEET) =   25.70
  STREET LENGTH(FEET) =   148.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.50

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.36
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
```

```
    HALFSTREET FLOOD WIDTH(FEET) =   12.37
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.64
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
  STREET FLOW TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =    3.94
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.723
  SUBAREA AREA(ACRES) =    1.19      SUBAREA RUNOFF(CFS) =    6.32
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       7.52

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.50
  FLOW VELOCITY(FEET/SEC.) =  2.98   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     248.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    22.70  DOWNSTREAM(FEET) =    20.55
  FLOW LENGTH(FEET) =   216.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.52
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =    4.51
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     464.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7219
  SUBAREA AREA(ACRES) =    0.91   SUBAREA RUNOFF(CFS) =    4.83
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =      12.36
  TC(MIN.) =    4.51

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.45  DOWNSTREAM(FEET) =    18.70
  FLOW LENGTH(FEET) =   174.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.15
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.36
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    4.92
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =     638.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7216
  SUBAREA AREA(ACRES) =    0.42   SUBAREA RUNOFF(CFS) =    2.23
  TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =      14.59
  TC(MIN.) =    4.92

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    18.60  DOWNSTREAM(FEET) =    14.85
  FLOW LENGTH(FEET) =   362.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.42
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.59
  PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =    5.73
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =    1000.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.757
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7209
  SUBAREA AREA(ACRES) =    2.34   SUBAREA RUNOFF(CFS) =   11.38
  TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =      24.74
  TC(MIN.) =    5.73

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.757
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7206
  SUBAREA AREA(ACRES) =    1.84   SUBAREA RUNOFF(CFS) =    8.95
  TOTAL AREA(ACRES) =        6.9   TOTAL RUNOFF(CFS) =      33.70
  TC(MIN.) =    5.73

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    209.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    14.75  DOWNSTREAM(FEET) =    11.45
  FLOW LENGTH(FEET) =   328.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.15
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.70
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =    6.33
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    209.00 =    1328.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.338
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7206
  SUBAREA AREA(ACRES) =    0.98   SUBAREA RUNOFF(CFS) =    4.47
  TOTAL AREA(ACRES) =        7.9   TOTAL RUNOFF(CFS) =      36.08
  TC(MIN.) =    6.33
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.338
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7205
  SUBAREA AREA(ACRES) =    1.32   SUBAREA RUNOFF(CFS) =    6.02
  TOTAL AREA(ACRES) =        9.2   TOTAL RUNOFF(CFS) =      42.11
  TC(MIN.) =    6.33

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    212.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.35  DOWNSTREAM(FEET) =     8.20
  FLOW LENGTH(FEET) =   348.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.28
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      42.11
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =    6.95
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    212.00 =    1676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    213.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.965
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7204
  SUBAREA AREA(ACRES) =    2.69   SUBAREA RUNOFF(CFS) =   11.55
  TOTAL AREA(ACRES) =       11.9   TOTAL RUNOFF(CFS) =      51.18
  TC(MIN.) =    6.95

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.965
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7203
  SUBAREA AREA(ACRES) =    1.88   SUBAREA RUNOFF(CFS) =    8.07
  TOTAL AREA(ACRES) =       13.8   TOTAL RUNOFF(CFS) =      59.25
  TC(MIN.) =    6.95

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     8.10  DOWNSTREAM(FEET) =     7.30
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.59
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.25
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    7.21
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =    1808.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.827
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6196
  SUBAREA AREA(ACRES) =    3.31   SUBAREA RUNOFF(CFS) =    3.86
  TOTAL AREA(ACRES) =       17.1   TOTAL RUNOFF(CFS) =      61.74
  TC(MIN.) =    7.21

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.827
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5991
  SUBAREA AREA(ACRES) =    0.88   SUBAREA RUNOFF(CFS) =    1.03
  TOTAL AREA(ACRES) =       18.0   TOTAL RUNOFF(CFS) =      62.77
  TC(MIN.) =    7.21

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     34.20
  DOWNSTREAM ELEVATION(FEET) =     33.45
  ELEVATION DIFFERENCE(FEET) =      0.75
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   13.223
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    55.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.940
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     33.45  DOWNSTREAM(FEET) =     31.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   305.00   CHANNEL SLOPE =  0.0064
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.274
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.29
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =  17.79
  Tc(MIN.) =   31.01
  SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.09
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       0.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   0.28
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     405.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.50  DOWNSTREAM(FEET) =    30.00
  FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.27
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.15
  PIPE TRAVEL TIME(MIN.) =   1.21    Tc(MIN.) =   32.22
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     570.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.3  TC(MIN.) =     32.22
  PEAK FLOW RATE(CFS)   =       0.15
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

3.3 Detention Analysis (100-Year Event)

The onsite detention facilities consist of underground storage vaults located beneath the drive aisle to provide mitigation of the 100-year, 6-hour storm event peak flow rate. HydroCAD-10 has the ability to route the 100-year, 6-hour storm event inflow hydrograph (generated and modeled using RatHydro, which is a Rational Method Design Storm Hydrograph software that creates a hydrograph using the results of the Rational Method calculations) through the underground detention vault. Based on the vault cross-section geometry, stage-storage and outlet structure data, HydroCAD-10 has the ability to perform a dynamic / routing analysis and calculate the detained peak flow rate as well as detained time to peak. The inflow runoff hydrograph to the biofiltration basin was modeled using RatHydro which is a Rational Method Design Storm Hydrograph software that creates a hydrograph using the results of the Rational Method calculations.

All site runoff will be collected by a series of private storm drain inlets and piping, and will be conveyed to the underground storage vaults prior to discharging from the property. The project also proposes the use of Modular Wetlands system proprietary biofiltration treatment devices to comply with the water quality component of the MS4 Permit. Additionally, an outlet module installed as part of the detention vault, consisting of a system of weirs and connected to an outlet pipe, will further serve to mitigate peak flows before discharging directly offsite. The weir system detail can be seen on the project plans. This drainage path with both outlets from the storage vault has been modeled in the HydroCAD-10 analysis as seen on the Routing Diagram included in Appendix B of this report.

PROPOSED DRAINAGE FLOWS (MIT)			
DRAINAGE AREA	DRAINAGE AREA (ACRES)	Q_{100} (CFS)	I_{100} (IN/HR)
PR-1	13.04 Ac	10.7	4.25
PR-2	17.98 Ac	5.9	2.09

Table 3. Proposed Condition Peak Drainage Flow Rates (Mitigated)

Table 3 above lists the peak flow rates for the project site in the proposed, mitigated condition after being routed through the biofiltration basin. Based on the results of the HydroCAD-10 analysis, the underground detention vaults and outlet structures provide mitigation for the 100-year, 6-hour storm event peak flow rate. The resulting total peak discharge leaving the site for Basin PR-1 is 10.7 cfs and for Basin PR-2 is 5.9 cfs, which is below the pre-development Q_{100} of 37.2 cfs for Basin EX-1 and 6.4 cfs for Basin EX-2 at the same points of discharge.

Refer to Appendix A of this Hydrology Report and also to Appendix B for the HydroCAD-10 detailed output, which shows the effect of the detention characteristics of the underground storage vaults on the resulting peak discharge and time of concentration leaving the subject property.

3.3.1 Proposed Detained Condition Output Summary (100-Year Event)

Summary of Pre-Development Flows

Peak Runoff Generated (At Northwest Corner)
Total Area = 1,129,995 sf (EX-1) → 25.94 Acres
Q_{100} = **37.2 cfs**

Peak Runoff Generated (At Southwest Corner)
Total Area = 153,118 sf (EX-2) → 3.52 Acres
Q_{100} = **6.4 cfs**

Peak Runoff Generated (At Northeast Corner)
Total Area = 82,422 sf (EX-3) → 1.89 Acres
Q_{100} = **2.4 cfs**

Summary of Post-Development Flows (Mitigated)

Peak Runoff Generated (At Northwest Corner)
Total Area = 568,200 sf (PR-1) → 13.04 Acres
Q_{100} = **10.7 cfs** < 37.2 cfs in the existing condition

Peak Runoff Generated (At Southwest Corner)
Total Area = 783,146 sf (PR-2) → 17.98 Acres
Q_{100} = **5.9 cfs** < 6.2 cfs in the existing condition

Peak Runoff Generated (At Northeast Corner)
Total Area = 14,229 sf (PR-3) → 0.33 Acres
Q_{100} = **0.15 cfs** < 2.4 cfs in the existing condition

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

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

                            Analysis prepared by:







 ************************** DESCRIPTION OF STUDY **************************
* 250 EDDY JONES WAY, OCEANSIDE, CA                                        *
* PLSA 3751 - POST DEVELOPMENT DETAINED HYDROLOGICAL STUDY                  *
*                                                                          *
 **************************************************************************

  FILE NAME: 3751PD.DAT
  TIME/DATE OF STUDY: 14:07 06/04/2024
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.800
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======   ===== ====== ===== =======
  1   17.5     12.5    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  9.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

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

```
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     38.00
  DOWNSTREAM ELEVATION(FEET) =     30.60
  ELEVATION DIFFERENCE(FEET) =      7.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.418
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    94.80
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.70
  TOTAL AREA(ACRES) =      0.32   TOTAL RUNOFF(CFS) =      1.70

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   30.60  DOWNSTREAM ELEVATION(FEET) =   22.20
  STREET LENGTH(FEET) =   216.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.50

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.36
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.79
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.77
  STREET FLOW TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    4.16
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.720
  SUBAREA AREA(ACRES) =    2.13      SUBAREA RUNOFF(CFS) =   11.31
  TOTAL AREA(ACRES) =        2.5        PEAK FLOW RATE(CFS) =      13.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.91
  FLOW VELOCITY(FEET/SEC.) =  5.56   DEPTH*VELOCITY(FT*FT/SEC.) =   2.36
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     316.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7200
  SUBAREA AREA(ACRES) =    1.84   SUBAREA RUNOFF(CFS) =    9.77
  TOTAL AREA(ACRES) =        4.3   TOTAL RUNOFF(CFS) =      22.79
  TC(MIN.) =    4.16

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    18.20  DOWNSTREAM(FEET) =    17.75
  FLOW LENGTH(FEET) =    47.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.20
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.79
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    4.25
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     363.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    17.65  DOWNSTREAM(FEET) =    14.70
  FLOW LENGTH(FEET) =   328.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.2 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.99
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.79
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =    4.94
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     691.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7200
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    4.78
  TOTAL AREA(ACRES) =        5.2   TOTAL RUNOFF(CFS) =      27.57
  TC(MIN.) =    4.94

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7200
  SUBAREA AREA(ACRES) =    1.32   SUBAREA RUNOFF(CFS) =    7.01
  TOTAL AREA(ACRES) =        6.5   TOTAL RUNOFF(CFS) =      34.58
  TC(MIN.) =    4.94

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    14.60  DOWNSTREAM(FEET) =    13.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.26
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.58
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =    5.22
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =     830.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.40  DOWNSTREAM(FEET) =    11.70
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.31
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.58
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =    5.64
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =    1042.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.825
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7200
  SUBAREA AREA(ACRES) =    1.59   SUBAREA RUNOFF(CFS) =    7.81
  TOTAL AREA(ACRES) =        8.1   TOTAL RUNOFF(CFS) =      39.80
  TC(MIN.) =    5.64

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.825
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7200
  SUBAREA AREA(ACRES) =    1.82   SUBAREA RUNOFF(CFS) =    8.94
  TOTAL AREA(ACRES) =        9.9   TOTAL RUNOFF(CFS) =      48.75
  TC(MIN.) =    5.64

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.64
  RAINFALL INTENSITY(INCH/HR) =   6.83
  TOTAL STREAM AREA(ACRES) =     9.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     48.75

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7400
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     29.50
  DOWNSTREAM ELEVATION(FEET) =     26.80
  ELEVATION DIFFERENCE(FEET) =      2.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.084
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    77.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.87
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.87

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   26.80  DOWNSTREAM ELEVATION(FEET) =   25.70
  STREET LENGTH(FEET) =   109.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.50

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.34
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
```

```
    HALFSTREET FLOOD WIDTH(FEET) =   11.30
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.40
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
  STREET FLOW TRAVEL TIME(MIN.) =   0.76   Tc(MIN.) =    4.84
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.723
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    4.94
  TOTAL AREA(ACRES) =        1.1        PEAK FLOW RATE(CFS) =       5.81

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.13
  FLOW VELOCITY(FEET/SEC.) =  2.75   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    122.00 =     209.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    22.70  DOWNSTREAM(FEET) =    20.70
  FLOW LENGTH(FEET) =   207.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.74
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.81
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =    5.44
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    123.00 =     416.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.984
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7217
  SUBAREA AREA(ACRES) =    0.74   SUBAREA RUNOFF(CFS) =    3.72
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       9.22
  TC(MIN.) =    5.44

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.60  DOWNSTREAM(FEET) =    19.60
  FLOW LENGTH(FEET) =    93.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.77
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.22
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    5.67
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    125.00 =     509.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    126.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    19.50  DOWNSTREAM(FEET) =    18.20
  FLOW LENGTH(FEET) =   126.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.65
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.22
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    5.99
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    126.00 =     635.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.567
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7213
  SUBAREA AREA(ACRES) =    0.62   SUBAREA RUNOFF(CFS) =    2.93
  TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =      11.61
  TC(MIN.) =    5.99

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    18.10  DOWNSTREAM(FEET) =    11.50
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.7 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.08
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.61
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.03
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    128.00 =     680.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.03
  RAINFALL INTENSITY(INCH/HR) =   6.54
  TOTAL STREAM AREA(ACRES) =     2.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.61

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       48.75     5.64        6.825          9.92
      2       11.61     6.03        6.540          2.45

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       59.61     5.64       6.825
      2       58.31     6.03       6.540

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.61   Tc(MIN.) =    5.64
  TOTAL AREA(ACRES) =       12.4
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    128.00 =    1042.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.74   RAIN INTENSITY(INCH/HOUR) =  4.25
  TOTAL AREA(ACRES) =    12.37   TOTAL RUNOFF(CFS) =     10.14

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    129.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.74
  RAINFALL INTENSITY(INCH/HR) =   4.25
  TOTAL STREAM AREA(ACRES) =    12.37
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.14

****************************************************************************
  FLOW PROCESS FROM NODE    129.00 TO NODE    129.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.64   RAIN INTENSITY(INCH/HOUR) =  6.83
  TOTAL AREA(ACRES) =     0.67   TOTAL RUNOFF(CFS) =      0.91

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    129.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.64
  RAINFALL INTENSITY(INCH/HR) =   6.83
  TOTAL STREAM AREA(ACRES) =     0.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.91

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       10.14    11.74        4.254         12.37
      2        0.91     5.64        6.826          0.67

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        5.78     5.64       6.826
      2       10.71    11.74       4.254

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.71   Tc(MIN.) =   11.74
  TOTAL AREA(ACRES) =       13.0
```

```
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    129.00 =    1042.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7400
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     37.50
  DOWNSTREAM ELEVATION(FEET) =     27.30
  ELEVATION DIFFERENCE(FEET) =     10.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.008
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.20
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      1.20

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   27.30  DOWNSTREAM ELEVATION(FEET) =   25.70
  STREET LENGTH(FEET) =   148.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.50

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.36
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.37
```

```
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.64
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
  STREET FLOW TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =    3.94
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.723
  SUBAREA AREA(ACRES) =    1.19      SUBAREA RUNOFF(CFS) =    6.32
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       7.52

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.50
  FLOW VELOCITY(FEET/SEC.) =  2.98   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     248.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    22.70  DOWNSTREAM(FEET) =    20.55
  FLOW LENGTH(FEET) =   216.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.52
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =    4.51
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     464.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7219
  SUBAREA AREA(ACRES) =    0.91   SUBAREA RUNOFF(CFS) =    4.83
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =      12.36
  TC(MIN.) =    4.51

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.45  DOWNSTREAM(FEET) =    18.70
  FLOW LENGTH(FEET) =   174.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.15
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.36
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    4.92
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =     638.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  81
-----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7216
  SUBAREA AREA(ACRES) =    0.42   SUBAREA RUNOFF(CFS) =    2.23
  TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =      14.59
  TC(MIN.) =    4.92

*****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  31
-----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    18.60  DOWNSTREAM(FEET) =    14.85
  FLOW LENGTH(FEET) =   362.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.42
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.59
  PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =    5.73
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =    1000.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =  81
-----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.757
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7209
  SUBAREA AREA(ACRES) =    2.34   SUBAREA RUNOFF(CFS) =   11.38
  TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =      24.74
  TC(MIN.) =    5.73

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.757
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7206
  SUBAREA AREA(ACRES) =    1.84   SUBAREA RUNOFF(CFS) =    8.95
  TOTAL AREA(ACRES) =        6.9   TOTAL RUNOFF(CFS) =      33.70
  TC(MIN.) =    5.73

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    209.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    14.75  DOWNSTREAM(FEET) =    11.45
  FLOW LENGTH(FEET) =   328.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.15
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.70
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =    6.33
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    209.00 =    1328.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.338
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7206
  SUBAREA AREA(ACRES) =    0.98   SUBAREA RUNOFF(CFS) =    4.47
  TOTAL AREA(ACRES) =        7.9   TOTAL RUNOFF(CFS) =      36.08
  TC(MIN.) =    6.33

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

```
  FLOW PROCESS FROM NODE    211.00 TO NODE    211.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.338
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7205
  SUBAREA AREA(ACRES) =    1.32   SUBAREA RUNOFF(CFS) =    6.02
  TOTAL AREA(ACRES) =        9.2   TOTAL RUNOFF(CFS) =      42.11
  TC(MIN.) =    6.33

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    212.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.35  DOWNSTREAM(FEET) =     8.20
  FLOW LENGTH(FEET) =   348.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.28
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      42.11
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =    6.95
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    212.00 =    1676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    213.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.965
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7204
  SUBAREA AREA(ACRES) =    2.69   SUBAREA RUNOFF(CFS) =   11.55
  TOTAL AREA(ACRES) =       11.9   TOTAL RUNOFF(CFS) =      51.18
  TC(MIN.) =    6.95

****************************************************************************
  FLOW PROCESS FROM NODE    214.00 TO NODE    214.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.965
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7203
  SUBAREA AREA(ACRES) =    1.88   SUBAREA RUNOFF(CFS) =    8.07
  TOTAL AREA(ACRES) =       13.8   TOTAL RUNOFF(CFS) =      59.25
  TC(MIN.) =    6.95

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     8.10  DOWNSTREAM(FEET) =     7.30
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.59
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.25
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    7.21
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =    1808.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  35.31   RAIN INTENSITY(INCH/HOUR) =  2.09
  TOTAL AREA(ACRES) =    13.80   TOTAL RUNOFF(CFS) =      4.10

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   35.31
  RAINFALL INTENSITY(INCH/HR) =   2.09
  TOTAL STREAM AREA(ACRES) =    13.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.10

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   7.21   RAIN INTENSITY(INCH/HOUR) =  5.83
  TOTAL AREA(ACRES) =     3.31   TOTAL RUNOFF(CFS) =      3.86
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE      3.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.21
  RAINFALL INTENSITY(INCH/HR) =   5.83
  TOTAL STREAM AREA(ACRES) =     3.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.86

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   7.21   RAIN INTENSITY(INCH/HOUR) =  5.83
  TOTAL AREA(ACRES) =     0.88   TOTAL RUNOFF(CFS) =      1.03

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE      4.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.21
  RAINFALL INTENSITY(INCH/HR) =   5.83
  TOTAL STREAM AREA(ACRES) =     0.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.03

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.10    35.31        2.091         13.80
      2        3.86     7.21        5.826          3.31
      3        1.03     7.21        5.826          0.88

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        5.73     7.21       5.826
      2        5.73     7.21       5.826
```

```
     3        5.86    35.31       2.091

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.86   Tc(MIN.) =   35.31
  TOTAL AREA(ACRES) =       18.0
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE      4.00 =    1808.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     34.20
  DOWNSTREAM ELEVATION(FEET) =     33.45
  ELEVATION DIFFERENCE(FEET) =      0.75
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   13.223
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    55.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.940
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     33.45  DOWNSTREAM(FEET) =     31.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   305.00   CHANNEL SLOPE =  0.0064
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.274
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.29
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =  17.79
  Tc(MIN.) =   31.01
  SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.09
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.200
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       0.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   0.28
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     405.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    31.50  DOWNSTREAM(FEET) =    30.00
  FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.27
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.15
  PIPE TRAVEL TIME(MIN.) =   1.21    Tc(MIN.) =   32.22
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     570.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.3  TC(MIN.) =     32.22
  PEAK FLOW RATE(CFS)   =       0.15
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

3.4 Hydromodification Analysis

Refer to the project Storm Water Quality Management Plan (SWQMP) prepared by Pasco, Laret, Suiter & Associates under separate cover for discussion of hydromodification management strategy and compliance to satisfy the requirements of the MS4 Permit.

3.5 Storm Water Pollutant Control

To meet the requirements of the MS4 Permit, the storm water treatment facilities are designed to treat onsite storm water pollutants contained in the volume of runoff from a 24-hour, 85th percentile storm event by infiltrating runoff through an engineered soil layer. Refer to the project Storm Water Quality Management Plan (SWQMP) prepared by Pasco, Laret, Suiter & Associates under separate cover for discussion of pollutant control.

3.6 Pipe Flow Capacity

24” @ 1.0% Pipe Capacity at (3/4 full) Q = 20.63 cfs
30” @ 1.0% Pipe Capacity at (3/4 full) Q = 37.41 cfs
36” @ 1.0% Pipe Capacity at (3/4 full) Q = 60.84 cfs

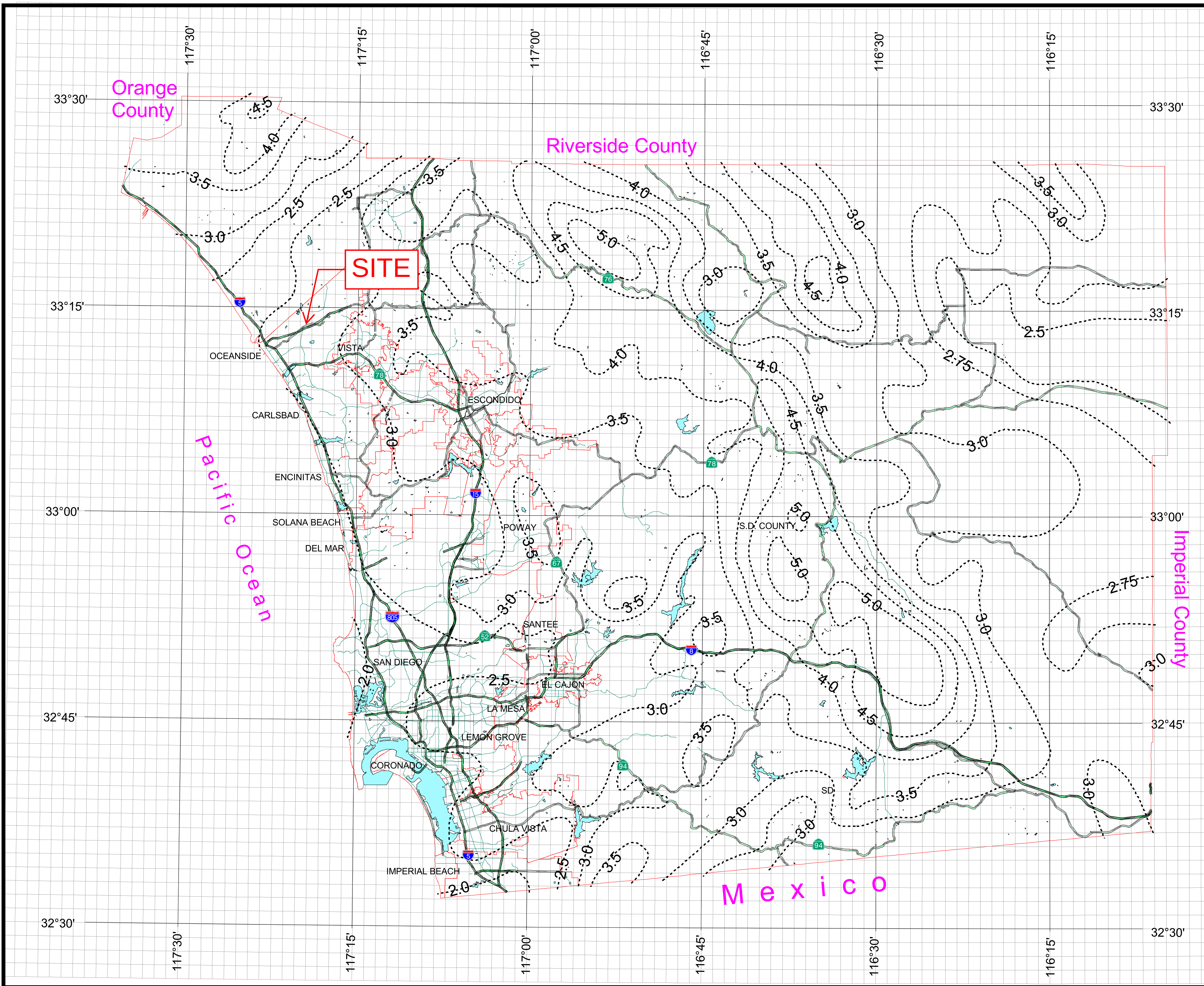
3.6.1 Benet Road Storm Drain Capacity

As mentioned previously in sections 1.2 and 1.3 of the report, Basins EX-2 and PR-2 discharge from the subject property towards the southwest corner of the site. From here, runoff continues south down Benet Road before entering an existing grated inlet on the south side of Eddie Jones Road. Runoff is then collected in a 30” RCP storm drain pipe sloped at 1.0% which then transitions to a 36” RCP storm drain pipe as shown as Line “A-1” on drawing R-9918. This line runs west under Benet Road prior to outletting to the San Luis Rey River not far downstream.

To analyze the impact of the proposed development on this system, the limits of the analysis were contained to the portions of the site within the proposed disturbed area to compare peak flows entering this system in the pre-project and post-developed conditions. A further delineation of the overall drainage basin discharging to this existing storm drain network outside the limits of the project scope was not performed at this time. This assumes the existing system to be adequately sized to handle the total drainage basin reaching this location in the pre-project location, and ensures that any impact of the proposed development and unmitigated increase in peak flows generated to this point of discharge are mitigated onsite to pre-project conditions prior to leaving the subject property.

APPENDIX A

Hydrology Support Material



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

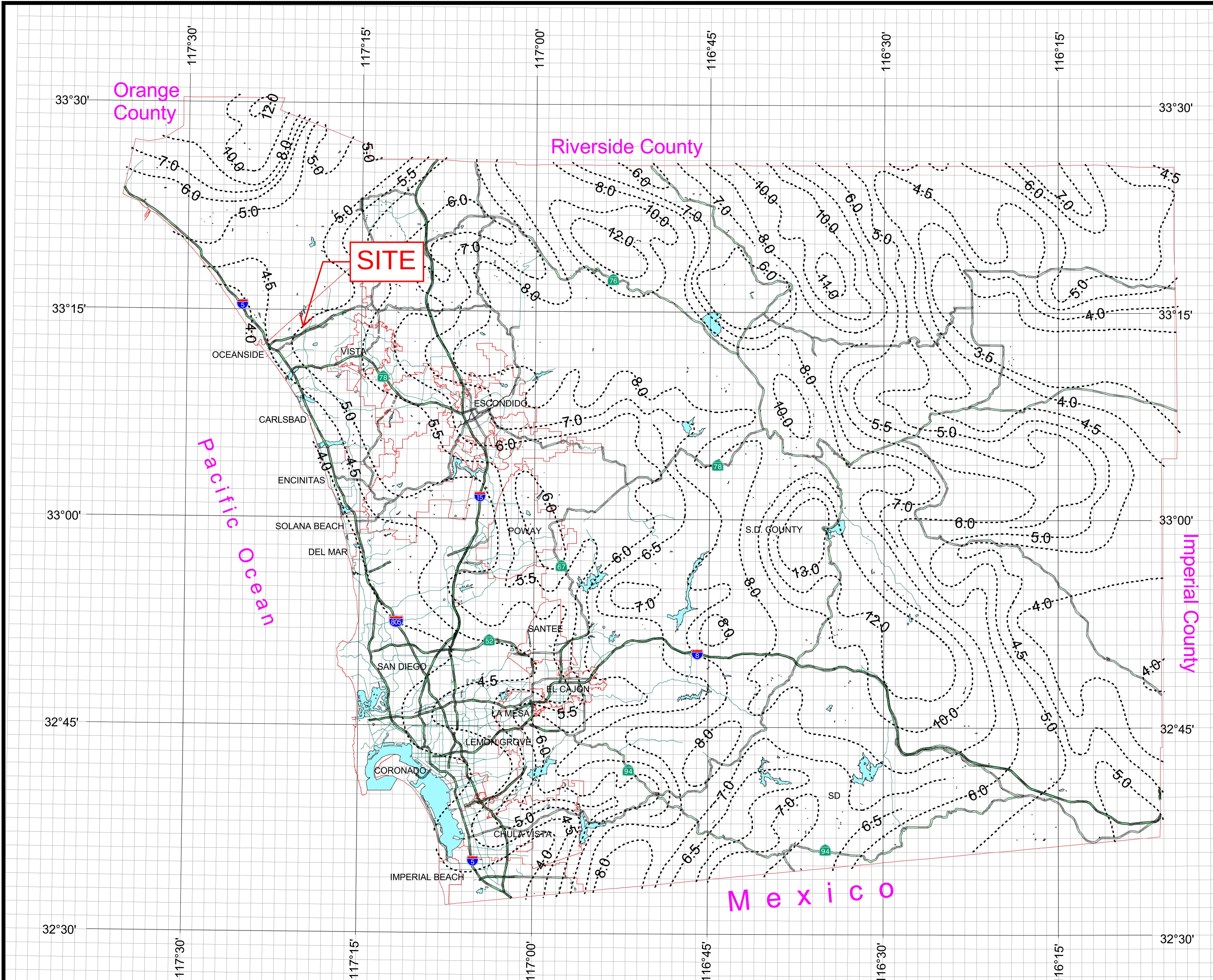
Isopluvial (inches)

DPW GIS
Department of Public Works Geographic Information Services

SanGIS
We Have San Diego Covered!

N S W E

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

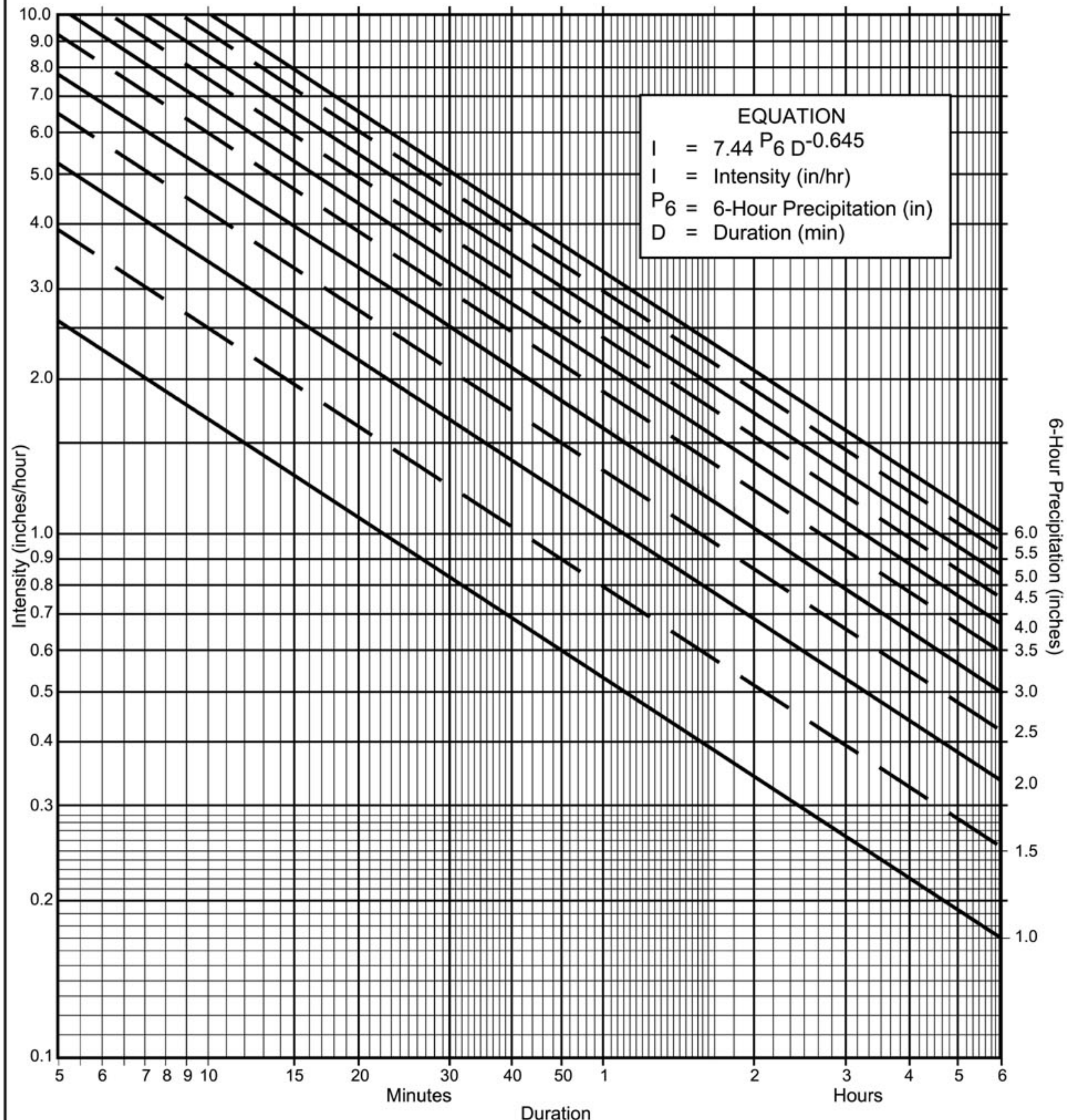
Isopluvial (inches)

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

3 0 3 Miles



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicable to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency ______ year

(b) P_6 = 2.8 in., P_{24} = 5.0 , $\frac{P_6}{P_{24}}$ = 56 %(2)

(c) Adjusted $P_6^{(2)}$ = 2.8 in.

(d) t_x = ______ min.

(e) I = ______ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE

3-1

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

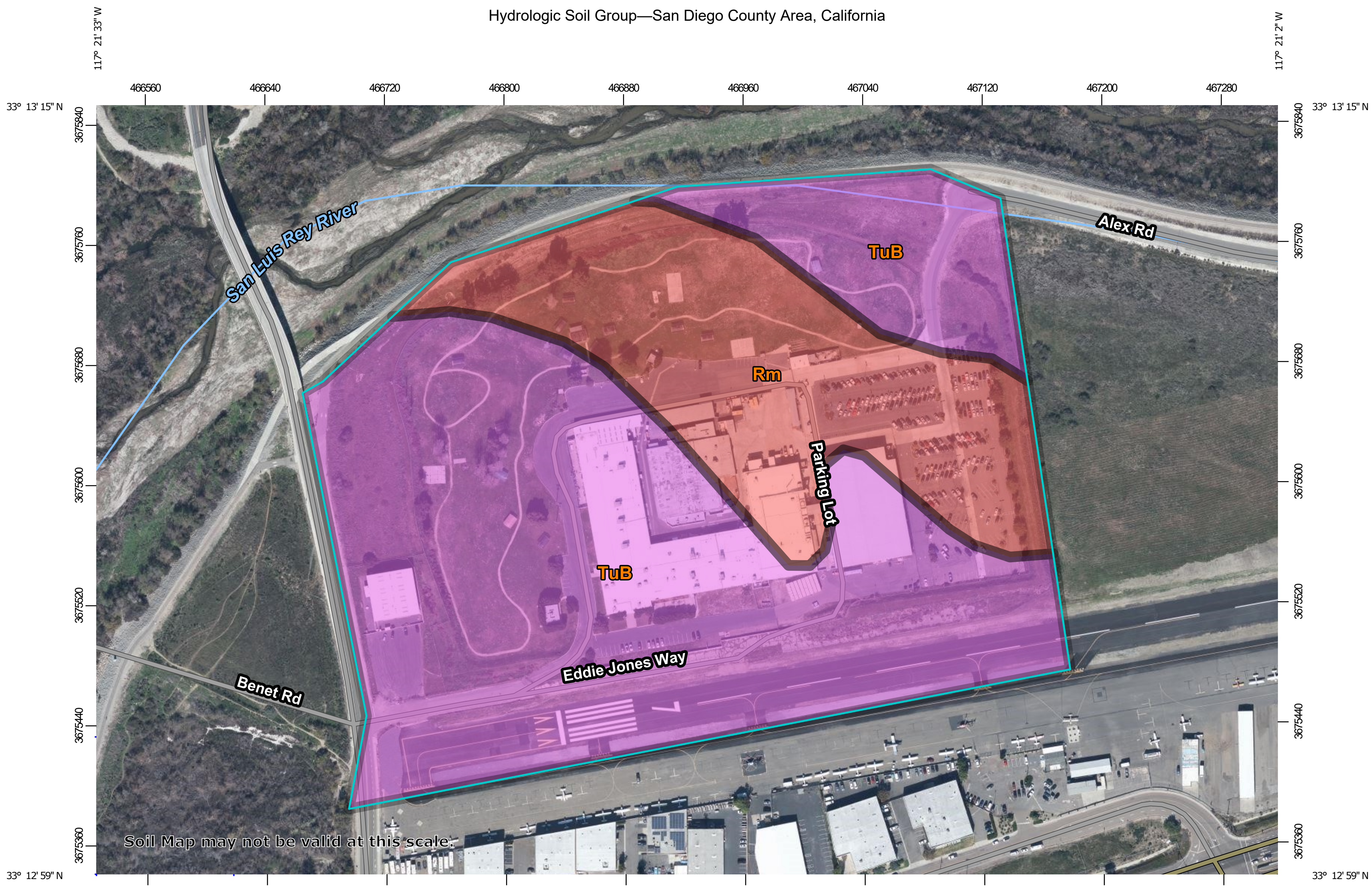
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M) & INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/	.5%		1%		2%		3%		5%		10%	
	Acre	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description



Map Scale: 1:3,620 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

N

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

Streams and Canals

Transportation

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

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

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

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Rm	Riverwash	D	11.8	29.0%
TuB	Tujunga sand, 0 to 5 percent slopes	A	28.8	71.0%
Totals for Area of Interest			**40.6**	**100.0%**

Description

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

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

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

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

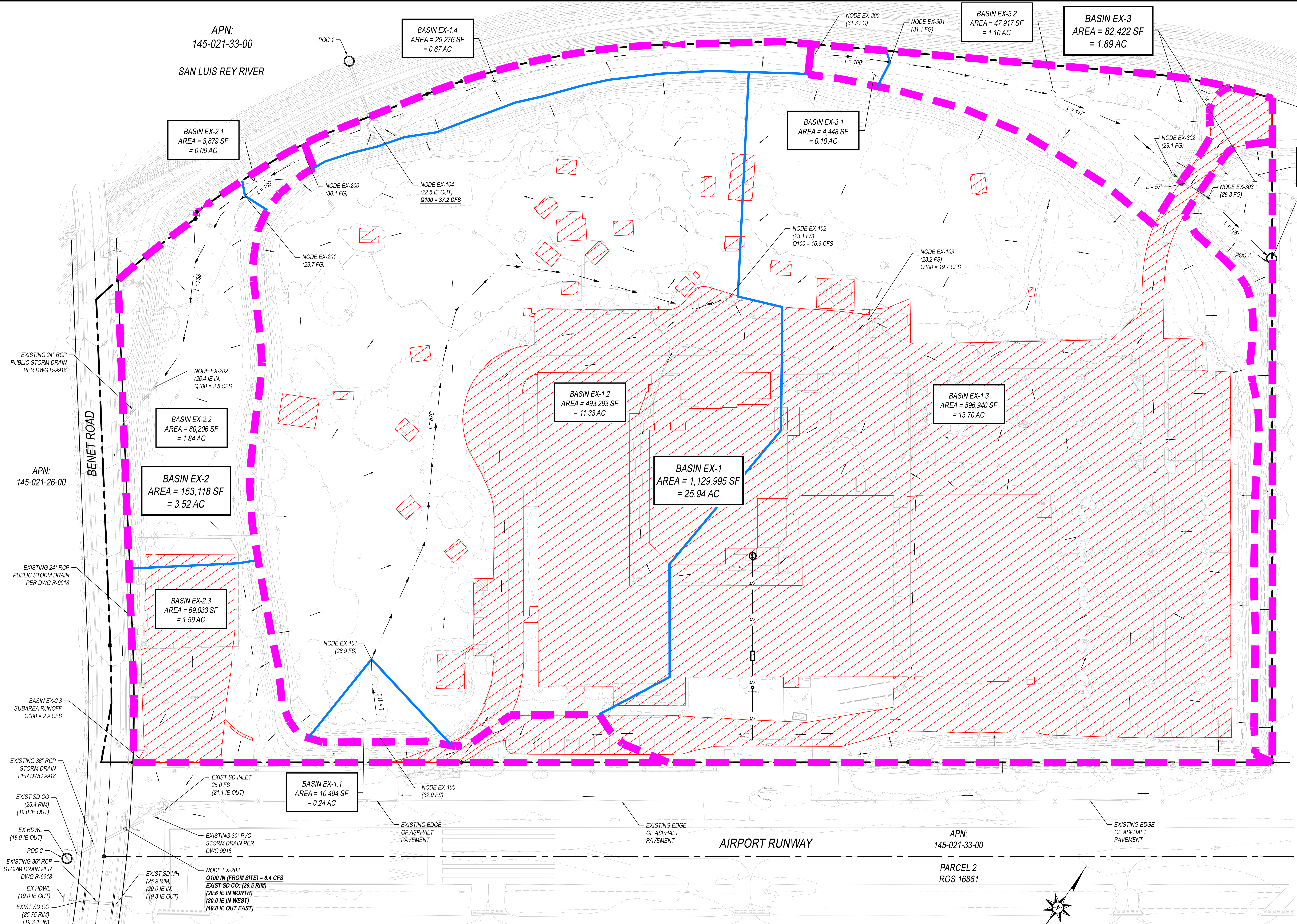
Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

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

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

Rating Options

Aggregation Method: Dominant Condition



PLAN VIEW - PRE DEVELOPMENT NODE MAP

SCALE: 1" = 60' HORIZONTAL

GRAPHIC SCALE: 1" = 60'

60 0 60 120 180

LEGEND

- PROPERTY BOUNDARY
- CENTERLINE OF ROAD
- ADJACENT PROPERTY LINE / RIGHT-OF-WAY
- EXISTING CONTOUR LINE
- EXISTING PATH OF TRAVEL
- EXISTING DIRECTION OF FLOW
- EXISTING IMPERVIOUS AREA
- MAJOR DRAINAGE BASIN BOUNDARY
- SUB DRAINAGE BASIN BOUNDARY

DISTURBED AREA - AREA CALCS

TOTAL SITE AREA	1,384,577 SF (31.79 AC)
DRAINAGE AREA TOTAL AREA	1,365,575 SF (31.35 AC)
TOTAL EXISTING IMPERVIOUS AREA	591,152 SF (13.57 AC)
TOTAL EXISTING PERVIOUS AREA	774,423 SF (17.78 AC)
% IMPERVIOUS	43.3%
Cn	0.50

BASIN EX-1 - AREA CALCULATIONS

BASIN EX-1 TOTAL AREA	1,129,995 SF (25.94 AC)
Cn	0.50
Tc	21.6 MIN
Q100	37.2 CFS

BASIN EX-2 - AREA CALCULATIONS

BASIN EX-2 TOTAL AREA	153,118 SF (3.52 AC)
Cn	0.50
Tc	15.2 MIN
Q100	6.4 CFS

BASIN EX-3 - AREA CALCULATIONS

BASIN EX-3 TOTAL AREA	82,422 SF (1.89 AC)
Cn	0.50
Tc	26.6 MIN
Q100	2.4 CFS

EXISTING HYDROLOGY EXHIBIT

250 EDDIE JONES WAY - CITY OF OCEANSIDE
SCALE: 1" = 60' HORIZONTAL

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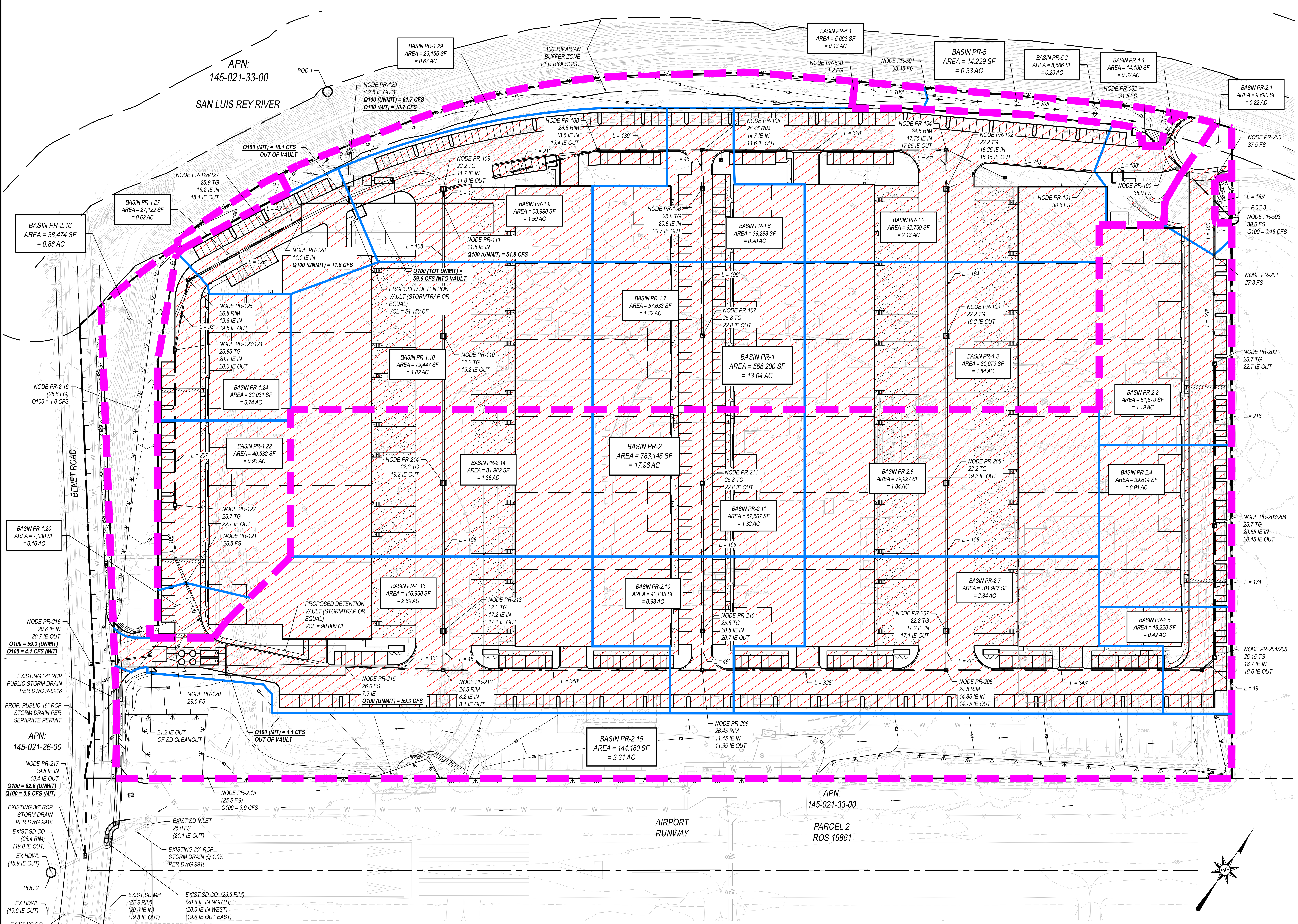

PLAN VIEW - POST DEVELOPMENT NODE MAP

SCALE: 1" = 60' HORIZONTAL

LEGEND

PROPERTY BOUNDARY	
CENTERLINE OF ROAD	
ADJACENT PROPERTY LINE / RIGHT-OF-WAY	
EXISTING CONTOUR LINE	
EXISTING PATH OF TRAVEL	
PROPOSED DIRECTION OF FLOW	
PROPOSED IMPERVIOUS AREA	
MAJOR DRAINAGE BASIN BOUNDARY	
SUB DRAINAGE BASIN BOUNDARY	

DISTURBED AREA - AREA CALCS

TOTAL SITE AREA	1,384,577 SF (31.79 AC)
DRAINAGE TOTAL AREA	1,365,575 SF (31.35 AC)
PROPOSED IMPERVIOUS AREA PROPOSED PERVIOUS AREA	1,034,986 SF (23.76 AC) 330,589 SF (7.59 AC)
% IMPERVIOUS	75.8%
Cn	0.72
TIME OF CONCENTRATION	5.0 MINUTES (PER SDCHM)

BASIN PR-1 - AREA CALCULATIONS

BASIN PR-1 TOTAL AREA	568,200 SF (13.04 AC)
Cn	0.72
TIME OF CONCENTRATION Q100	5.64 MINUTES 61.7 CFS (UNMIT) 10.7 CFS (MIT)

BASIN PR-2 - AREA CALCULATIONS

BASIN PR-2 TOTAL AREA	783,146 SF (17.98 AC)
Cn	0.72
TIME OF CONCENTRATION Q100	7.21 MINUTES 62.8 CFS (UNMIT) 5.9 CFS (MIT)

BASIN PR-3 - AREA CALCULATIONS

BASIN PR-3 TOTAL AREA	14,229 SF (0.33 AC)
Cn	0.22
TIME OF CONCENTRATION Q100	32.2 MINUTES 0.15 CFS (UNMIT)

GRAPHIC SCALE: 1" = 60'

60 0 60 120 180

PROPOSED HYDROLOGY EXHIBIT

250 EDDIE JONES WAY - CITY OF OCEANSIDE

SCALE: 1" = 60' HORIZONTAL

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PLSA 3751

Appendix B

Storm Water Pollutant Control and Detention Calculations

RATIONAL METHOD HYDROGRAPH PROGRAM

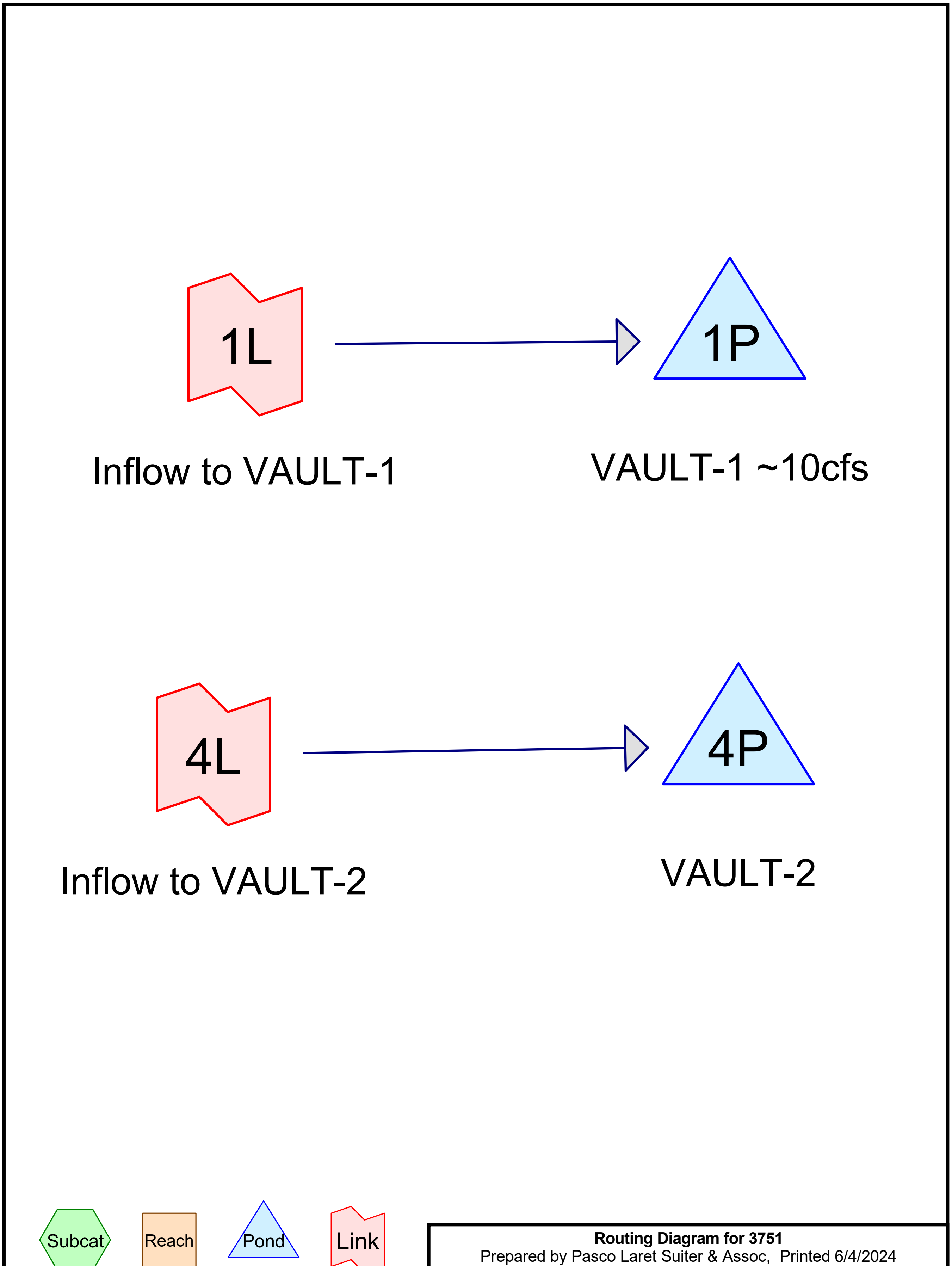
RUN DATE 5/21/2024
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 2.8 INCHES
BASIN AREA 12.4 ACRES
RUNOFF COEFFICIENT 0.72
PEAK DISCHARGE 59.61 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 1.5
TIME (MIN) = 12	DISCHARGE (CFS) = 1.5
TIME (MIN) = 18	DISCHARGE (CFS) = 1.5
TIME (MIN) = 24	DISCHARGE (CFS) = 1.6
TIME (MIN) = 30	DISCHARGE (CFS) = 1.6
TIME (MIN) = 36	DISCHARGE (CFS) = 1.6
TIME (MIN) = 42	DISCHARGE (CFS) = 1.7
TIME (MIN) = 48	DISCHARGE (CFS) = 1.7
TIME (MIN) = 54	DISCHARGE (CFS) = 1.7
TIME (MIN) = 60	DISCHARGE (CFS) = 1.7
TIME (MIN) = 66	DISCHARGE (CFS) = 1.8
TIME (MIN) = 72	DISCHARGE (CFS) = 1.8
TIME (MIN) = 78	DISCHARGE (CFS) = 1.9
TIME (MIN) = 84	DISCHARGE (CFS) = 1.9
TIME (MIN) = 90	DISCHARGE (CFS) = 2
TIME (MIN) = 96	DISCHARGE (CFS) = 2
TIME (MIN) = 102	DISCHARGE (CFS) = 2.1
TIME (MIN) = 108	DISCHARGE (CFS) = 2.1
TIME (MIN) = 114	DISCHARGE (CFS) = 2.2
TIME (MIN) = 120	DISCHARGE (CFS) = 2.2
TIME (MIN) = 126	DISCHARGE (CFS) = 2.3
TIME (MIN) = 132	DISCHARGE (CFS) = 2.4
TIME (MIN) = 138	DISCHARGE (CFS) = 2.5
TIME (MIN) = 144	DISCHARGE (CFS) = 2.6
TIME (MIN) = 150	DISCHARGE (CFS) = 2.7
TIME (MIN) = 156	DISCHARGE (CFS) = 2.8
TIME (MIN) = 162	DISCHARGE (CFS) = 3
TIME (MIN) = 168	DISCHARGE (CFS) = 3.1
TIME (MIN) = 174	DISCHARGE (CFS) = 3.3
TIME (MIN) = 180	DISCHARGE (CFS) = 3.4
TIME (MIN) = 186	DISCHARGE (CFS) = 3.7
TIME (MIN) = 192	DISCHARGE (CFS) = 3.9
TIME (MIN) = 198	DISCHARGE (CFS) = 4.3
TIME (MIN) = 204	DISCHARGE (CFS) = 4.6
TIME (MIN) = 210	DISCHARGE (CFS) = 5.2
TIME (MIN) = 216	DISCHARGE (CFS) = 5.7
TIME (MIN) = 222	DISCHARGE (CFS) = 6.9
TIME (MIN) = 228	DISCHARGE (CFS) = 7.9
TIME (MIN) = 234	DISCHARGE (CFS) = 11.6
TIME (MIN) = 240	DISCHARGE (CFS) = 15.3
TIME (MIN) = 246	DISCHARGE (CFS) = 59.61
TIME (MIN) = 252	DISCHARGE (CFS) = 9.3
TIME (MIN) = 258	DISCHARGE (CFS) = 6.2
TIME (MIN) = 264	DISCHARGE (CFS) = 4.9
TIME (MIN) = 270	DISCHARGE (CFS) = 4.1
TIME (MIN) = 276	DISCHARGE (CFS) = 3.5
TIME (MIN) = 282	DISCHARGE (CFS) = 3.2
TIME (MIN) = 288	DISCHARGE (CFS) = 2.9
TIME (MIN) = 294	DISCHARGE (CFS) = 2.6
TIME (MIN) = 300	DISCHARGE (CFS) = 2.5
TIME (MIN) = 306	DISCHARGE (CFS) = 2.3
TIME (MIN) = 312	DISCHARGE (CFS) = 2.2
TIME (MIN) = 318	DISCHARGE (CFS) = 2
TIME (MIN) = 324	DISCHARGE (CFS) = 1.9
TIME (MIN) = 330	DISCHARGE (CFS) = 1.9
TIME (MIN) = 336	DISCHARGE (CFS) = 1.8
TIME (MIN) = 342	DISCHARGE (CFS) = 1.7
TIME (MIN) = 348	DISCHARGE (CFS) = 1.6
TIME (MIN) = 354	DISCHARGE (CFS) = 1.6
TIME (MIN) = 360	DISCHARGE (CFS) = 1.5
TIME (MIN) = 366	DISCHARGE (CFS) = 0

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 5/21/2024
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 7 MIN.
6 HOUR RAINFALL 2.8 INCHES
BASIN AREA 13.8 ACRES
RUNOFF COEFFICIENT 0.72
PEAK DISCHARGE 60.43 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 7	DISCHARGE (CFS) = 1.7
TIME (MIN) = 14	DISCHARGE (CFS) = 1.7
TIME (MIN) = 21	DISCHARGE (CFS) = 1.7
TIME (MIN) = 28	DISCHARGE (CFS) = 1.8
TIME (MIN) = 35	DISCHARGE (CFS) = 1.8
TIME (MIN) = 42	DISCHARGE (CFS) = 1.8
TIME (MIN) = 49	DISCHARGE (CFS) = 1.9
TIME (MIN) = 56	DISCHARGE (CFS) = 1.9
TIME (MIN) = 63	DISCHARGE (CFS) = 2
TIME (MIN) = 70	DISCHARGE (CFS) = 2
TIME (MIN) = 77	DISCHARGE (CFS) = 2.1
TIME (MIN) = 84	DISCHARGE (CFS) = 2.1
TIME (MIN) = 91	DISCHARGE (CFS) = 2.2
TIME (MIN) = 98	DISCHARGE (CFS) = 2.3
TIME (MIN) = 105	DISCHARGE (CFS) = 2.4
TIME (MIN) = 112	DISCHARGE (CFS) = 2.4
TIME (MIN) = 119	DISCHARGE (CFS) = 2.5
TIME (MIN) = 126	DISCHARGE (CFS) = 2.6
TIME (MIN) = 133	DISCHARGE (CFS) = 2.7
TIME (MIN) = 140	DISCHARGE (CFS) = 2.8
TIME (MIN) = 147	DISCHARGE (CFS) = 3
TIME (MIN) = 154	DISCHARGE (CFS) = 3.1
TIME (MIN) = 161	DISCHARGE (CFS) = 3.3
TIME (MIN) = 168	DISCHARGE (CFS) = 3.4
TIME (MIN) = 175	DISCHARGE (CFS) = 3.7
TIME (MIN) = 182	DISCHARGE (CFS) = 3.9
TIME (MIN) = 189	DISCHARGE (CFS) = 4.3
TIME (MIN) = 196	DISCHARGE (CFS) = 4.6
TIME (MIN) = 203	DISCHARGE (CFS) = 5.3
TIME (MIN) = 210	DISCHARGE (CFS) = 5.7
TIME (MIN) = 217	DISCHARGE (CFS) = 7
TIME (MIN) = 224	DISCHARGE (CFS) = 8
TIME (MIN) = 231	DISCHARGE (CFS) = 11.7
TIME (MIN) = 238	DISCHARGE (CFS) = 15
TIME (MIN) = 245	DISCHARGE (CFS) = 60.43
TIME (MIN) = 252	DISCHARGE (CFS) = 9.4
TIME (MIN) = 259	DISCHARGE (CFS) = 6.3
TIME (MIN) = 266	DISCHARGE (CFS) = 4.9
TIME (MIN) = 273	DISCHARGE (CFS) = 4.1
TIME (MIN) = 280	DISCHARGE (CFS) = 3.6
TIME (MIN) = 287	DISCHARGE (CFS) = 3.2
TIME (MIN) = 294	DISCHARGE (CFS) = 2.9
TIME (MIN) = 301	DISCHARGE (CFS) = 2.7
TIME (MIN) = 308	DISCHARGE (CFS) = 2.5
TIME (MIN) = 315	DISCHARGE (CFS) = 2.3
TIME (MIN) = 322	DISCHARGE (CFS) = 2.2
TIME (MIN) = 329	DISCHARGE (CFS) = 2.1
TIME (MIN) = 336	DISCHARGE (CFS) = 2
TIME (MIN) = 343	DISCHARGE (CFS) = 1.9
TIME (MIN) = 350	DISCHARGE (CFS) = 1.8
TIME (MIN) = 357	DISCHARGE (CFS) = 1.7
TIME (MIN) = 364	DISCHARGE (CFS) = 0



Routing Diagram for 3751
Prepared by Pasco Laret Suiter & Assoc, Printed 6/4/2024
HydroCAD® 10.20-5a s/n 10097 © 2023 HydroCAD Software Solutions LLC

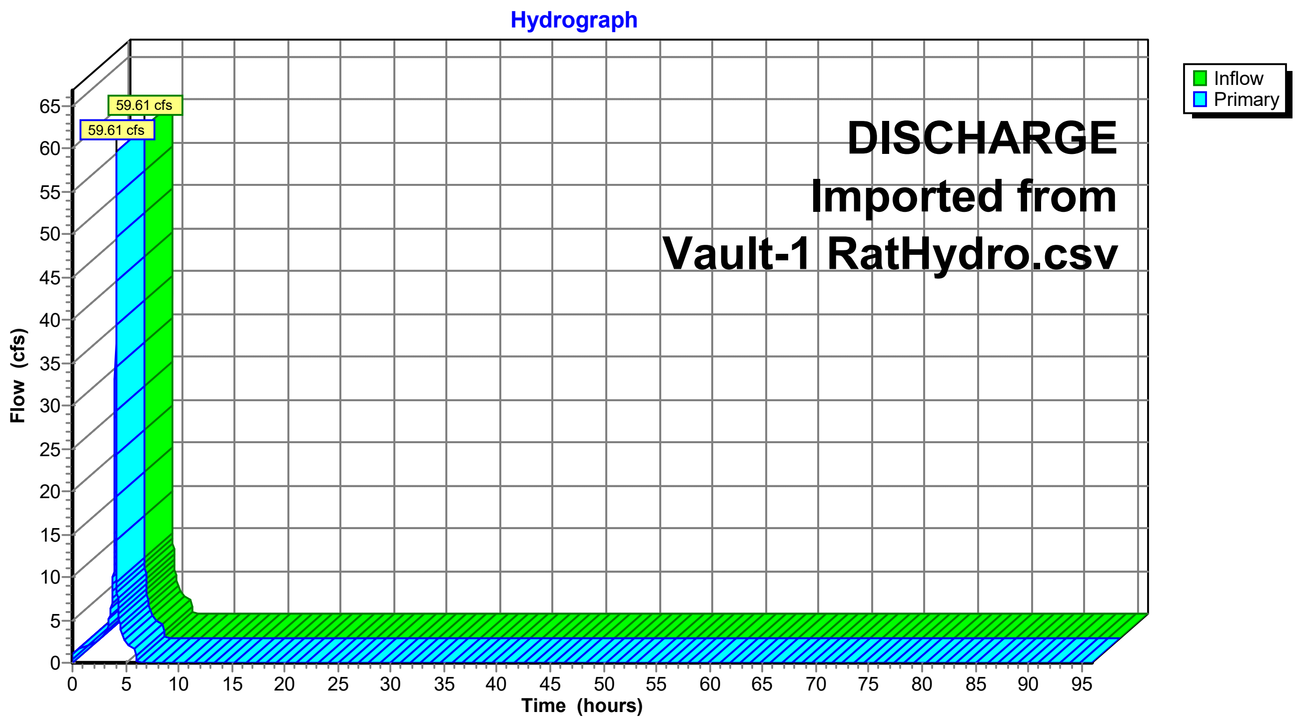
Summary for Link 1L: Inflow to VAULT-1

Inflow = 59.61 cfs @ 4.10 hrs, Volume= 2.071 af
Primary = 59.61 cfs @ 4.10 hrs, Volume= 2.071 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 1P : VAULT-1 ~10cfs

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

DISCHARGE Imported from Vault-1 RatHydro.csv

Link 1L: Inflow to VAULT-1



Summary for Pond 1P: VAULT-1 ~10cfs

Inflow	=	59.61 cfs @	4.10 hrs, Volume=	2.071 af
Outflow	=	10.14 cfs @	4.20 hrs, Volume=	2.071 af, Atten= 83%, Lag= 6.1 min
Primary	=	10.14 cfs @	4.20 hrs, Volume=	2.071 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 107.24' @ 4.20 hrs Surf.Area= 9,300 sf Storage= 60,569 cf

Plug-Flow detention time= 398.8 min calculated for 2.071 af (100% of inflow)
Center-of-Mass det. time= 398.7 min (611.8 - 213.1)

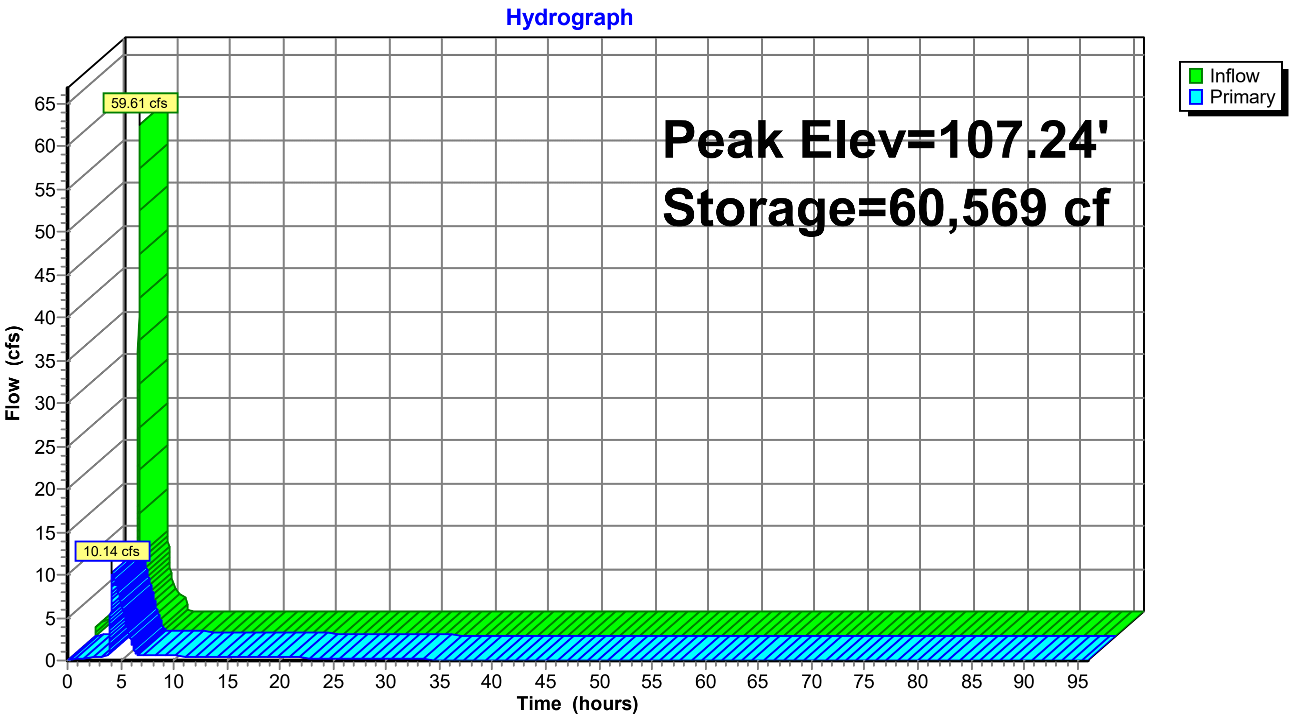
Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	69,722 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
100.00	9,300	0.0	0	0	9,300
101.00	9,300	90.0	8,370	8,370	9,642
102.00	9,300	90.0	8,370	16,740	9,984
103.00	9,300	90.0	8,370	25,110	10,326
104.00	9,300	90.0	8,370	33,480	10,667
104.20	9,300	90.0	1,674	35,154	10,736
105.00	9,300	90.0	6,696	41,850	11,009
106.00	9,300	90.0	8,370	50,220	11,351
107.00	9,300	90.0	8,370	58,590	11,693
107.33	9,300	90.0	2,762	61,352	11,806
108.00	9,300	90.0	5,608	66,960	12,035
108.33	9,300	90.0	2,762	69,722	12,148

Device	Routing	Invert	Outlet Devices
#1	Primary	100.00'	**30.00" Round Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 100.00' / 99.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	100.00'	**3.30" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	104.20'	**14.00" W x 6.00" H Vert. Orifice X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	107.33'	**Custom Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 Width (feet) 20.00 20.00 0.00

Primary OutFlow Max=10.13 cfs @ 4.20 hrs HW=107.24' (Free Discharge)
└─**1=Culvert** (Passes 10.13 cfs of 57.83 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.76 cfs @ 12.83 fps)
  ├─**3=Orifice** (Orifice Controls 9.37 cfs @ 8.03 fps)
  └─**4=Custom Weir** (Controls 0.00 cfs)

Pond 1P: VAULT-1 ~10cfs

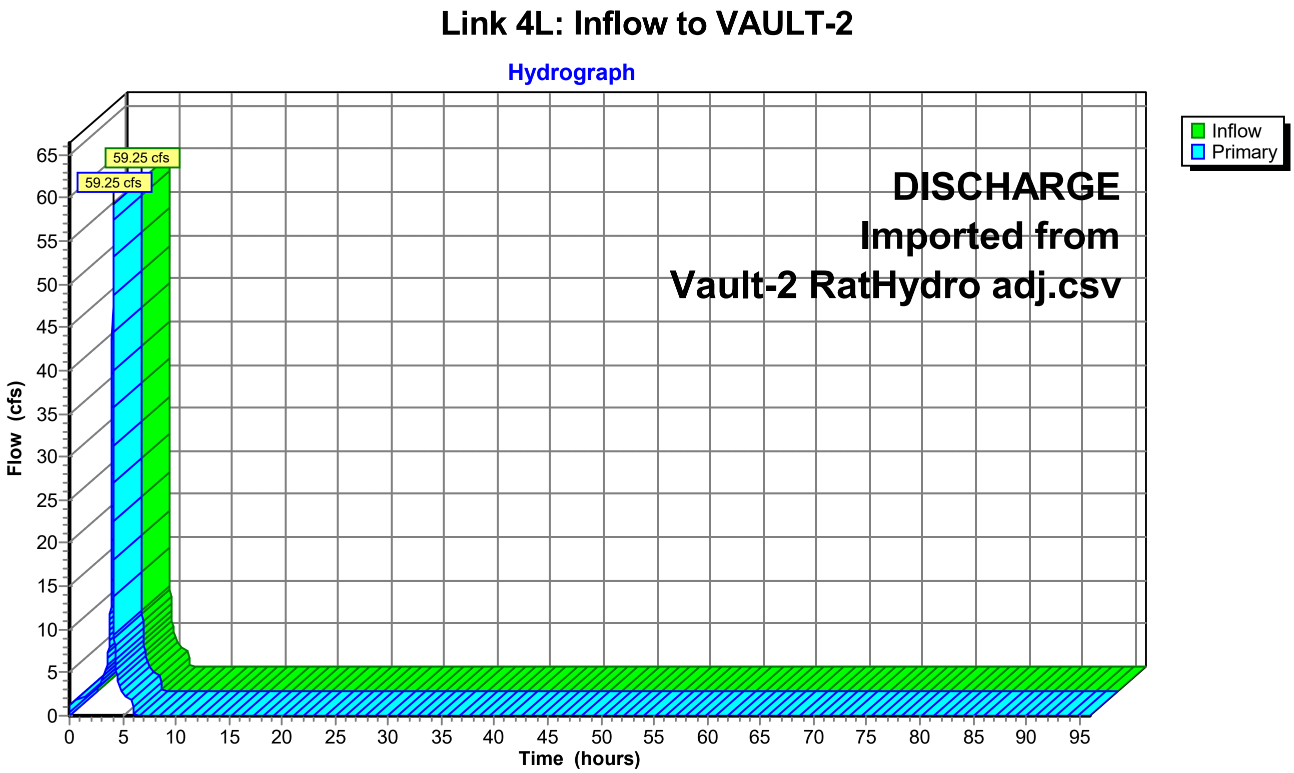


Summary for Link 4L: Inflow to VAULT-2

Inflow = 59.25 cfs @ 4.08 hrs, Volume= 2.299 af
Primary = 59.25 cfs @ 4.08 hrs, Volume= 2.299 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 4P : VAULT-2

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

DISCHARGE Imported from Vault-2 RatHydro adj.csv



Summary for Pond 4P: VAULT-2

Inflow = 59.25 cfs @ 4.08 hrs, Volume= 2.299 af
Outflow = 4.10 cfs @ 4.55 hrs, Volume= 2.299 af, Atten= 93%, Lag= 28.1 min
Primary = 4.10 cfs @ 4.55 hrs, Volume= 2.299 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 113.75' @ 4.55 hrs Surf.Area= 6,000 sf Storage= 74,234 cf

Plug-Flow detention time= 494.5 min calculated for 2.299 af (100% of inflow)
Center-of-Mass det. time= 494.5 min (706.7 - 212.3)

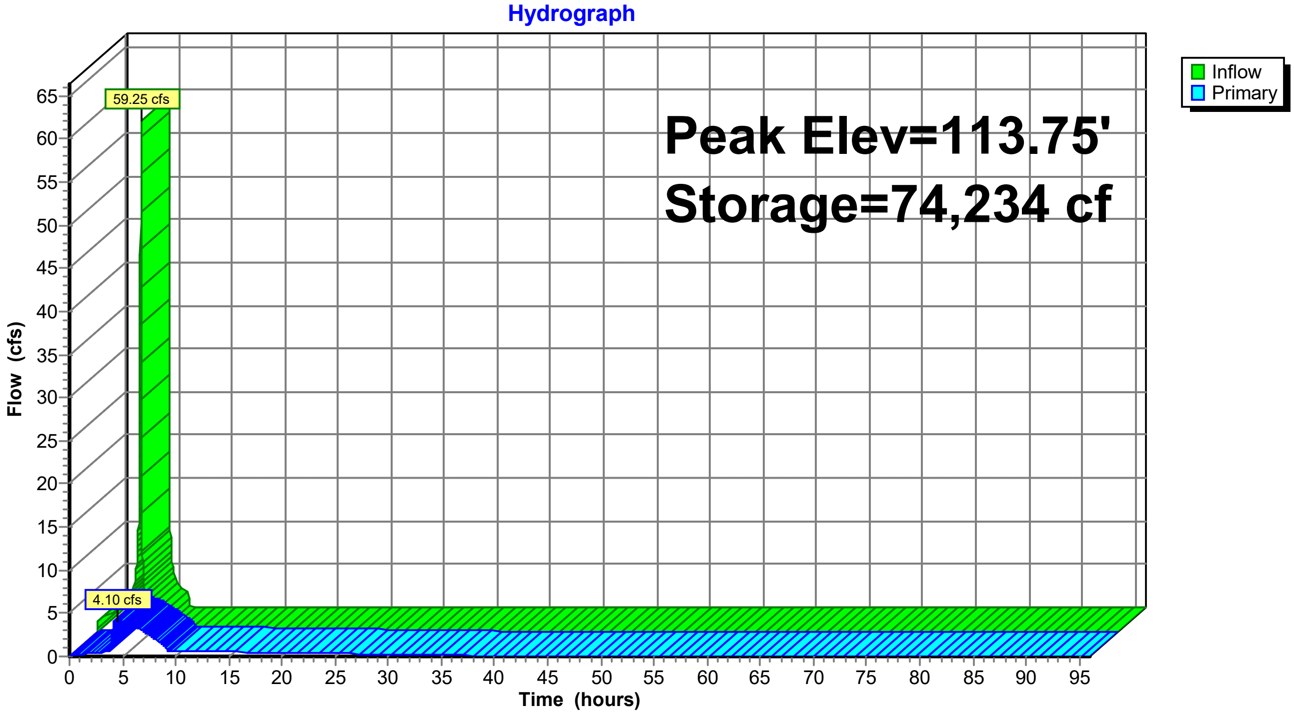
Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	81,000 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
100.00	6,000	0.0	0	0	6,000
101.00	6,000	90.0	5,400	5,400	6,275
102.00	6,000	90.0	5,400	10,800	6,549
103.00	6,000	90.0	5,400	16,200	6,824
104.00	6,000	90.0	5,400	21,600	7,098
105.00	6,000	90.0	5,400	27,000	7,373
106.00	6,000	90.0	5,400	32,400	7,648
107.00	6,000	90.0	5,400	37,800	7,922
107.20	6,000	90.0	1,080	38,880	7,977
108.00	6,000	90.0	4,320	43,200	8,197
109.00	6,000	90.0	5,400	48,600	8,471
110.00	6,000	90.0	5,400	54,000	8,746
111.00	6,000	90.0	5,400	59,400	9,020
112.00	6,000	90.0	5,400	64,800	9,295
113.00	6,000	90.0	5,400	70,200	9,570
114.00	6,000	90.0	5,400	75,600	9,844
115.00	6,000	90.0	5,400	81,000	10,119

Device	Routing	Invert	Outlet Devices
#1	Primary	100.00'	**24.00" Round Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 100.00' / 99.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	100.00'	**3.00" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	107.20'	**19.00" W x 2.00" H Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	114.00'	**Custom Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 Width (feet) 20.00 20.00 0.00

Primary OutFlow Max=4.10 cfs @ 4.55 hrs HW=113.75' (Free Discharge)
└─**1=Culvert** (Passes 4.10 cfs of 54.01 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.87 cfs @ 17.77 fps)
  ├─**3=Orifice** (Orifice Controls 3.23 cfs @ 12.24 fps)
  └─**4=Custom Weir** (Controls 0.00 cfs)

Pond 4P: VAULT-2



Vault Drawdown Calculation - Vault-1

Project Name	Eddie Jones		
Project No	3751	Date	6/4/2024

Vault Drawdown **35.2** **hrs**

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

Underdrain Orifice Diameter:	**3.3**	in
C:	**0.6**	

Surface Depth (ft)	Volume (cf)	$Q_{orifice}$ (cfs)	ΔT (hr)	Total Time (hr)
4.20	35154.00	0.576	0.00	0.00
3.00	25110.00	0.484	5.27	5.27
2.00	16740.00	0.390	5.32	10.59
1.00	8370.00	0.265	7.09	17.68
0.00	0.00	0.000	17.52	35.20

Vault Drawdown Calculation - Vault-2

Project Name	Eddie Jones		
Project No	3751	Date	6/4/2024

Vault Drawdown **35.5** **hrs**

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

Underdrain Orifice Diameter:	**3**	in
C:	**0.6**	

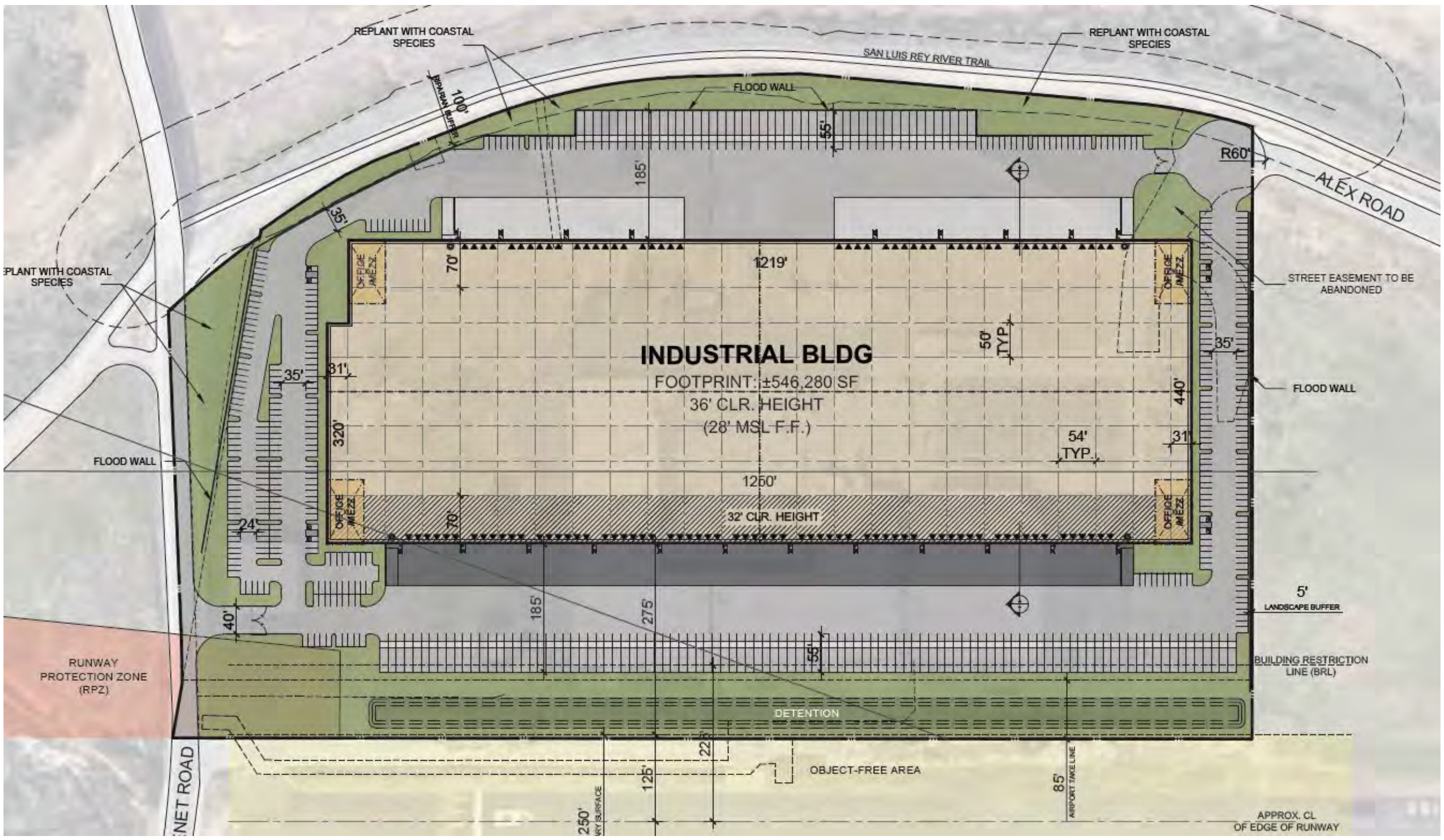
Surface Depth (ft)	Volume (cf)	$Q_{orifice}$ (cfs)	ΔT (hr)	Total Time (hr)
7.20	38880.00	0.628	0.00	0.00
6.00	32400.00	0.573	3.00	3.00
5.00	27000.00	0.522	2.74	5.74
4.00	21600.00	0.465	3.04	8.78
3.00	16200.00	0.401	3.47	12.25
2.00	10800.00	0.323	4.14	16.39
1.00	5400.00	0.221	5.51	21.90
0.00	0.00	0.000	13.58	35.48

ATTACHMENT 6
Geotechnical and Groundwater Investigation Report

This is the cover sheet for Attachment 6.

GEOTECHNICAL INVESTIGATION

Proposed Industrial Development
260 Eddy Jones Way, Oceanside, CA



RAF Pacifica Group
315 South Coast Highway 101, Suite U-12
Encinitas, CA 92024
Carlsbad, California 92008

NOVA Project No. 2021176
October 22, 2021

NOVA Services
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Suite B
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Jim Jacobs
Director of Development
RAF Pacifica Group
315 South Coast Highway 101, Suite U-12
Encinitas, California 92024

October 22, 2021
NOVA Project No. 2021176

Subject: Geotechnical Investigation
Proposed Industrial Development
260 Eddy Jones Way, Oceanside, California

Dear Mr. Jacobs:

NOVA Services, Inc. (NOVA) is pleased to present our report describing the geotechnical investigation performed for the new proposed industrial development at 260 Eddy Jones Way, Oceanside, California. We conducted the geotechnical investigation in general conformance with the scope of work presented in our proposal dated June 1, 2021 as authorized on August 5, 2021.

This site is considered geotechnically suitable for the proposed development provided the recommendations within this report are followed.

NOVA appreciates the opportunity to be of service to RAF Pacifica Group. If you have any questions regarding this report, please do not hesitate to call us at 858.292.7575 x 406.

Sincerely,
NOVA Services, Inc.

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GEOTECHNICAL INVESTIGATION

Proposed Industrial Development
260 Eddy Jones Way, Oceanside, CA

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1. INTRODUCTION

This report presents the results of the geotechnical investigation NOVA performed for the proposed industrial development located at 260 Eddy Jones Way, Oceanside, California. We understand the project will consist of demolishing the current configuration, grading to reach design grades, and construction of an approximately 509,654 SF industrial building. The purpose of our work is to provide conclusions and recommendations regarding the geotechnical aspects of the project. Figure 1-1 presents a site vicinity map, and Figure 1-2 (following page) presents the site location.

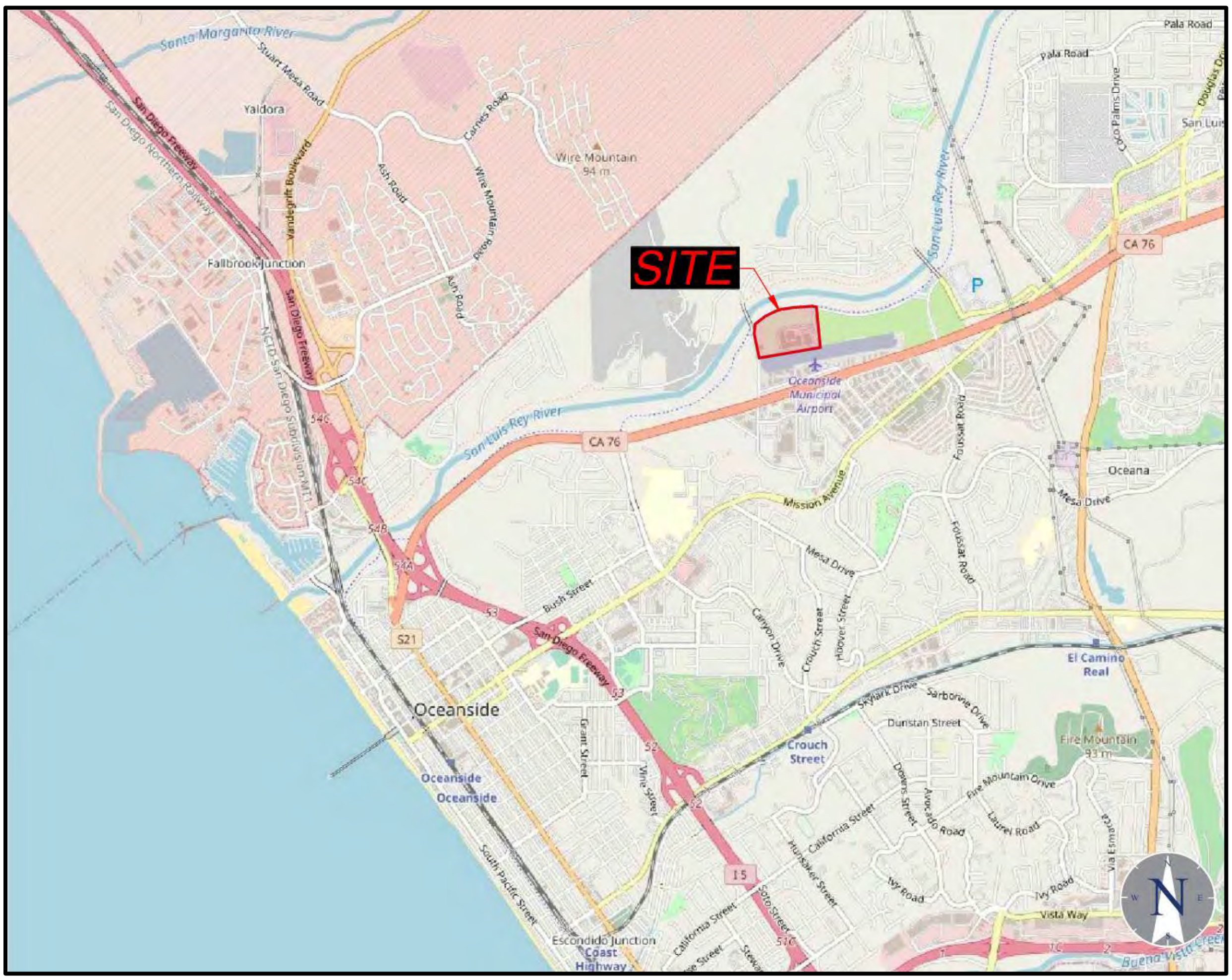


Figure 1-1. Site Vicinity Map

Figure 1-2. Site Location Map

2. SCOPE OF WORK

The scope of work provided during this investigation was generally as described in the proposal dated June 1, 2021. NOVA provided the following scope of work.

2.1. Field Investigation

NOVA's field investigation consisted of a visual reconnaissance of the site and drilling four (4) geotechnical borings (B-1 through B-4) to depths between about 21½ and 51½ feet below the ground surface (bgs) and two (2) percolation test borings (P-1 and P-2) to a depth of about 5 feet bgs using a truck-mounted drill rig equipped with a hollow stem auger. The percolation test borings were drilled within areas of potential BMP locations to evaluate stormwater infiltration feasibility. Additionally, four (4) Cone Penetrometer Test (CPT) soundings were advanced to depths between about 70 and 95 feet bgs to evaluate liquefaction potential. Figure 2-1 presents the approximate locations of the subsurface explorations.

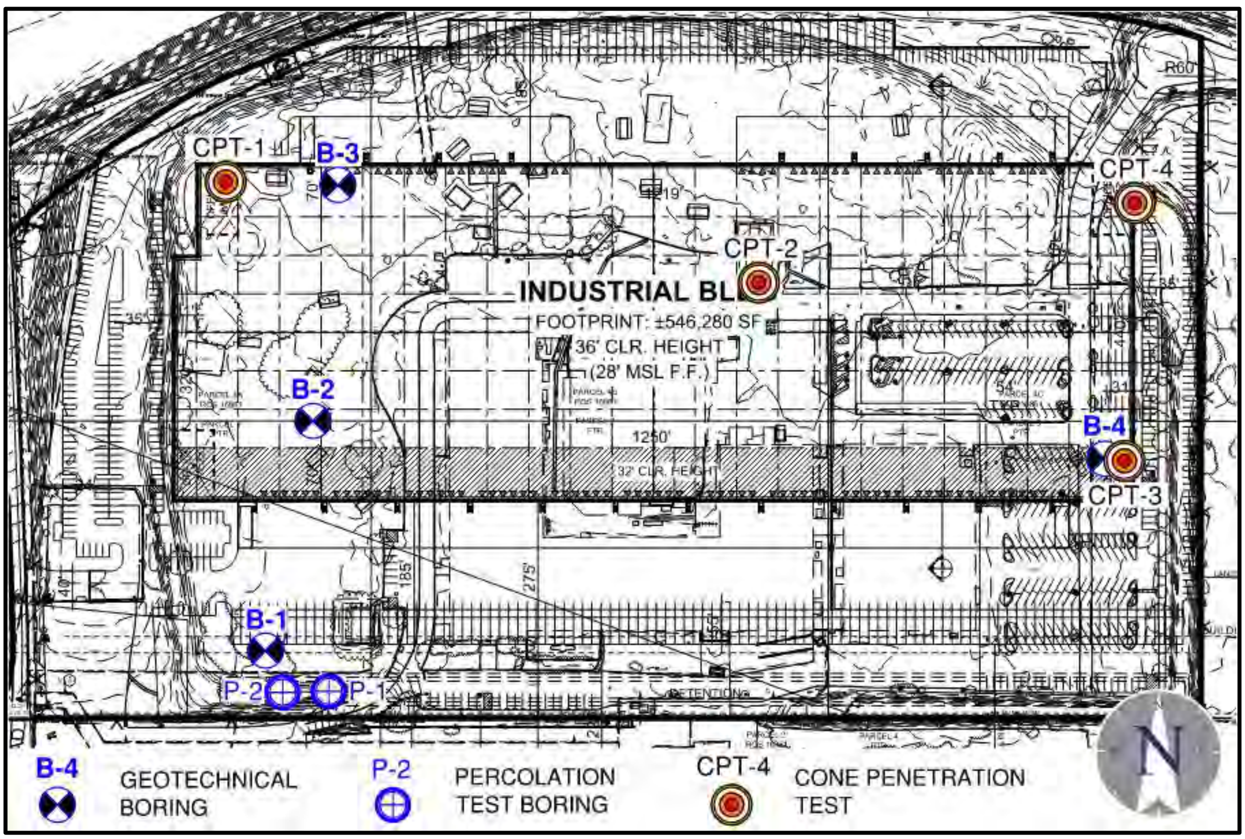


Figure 2-1. Locations of Subsurface Explorations

diameter and 1⅜-inch inner diameter split tube sampler. The CAL and SPT samplers were driven using an automatic hammer with a calibrated Energy Transfer Ratio (ETR) of about 70.6%. The number of blows needed to drive the sampler the final 12 inches of an 18-inch drive is noted on the logs. The field blow counts, N, were corrected to a standard hammer (cathead and rope) with a 60% ETR. The corrected blow counts are noted on the boring logs as N_{60}. Disturbed bulk samples were obtained from the SPT sampler and the drill cuttings. Logs of the borings are presented in Appendix B. Soils are classified according to the Unified Soil Classification System.

2.2. Laboratory Testing

NOVA tested select samples to evaluate soil classification and engineering properties and develop geotechnical conclusions and recommendations. The laboratory tests consisted of particle-size distribution, Atterberg limits, expansion index, R-value, and corrosivity. The results of the laboratory tests and brief explanations of the test procedures are presented in Appendix D.

2.3. Borehole Percolation Testing

NOVA performed borehole percolation testing in accordance with the test method described in the City of Oceanside Stormwater Standards BMP Design Manual, February 2016 Edition (hereinafter ‘BMP Manual’). The procedure is discussed in Section 8 of this report, and infiltration worksheets are presented in Appendix E.

2.4. Analysis and Report Preparation

The results of the field and laboratory testing were evaluated to develop conclusions and recommendations regarding the geotechnical aspects of the proposed construction. This report presents our findings, conclusions, and recommendations.

3. SITE AND PROJECT DESCRIPTION

3.1. Site Description

The proposed development will be located in an approximately 31.7-acre site at 260 Eddy Jones Way corresponding to APNs 145-021-29-00, 145-021-030-00 and 145-021-032-00 in Oceanside, California. The site is bounded by the San Luis Rey River to the north, Oceanside Municipal Airport to the south, Benet Road to the west, and open space to the east. The site is currently occupied by vacant buildings formerly used for electronics manufacturing. The site is relatively flat, with elevations ranging from about +25 feet mean sea level (msl) to about +30 feet msl.

A review of historic aerial photography dating back to 1938, the earliest available historical imagery, shows that the southern and western portions of the main building have been in place since at least 1967 and the site has occupied its current configuration since at least 2005, when the building to the east was built. Review of historical topography dating back to 1893 shows that the north and east portions of the site were once occupied by the San Luis Rey River channel until development occurred around 1967, at which point the river was diverted to the north.

3.2. Proposed Construction

Based on discussion with you and review of provided plans (WM, 2021), NOVA understands that the proposed development will consist of demolishing the existing building and designing and constructing a 546,280-sqare-foot industrial building and associated improvements including a floodwall with a height of about 6 feet, parking bays and drive isles around the site perimeter, and a detention basin for stormwater management. Site grading will consist of minor cuts and fills to achieve design grades. Plate 1 following the text of the report presents the currently proposed building configuration.

4. GEOLOGY AND SUBSURFACE CONDITIONS

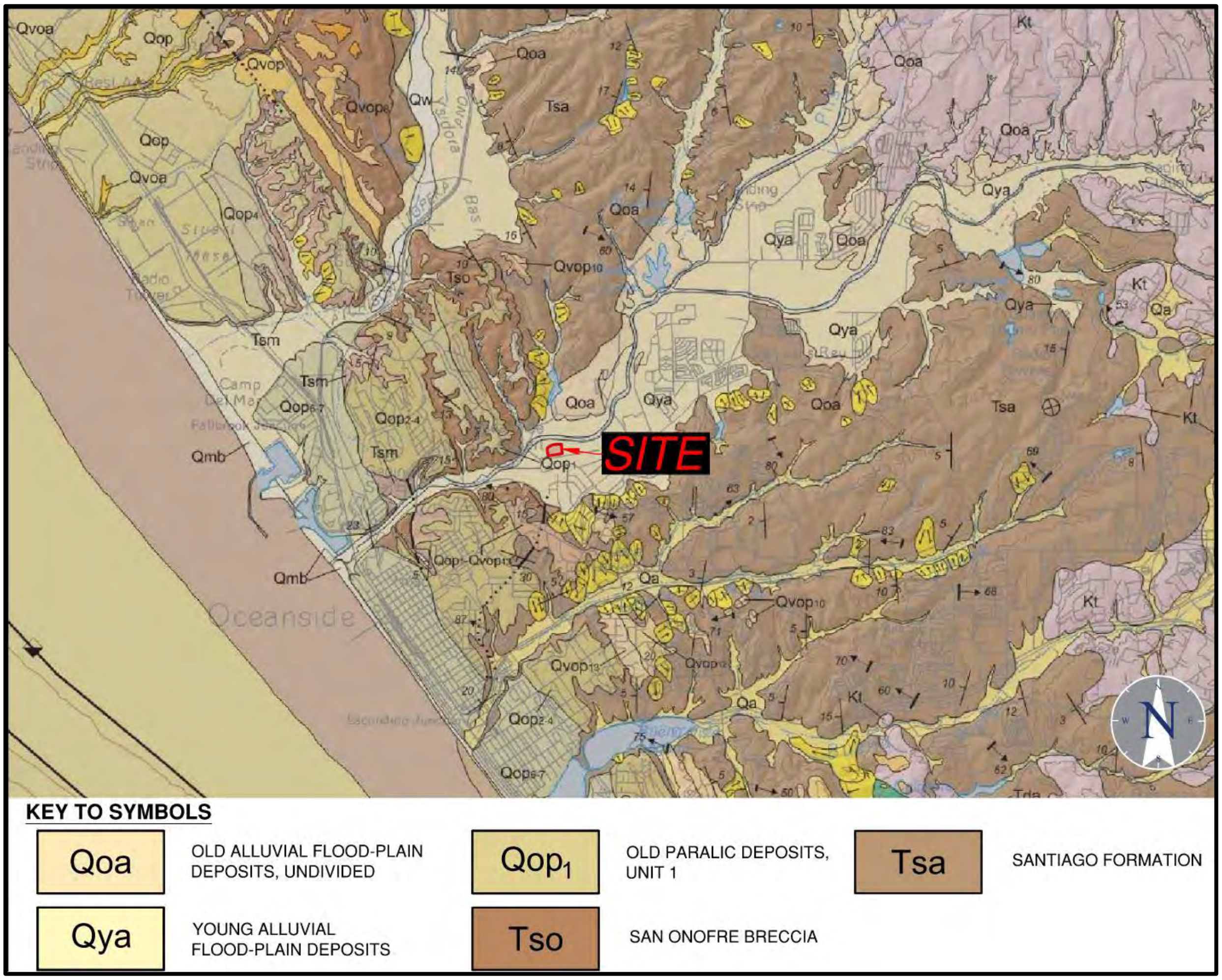
The project site lies within the Peninsular Ranges Geomorphic Province of California, which stretches from the Los Angeles basin to the tip of Baja California in Mexico. In general, the province consists of northwest trending mountains underlain by Tertiary sedimentary rocks, Mesozoic meta-volcanic and metasedimentary rocks, and Cretaceous igneous rocks of the Southern California Batholith (CGS, 2002).

The Peninsular Ranges Province is traversed by a group of sub-parallel faults and fault zones trending roughly northwest. Several of these faults are considered active. The Elsinore, San Jacinto, and San Andreas Fault Zones are active systems located east of the project area and the Newport-Inglewood, Agua Blanca-Coronado Bank, and San Clemente Fault Zones are active systems located offshore, west of the site. The majority of these faults have right-lateral, strike-slip movement. Uplift associated with these faults has created a diverse topographic environment that has also brought hazards such as landslides, mudslides, and hillside creep (gradual downhill soil movement).

NOVA's subsurface investigation and regional geologic maps (CGS, 2007) indicate the site is underlain by Quaternary Young Alluvial Flood-Plain Deposits (map unit – Qya). Descriptions of the subsurface materials encountered are presented below. Figure 4-1 presents the regional geology in the vicinity of the site. Plate 1 following the text of the report provides a geotechnical map and geologic cross-sections.

Young Alluvial Flood-Plain Deposits (Qya): Young Alluvial Flood-Plain Deposits were encountered to the maximum-explored depth of about 95 feet bgs. The alluvial deposits generally consisted of dry to wet, olive brown to gray and dark gray, very loose to medium dense poorly graded sand, silty sand, and sandy silt.

Groundwater: Groundwater was encountered at depths between about 7 and 7½ feet bgs, corresponding to elevations between about +18½ and +20 feet msl. Groundwater levels may fluctuate in the future due to rainfall, irrigation, broken pipes, or changes in site drainage. Groundwater should be anticipated during design and construction of the proposed development.



(Source: CGS 2007)

5. GEOLOGIC HAZARDS

5.1. Faulting and Surface Rupture

California is known to contain active faults that can potentially cause significant damage during earthquakes. The Alquist-Priolo Earthquake Fault Zoning Act was implemented in 1972 to prevent the development over the surface trace of active faults. California Geologic Survey Special Publication 42 was created to provide guidance for following and implementing the law requirements. Special Publication 42 was most recently revised in 2018 (CGS, 2018). The State Geologist defines an “active” fault as one which has had surface rupture within recent geologic time (i.e., Holocene time, <11,700 years b.p.). Earthquake Fault Zones have been delineated to encompass traces of known, Holocene-active faults to address hazards associated with fault surface rupture within California. Where developments for human occupation are proposed within these zones, the state requires detailed fault evaluations be performed so that engineering geologists can identify the locations of active faults and recommend setbacks from locations of possible surface fault rupture. The site is not located within an Earthquake Fault Zone. No faults were identified on the site during the site evaluation; therefore, the possibility of damage due to surface rupture is considered low. The closest known active fault is the Oceanside section of the Newport-Inglewood-Rose Canyon Fault Zone, located approximately 6.8 miles southwest of the site. Figure 5-1 shows the locations regional faulting in the general site area.

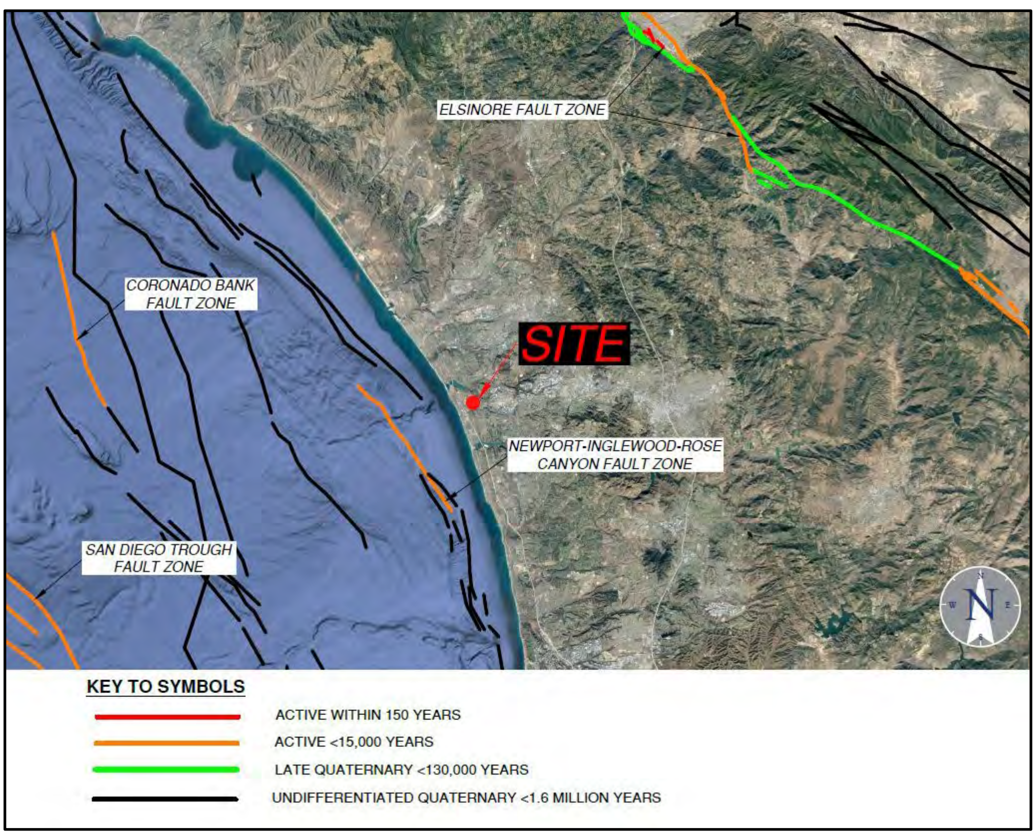


Figure 5-1. Fault Map

5.2. Liquefaction and Dynamic Settlement

Liquefaction is a process in which soil grains in a saturated deposit lose contact after the occurrence of earthquakes or other sources of ground shaking. The soil deposit temporarily behaves as a viscous fluid; pore pressures rise, and the strength of the deposit is greatly diminished. Liquefiable soils typically consist of cohesionless sands and silts that are loose to medium dense, and saturated. Recent studies also show that some relatively soft cohesive soils can be subject to cyclic softening during significant earthquake shaking. To liquefy, saturated soils must be subjected to ground shaking of sufficient magnitude and duration. For our analysis we used a PGA of 0.50g, an earthquake magnitude of 7.0, and groundwater depth of 7 feet bgs.

Based on our analysis, there is a potential for liquefaction to occur within the very loose to medium dense alluvial sands and silts underlying the site. Dynamic and post-liquefaction settlements are estimated to be about 10 to 12 inches total and about 5 to 6 inches differential across the structure. Lateral spreading is estimated to be about 15 to 20 inches. We that understand ground improvement will be performed to reduce settlements to 2 inches total and 1-inch differential over a distance of 40 feet.

5.3. CBC Seismic Design Parameters

A geologic hazard likely to affect the project is ground shaking caused by movement along an active fault in the vicinity of the subject site. Assuming ground improvement will be performed to densify the in-situ soils and mitigate liquefaction, a Site Class D was assigned for the site. The site coefficients and maximum considered earthquake (MCE_R) spectral response acceleration parameters in accordance with the 2019 CBC and ASCE 7-16 are presented in Table 5-1.

Table 5-1. 2019 CBC and ASCE 7-16 Seismic Design Parameters

Site Coordinates	
Latitude: 33.2195203°	Longitude: -117.3539506°
Site Coefficients and Spectral Response Acceleration Parameters	**Value**
Site Class	D
Site Coefficients, F_a	1.11
Site Coefficients, F_v	1.62
Mapped Spectral Response Acceleration at Short Period, S_s	0.977g
Mapped Spectral Response Acceleration at 1-Second Period, S_1	0.36g
Mapped Design Spectral Acceleration at Short Period, S_{DS}	0.781g
Design Spectral Acceleration at 1-Second Period, S_{D1}	0.39g
Site Peak Ground Acceleration, PGA_M	0.51g

5.4. Landslides and Slope Stability

Evidence of landslides, deep-seated landslides, or slope instabilities were not observed at the time of the field investigation. Additionally, there are no mapped landslides in the vicinity of the project site. The site is relatively level and the potential for landslides or slope instabilities to occur at the site is considered very low.

5.5. Flooding, Tsunamis, and Seiches

The site is located within zone A99, a 1% annual chance flood area (FEMA, 2019). The site is not located within a mapped inundation area on the State of California Tsunami Inundation Maps (Cal EMA, 2009); therefore, damage due to tsunamis is considered negligible. Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays, or reservoirs. The site is not located adjacent to any lakes or confined bodies of water; therefore, the potential for a seiche to affect the site is considered negligible.

5.6. Subsidence

The site is not located in an area of known subsidence associated with fluid withdrawal (groundwater or petroleum); therefore, the potential for subsidence due to the extraction of fluids is considered negligible.

5.7. Hydro-Consolidation

Hydro-consolidation can occur in recently deposited sediments (less than 10,000 years old) that were deposited in a semi-arid environment. Examples of such sediments are eolian sands, alluvial fan deposits, and mudflow sediments deposited during flash floods. The pore spaces between the particle grains can re-adjust when inundated by groundwater, causing the material to consolidate. The fill and alluvial soils are susceptible to hydro-consolidation. The proposed ground improvement should effectively mitigate this hazard.

6. CONCLUSIONS

Based on the results of our investigation, we consider the proposed construction feasible from a geotechnical standpoint provided the recommendations contained in this report are followed. Geotechnical conditions exist that should be addressed prior to construction. Geotechnical design and construction considerations include the following.

- There are no known active faults underlying the site. The main seismic hazard at the site is the potential for moderate to severe ground shaking in response to large-magnitude earthquakes generated during the lifetime of the proposed construction. The risk of strong ground motion is common to all construction in southern California and is typically mitigated through building design in accordance with the CBC.
- The site is underlain by relatively deep, saturated alluvial deposits that are potentially liquefiable should a significant seismic event occur. Seismic settlements on the order of 10 to 12 inches total and 5 to 6 inches differential are estimated. Mitigation of potentially liquefiable soils typically consists of ground improvement or deep foundations. We understand that ground improvement consisting of rammed aggregate piers will be used to mitigate the liquefaction hazard and the resulting settlements to acceptable levels.
- The unsaturated soils above groundwater are potentially compressible. To improve subgrade support and reduce the potential for settlement, remedial grading of the upper soils will need to be performed. Remedial grading recommendations are provided herein.
- Based on our laboratory testing, the on-site soils have a very low expansion potential. These soils are suitable for reuse as compacted fill. Clays, if encountered, are not suitable for direct support of buildings or heave-sensitive improvements. Recommendations for expansive soils are provided herein.
- In general, excavations should be achievable using standard heavy earthmoving equipment in good working order with experienced operators.
- Following ground improvement and mitigation of seismic settlements to acceptable levels, the proposed building can be supported on shallow spread footings with bottom levels bearing on rammed aggregate piers. Foundation recommendations are provided herein.
- Flooding after periods of rainfall can occur due to the site's proximity to the San Luis Rey River. A floodwall will be constructed to mitigate the flooding hazard. We understand the floodwall will be constructed using sheet piles. Floodwall recommendations are provided herein.
- Groundwater was encountered at depths between about 7 and 7½ feet bgs, corresponding to elevations of about +18½ to +20 feet msl, and should be anticipated during construction.
- The infiltration feasibility condition category is "No Infiltration" within the Quaternary Alluvial Flood-Plain deposits due to increased risk of geotechnical hazards. Infiltration is discussed further in Section 8 of this report.

7. RECOMMENDATIONS

The remainder of this report presents recommendations regarding earthwork construction as well as preliminary geotechnical recommendations for the design of the proposed improvements. These recommendations are based on empirical and analytical methods typical of the standard of practice in southern California. If these recommendations appear not to address a specific feature of the project, please contact our office for additions or revisions to the recommendations. The recommendations presented herein may need to be updated once final plans are developed.

7.1. Earthwork

Grading and earthwork should be conducted in accordance with the CBC and the recommendations of this report. The following recommendations are provided regarding specific aspects of the proposed earthwork construction. These recommendations should be considered subject to revision based on field conditions observed by our offices during grading.

7.1.1 Site Preparation

Site preparation should begin with the removal of existing improvements, vegetation, and debris. Subsurface improvements that are to be abandoned should be removed, and the resulting excavations should be backfilled and compacted in accordance with the recommendations of this report. Pipeline abandonment can consist of capping or rerouting at the project perimeter and removal within the project perimeter. If appropriate, abandoned pipelines can be filled with grout or slurry as recommended by and observed by the geotechnical consultant.

7.1.2 Remedial Grading – Building Pad

To improve building support and reduce the potential for static settlement, the top 5 feet of existing soil beneath the proposed building pad should be excavated. Horizontally, the excavations should extend at least 5 feet outside the planned perimeter foundations or up to existing improvements or the project boundary, whichever is less. NOVA should observe conditions exposed in the bottom of the excavation to determine if additional excavation is required. The resulting excavation should then be filled to the finished pad grade with compacted fill having an expansion index of 50 or less. We anticipate that the excavated soils will generally be suitable for reuse as compacted fill.

7.1.1 Ground Improvement

Various ground improvement methods are available to mitigate liquefaction and the resulting settlements to acceptable levels. They include stone columns, rammed aggregate piers, or pressure grouting. The specifications are unique to the method used and to the contractor performing the work, as each contractor’s methods and equipment vary. The only control is to perform post-treatment testing to verify that the soils have been densified as required to mitigate the potential for liquefaction. Verification testing should be performed after ground improvement is completed. We understand rammed aggregate piers will be used for ground improvement, and that settlements will be reduced to 2 inches total and 1-inch differential over a distance of 40 feet.

Following ground improvement and verification that the liquefaction potential has been mitigated to acceptable levels, the planned building can be supported on shallow spread footings with bottoms levels on aggregate piers. NOVA should observe the ground improvement operations.

7.1.2 Remedial Grading – Pedestrian Hardscape

Beneath proposed pedestrian hardscape areas, the on-site soils should be excavated to a depth of at least 2 feet below planned subgrade elevation. Horizontally, excavations should extend at least 2 feet outside the planned hardscape or up to existing improvements, whichever is less. NOVA should observe the conditions exposed at the bottom of excavations to evaluate whether additional excavation is recommended. The resulting surface should then be scarified to a depth of 6 to 8 inches, moisture conditioned to near optimum moisture content, and compacted to at least 90% relative compaction. The excavation should be filled with compacted fill having an expansion index of 50 or less.

7.1.3 Remedial Grading – Vehicular Pavements

Beneath proposed vehicular pavement areas, the existing soils should be excavated to a depth of at least 1 foot below planned subgrade elevation. Horizontally, excavations should extend at least 2 feet outside the planned pavement or up to existing improvements, whichever is less. NOVA should observe the conditions exposed in the bottom of excavations to evaluate whether additional excavation is recommended. The resulting surface should then be scarified to a depth of 6 to 8 inches, moisture conditioned to near optimum moisture content, and compacted to at least 90% relative compaction. The excavation should be filled with material suitable for reuse as compacted fill.

7.1.4 Remedial Grading – Conventional Site Walls and Retaining Walls

Beneath proposed conventional site walls and retaining walls not connected to buildings, the existing fill should be excavated to a depth of at least 2 feet below bottom of footing. Horizontally, the excavations should extend at least 2 feet outside the planned hardscape, wall footing, or up to existing improvements, whichever is less. NOVA should observe the conditions exposed at the bottom of excavations to evaluate whether additional excavation is recommended. Any required fill should have an expansion index of 50 or less.

7.1.5 Remedial Grading – Floodwall

Prior to installing sheet piles for the proposed floodwall, site preparation should be performed along the floodwall alignment as described in Section 7.1.1. The removals should include the areas within the limits of proposed backfill behind the floodwall. Once the sheet piles are driven and the floodwall has achieved adequate structural strength, granular and free-draining soil having an expansion index of 20 or less can be placed and compacted. Lateral deflection of the floodwall should be monitored during backfilling.

7.1.6 Expansive Soil

The on-site soils tested have expansion indices of 0 and 2, classified as very low expansion potential. To reduce the potential for expansive heave, the top 2 feet of material beneath building footings, concrete slabs-on-grade, hardscape, and site and retaining wall footings should have an expansion index of 50 or less. Horizontally, the soils having an expansion index of 50 or less should extend at least 5 feet outside the planned perimeter building foundations, at least 2 feet outside hardscape and site/retaining wall footings, or up to existing improvements, whichever is less. NOVA anticipates that the on-site silty and clayey sand will meet the expansion index criteria.

7.1.7 Compacted Fill

Fill and backfill beneath the structure should be placed in 6- to 8-inch-thick loose lifts, moisture conditioned to near optimum moisture content, and compacted to at least 95% relative compaction. The maximum density and optimum moisture content for the evaluation of relative compaction should be determined in accordance with ASTM D1557. Outside the structures, utility trench backfill and subgrade soils beneath pedestrian hardscape should be compacted to at least 90% relative compaction. The top 12 inches of subgrade soils beneath vehicular pavements should be compacted to at least 95% relative compaction.

7.1.8 Imported Soil

Imported soil should consist of predominately granular soil, free of organic matter and rocks greater than 6 inches. Imported soil should be observed and, if appropriate, tested by NOVA prior to transport to the site to evaluate suitability for the intended use.

7.1.9 Subgrade Stabilization

Excavation bottoms should be firm and unyielding prior to placing fill. In areas of saturated or yielding subgrade, a reinforcing geogrid such as Tensar® Triax® TX-5 or equivalent can be placed on the excavation bottom, and then at least 12 inches of aggregate base placed and compacted. Once the surface of the aggregate base is firm enough to achieve compaction, then the remaining excavation should be filled to finished pad grade with suitable material.

7.1.10 Excavation Characteristics

It is anticipated that excavations can be achieved with conventional earthwork equipment in good working order.

7.1.11 Oversized Material

Excavations may generate oversized material. Oversized material is defined as rocks or cemented clasts greater than 6 inches in largest dimension. Oversized material should be broken down to no greater than 6 inches in largest dimension for use in fill, use as landscape material, or disposed of off-site.

7.1.12 Temporary Excavations

Temporary excavations 3 feet deep or less can be made vertically. Deeper temporary excavations in fill should be laid back no steeper than 1:1 (horizontal:vertical). The faces of temporary slopes should be inspected daily by the contractor's Competent Person before personnel are allowed to enter the excavation. Any zones of potential instability, sloughing, or raveling should be brought to the attention of the engineer and corrective action implemented before personnel begin working in the excavation. Excavated soils should not be stockpiled behind temporary excavations within a distance equal to the depth of the excavation. NOVA should be notified if other surcharge loads are anticipated so that lateral load criteria can be developed for the specific situation. If temporary slopes are to be maintained during the rainy season, berms are recommended along the tops of slopes to prevent runoff water from entering the excavation and eroding the slope faces.

Slopes steeper than those described above will require shoring. Additionally, temporary excavations that extend below a plane inclined at 1½:1 (h:v) downward from the outside bottom edge of existing structures or improvements will require shoring. Soldier piles and lagging, internally braced shoring, or trench boxes could be used. If trench boxes are used, the soil immediately adjacent to the trench box is not directly supported. Ground surface deformations immediately adjacent to the pit or trench could be greater where trench boxes are used compared to other methods of shoring.

7.1.13 Temporary Shoring

For design of cantilevered shoring with level backfill, an active earth pressure equal to a fluid weighing 35 pounds per cubic foot (pcf) can be used. An additional 20 pcf should be added for 2:1 (h:v) sloping ground. The surcharge loads on shoring from traffic and construction equipment working adjacent to the excavation can be modeled by assuming an additional 2 feet of soil behind the shoring. For design of soldier piles, an allowable passive pressure of 300 pounds per square foot (psf) per foot of embedment above groundwater or 150 psf below groundwater can be used over two times the pile diameter up to a maximum of 2,000 psf. Soldier piles should be spaced at least three pile diameters, center to center. Continuous lagging will be required throughout. The soldier piles should be designed for the full anticipated lateral pressure; however, the pressure on the lagging will be less due to arching in the soils. For design of lagging, the earth pressure can be limited to a maximum of 400 psf.

7.1.14 Slopes

Permanent slopes should be constructed no steeper than 2:1 (h:v). Faces of fill slopes should be compacted either by rolling with a sheepsfoot roller or other suitable equipment, or by overfilling and cutting back to design grade. Fills should be benched into sloping ground inclined steeper than 5:1 (h:v). In our opinion, slopes constructed no steeper than 2:1 (h:v) will possess an adequate factor of safety. An engineering geologist should observe cut slopes during grading to ascertain that no unforeseen adverse geologic conditions are encountered that require revised recommendations. Slopes are susceptible to surficial slope failure and erosion. Water should not be allowed to flow over the top of slope. Additionally, slopes should be planted with vegetation that will reduce the potential for erosion.

7.1.15 Groundwater

As previously mentioned, groundwater was encountered at depths between about 7 and 7½ feet bgs and should be anticipated in excavations. Groundwater levels may fluctuate in the future due to rainfall, irrigation, broken pipes, or changes in site drainage. If dewatering is necessary, the dewatering method should be evaluated and implemented by an experienced dewatering subcontractor.

7.1.16 Surface Drainage

Final surface grades around structures should be designed to collect and direct surface water away from structures, including retaining walls, and toward appropriate drainage facilities. The ground around the structure should be graded so that surface water flows rapidly away from the structure without ponding. In general, we recommend that the ground adjacent to the structure slope away at a gradient of at least 2%. Densely vegetated areas where runoff can be impaired should have a minimum gradient of at least 5% within the first 5 feet from the structure. Roof gutters with downspouts that discharge directly into a closed drainage system are recommended on structures. Drainage patterns established at the time of fine grading should be maintained throughout the life of the proposed structures. Site irrigation should be limited to the minimum necessary to sustain landscape growth. Should excessive irrigation, impaired drainage, or unusually high rainfall occur, saturated zones of perched groundwater can develop.

7.1.17 Grading Plan Review

NOVA should review the grading plans and earthwork specifications to ascertain whether the intent of the recommendations contained in this report have been implemented, and that no revised recommendations are needed due to changes in the development scheme.

7.2. Foundations

The foundation recommendations provided herein are considered generally consistent with methods typically used in southern California. Other alternatives may be available. Our recommendations are only minimum criteria based on geotechnical factors and should not be considered a structural design, or to preclude more restrictive criteria of governing agencies or by the structural engineer. The design of the foundation system should be performed by the project structural engineer, incorporating the geotechnical parameters described herein and the requirements of applicable building codes.

7.2.1 Spread Footings

Following ground improvement and mitigation of seismic settlements to acceptable levels, the proposed building can be supported on shallow spread footings with bottom levels bearing on rammed aggregate piers. Footings should extend at least 24 inches below lowest adjacent finished grade. A minimum width of 12 inches is recommended for continuous footings and 24 inches for isolated or wall footings. An allowable bearing capacity of 5,000 psf can be used. The bearing value can be increased by ⅓ when considering the total of all loads, including wind or seismic forces. Footings located adjacent to or within slopes should be extended to a depth such that a minimum horizontal distance of 10 feet exists between the lower outside footing edge and the face of the slope.

Lateral loads will be resisted by friction between the bottoms of footings and passive pressure on the faces of footings and other structural elements below grade. An allowable coefficient of friction of 0.35 can be used. An allowable passive pressure of 350 psf per foot of depth below the ground surface can be used for level ground conditions. The allowable passive pressure should be reduced for sloping ground conditions. The passive pressure can be increased by ⅓ when considering the total of all loads, including wind or seismic forces. The upper 1 foot of soil should not be relied on for passive support unless the ground is covered with pavements or slabs.

7.2.2 Settlement Characteristics

We understand that the ground improvement program will be designed to result in foundation settlements of 2 inches total and 1-inch differential over a distance of 40 feet for static and seismic.

7.2.3 Foundation Plan Review

NOVA should review the foundation plans to ascertain that the intent of the recommendations in this report has been implemented and that revised recommendations are not necessary as a result of changes after this report was completed.

7.2.4 Foundation Excavation Observations

A representative from NOVA should observe the foundation excavations prior to forming or placing reinforcing steel.

7.3. Interior Slabs-On-Grade

Interior concrete slabs-on-grade should be underlain by at least 2 feet of material with an expansion index of 50 or less. We recommend that conventional concrete slab-on-grade floors be at least 5 inches thick and reinforced with at least No. 4 bars at 18 inches on center each way. To reduce the potential for excessive cracking, concrete slabs-on-grade should be provided with construction or ‘weakened plane’ joints at frequent intervals. The project structural engineer should design on-grade building slabs and joint spacing.

Moisture protection should be installed beneath slabs where moisture-sensitive floor coverings will be used. The project architect should review the tolerable moisture transmission rate of the proposed floor covering and specify an appropriate moisture protection system. Typically, a plastic vapor barrier is used. Minimum 15-mil plastic is recommended. The plastic should comply with ASTM E1745. The vapor barrier installation should comply with ASTM E1643. The slab can be placed directly on the vapor barrier.

7.4. Hardscape

Hardscape should be underlain by at least 2 feet of material with an expansion index of 50 or less. Exterior slabs should be at least 4 inches in thickness and reinforced with at least No. 3 bars at 18 inches on center each way. Slabs should be provided with weakened plane joints. Joints should be placed in accordance with the American Concrete Institute (ACI) guidelines. The project architect should select the final joint patterns. A 1-inch maximum size aggregate mix is recommended for concrete for exterior slabs. The corrosion potential of on-site soils with respect to reinforced concrete will need to be taken into account in concrete mix design. Coarse and fine aggregate in concrete should conform to the “Greenbook” Standard Specifications for Public Works Construction.

7.5. Conventional Retaining Walls

Conventional retaining walls can be supported on shallow spread footings. The recommendations for spread footings provided in the foundation section of this report are also applicable to conventional retaining walls.

The active earth pressure for the design of unrestrained retaining walls with level backfill can be taken as equivalent to the pressure of a fluid weighing 35 pcf. The at-rest earth pressure for the design of restrained retaining wall with level backfill can be taken as equivalent to the pressure of a fluid weighing 55 pcf. These values assume a granular and drained backfill condition. Higher lateral earth pressures would apply if walls retain clay soils. An additional 20 pcf should be added to these values for walls with 2:1 (h:v) sloping backfill. An increase in earth pressure equivalent to an additional 2 feet of retained soil can be used to account for surcharge loads from light traffic. The above values do not include a factor of safety. Appropriate factors of safety should be incorporated into the design. If any other surcharge loads are anticipated, NOVA should be contacted for the necessary increase in soil pressure.

If required, the seismic earth pressure can be taken as equivalent to the pressure of a fluid pressure weighing 18 pcf. This value is for level backfill and does not include a factor of safety. Appropriate factors of safety should be incorporated into the design. This pressure is in addition to the un-factored, active earth pressure. The total equivalent fluid pressure can be modeled as a triangular pressure distribution with the resultant acting at a height of H/3 up from the base of the wall, where H is the retained height of the wall. The passive pressure and bearing capacity can be increased by ⅓ in determining the seismic stability of the wall.

Retaining walls should be provided with a backdrain to reduce the accumulation of hydrostatic pressures or be designed to resist hydrostatic pressures. Backdrains can consist of a 2-foot-wide zone of ¾-inch crushed rock. The crushed rock should be separated from the adjacent soils using a non-woven filter fabric, such as Mirafi 140N or equivalent. A perforated pipe should be installed at the base of the backdrain and sloped to discharge to a suitable storm drain facility, or weep holes should be provided. As an alternative, a geocomposite drainage system such as Miradrain 6000 or equivalent placed behind the wall and connected to a suitable storm drain facility can be used. The project architect should provide dampproofing/waterproofing specifications and details.

Figure 7-1 presents typical conventional retaining wall backdrain details. Note that the guidance provided on Figure 7-1 is conceptual. Other options are available.

Wall backfill should consist of granular, free-draining material having an expansion index of 20 or less. The backfill zone is defined by a 1:1 plane projected upward from the heel of the wall. Expansive or clayey soil should not be used. Additionally, backfill within 3 feet from the back of the wall should not contain rocks greater than 3 inches in dimension. Backfill should be compacted to at least 90% relative compaction. Backfill should not be placed until walls have achieved adequate structural strength. Compaction of wall backfill will be necessary to minimize settlement of the backfill and overlying settlement-sensitive improvements. However, some settlement should still be anticipated. Provisions should be made for some settlement of concrete slabs and pavements supported on backfill. Additionally, any utilities supported on backfill should be designed to tolerate differential settlement.

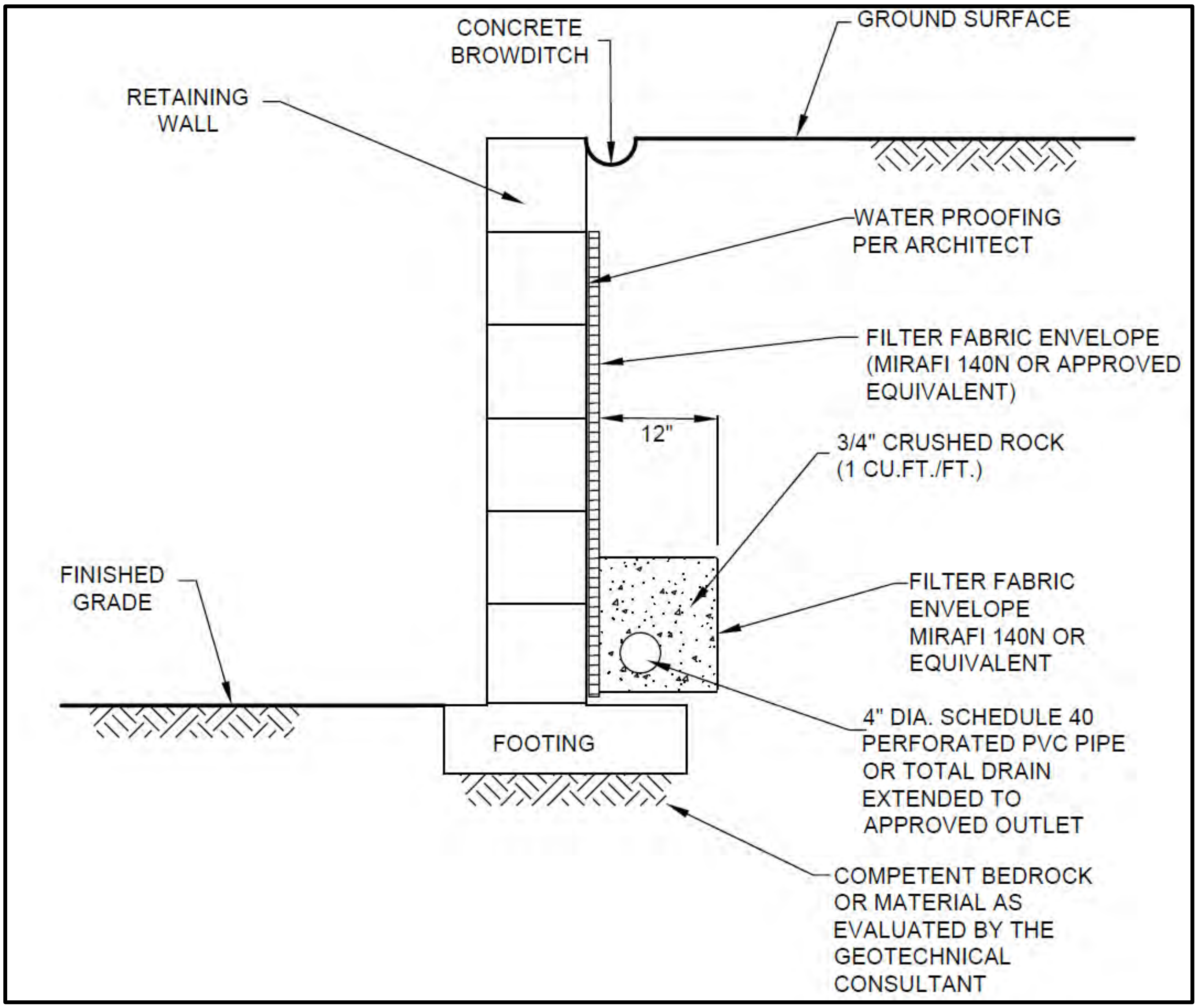


Figure 7-1. Typical Conventional Retaining Wall Backdrain Details

7.6. Floodwall

We understand the proposed floodwall will be constructed using steel sheet piles. The active earth pressure for the design of unrestrained sheet piles can be taken as equivalent to the pressure of a fluid weighing 35 pcf. If required, the seismic earth pressure can be taken in addition to the active earth pressure as equivalent to the pressure of a fluid pressure weighing 18 pcf. These values are for level backfill and do not include a factor of safety. Appropriate factors of safety should be incorporated into the design. The total equivalent fluid pressure can be modeled as a triangular pressure distribution with the resultant acting at a height of H/3 up from the base of the wall, where H is the retained height of the wall.

For level ground conditions above groundwater, an allowable passive pressure of 300 psf per foot of depth below the ground surface can be used. For level ground conditions below groundwater, an allowable passive pressure of 150 psf per foot of depth below the ground surface can be used. The allowable passive pressure values should be reduced for sloping ground conditions. The passive pressure can be increased by ⅓ when considering the total of all loads, including wind or seismic forces. The upper 1 foot of soil should not be relied on for passive support unless the ground is covered with pavements or slabs.

To reduce the potential for water intrusion, a sheet piling interlock sealant such as WADIT is recommended. The sealant is typically applied to the interlocks prior to driving the sheets in general accordance with the product manufacturer's recommendations.

The floodwall should be provided with a backdrain to reduce the accumulation of hydrostatic pressures or be designed to resist hydrostatic pressures. The backdrain can consist of a 4-inch diameter perforated PVC pipe surrounded by crushed rock wrapped with filter fabric such as Mirafi 140N, and outlet through solid PVC pipe to the storm drain system.

Wall backfill should consist of granular, free-draining material having an expansion index of 20 or less. The backfill and compaction equipment will load the sheet pile floodwall, which may result in lateral deflection. Floodwall deflection should be evaluated by the design engineer to confirm that the sheet piles will contain adequate moment capacity. The actual deflection should be monitored weekly during the backfill process using surveyed monuments to confirm that deflection remains within tolerable limits defined by the structural engineer.

Sheet piles are typically installed by vibratory driving, impact driving, and/or hydraulic pushing. In general, vibratory driving is the most efficient method of installing sheet piles in granular soils such as the on-site soils. Most of the alluvium is anticipated to be relatively easily penetrated; however, localized layers of dense sands may result in driving difficulties. The contractor should select the appropriate driving methods and equipment to achieve the required penetration without damaging the sheet piles.

7.7. Pipelines

For level ground conditions, a passive earth pressure of 300 psf per foot of depth below the lowest adjacent final grade can be used to compute allowable thrust block resistance. A value of 150 psf per foot should be used below groundwater level.

A modulus of soil reaction (E') of 1,500 psi can be used to evaluate the deflection of buried flexible pipelines. This value assumes that granular bedding material is placed adjacent to the pipe and is compacted to at least 90% relative compaction.

Pipe bedding as specified in the "Greenbook" Standard Specifications for Public Works Construction can be used. Bedding material should consist of clean sand having a sand equivalent not less than 20 and should extend to at least 12 inches above the top of pipe. Alternative materials meeting the intent of the bedding specifications are also acceptable. Samples of materials proposed for use as bedding should be provided to the engineer for inspection and testing before the material is imported for use on the project. The on-site materials are not expected to meet "Greenbook" bedding specifications. The pipe bedding material should be placed over the full width of the trench. After placement of the pipe, the bedding should be brought up uniformly on both sides of the pipe to reduce the potential for unbalanced loads. No voids or uncompacted areas should be left beneath the pipe haunches. Ponding or jetting the pipe bedding should not be allowed.

Where pipeline inclinations exceed 15%, cutoff walls are recommended in trench excavations. Additionally, we do not recommend that open graded rock be used for pipe bedding or backfill because of the potential for piping erosion. The recommended bedding is clean sand having a sand equivalent not less than 20 or 2-sack sand/cement slurry. If sand/cement slurry is used for pipe bedding to at least 1 foot over the top of the pipe, cutoff walls are not considered necessary. The need for cutoff walls should be further evaluated by the project civil engineer designing the pipeline.

7.8. Corrosivity

Representative samples of the on-site soils were tested to evaluate corrosion potential. The test results are presented in Appendix C. The project design engineer can use the sulfate results in conjunction with ACI 318 to specify the water/cement ratio, compressive strength, and cementitious material types for concrete exposed to soil. A corrosion engineer should be contacted to provide specific corrosion control recommendations.

7.9. Pavement Section Recommendations

The pavement support characteristics of the soils encountered during NOVA's investigation are considered low to medium. An R-value of 39 was assumed for design of preliminary pavement sections. The actual R-value of the subgrade soils should be determined after grading, and the final pavement sections should be provided. Based on an R-value of 39, the following preliminary pavement structural sections are provided for the assumed Traffic Indexes on Table 7-1.

Table 7-1. AC and PCC Pavement Sections

Traffic Type	Traffic Index	Asphalt Concrete (inches)	Portland Cement Concrete (inches)
Parking Stalls	4.5	3 AC / 4 AB	6 PCC
Driveways	6.0	4 AC / 5 AB	6½ PCC
Fire Lanes	7.5	5 AC / 7 AB	7½ PCC

AC: Asphalt Concrete
AB: Aggregate Base
PCC: Portland Cement Concrete

Subgrade preparation should be performed immediately prior to placement of the pavement section. The upper 12 inches of subgrade should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 95% relative compaction. All soft or yielding areas should be stabilized or removed and replaced with compacted fill or aggregate base. Aggregate base and asphalt concrete should conform to the Caltrans Standard Specifications or the "Greenbook" and should be compacted to at least 95% relative compaction. Aggregate base should have an R-value of not less than 78. All materials and methods of construction should conform to good engineering practices and the minimum local standards.

8. INFILTRATION FEASIBILITY

Final stormwater infiltration Best Management Practices ('stormwater BMP') locations were not identified at the time of the investigation; however, NOVA coordinated with the project architect to provide infiltration testing in the areas most likely to have BMPs.

Two (2) percolation test borings (P-1 and P-2) were constructed following the recommendations for percolation testing presented in the City of Oceanside BMP Design Manual (hereinafter, 'the BMP Manual').

The percolation test borings were drilled with a truck-mounted, 8-inch hollow stem auger to depths of about 5 feet bgs. Field measurements were taken to confirm that the boring was excavated to about 8 inches in diameter. The borings were logged by a NOVA geologist, who observed and logged the exposed soil cuttings and the boring conditions.

Once the boring was drilled to the desired depth, the boring was converted to a percolation test boring by placing an approximately 2-inch layer of ¾-inch gravel on the bottom, then extending 3-inch diameter Schedule 40 perforated PVC pipe to the ground surface. The ¾-inch gravel was used to partially fill the annular space around the perforated pipe below existing finish grade to minimize the potential of soil caving.

The percolation test well was pre-soaked by filling the hole with water to the ground surface level and testing commenced within a 26-hour window. On the day of testing, two 25-minute trials were conducted in the well.

In the percolation borings, the pre-soak water did not percolate over 6 inches into the soil unit within 25 minutes. Based on the results of the trials, water levels were recorded every 30 minutes for 6 hours. At the beginning of each test interval, the water level was raised to approximately the same level as the previous tests, in order to maintain a near-constant head during all test periods.

The percolation rate of a soil profile is not the same as its infiltration rate ('I'). Therefore, the field percolation rate was converted to an estimated infiltration rate utilizing the Porchet Method in accordance with guidance contained in the BMP Manual. The table below provides a summary of the infiltration rates determined by the percolation testing.

Table 8-1. Infiltration Rate Test Results

Test Location	Test Depth (feet)	Material at Test Depth	Infiltration Rate (in/hr, FS=2)
P-1	5	Young Alluvial Flood-Plain Deposits: Poorly Graded Sand	0.45
P-2	5	Young Alluvial Flood-Plain Deposits: Poorly Graded Sand	0.12

Note: 'FS' indicates 'Factor of Safety'

As shown in Table 8-1, a factor of safety (FS) is applied to the infiltration rate (I) determined by the percolation testing. This factor of safety, at least FS = 2 in local practice, considers the nature and variability of subsurface materials, as well as the natural tendency of infiltration structures to become less efficient with time. The infiltration rate after applying FS = 2 is I > 0.01 inch per hour but less than 0.5 inches per hour. Partial infiltration BMPs are typically suitable with these rates, however, not without increasing the geotechnical hazards.

Appendix E presents Worksheet C.4-1: Categorization of Infiltration Feasibility Condition Based on Geotechnical Conditions. The tested infiltration rates do support reliable stormwater infiltration in any appreciable quantity, however, based on the potential for liquefaction of the underlying soils and distance to groundwater, it is NOVA's judgment that the site is not suitable for permanent infiltration BMPs. Based on the test results, the infiltration feasibility condition category is "No Infiltration." BMP facilities should be lined throughout with an impermeable geomembrane to reduce the potential for water-related distress to adjacent structures or improvements. A subdrain system should be installed at the bottom of BMP facilities. Additionally, BMP facilities should be kept at least 10 feet from structural foundations.

9. CLOSURE

NOVA should review project plans and specifications prior to bidding and construction to check that the intent of the recommendations in this report has been incorporated. Observations and tests should be performed during construction. If the conditions encountered during construction differ from those anticipated based on the subsurface exploration program, the presence of personnel from our offices during construction will enable an evaluation of the exposed conditions and modifications of the recommendations in this report or development of additional recommendations in a timely manner.

NOVA should be advised of changes in the project scope so that the recommendations contained in this report can be evaluated with respect to the revised plans. Changes in recommendations will be verified in writing. The findings in this report are valid as of the date of this report. Changes in the condition of the site can, however, occur with the passage of time, whether they are due to natural processes or work on this or adjacent areas. In addition, changes in the standards of practice and government regulations can occur. Thus, the findings in this report may be invalidated wholly or in part by changes beyond our control. This report should not be relied upon after a period of two years without a review by us verifying the suitability of the conclusions and recommendations to site conditions at that time.

In the performance of our professional services, we comply with that level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions and in the same locality. The client recognizes that subsurface conditions may vary from those encountered at the boring locations and that our data, interpretations, and recommendations are based solely on the information obtained by us. We will be responsible for those data, interpretations, and recommendations, but shall not be responsible for interpretations by others of the information developed. Our services consist of professional consultation and observation only, and no warranty whatsoever, express or implied, is made or intended in connection with the work performed or to be performed by us, or by our proposal for consulting or other services, or by our furnishing of oral or written reports or findings.

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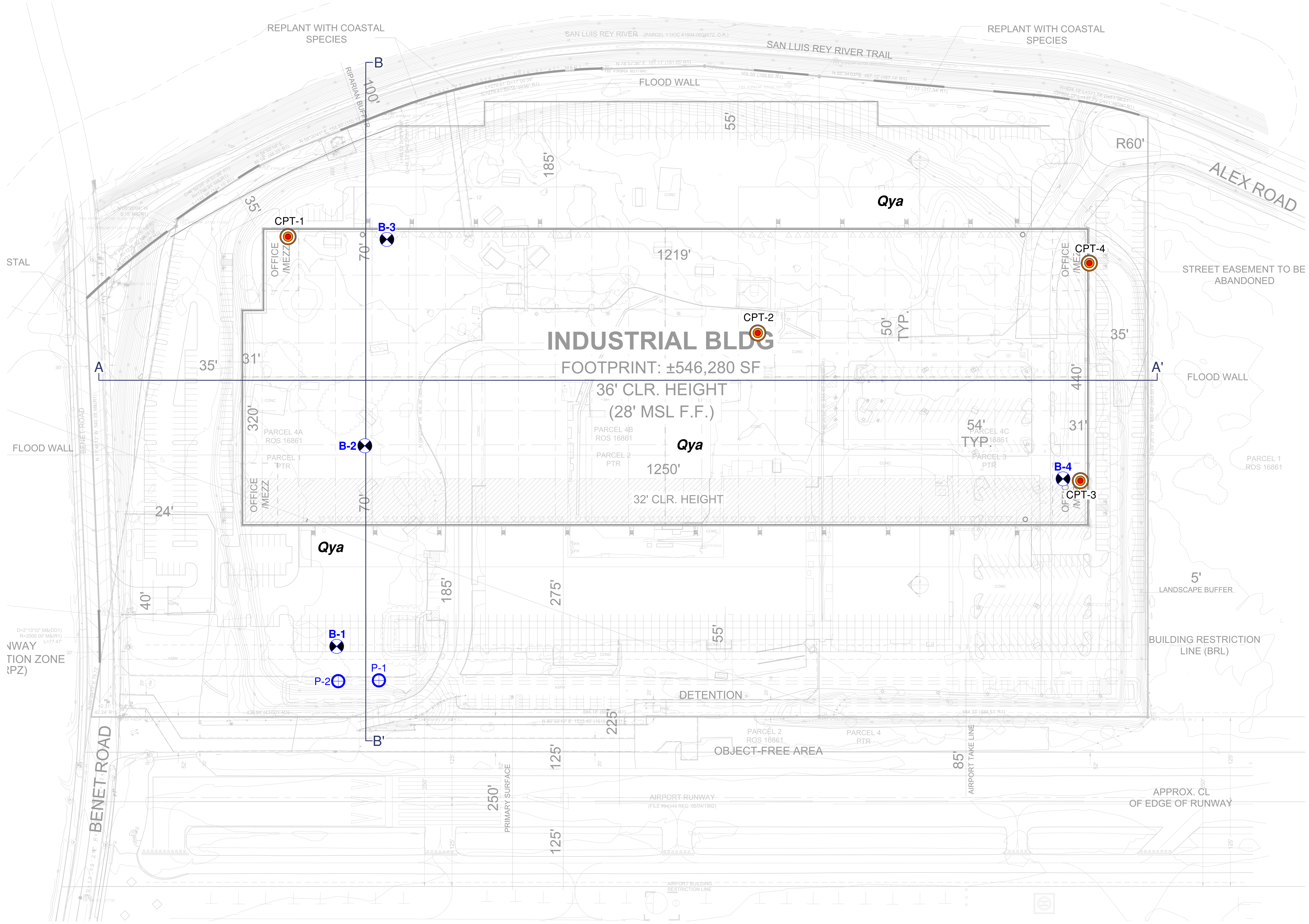
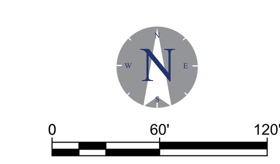
PLATES

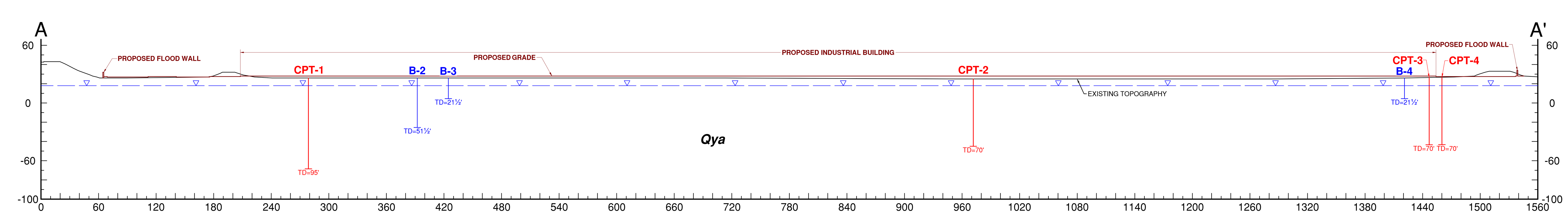


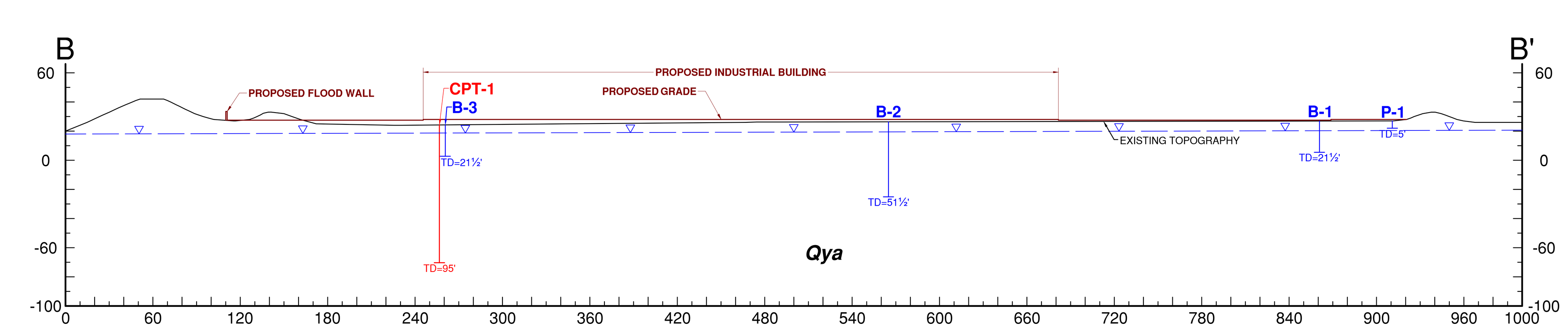


PASCO LARET SUITER & ASSOCIATES

KEY TO SYMBOLS

Qya	YOUNG ALLUVIAL FLOOD-PLAIN DEPOSITS
B-4	GEOTECHNICAL BORING
P-2	PERCOLATION TEST BORING
CPT-4	CONE PENETRATION TEST
B B'	CROSS-SECTION ALIGNMENT





KEY TO SYMBOLS

Qya	YOUNG ALLUVIAL FLOOD-PLAIN DEPOSITS
B-4	GEOTECHNICAL BORING
P-2	PERCOLATION TEST BORING
CPT-4	CONE PENETRATION TEST
	APPROXIMATE LOCATION OF GROUNDWATER

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DATE:	OCT 2021
DRAWN BY:	DTJ
REVIEWED BY:	CJ
SCALE:	1"=60'
DRAWING TITLE:	

GEOTECHNICAL MAP & CROSS-SECTIONS AA' & BB'

PLATE NO. 1 OF 1

APPENDIX A
USE OF THE GEOTECHNICAL REPORT

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
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APPENDIX B
BORING LOGS

MAJOR DIVISIONS				TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVEL MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVEL WITH LESS THAN 15% FINES	GW	WELL-GRADED GRAVEL WITH OR WITHOUT SAND
			GP	POORLY GRADED GRAVEL WITH OR WITHOUT SAND
		GRAVEL WITH 15% OR MORE FINES	GM	SILTY GRAVEL WITH OR WITHOUT SAND
			GC	CLAYEY GRAVEL WITH OR WITHOUT SAND
	SAND MORE THAN HALF COARSE FRACTION IS FINER THAN NO. 4 SIEVE SIZE	CLEAN SAND WITH LESS THAN 15% FINES	SW	WELL-GRADED SAND WITH OR WITHOUT GRAVEL
			SP	POORLY GRADED SAND WITH OR WITHOUT GRAVEL
		SAND WITH 15% OR MORE FINES	SM	SILTY SAND WITH OR WITHOUT GRAVEL
			SC	CLAYEY SAND WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML	SILT WITH OR WITHOUT SAND OR GRAVEL
			CL	LEAN CLAY WITH OR WITHOUT SAND OR GRAVEL
			OL	ORGANIC SILT OR CLAY OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH	ELASTIC SILT WITH OR WITHOUT SAND OR GRAVEL
			CH	FAT CLAY WITH OR WITHOUT SAND OR GRAVEL
			OH	ORGANIC SILT OR CLAY OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

GROUNDWATER / STABILIZED
PERCHED GROUNDWATER
BULK SAMPLE
SPT SAMPLE (ASTM D1586)
MOD. CAL. SAMPLE (ASTM D3550)
* NO SAMPLE RECOVERY
GEOLOGIC CONTACT
SOIL TYPE CHANGE

LAB TEST ABBREVIATIONS

CR	CORROSIVITY
MD	MAXIMUM DENSITY
DS	DIRECT SHEAR
EI	EXPANSION INDEX
AL	ATTERBERG LIMITS
SA	SIEVE ANALYSIS
RV	RESISTANCE VALUE
CN	CONSOLIDATION
SE	SAND EQUIVALENT

RELATIVE DENSITY OF COHESIONLESS SOILS	
RELATIVE DENSITY	SPT N60 BLOWS/FOOT
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

CONSISTENCY OF COHESIVE SOILS		
CONSISTENCY	SPT N60 BLOWS/FOOT	POCKET PENETROMETER MEASUREMENT (TSF)
VERY SOFT	0 - 2	0 - 0.25
SOFT	2 - 4	0.25 - 0.50
MEDIUM STIFF	4 - 8	0.50 - 1.0
STIFF	8 - 15	1.0 - 2.0
VERY STIFF	15 - 30	2.0 - 4.0
HARD	OVER 30	OVER 4.0

NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).
IF THE SEATING INTERVAL (1st 6 INCH INTERVAL) IS NOT ACHEIVED, N IS REPORTED AS REF.

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San Clemente, CA 92673
P: 949.388.7710

SUBSURFACE EXPLORATION LEGEND

LOG OF BORING B-1

DATE DRILLED: OCTOBER 4,2021 **DRILLING METHOD:** HOLLOW STEM AUGER

ELEVATION: ± 27 FT MSL **DRILLING EQUP.:** CME 95 **GROUNDWATER DEPTH:** 7 1/2 FT

SAMPLE METHOD: HAMMER: 140 LBS., DROP: 30 IN (AUTOMATIC) **NOTES:** ETR~70.6%, N_{60} ~ 70.6/60*N~1.17*N

DEPTH (FT)	BULK SAMPLE	CAL/SPT SAMPLE	BLOWS PER FOOT N	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	SOIL CLASS. (USCS)	**SOIL DESCRIPTION** *SUMMARY OF SUBSURFACE CONDITIONS (USCS; COLOR, MOISTURE, DENSITY, GRAIN SIZE, OTHER)*	LAB TESTS
0								*VEGETATED SURFACE*	
							SP	**YOUNG ALLUVIAL FLOOD-PLAIN DEPOSITS (Qya):** *POORLY GRADED SAND; OLIVE BROWN TO GRAY, DRY TO MOIST, LOOSE, FINE TO MEDIUM GRAINED, MICACEOUS*	RV
5			7	8				*VERY MOIST, LOOSE*	
								GROUNDWATER ENCOUNTERED	
10			8	9			SM	*SILTY SAND; GRAY, WET, LOOSE, FINE TO MEDIUM GRAINED, MICACEOUS*	
15			7	8					
20			20	23				*BROWN SILT LAYER* *SILTY SAND; GRAY, WET, MEDIUM DENSE*	
								BORING TERMINATED AT 21½ FT. GROUNDWATER ENCOUNTERED AT 7½ FT. CAVING AT 7½ FT.	
25									
30									

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PROPOSED INDUSTRIAL DEVELOPMENT

260 EDDY JONES WAY

OCEANSIDE, CA 92058

FIGURE B.1

LOGGED BY: DB | REVIEWED BY: MS | PROJECT NO.: 2021176

LOG OF BORING B-2

DATE DRILLED: OCTOBER 4,2021 **DRILLING METHOD:** HOLLOW STEM AUGER

ELEVATION: ± 26 FT MSL **DRILLING EQUP.:** CME 95 **GROUNDWATER DEPTH:** 7 FT

SAMPLE METHOD: HAMMER: 140 LBS., DROP: 30 IN (AUTOMATIC) **NOTES:** ETR~70.6%, N_{60} ~ 70.6/60*N~1.17*N

DEPTH (FT)	BULK SAMPLE	CAL/SPT SAMPLE	BLOWS PER FOOT N	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	SOIL CLASS. (USCS)	**SOIL DESCRIPTION** *SUMMARY OF SUBSURFACE CONDITIONS (USCS; COLOR, MOISTURE, DENSITY, GRAIN SIZE, OTHER)*	LAB TESTS
0								*VEGETATED SURFACE*	
							SM	**YOUNG ALLUVIAL FLOOD-PLAIN DEPOSITS (Qya):** *SILTY SAND; OLIVE BROWN TO GRAY, DRY TO MOIST, LOOSE, FINE TO MEDIUM GRAINED, MICACEOUS*	SA AL EI CR
5			7	8			SP	*POORLY GRADED SAND; DARK GRAY, MOIST, LOOSE, FINE TO MEDIUM GRAINED*	
								GROUNDWATER ENCOUNTERED	
10			4	5				*BROWNISH GRAY, WET*	
15			9	11				*DARK GRAY, MEDIUM DENSE*	
20			19	22				*DARK GRAY TO GRAY, FINE GRAINED*	
25			15	18			SM/SP	*SILTY SAND TO POORLY GRADED SAND; GRAY, WET, MEDIUM DENSE, FINE GRAINED, MICACEOUS*	
30									

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PROPOSED INDUSTRIAL DEVELOPMENT
260 EDDY JONES WAY
OCEANSIDE, CA 92058

FIGURE B.2

LOGGED BY: DB	REVIEWED BY: MS	PROJECT NO.: 2021176

LOG OF BORING B-2

DATE DRILLED: OCTOBER 4,2021 **DRILLING METHOD:** HOLLOW STEM AUGER

ELEVATION: ± 26 FT MSL **DRILLING EQUP.:** CME 95 **GROUNDWATER DEPTH:** 7 FT

SAMPLE METHOD: HAMMER: 140 LBS., DROP: 30 IN (AUTOMATIC) **NOTES:** ETR~70.6%, N_{60} ~ 70.6/60*N~1.17*N

DEPTH (FT)	BULK SAMPLE	CAL/SPT SAMPLE	BLOWS PER FOOT N	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	SOIL CLASS. (USCS)	**SOIL DESCRIPTION** *SUMMARY OF SUBSURFACE CONDITIONS (USCS; COLOR, MOISTURE, DENSITY, GRAIN SIZE, OTHER)*	LAB TESTS
30			16	19			SP-SM	**YOUNG ALLUVIAL FLOOD-PLAIN DEPOSITS (Qya) CONTINUED:** *POORLY GRADED SAND WITH SILT; GRAY, WET, MEDIUM DENSE, FINE TO MEDIUM GRAINED*	
35			7	8				*DARK GRAY, WET, LOOSE, FINE GRAINED, MICACEOUS*	
40			22	26			ML	*SANDY SILT; DARK GRAY, WET, VERY STIFF, FINE GRAINED*	
45			10	12			SM-ML	*SILTY SAND TO SANDY SILT; DARK GRAY, WET, MEDIUM DENSE TO STIFF, FINE GRAINED, MICACEOUS*	
50			10	12			ML	*SANDY SILT; DARK GRAY, WET, STIFF, FINE TO MEDIUM GRAINED, SOFT SEDIMENT DEFORMATION*	
								BORING TERMINATED AT 51½ FT. GROUNDWATER ENCOUNTERED AT 7FT. CAVING TO 7FT.	
55									
60									

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260 EDDY JONES WAY
OCEANSIDE, CA 92058

FIGURE B.3

LOGGED BY: DB | REVIEWED BY: MS | PROJECT NO.: 2021176

LOG OF BORING B-3

DATE DRILLED: OCTOBER 4,2021 **DRILLING METHOD:** HOLLOW STEM AUGER

ELEVATION: ± 26 FT MSL **DRILLING EQUP.:** CME 95 **GROUNDWATER DEPTH:** 7 1/2 FT

SAMPLE METHOD: HAMMER: 140 LBS., DROP: 30 IN (AUTOMATIC) **NOTES:** ETR~70.6%, N_{60} ~ 70.6/60*N~1.17*N

DEPTH (FT)	BULK SAMPLE	CAL/SPT SAMPLE	BLOWS PER FOOT N	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	SOIL CLASS. (USCS)	**SOIL DESCRIPTION** *SUMMARY OF SUBSURFACE CONDITIONS (USCS; COLOR, MOISTURE, DENSITY, GRAIN SIZE, OTHER)*	LAB TESTS
0								*VEGETATED SURFACE*	
							SP	**YOUNG ALLUVIAL FLOOD-PLAIN DEPOSITS (Qya):** *POORLY GRADED SAND; OLIVE BROWN TO GRAY, DRY TO MOIST, LOOSE, FINE TO MEDIUM GRAINED*	
5			8	9				*SILTY SAND; DARK GRAY, VERY MOIST, LOOSE*	
								GROUNDWATER ENCOUNTERED	
10			9	11				*POORLY GRADED SAND; GRAY, WET, MEDIUM DENSE, MEDIUM GRAINED, MICACEOUS, IRON OXIDE*	
15			5	6			ML	*SANDY SILT; GRAY, WET, MEDIUM STIFF, FINE GRAINED, IRON OXIDE, SOME CLAY*	
20			8	9			SM	*SILTY SAND; GRAY, WET, LOOSE, FINE GRAINED, SCATTERED ORGANIC MATERIAL, MICACEOUS*	
								BORING TERMINATED AT 21½ FT. GROUNDWATER ENCOUNTERED AT 7½ FT. CAVING TO 7½ FT.	
25									
30									

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FIGURE B.4

LOGGED BY: DB | REVIEWED BY: MS | PROJECT NO.: 2021176

LOG OF BORING B-4

DATE DRILLED: OCTOBER 4,2021 **DRILLING METHOD:** HOLLOW STEM AUGER

ELEVATION: ± 27 FT MSL **DRILLING EQUP.:** CME 95 **GROUNDWATER DEPTH:** 7 FT

SAMPLE METHOD: HAMMER: 140 LBS., DROP: 30 IN (AUTOMATIC) **NOTES:** ETR~70.6%, N_{60} ~ 70.6/60*N~1.17*N

DEPTH (FT)	BULK SAMPLE	CAL/SPT SAMPLE	BLOWS PER FOOT N	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	SOIL CLASS. (USCS)	**SOIL DESCRIPTION** *SUMMARY OF SUBSURFACE CONDITIONS (USCS; COLOR, MOISTURE, DENSITY, GRAIN SIZE, OTHER)*	LAB TESTS
0								*2.5 INCHES OF ASPHALT CONCRETE OVER 3 INCHES OF AGGREGATE BASE*	
	X						SC-SM	**YOUNG ALLUVIAL FLOOD-PLAIN DEPOSITS (Qya):** *SILTY, CLAYEY SAND; DARK GRAY, MOIST, LOOSE, FINE TO MEDIUM GRAINED*	SA AL EI RV CR
5	X	X	13	15			SP-SM	*POORLY GRADED SAND WITH SILT; DARK GRAY, VERY MOIST, MEDIUM DENSE, FINE TO MEDIUM GRAINED*	
▼								*GROUNDWATER ENCOUNTERED*	
10		X	15	18				*GRAY TO BROWN, WET, MEDIUM GRAINED*	
15		X	14	16				*GRAY, WET, FINE TO MEDIUM GRAINED, MICACEOUS*	
20		X	19	22			SP	*POORLY GRADED SAND; GRAY, WET, MEDIUM DENSE, FINE TO MEDIUM GRAINED*	
								BORING TERMINATED AT 21½ FT. GROUNDWATER ENCOUNTERED AT 7 FT. CAVING TO 7 FT.	
25									
30									

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FIGURE B.5

LOGGED BY: DB | REVIEWED BY: MS | PROJECT NO.: 2021176

LOG OF PERCOLATION BORING P-1

DATE DRILLED: OCTOBER 4,2021 **DRILLING METHOD:** HOLLOW STEM AUGER

ELEVATION: ± 27 FT MSL **DRILLING EQUP.:** CME 95 **GROUNDWATER DEPTH:** NOT ENCOUNTERED

SAMPLE METHOD: HAMMER: 140 LBS., DROP: 30 IN (AUTOMATIC) **NOTES:** ETR~70.6%, N_{60} ~ 70.6/60*N~1.17*N

DEPTH (FT)	BULK SAMPLE	CAL/SPT SAMPLE	BLOWS PER FOOT N	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	SOIL CLASS. (USCS)	**SOIL DESCRIPTION** *SUMMARY OF SUBSURFACE CONDITIONS (USCS; COLOR, MOISTURE, DENSITY, GRAIN SIZE, OTHER)*	LAB TESTS
0								*VEGETATED SURFACE*	
	X						SP-SM	**YOUNG ALLUVIAL FLOOD-PLAIN DEPOSITS (Qya):** *POORLY GRADED SAND WITH SILT; OLIVE BROWN TO GRAY, DRY TO MOIST, LOOSE, FINE TO MEDIUM GRAINED, MICACEOUS*	SA
5								*BORING TERMINATED AT 5 FT AND CONVERTED TO PERCOLATION TEST WELL. GROUNDWATER NOT ENCOUNTERED.*	
10									
15									
20									
25									
30									

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FIGURE B.6

LOGGED BY: DB | REVIEWED BY: MS | PROJECT NO.: 2021176

LOG OF PERCOLATION BORING P-2

DATE DRILLED: OCTOBER 4,2021 **DRILLING METHOD:** HOLLOW STEM AUGER

ELEVATION: ± 27 FT MSL **DRILLING EQUP.:** CME 95 **GROUNDWATER DEPTH:** NOT ENCOUNTERED

SAMPLE METHOD: HAMMER: 140 LBS., DROP: 30 IN (AUTOMATIC) **NOTES:** ETR~70.6%, N_{60} ~ 70.6/60*N~1.17*N

DEPTH (FT)	BULK SAMPLE	CAL/SPT SAMPLE	BLOWS PER FOOT N	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	SOIL CLASS. (USCS)	**SOIL DESCRIPTION** SUMMARY OF SUBSURFACE CONDITIONS (USCS; COLOR, MOISTURE, DENSITY, GRAIN SIZE, OTHER)	LAB TESTS
0								*VEGETATED SURFACE*	
	X						SP	**YOUNG ALLUVIAL FLOOD-PLAIN DEPOSITS (Qya):** *POORLY GRADED SAND; OLIVE BROWN TO GRAY, DRY TO MOIST, LOOSE, FINE TO MEDIUM GRAINED, MICACEOUS*	RV
5								*BORING TERMINATED AT 5 FT AND CONVERTED TO PERCOLATION TEST WELL. GROUNDWATER NOT ENCOUNTERED.*	
10									
15									
20									
25									
30									

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PROPOSED INDUSTRIAL DEVELOPMENT

260 EDDY JONES WAY

OCEANSIDE, CA 92058

FIGURE B.7

LOGGED BY: DB | REVIEWED BY: MS | PROJECT NO.: 2021176

APPENDIX C
CPT DATA AND LIQUEFACTION ANALYSIS

SUMMARY

OF

CONE PENETRATION TEST DATA

Project:

260 Eddy Jones Way
Oceanside, CA
September 20, 2021

Prepared for:

Mr. Gio Norman
NOVA Services, Inc.
4373 Viewridge Avenue, Ste B
San Diego, CA 92123-1608
Office (858) 292-7575/Fax (858) 292-7570

Prepared by:

KEHOE TESTING & ENGINEERING
5415 Industrial Drive
Huntington Beach, CA 92649-1518
Office (714) 901-7270 / Fax (714) 901-7289
www.kehoetesting.com

TABLE OF CONTENTS

SUMMARY

OF

CONE PENETRATION TEST DATA

1. INTRODUCTION

This report presents the results of a Cone Penetration Test (CPT) program carried out for the project located at 260 Eddy Jones Way in Oceanside, California. The work was performed by Kehoe Testing & Engineering (KTE) on September 20, 2021. The scope of work was performed as directed by NOVA Services, Inc. personnel.

2. SUMMARY OF FIELD WORK

The fieldwork consisted of performing CPT soundings at four locations to determine the soil lithology. A summary is provided in **TABLE 2.1**.

LOCATION	DEPTH OF CPT (ft)	COMMENTS/NOTES:
C-1	94	Refusal
C-2	70	
C-3	70	
C-4	70	

TABLE 2.1 - Summary of CPT Soundings

3. FIELD EQUIPMENT & PROCEDURES

The CPT soundings were carried out by **KTE** using an integrated electronic cone system manufactured by Vertek. The CPT soundings were performed in accordance with ASTM standards (D5778). The cone penetrometers were pushed using a 30-ton CPT rig. The cone used during the program was a 15 cm^2 cone with a cone net area ratio of 0.83. The following parameters were recorded at approximately 2.5 cm depth intervals:

- Cone Resistance (qc)
- Sleeve Friction (fs)
- Dynamic Pore Pressure (u)
- Inclination
- Penetration Speed
- Pore Pressure Dissipation (at selected depths)

At location CPT-1, shear wave measurements were obtained at approximately 10-foot intervals. The shear wave is generated using an air-actuated hammer, which is located inside the front jack of the CPT rig. The cone has a triaxial geophone, which recorded the shear wave signal generated by the air hammer.

The above parameters were recorded and viewed in real time using a laptop computer. Data is stored at the KTE office for up to 2 years for future analysis and reference. A complete set of baseline readings was taken prior to each sounding to determine temperature shifts and any zero load offsets. Monitoring base line readings ensures that the cone electronics are operating properly.

4. CONE PENETRATION TEST DATA & INTERPRETATION

The Cone Penetration Test data is presented in graphical form in the attached Appendix. These plots were generated using the CPeT-IT program. Penetration depths are referenced to ground surface. The soil behavior type on the CPT plots is derived from the attached CPT SBT plot (Robertson, “Interpretation of Cone Penetration Test…”, 2009) and presents major soil lithologic changes. The stratigraphic interpretation is based on relationships between cone resistance (qc), sleeve friction (fs), and penetration pore pressure (u). The friction ratio (Rf), which is sleeve friction divided by cone resistance, is a calculated parameter that is used along with cone resistance to infer soil behavior type. Generally, cohesive soils (clays) have high friction ratios, low cone resistance and generate excess pore water pressures. Cohesionless soils (sands) have lower friction ratios, high cone bearing and generate little (or negative) excess pore water pressures.

The CPT data files have also been provided. These files can be imported in CPeT-IT (software by GeoLogismiki) and other programs to calculate various geotechnical parameters.

It should be noted that it is not always possible to clearly identify a soil type based on qc, fs and u. In these situations, experience, judgement and an assessment of the pore pressure data should be used to infer the soil behavior type.

If you have any questions regarding this information, please do not hesitate to call our office at (714) 901-7270.

Sincerely,

KEHOE TESTING & ENGINEERING

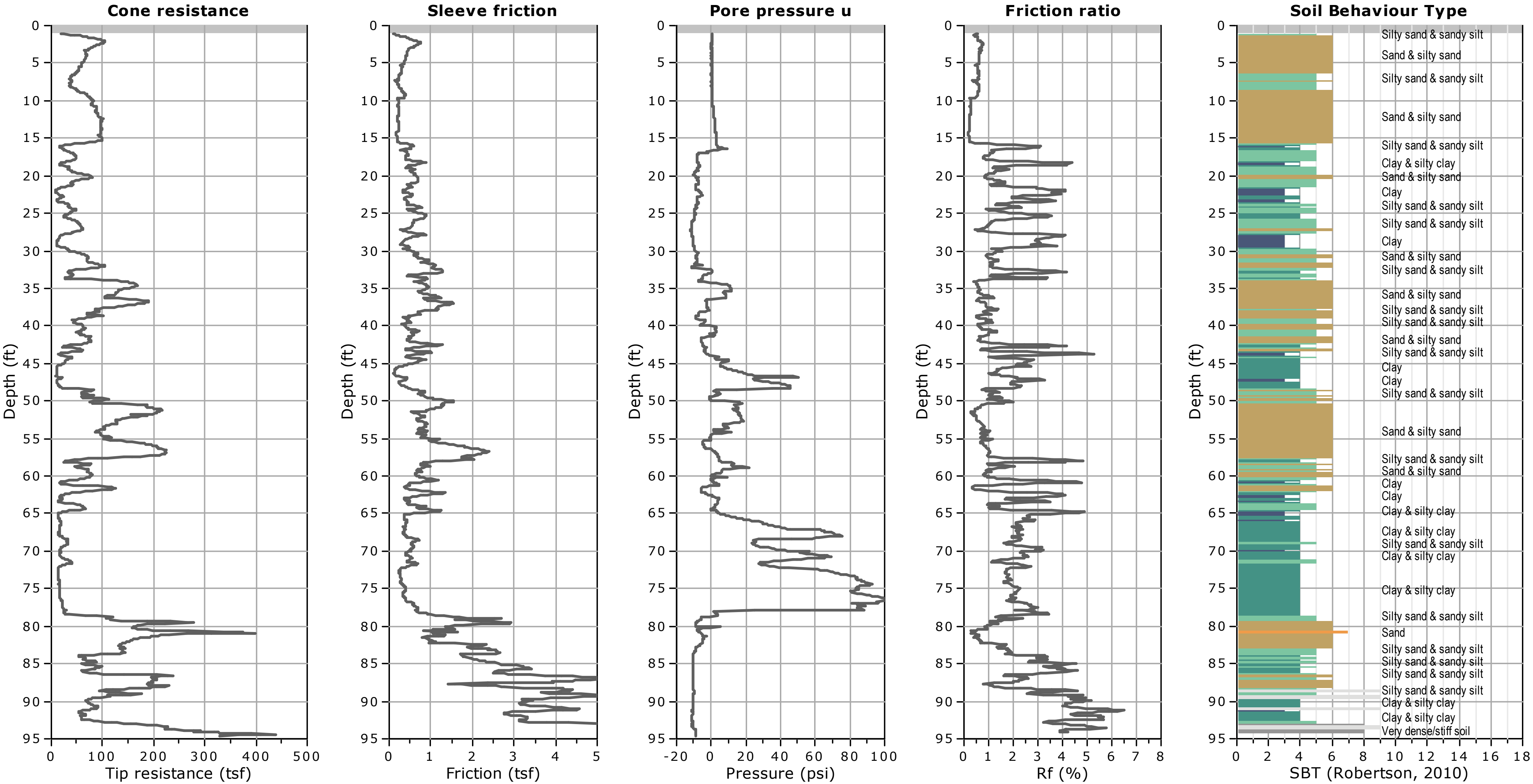
Steven P. Kehoe
President

09/24/21-hh-3022

APPENDIX

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

Project: **NOVA Services** **C-1**
Location: **260 Eddy Jones Way, Oceanside, CA** Total depth: 94.56 ft, Date: 9/20/2021



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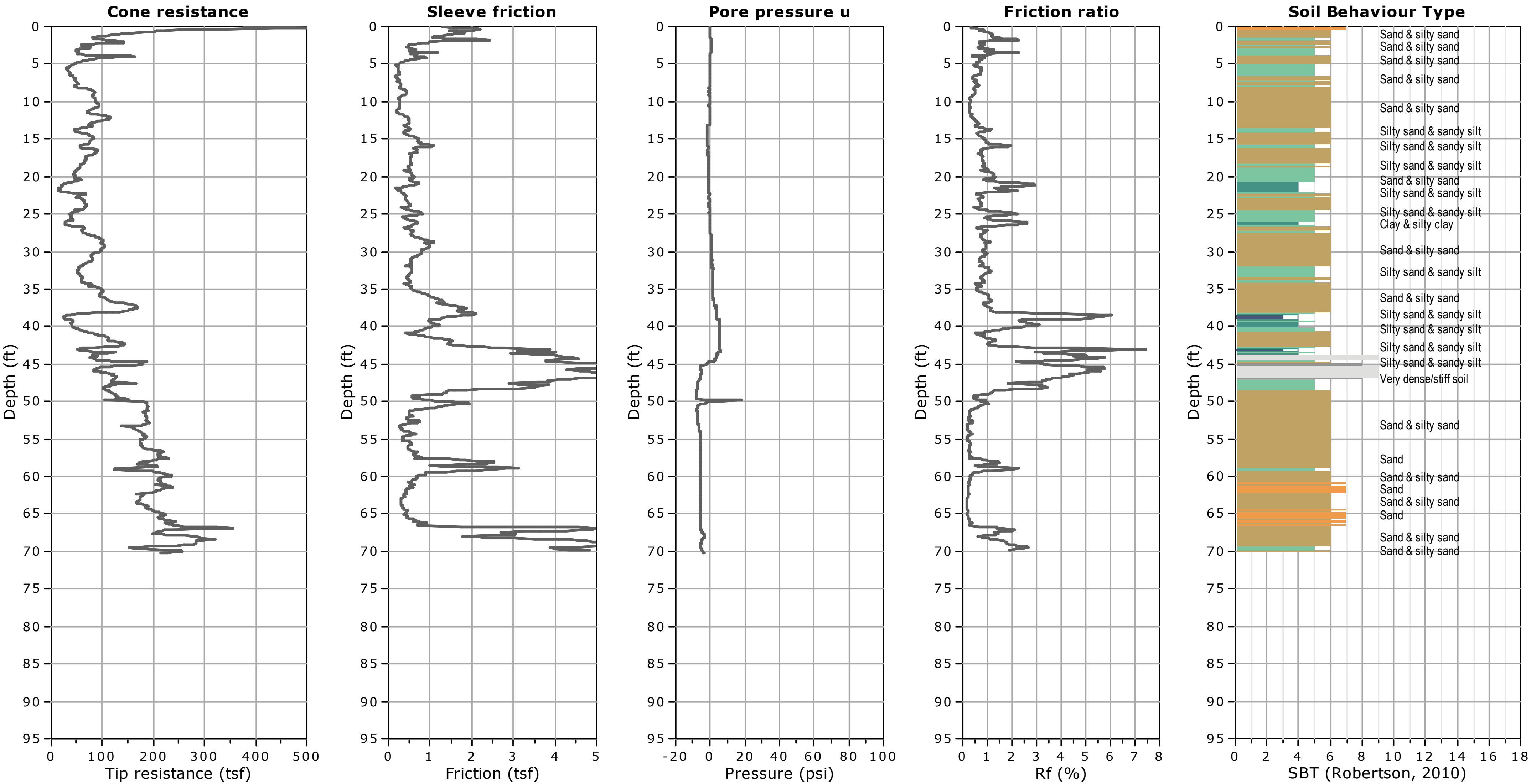
steve@kehoetesting.com
www.kehoetesting.com

Project: NOVA Services

Location: 260 Eddy Jones Way, Oceanside, CA

C-2

Total depth: 70.29 ft, Date: 9/20/2021



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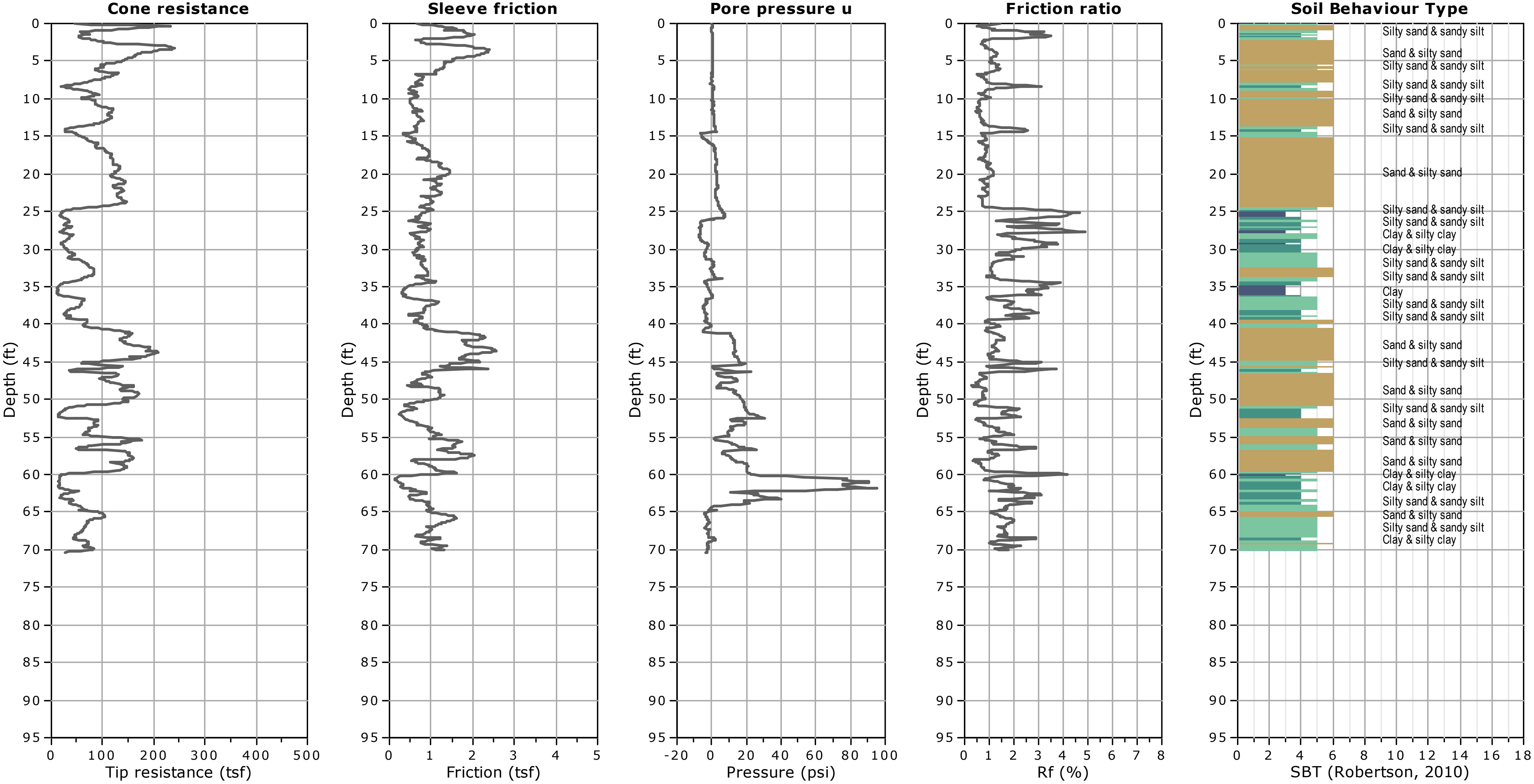
Project: NOVA Services

Location: 260 Eddy Jones Way, Oceanside, CA

C-3

Total depth: 70.43 ft, Date: 9/20/2021



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steve@kehoetesting.com
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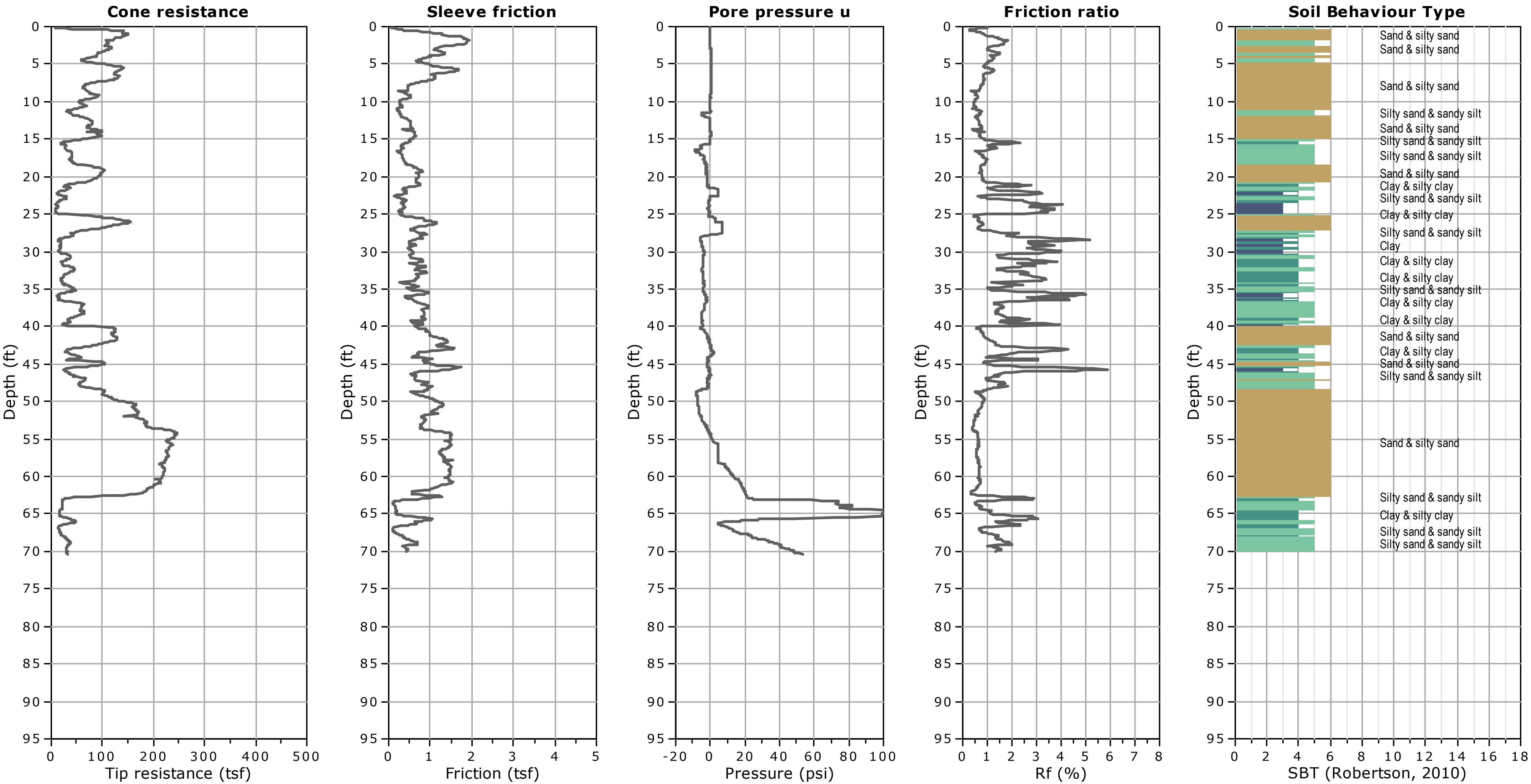
Project: **NOVA Services**

Location: **260 Eddy Jones Way, Oceanside, CA**

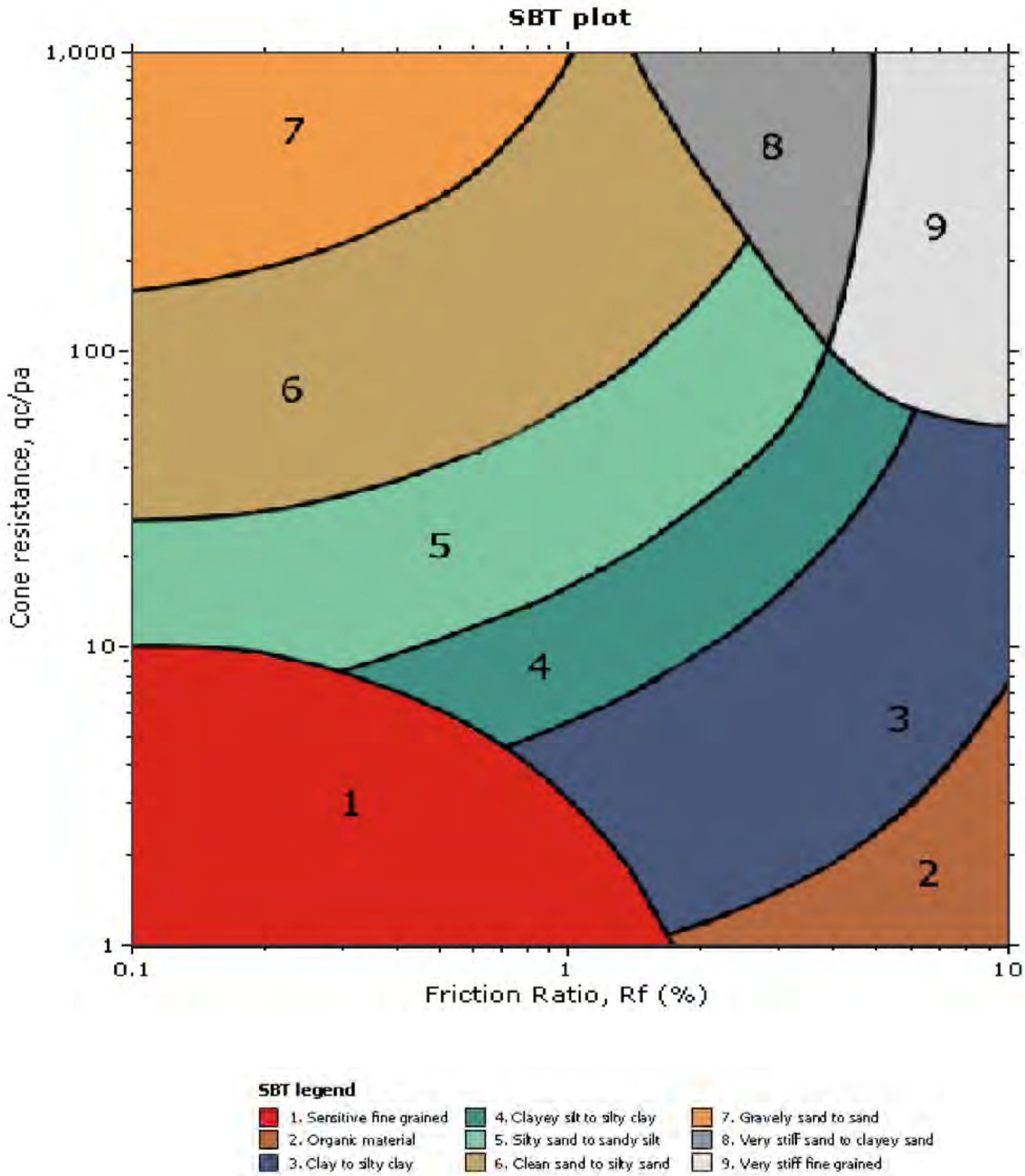
C-4

Total depth: 70.34 ft, Date: 9/20/2021



Project file:

Kehoe Testing & Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com



NOVA Services
260 Eddy Jones Way
Oceanside, CA

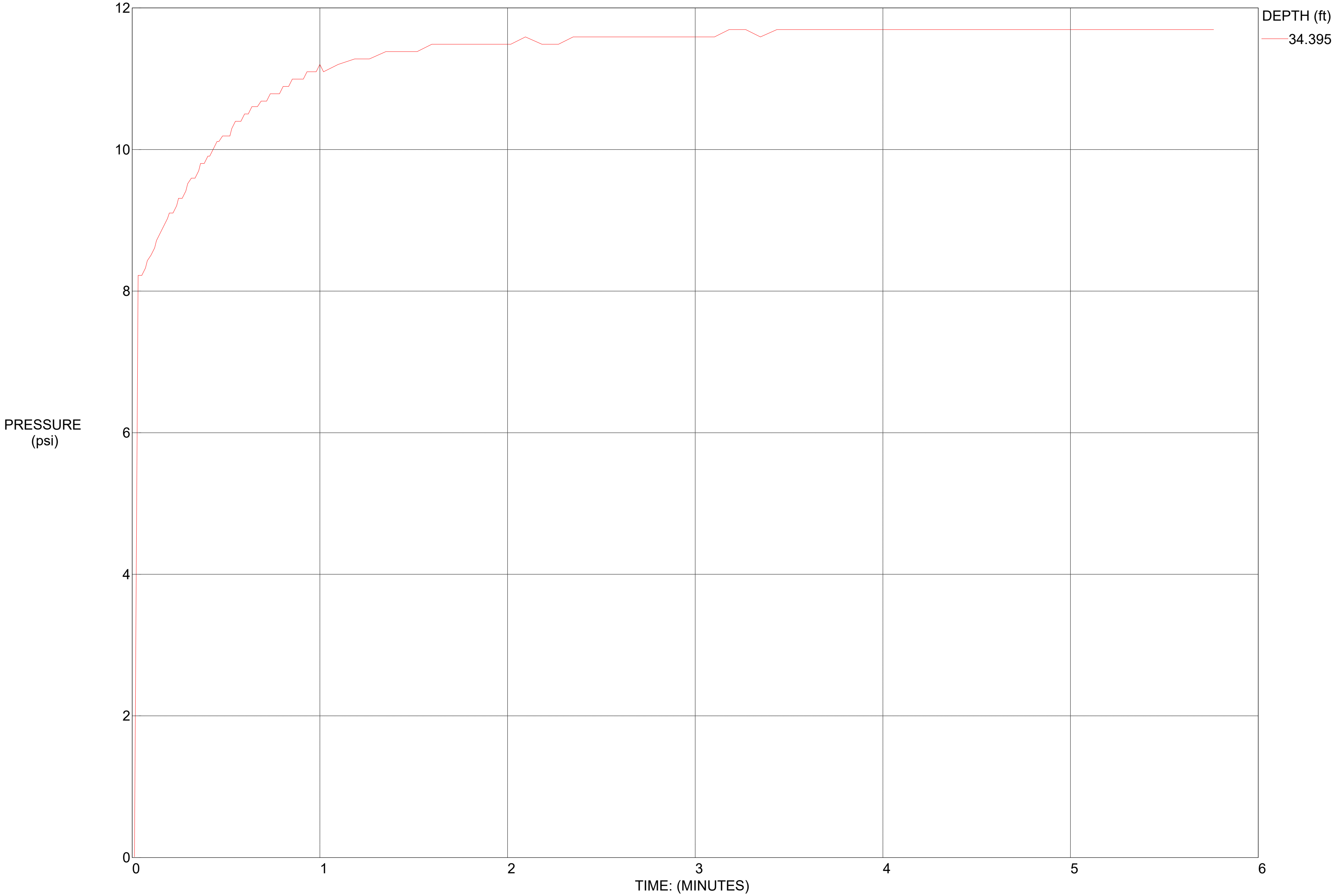
CPT Shear Wave Measurements

Location	Tip Depth (ft)	Geophone Depth (ft)	Travel Distance (ft)	S-Wave Arrival (msec)	S-Wave Velocity from Surface (ft/sec)	Interval S-Wave Velocity (ft/sec)
C-1	10.04	9.04	9.26	14.24	650	
	20.05	19.05	19.15	32.76	585	534
	30.02	29.02	29.09	47.96	607	654
	40.03	39.03	39.08	60.68	644	786
	50.03	49.03	49.07	76.88	638	617
	60.04	59.04	59.07	89.38	661	800
	70.05	69.05	69.08	103.72	666	698
	80.09	79.09	79.12	114.24	693	954
	90.03	89.03	89.05	123.00	724	1134

Shear Wave Source Offset - 2 ft

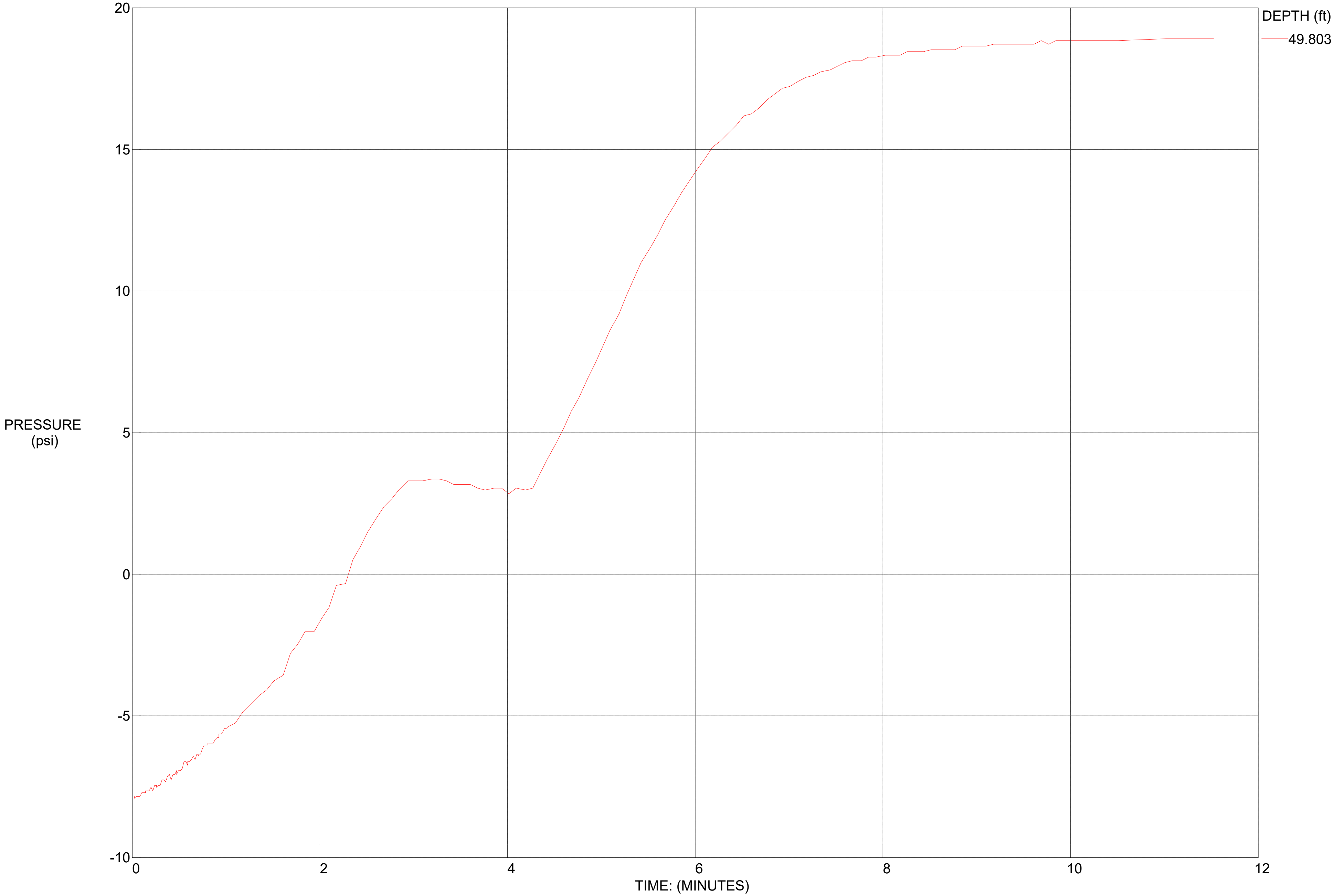
S-Wave Velocity from Surface = Travel Distance/S-Wave Arrival
Interval S-Wave Velocity = (Travel Dist2-Travel Dist1)/(Time2-Time1)

TEST ID: C-1



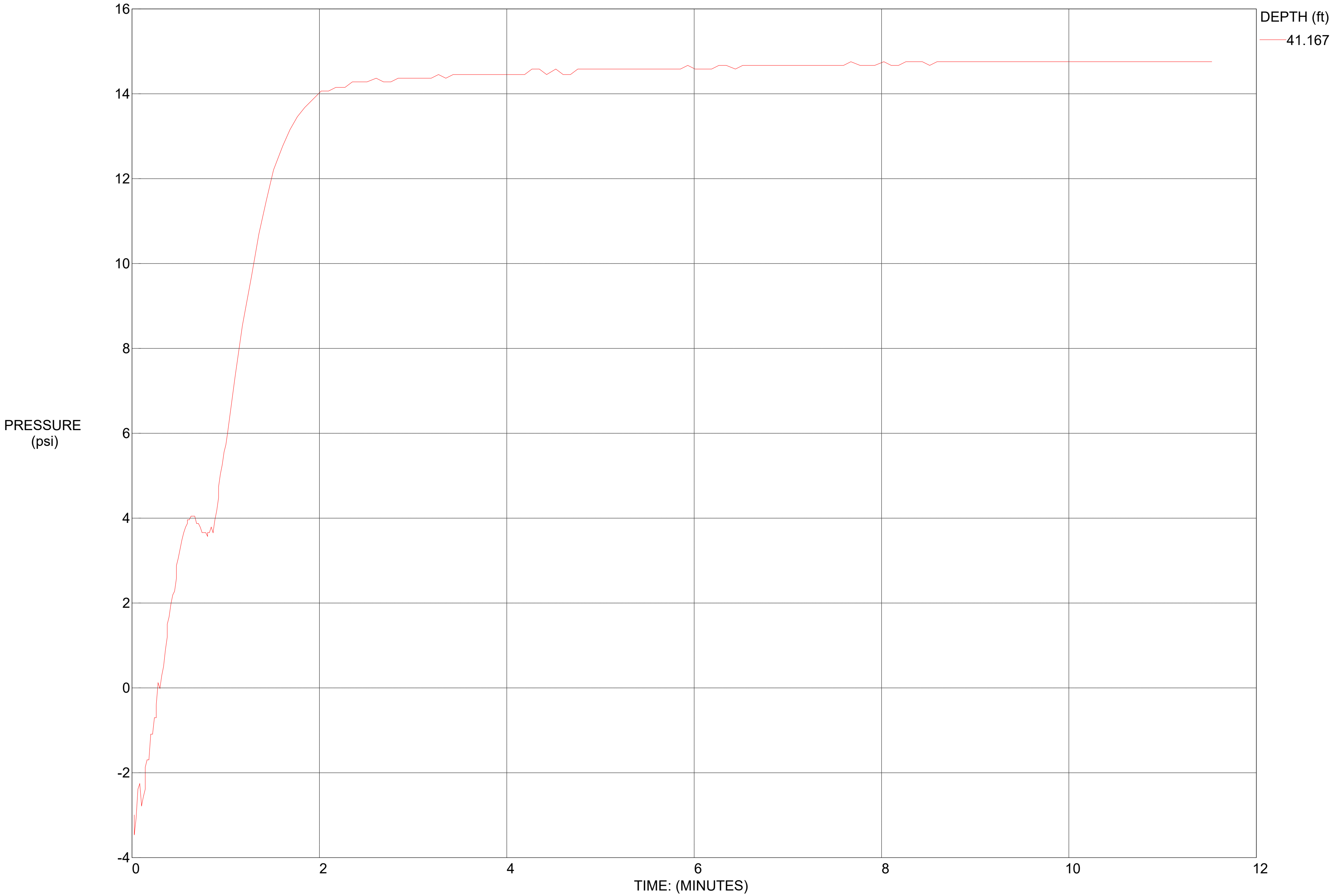
PRESSURE
(psi)
0
2
4
6
8
10
12
0
1
2
3
4
5
6
TIME: (MINUTES)
DEPTH (ft)
34.395

TEST ID: C-2



PRESSURE (psi)
20
15
10
5
0
-5
-10
0
2
4
6
8
10
12
TIME: (MINUTES)
DEPTH (ft)
49.803

TEST ID: C-3


PRESSURE
(psi)
16
14
12
10
8
6
4
2
0
-2
-4
0
2
4
6
8
10
12
TIME: (MINUTES)
DEPTH (ft)
41.167

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NOVA Services, Inc.
4373 Viewridge Avenue, Suite B
San Diego, CA 92123

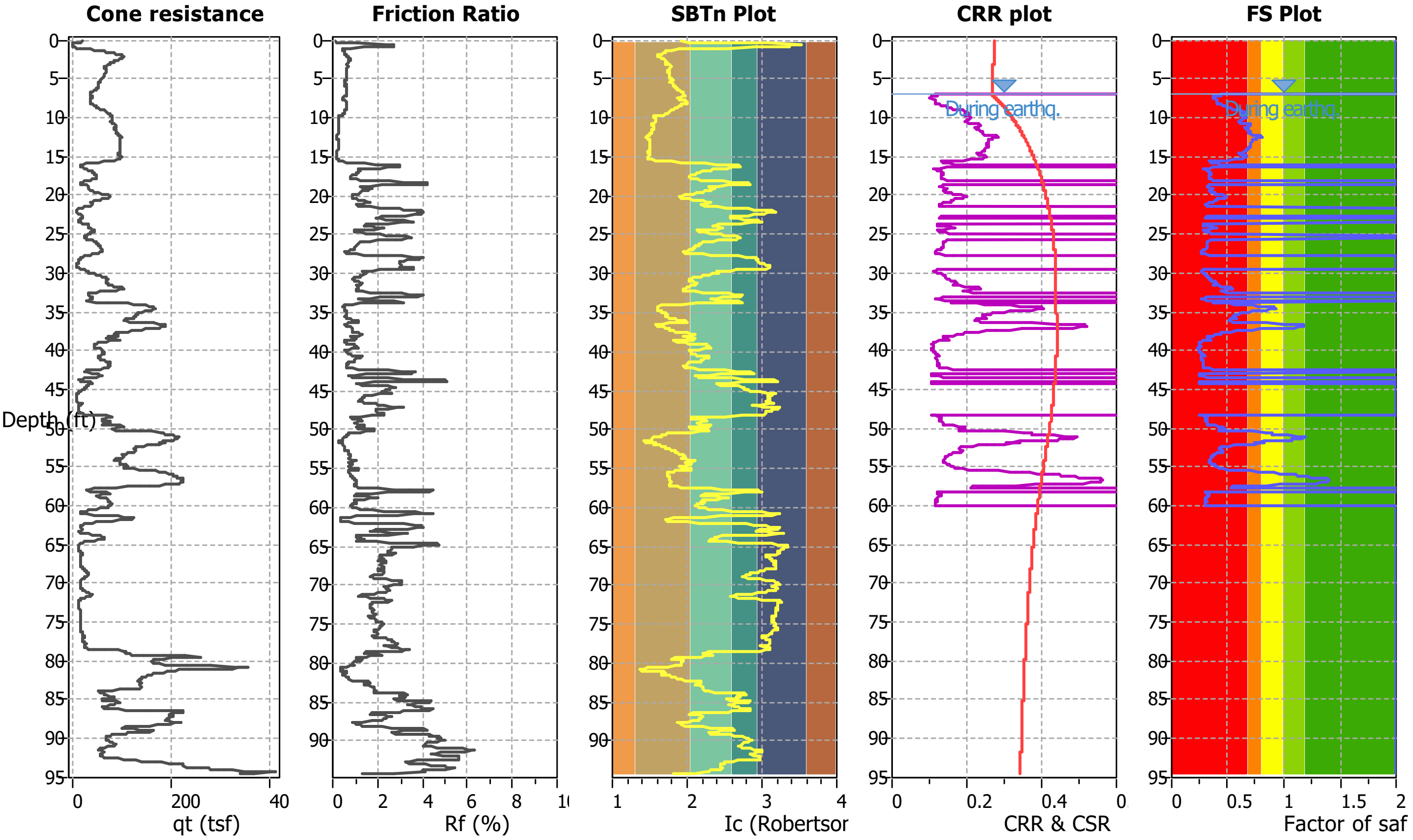
LIQUEFACTION ANALYSIS REPORT

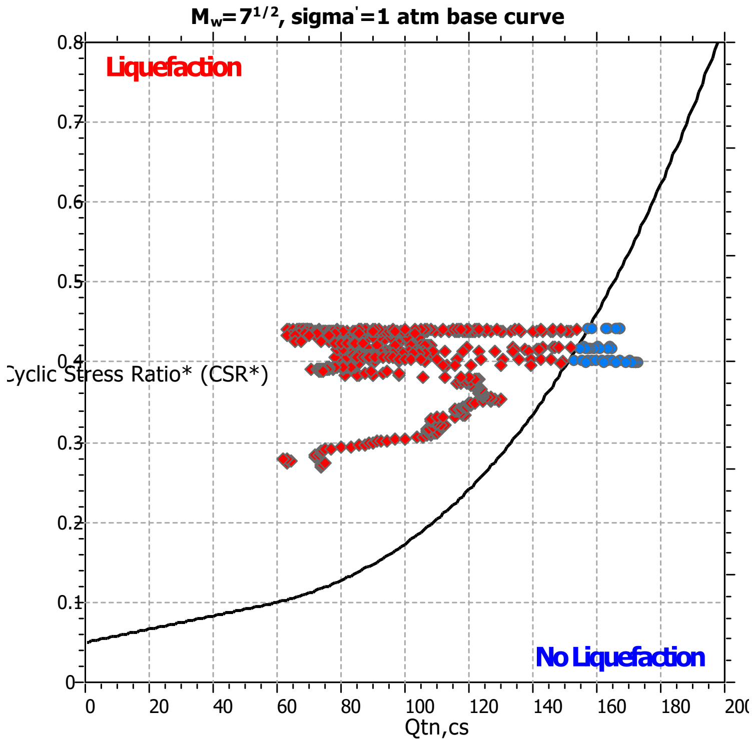
Project title : Eddy Jones Warehouse **Location : 630 Eddy Jones, Oceanside, CA**

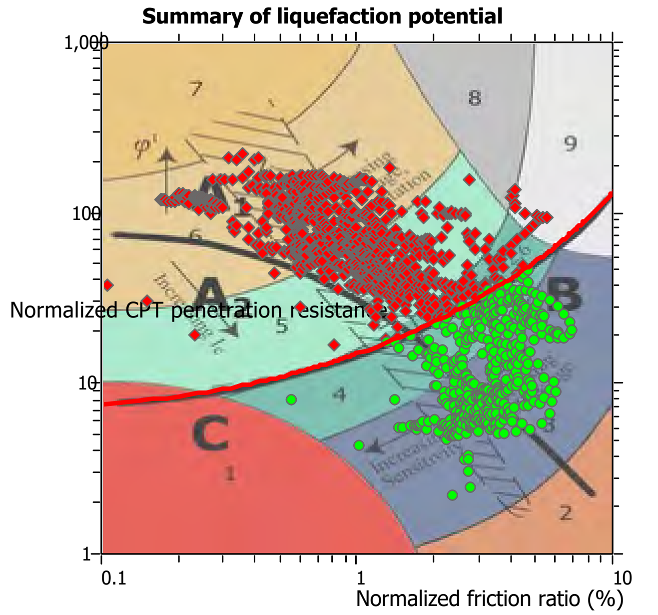
CPT file : CPT-1

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	8.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	7.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.50	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

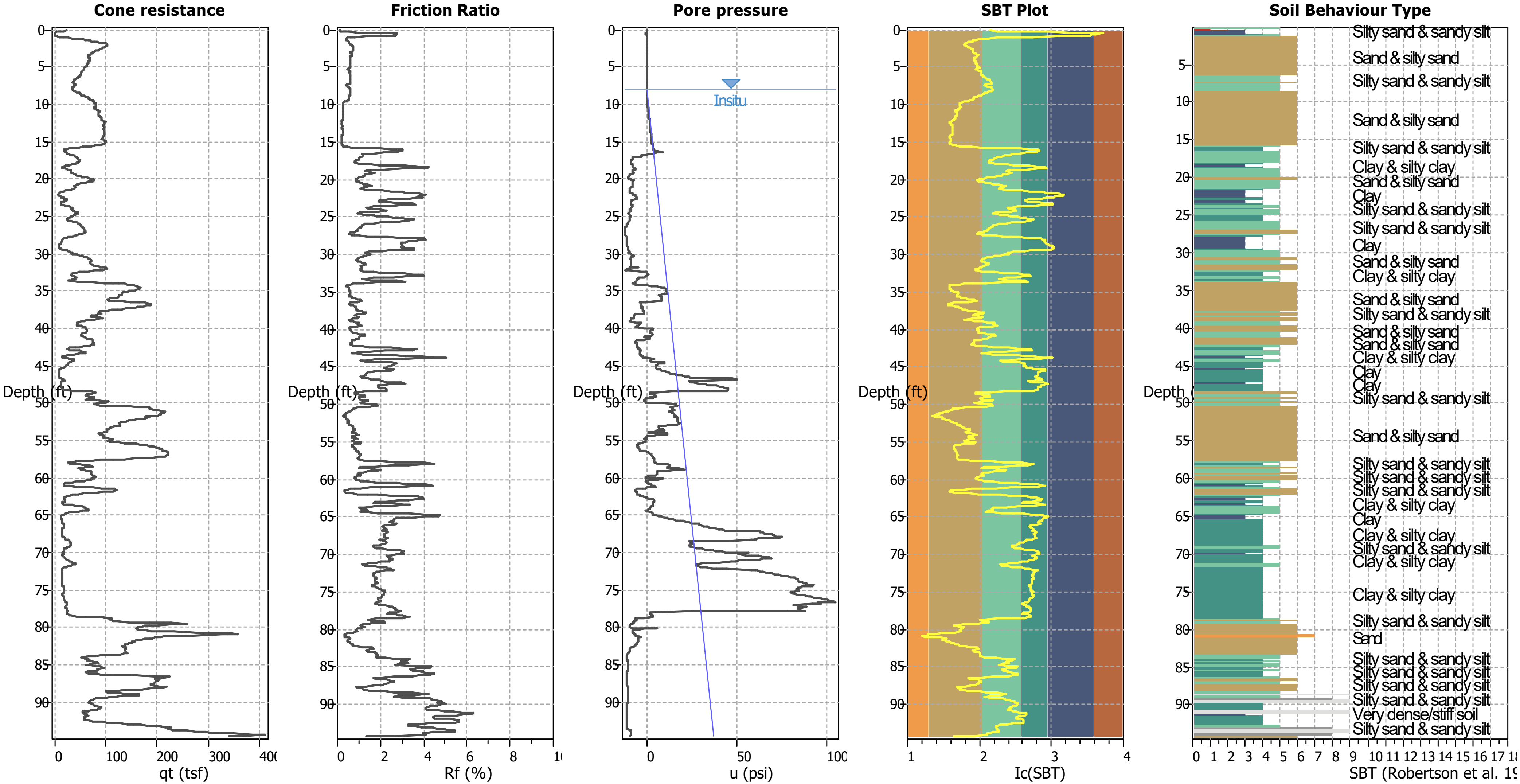






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



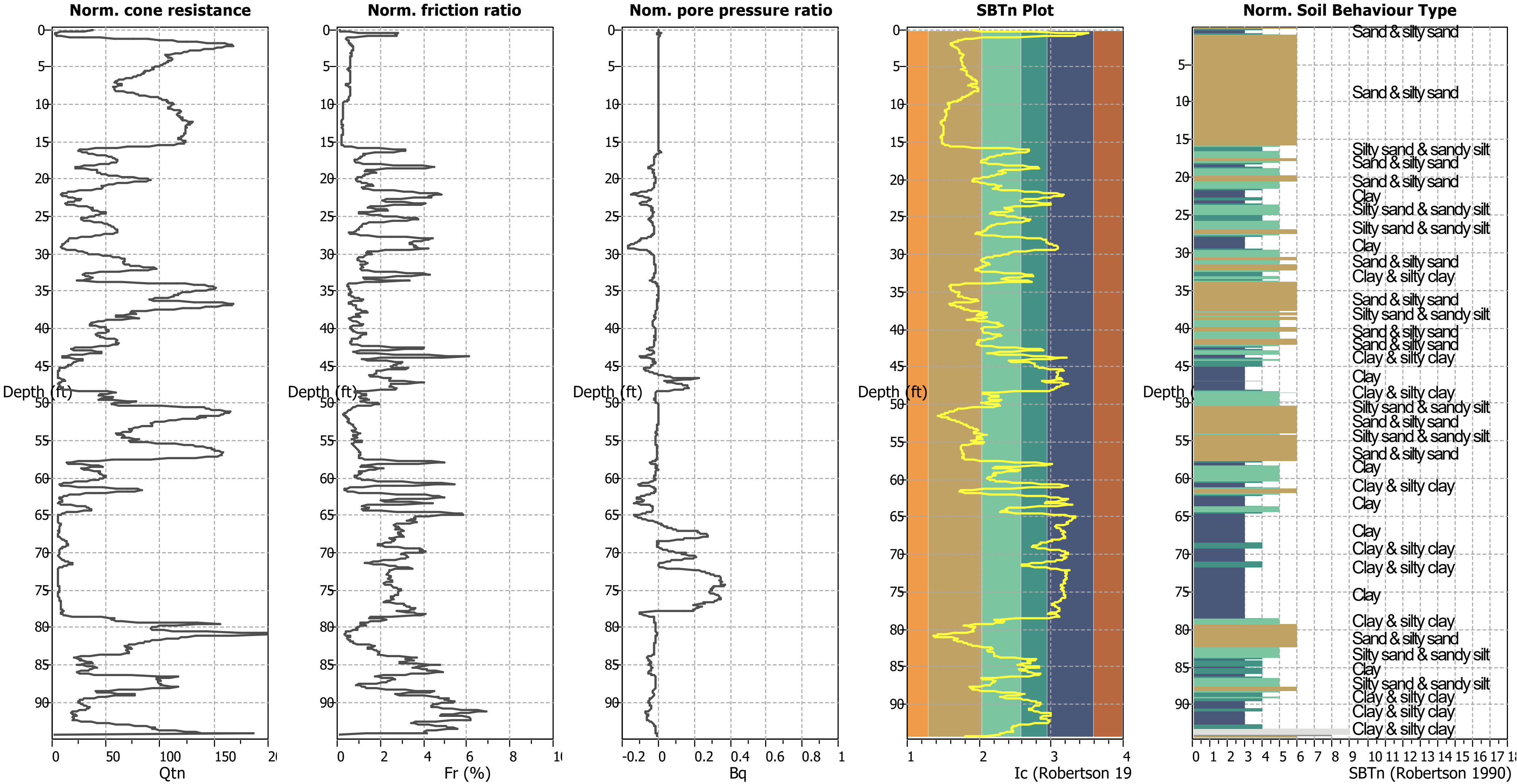
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



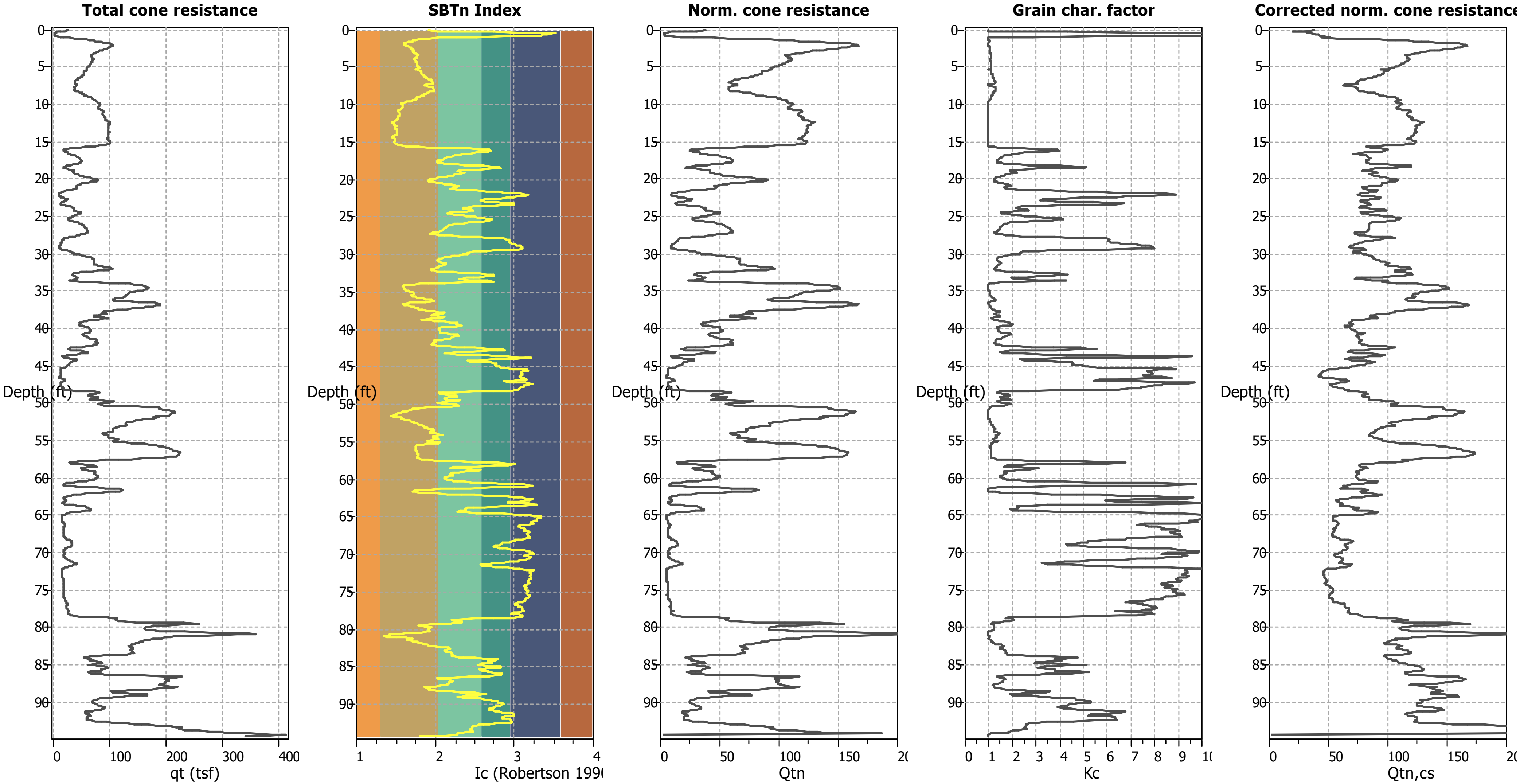
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

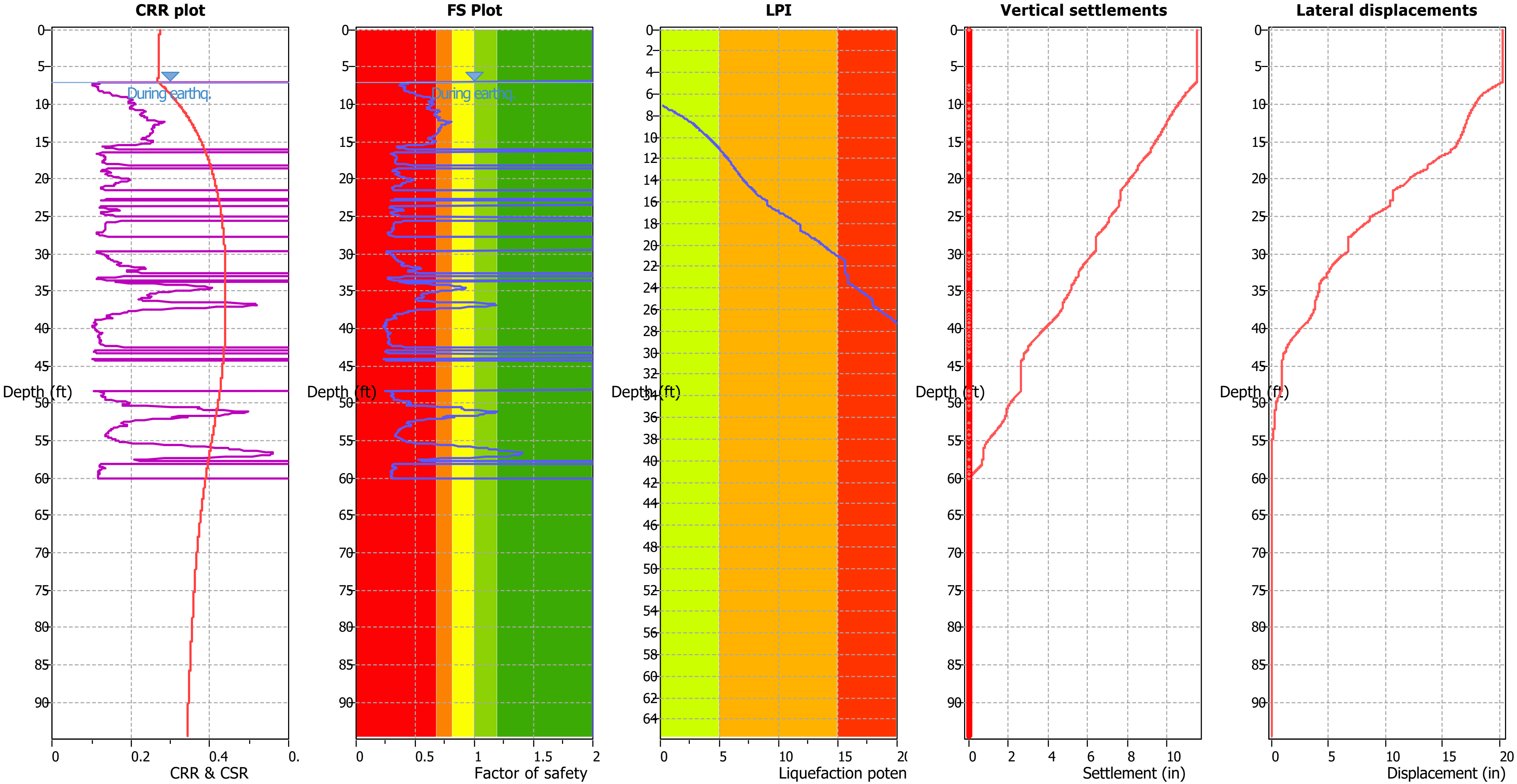
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

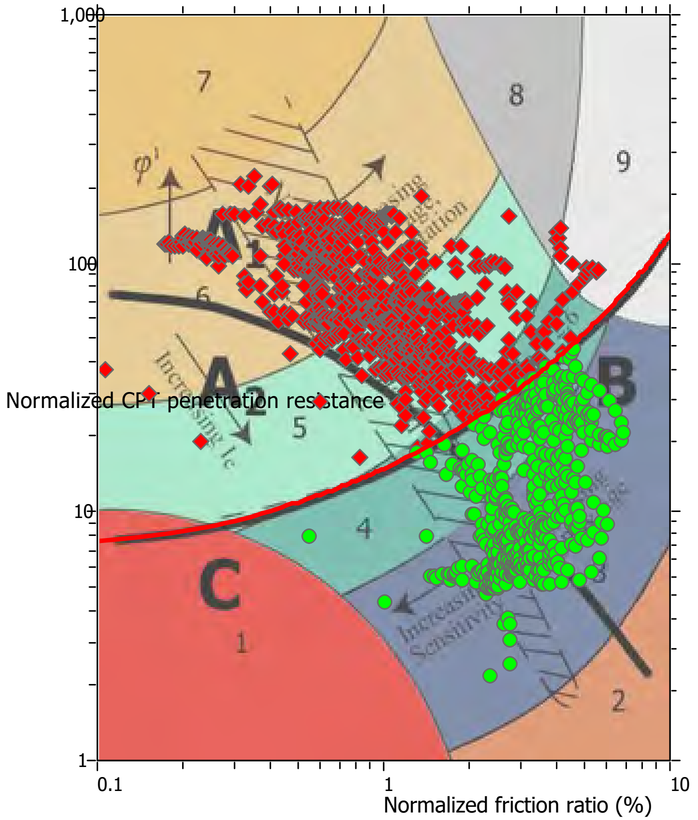
F.S. color scheme

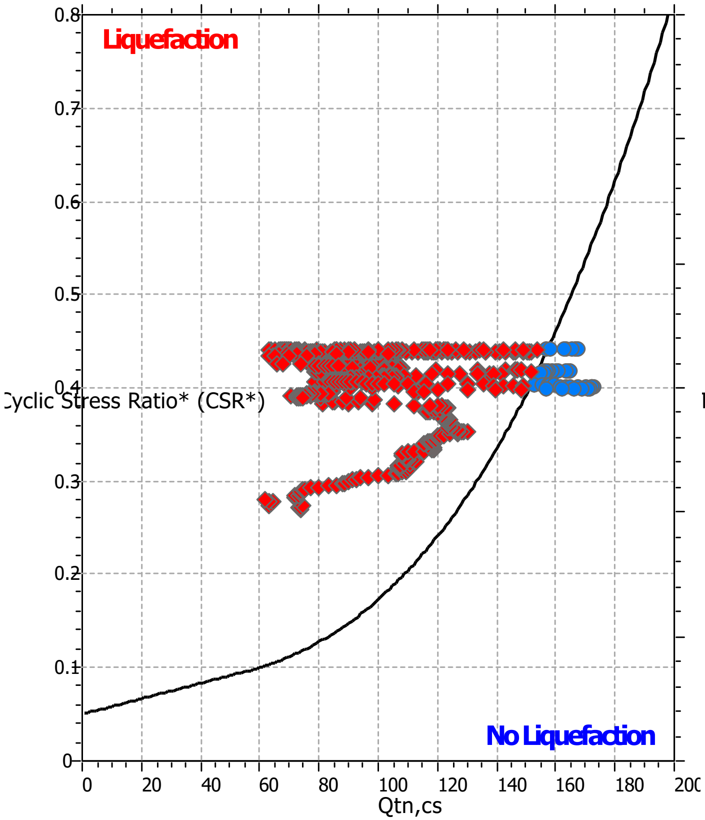
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

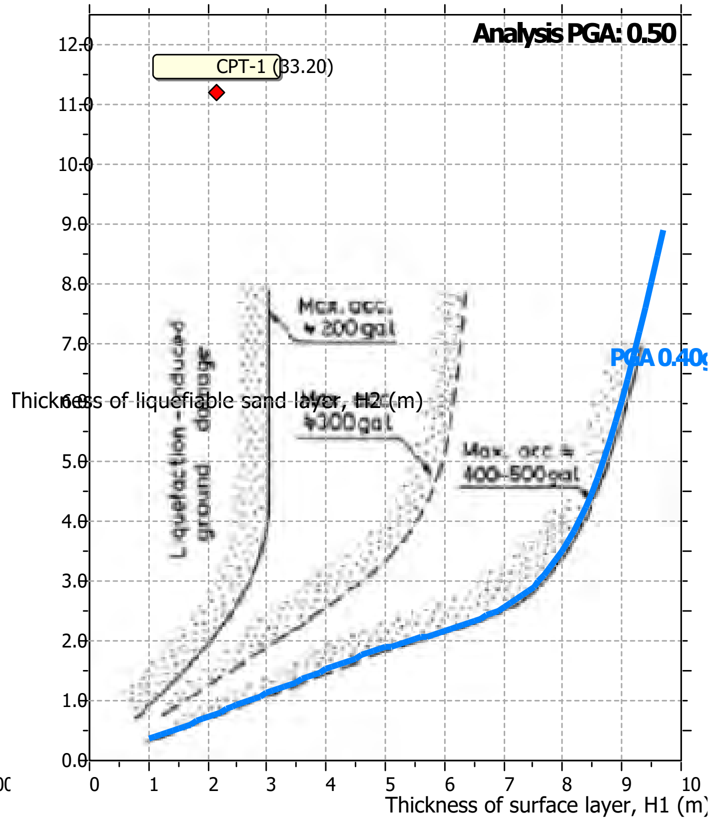
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



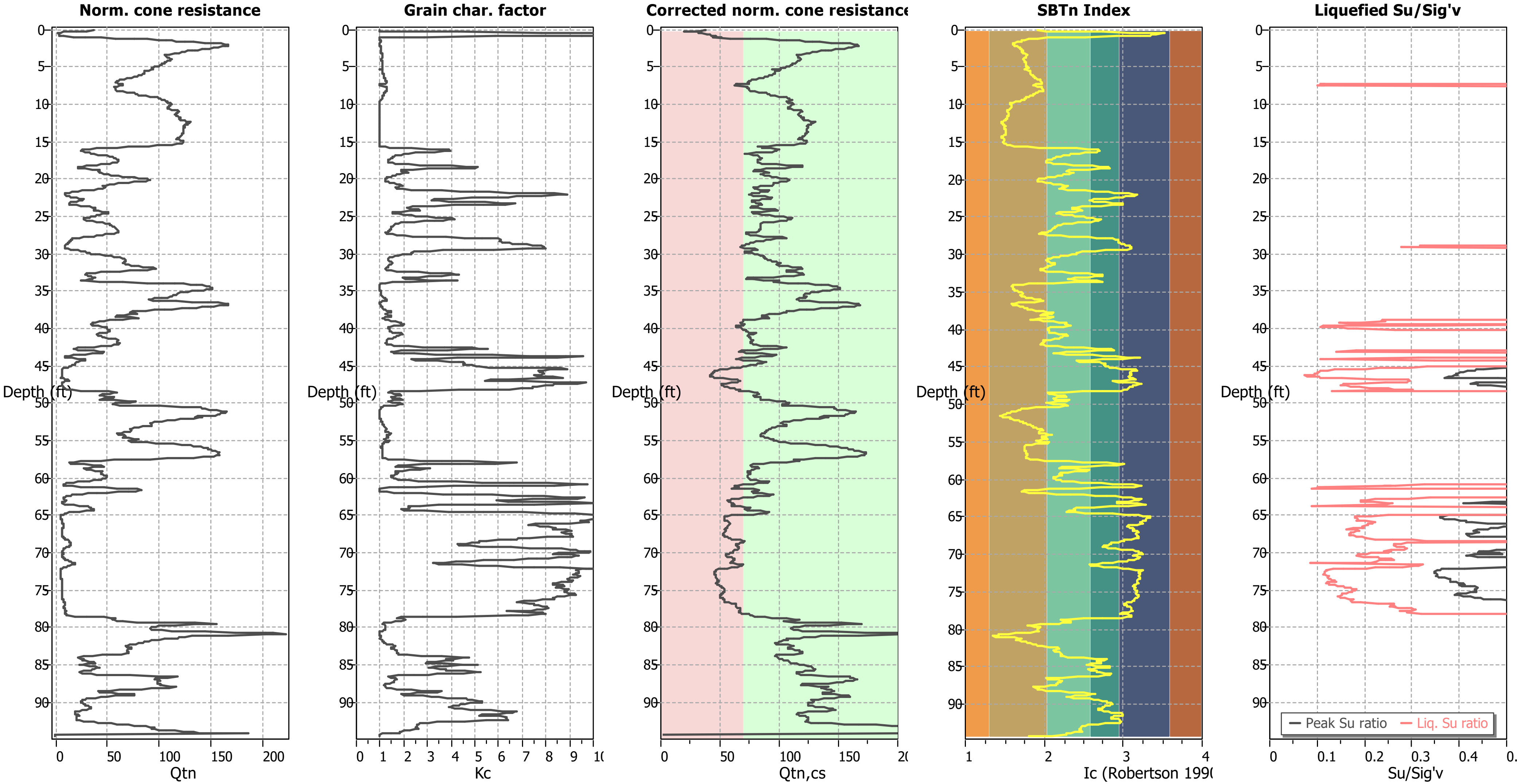




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

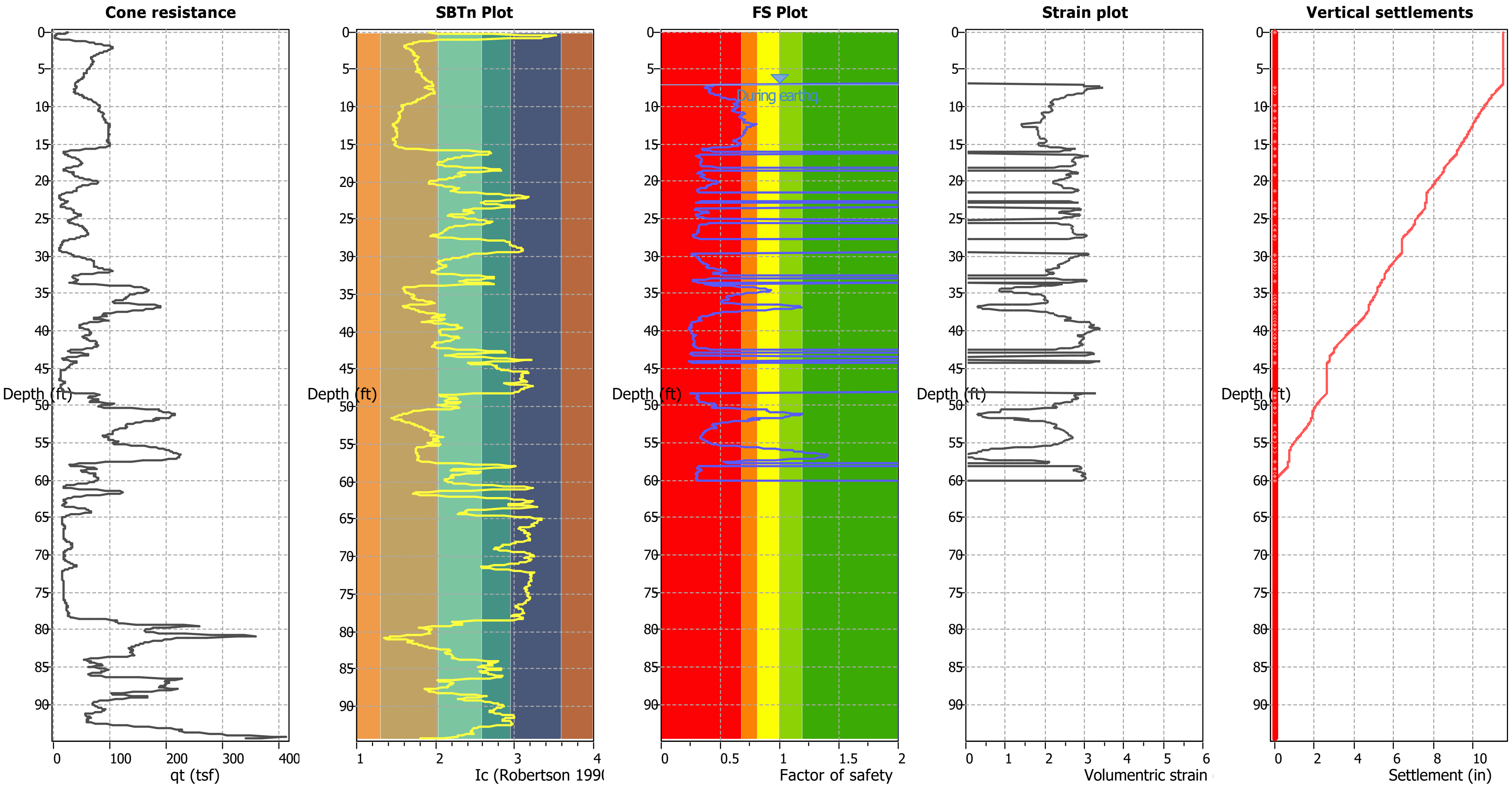
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

Estimation of post-earthquake settlements

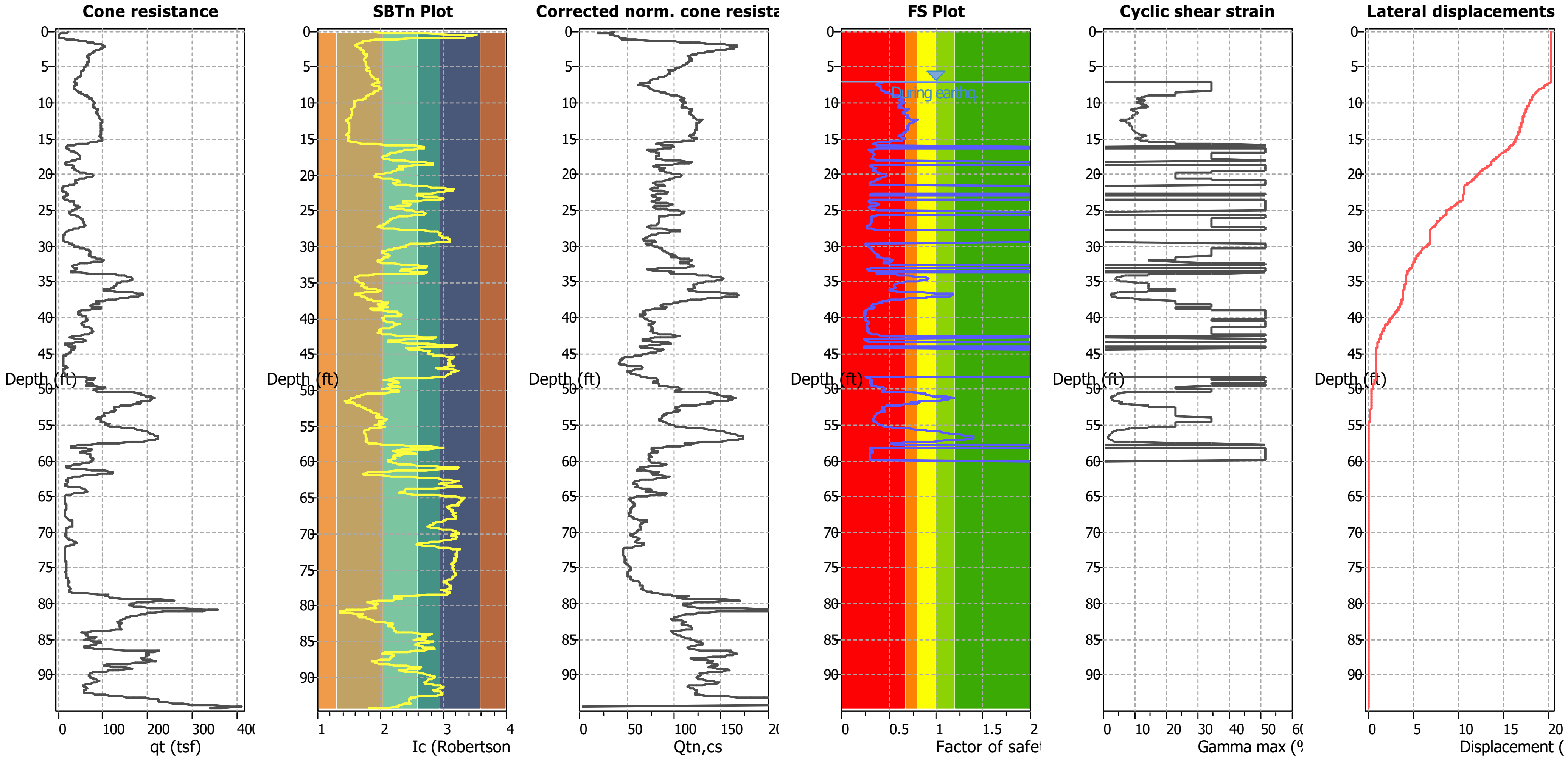


Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

Estimation of post-earthquake lateral Displacements

Geometric parameters: Gently sloping ground without free face (Slope 0.12 %)

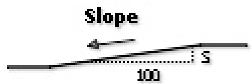


Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance

F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Surface condition



NOVA Services, Inc.
4373 Viewridge Avenue, Suite B
San Diego, CA 92123

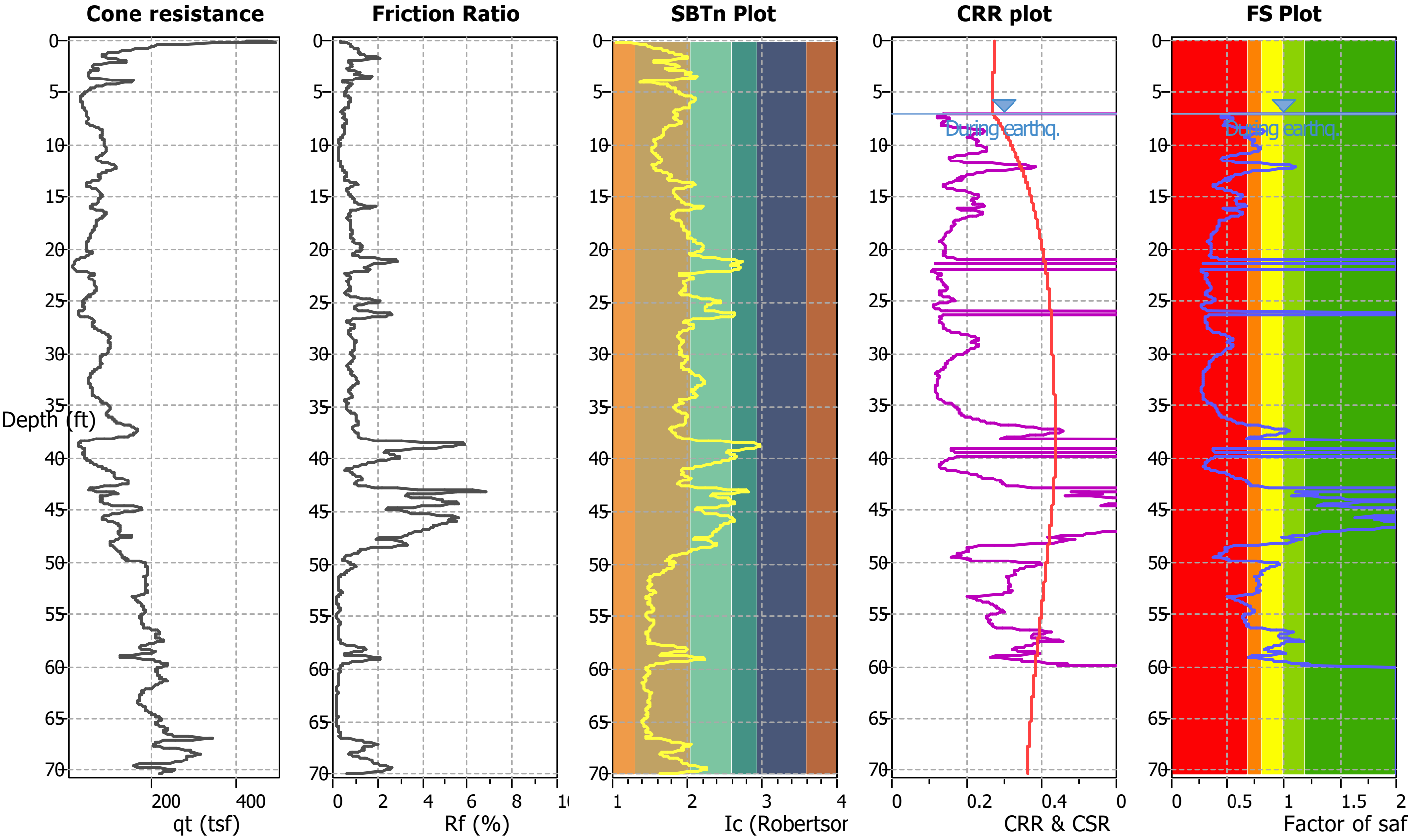
LIQUEFACTION ANALYSIS REPORT

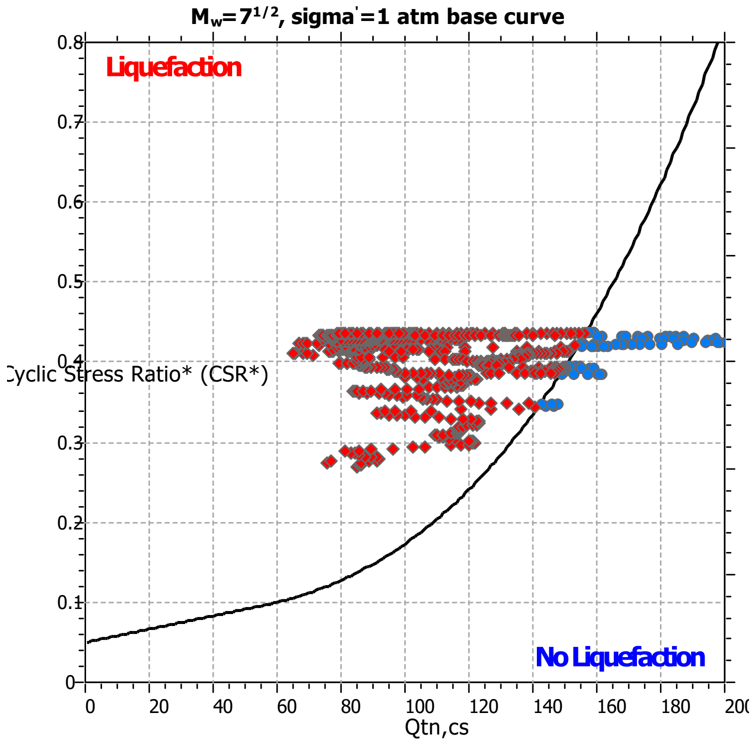
Project title : Eddy Jones Warehouse **Location : 630 Eddy Jones, Oceanside, CA**

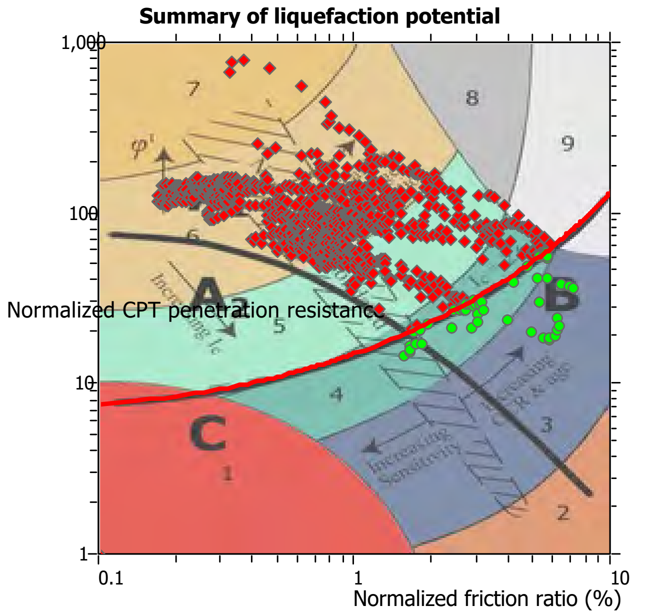
CPT file : CPT-2

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	8.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	7.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.50	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

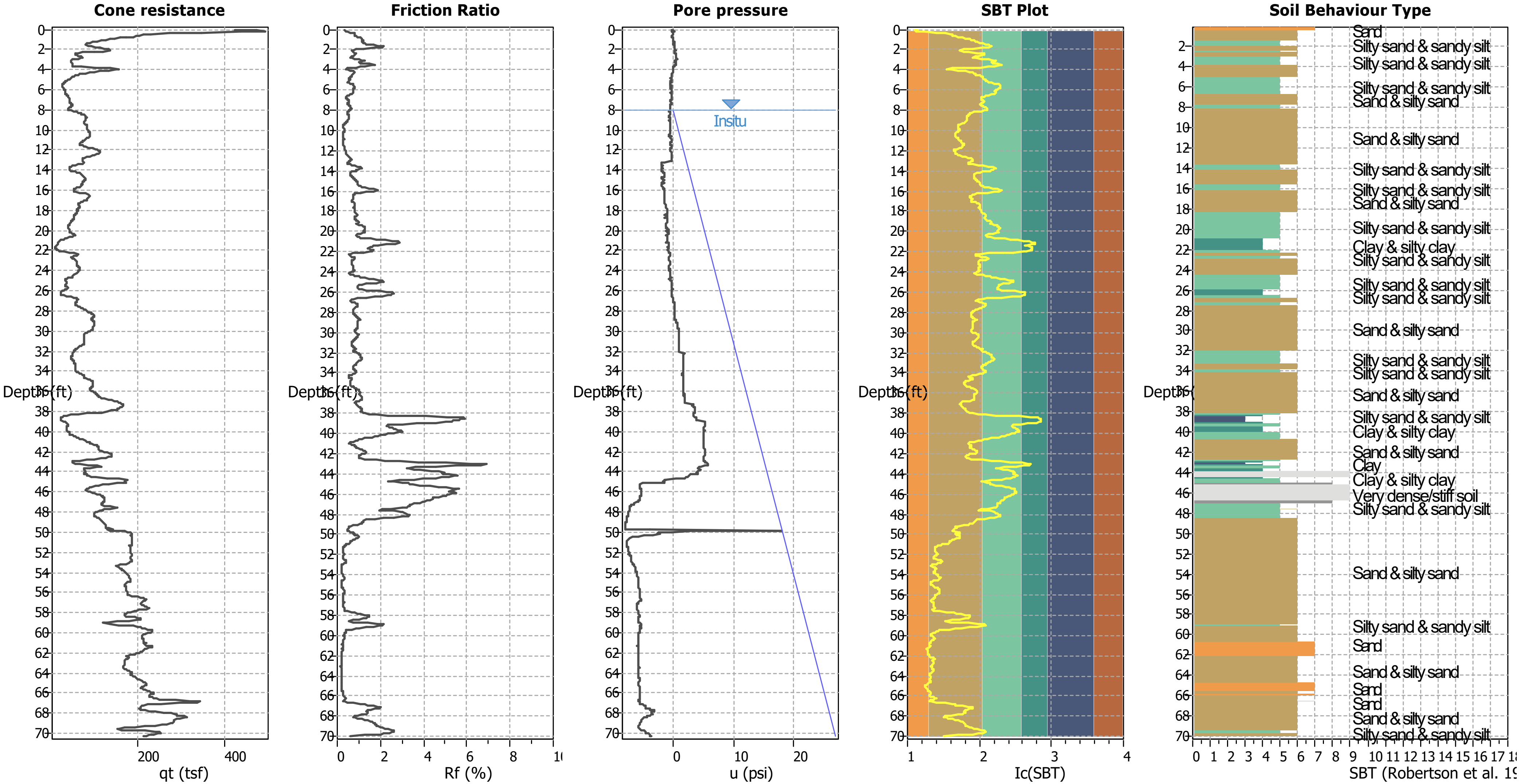






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



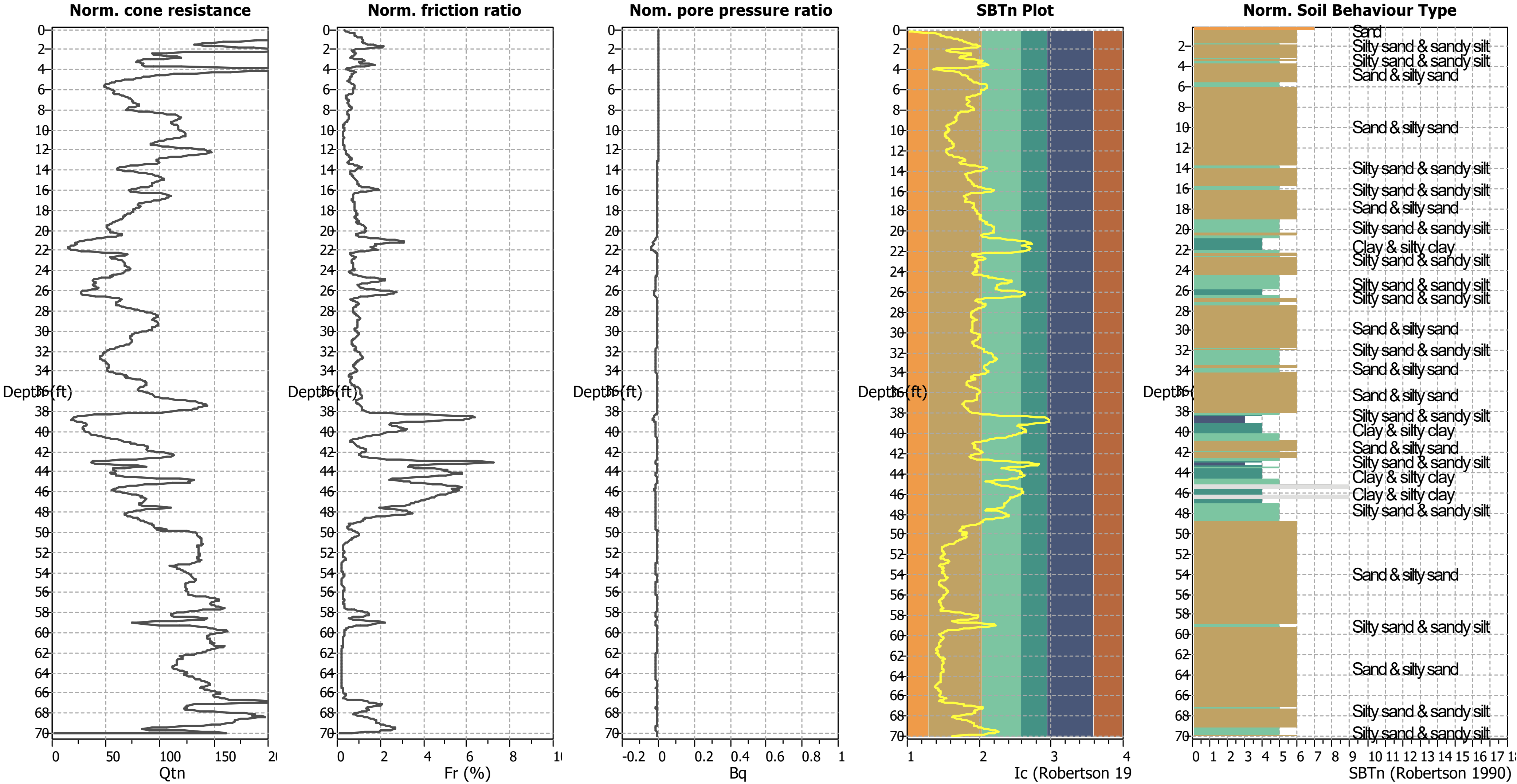
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



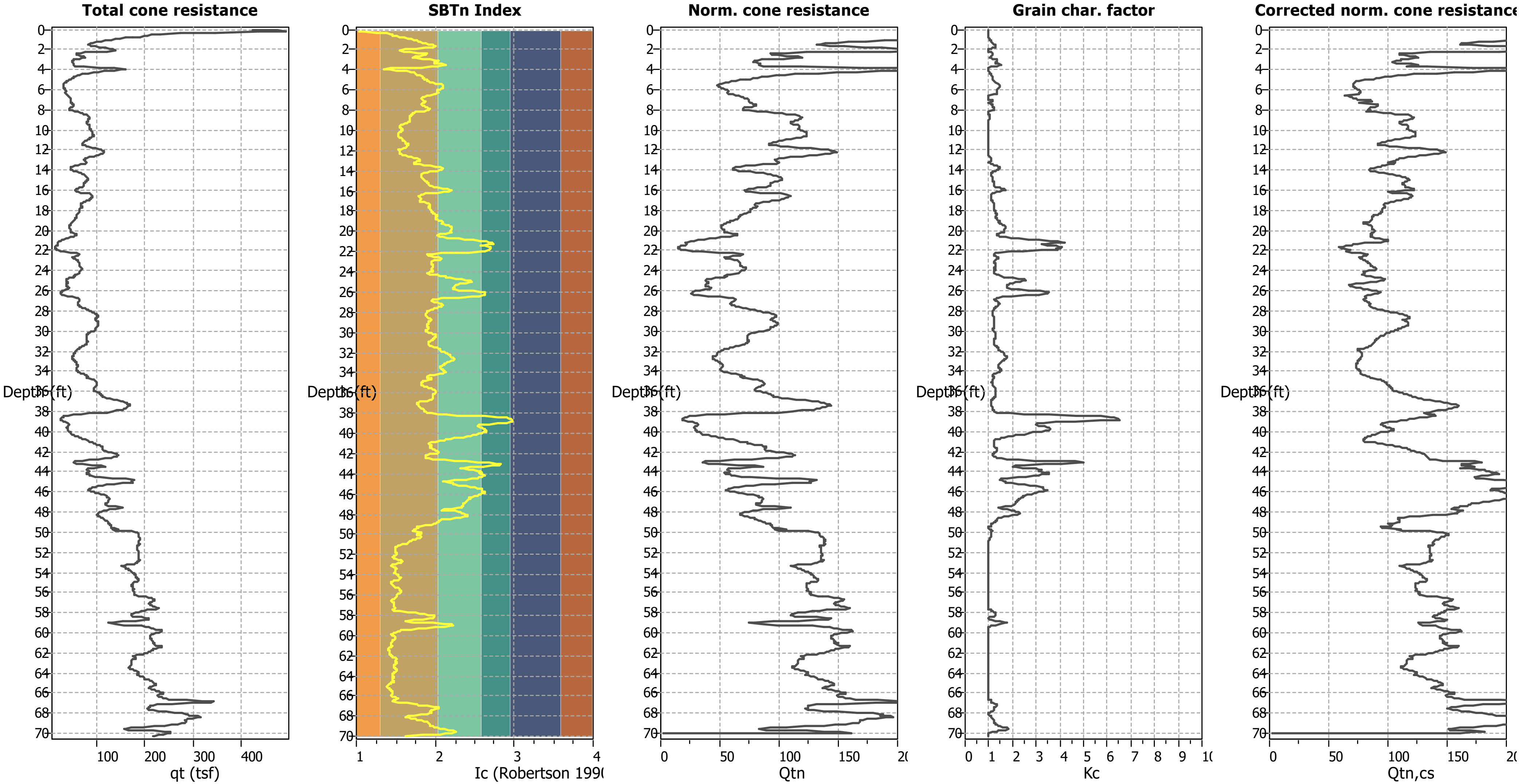
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

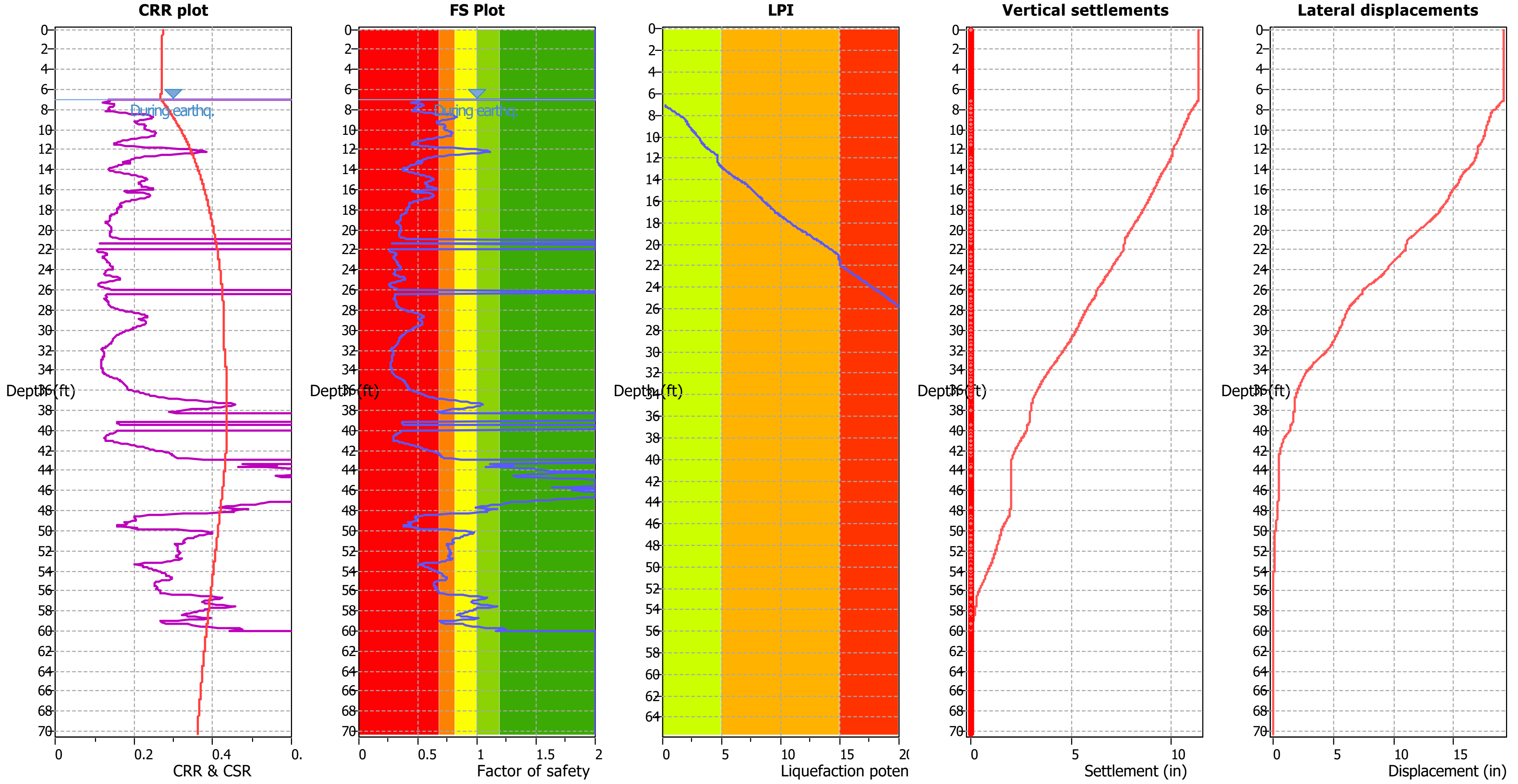
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

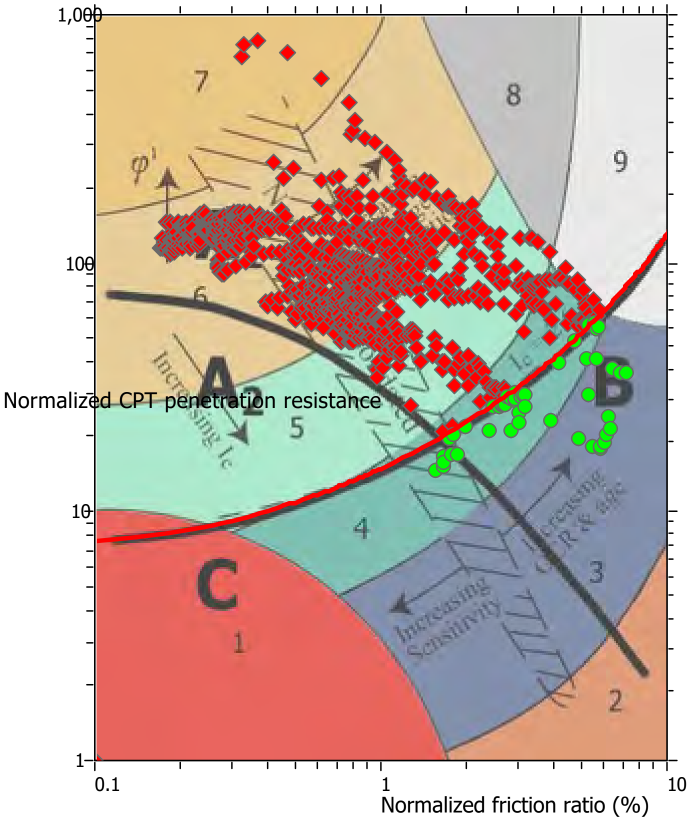
F.S. color scheme

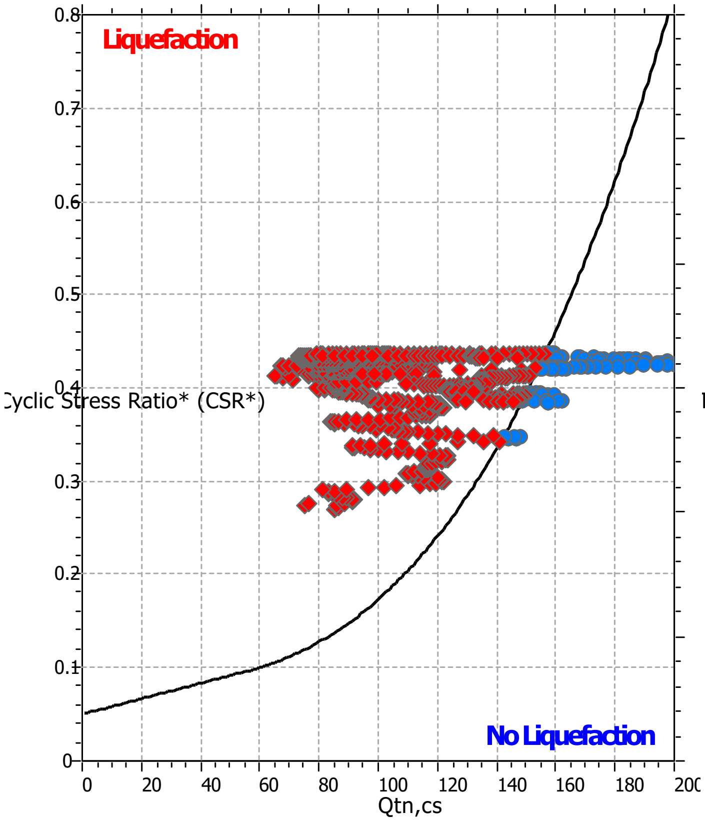
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

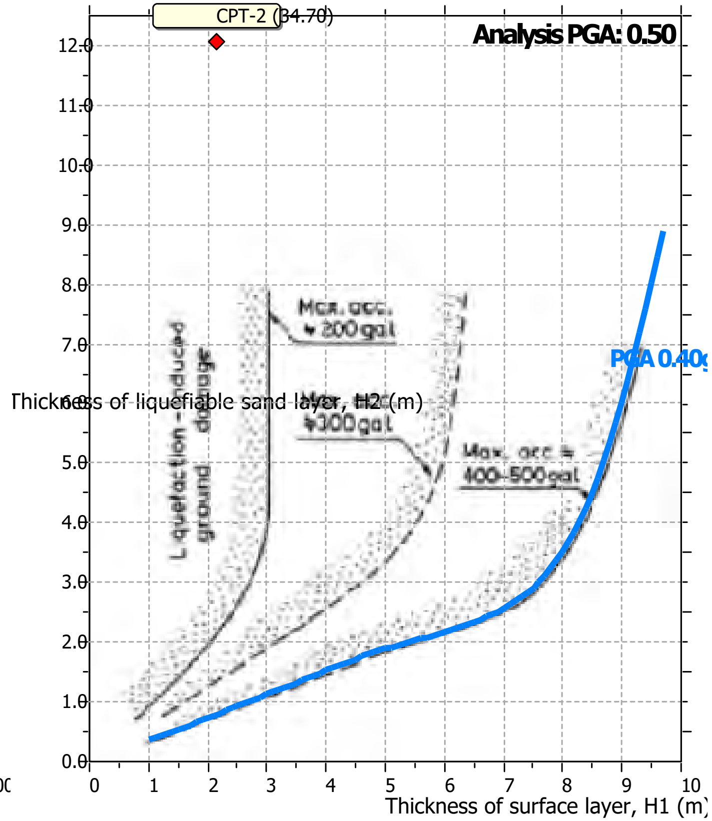
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



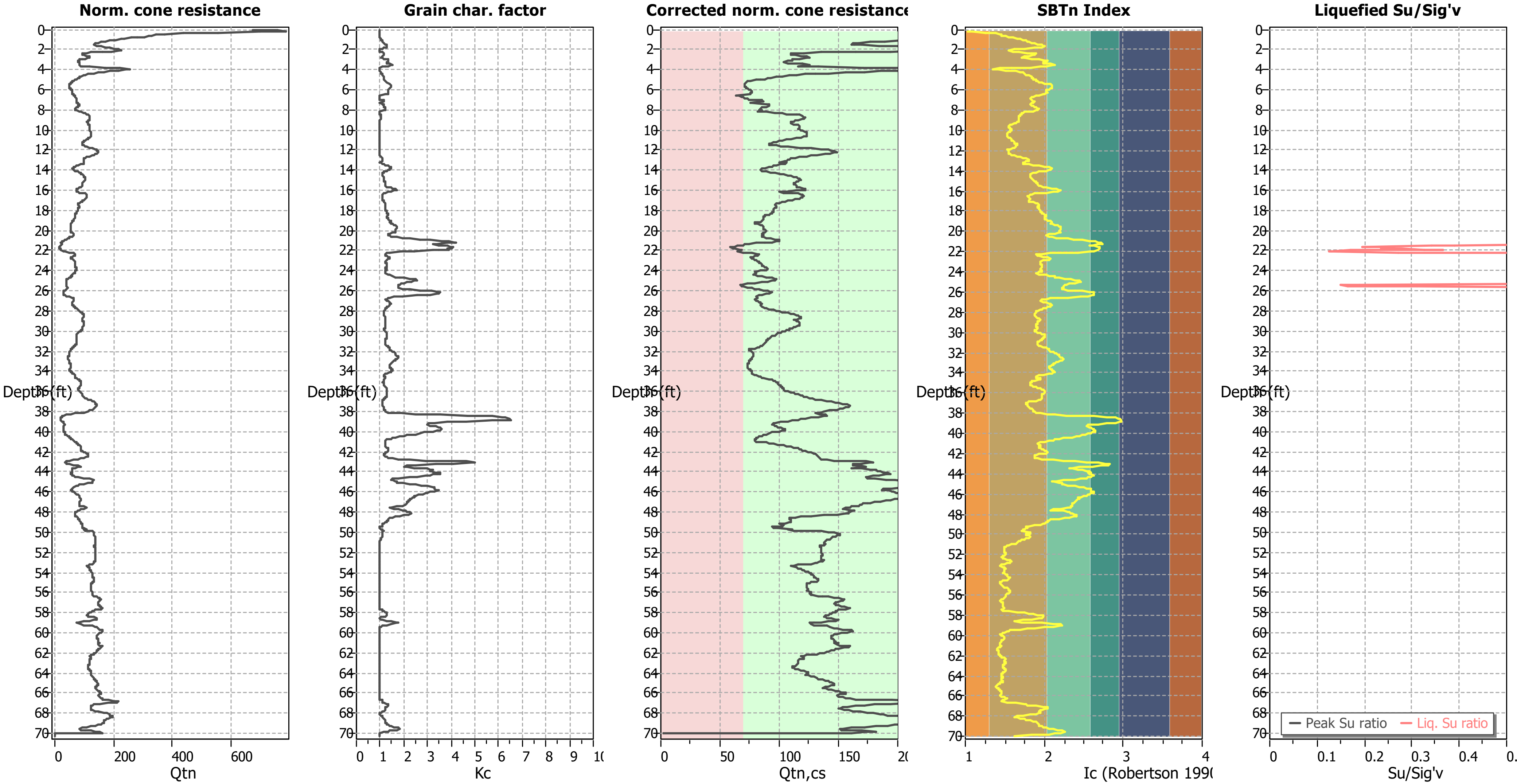




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

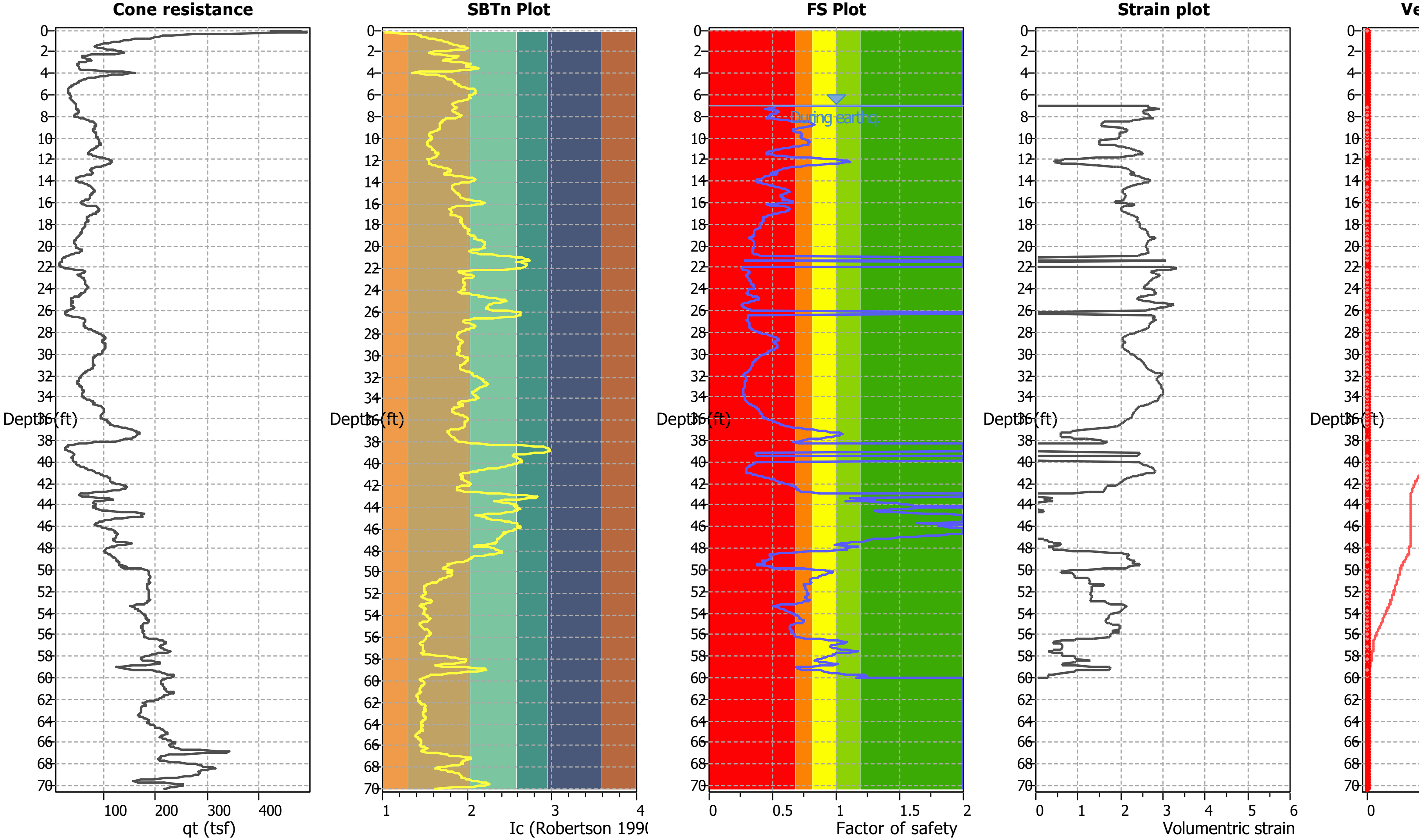
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

Estimation of post-earthquake settlements

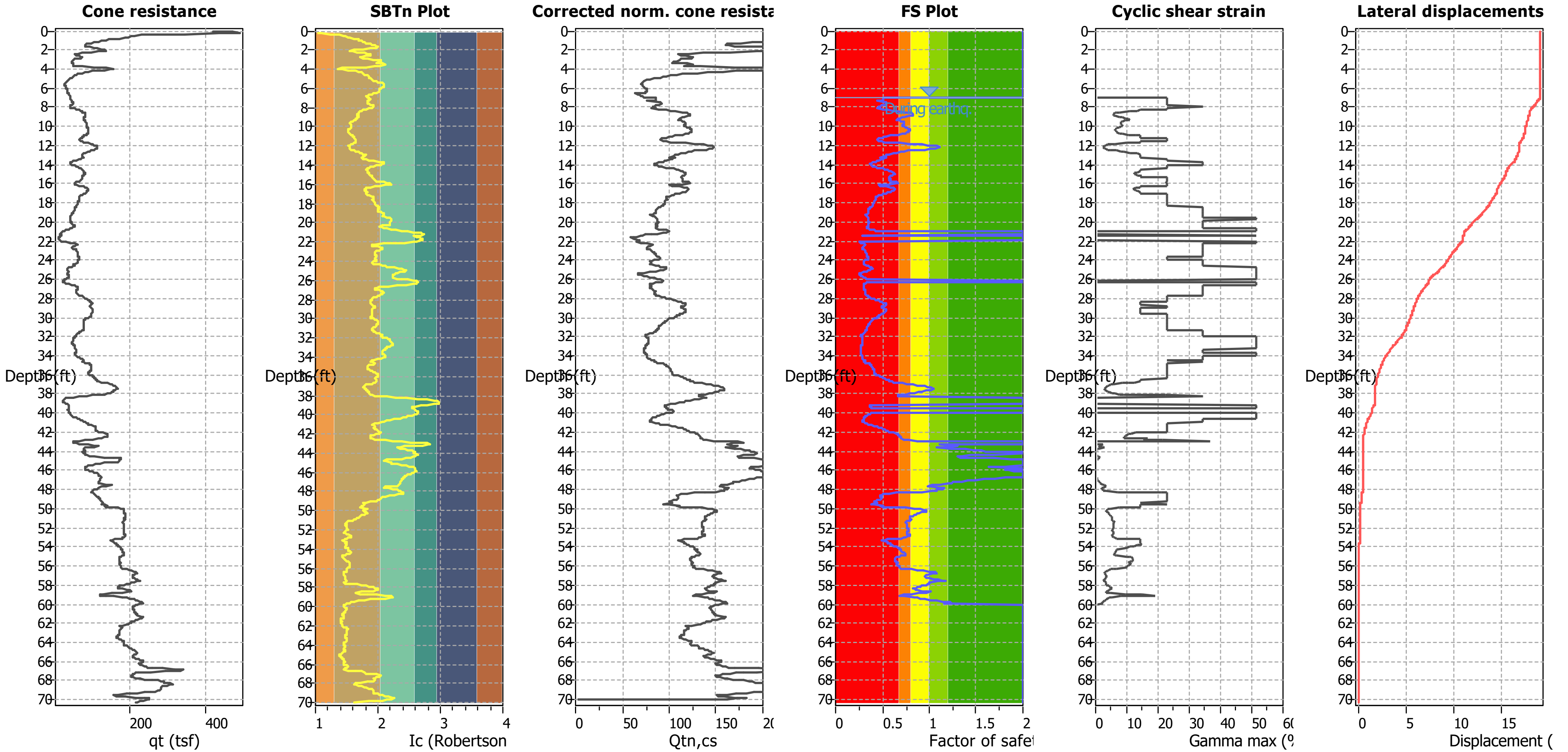


Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

Estimation of post-earthquake lateral Displacements

Geometric parameters: Gently sloping ground without free face (Slope 0.12 %)

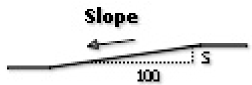


Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance

F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Surface condition



NOVA Services, Inc.
4373 Viewridge Avenue, Suite B
San Diego, CA 92123

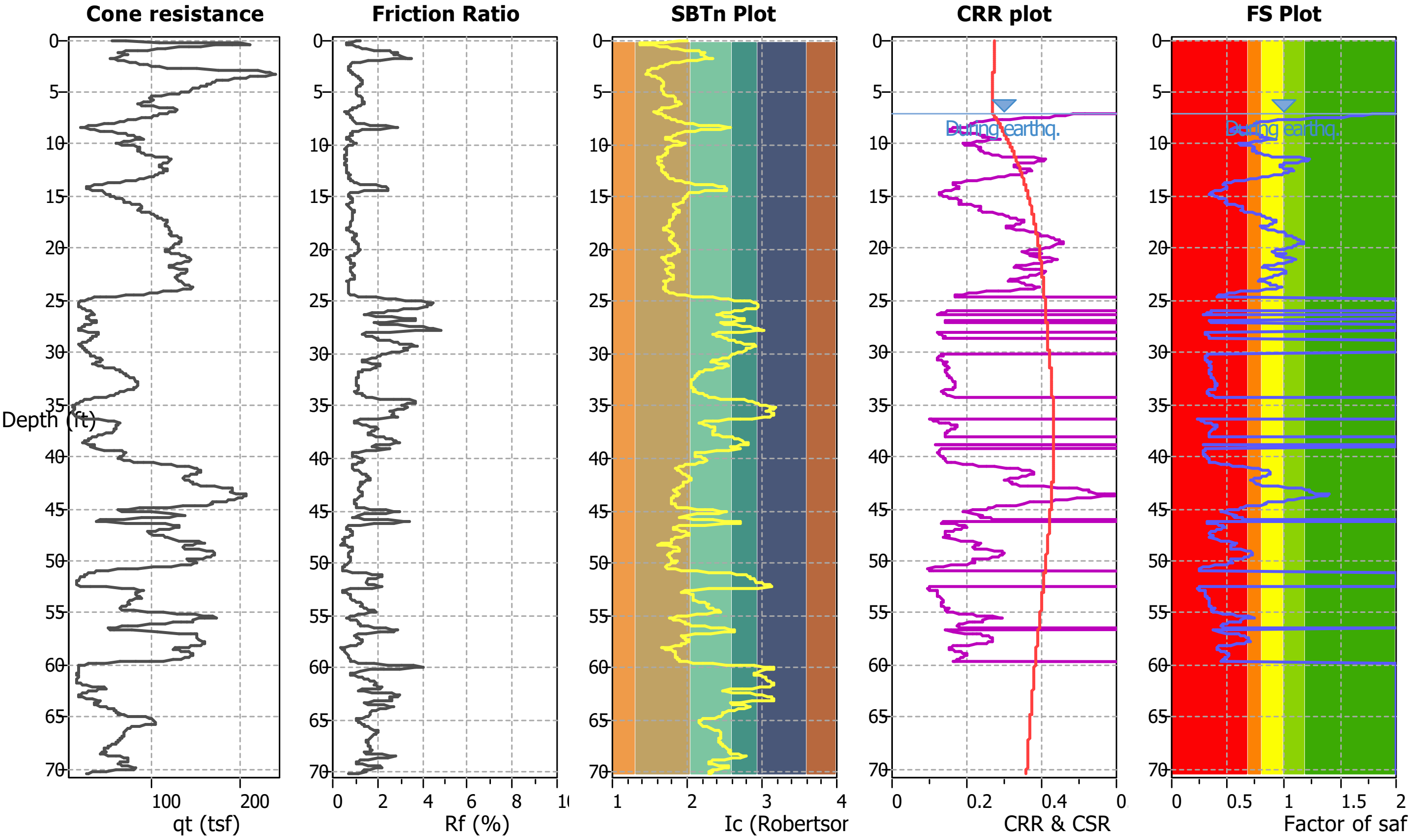
LIQUEFACTION ANALYSIS REPORT

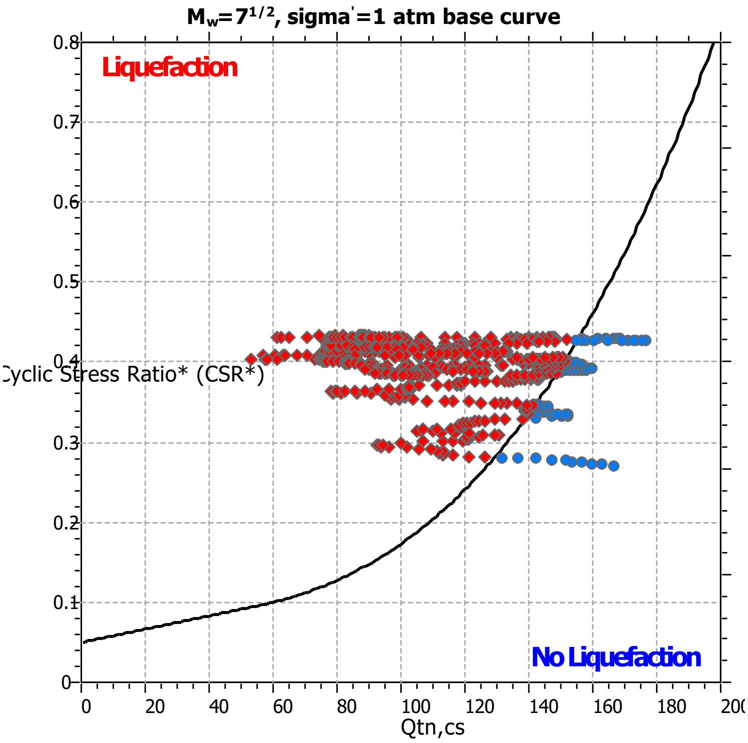
Project title : Eddy Jones Warehouse **Location : 630 Eddy Jones, Oceanside, CA**

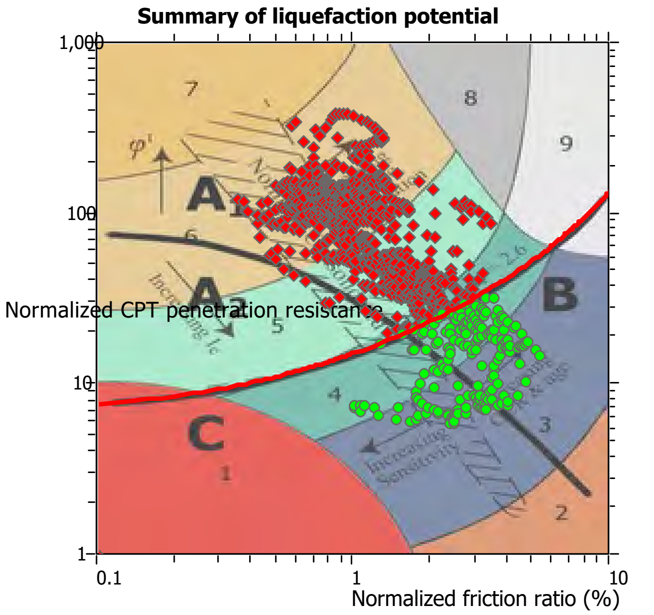
CPT file : CPT-3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	8.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	7.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.50	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

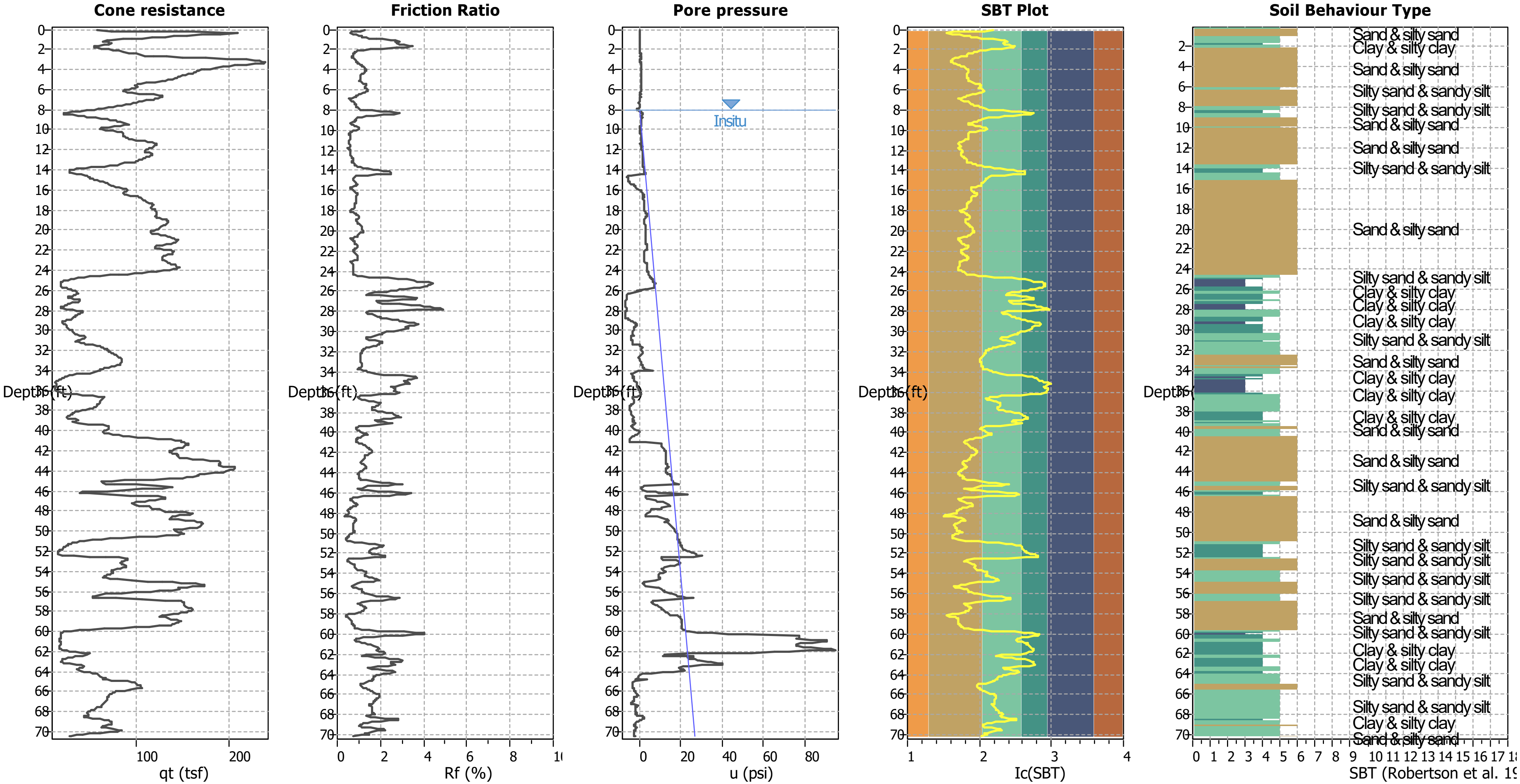






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



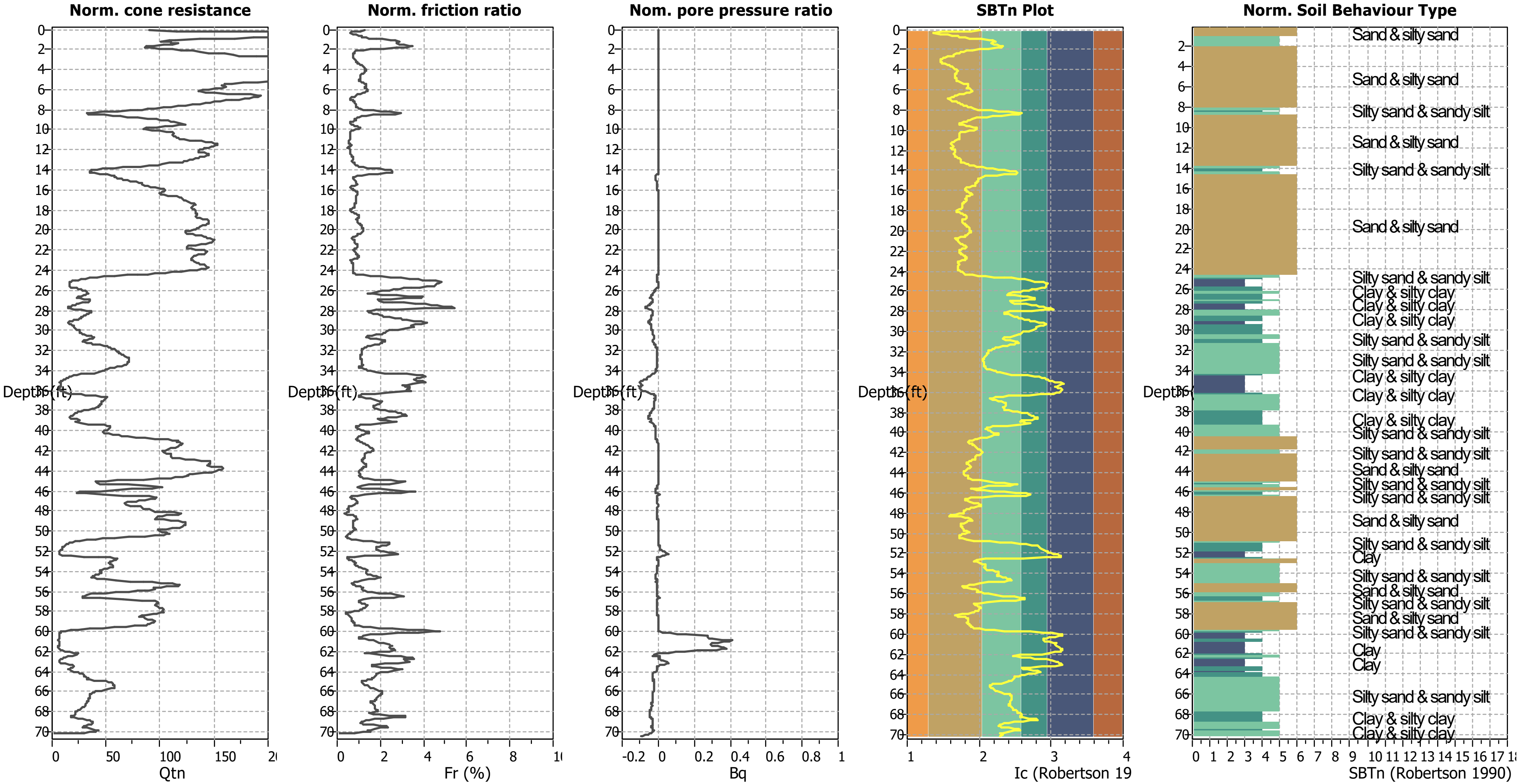
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



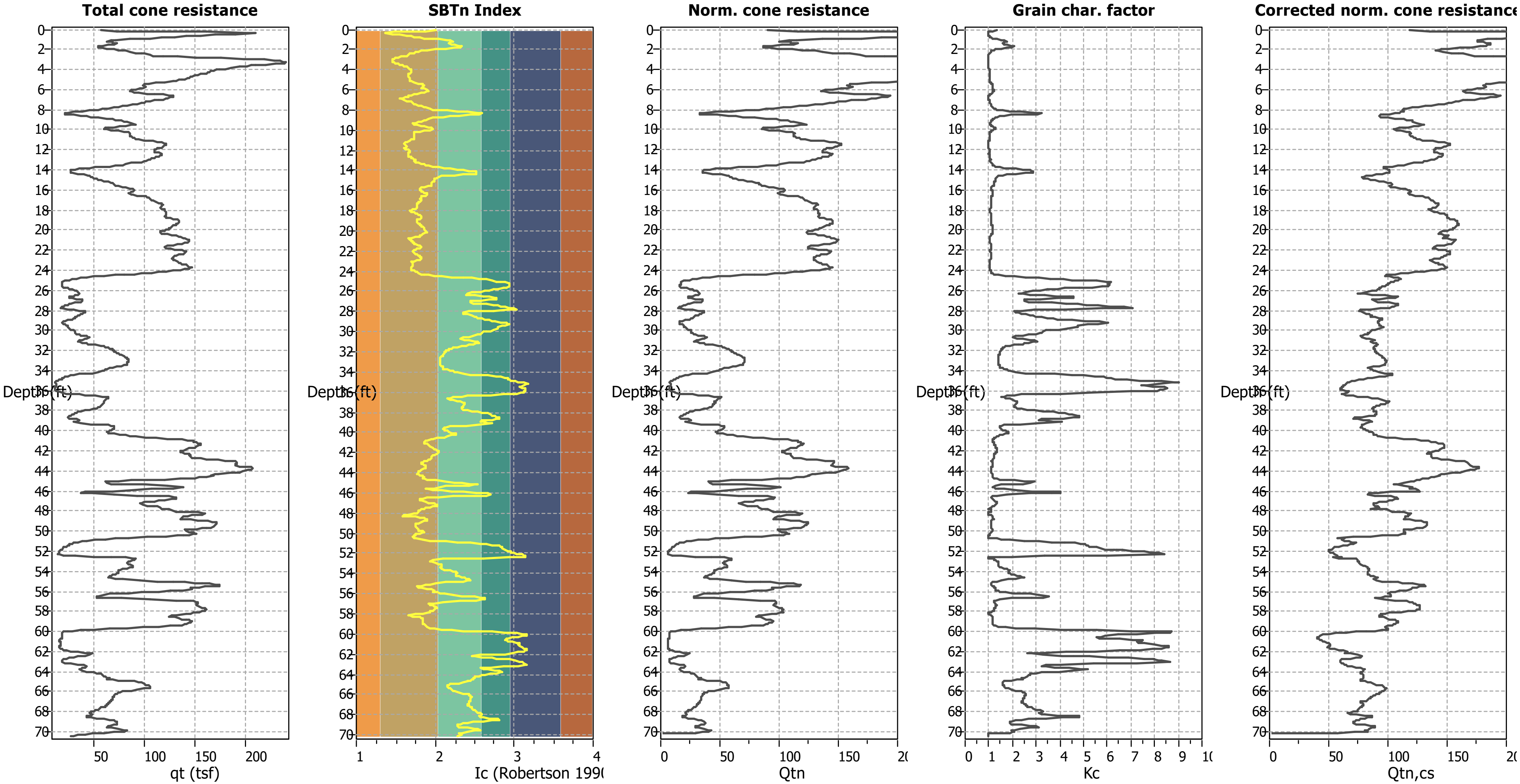
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

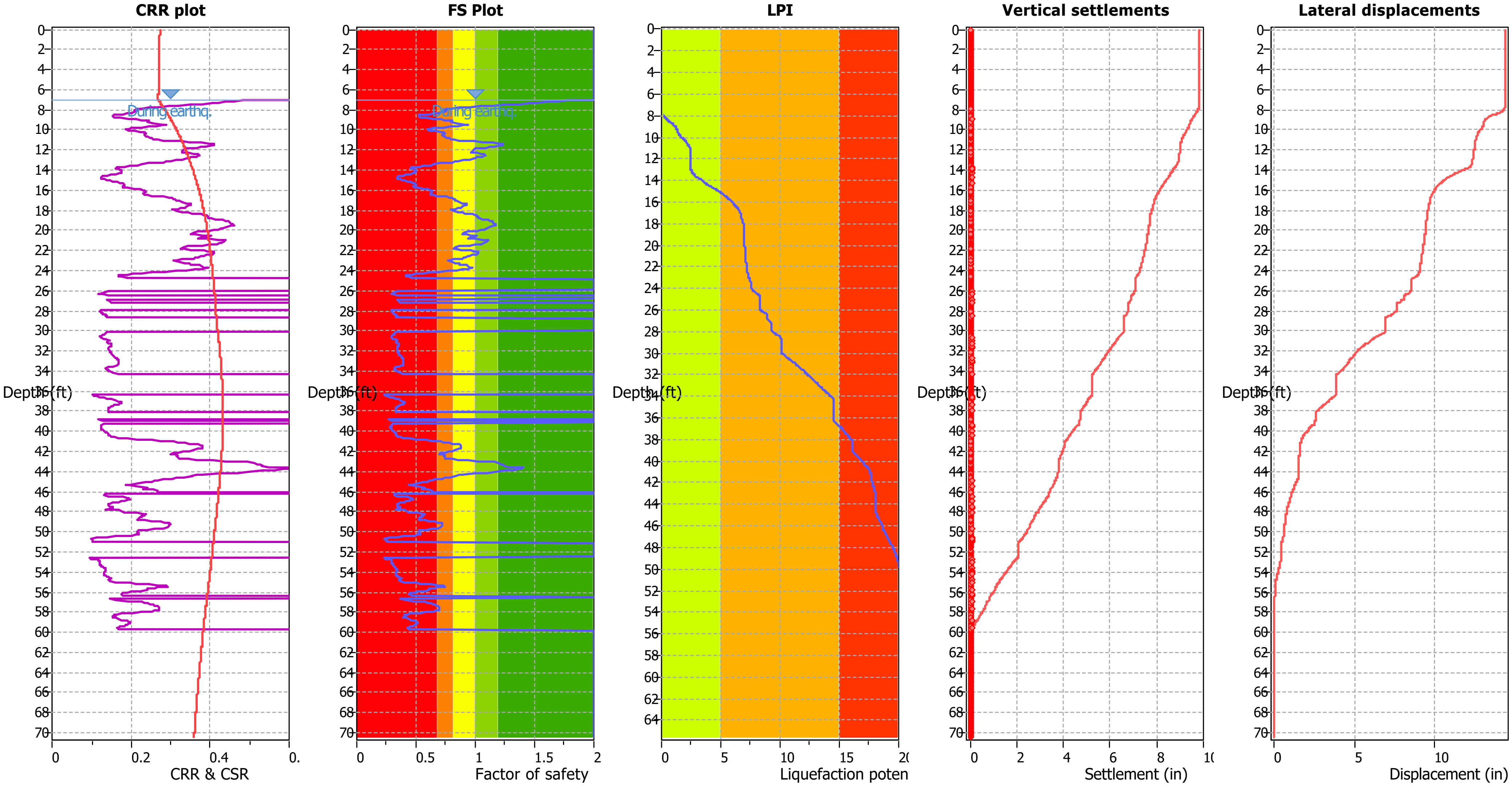
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

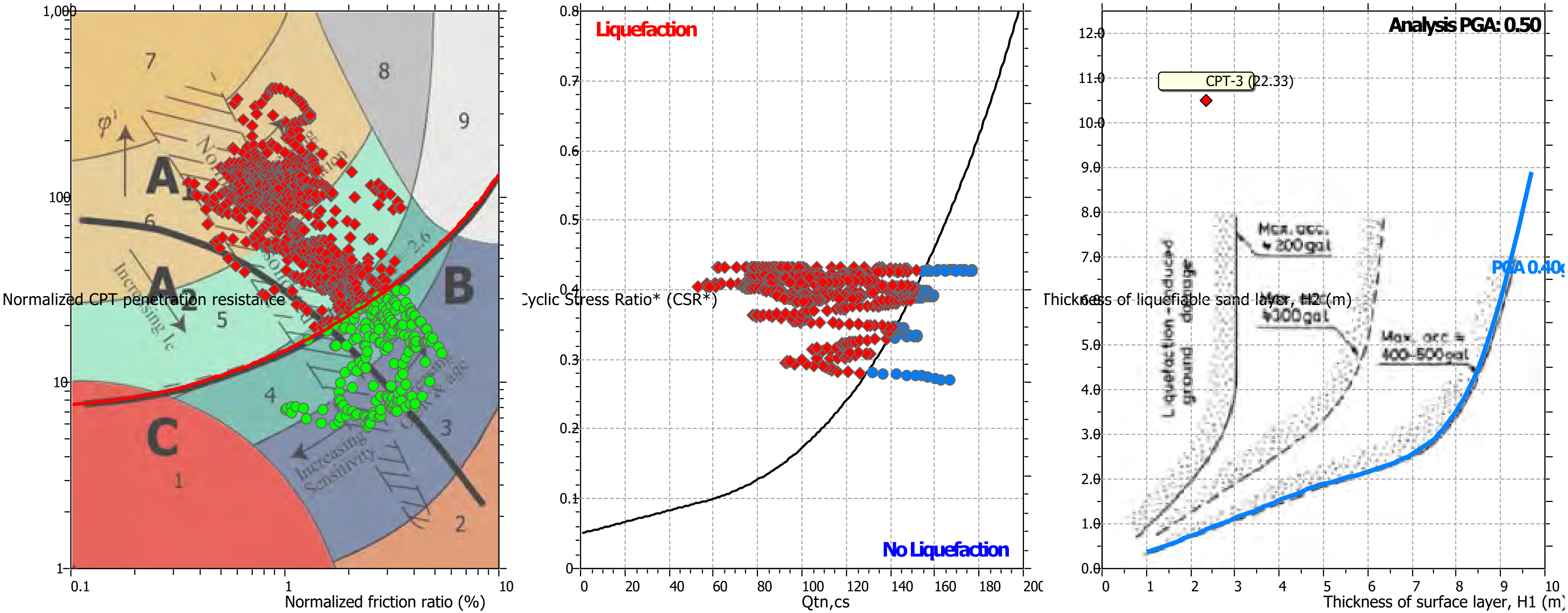
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

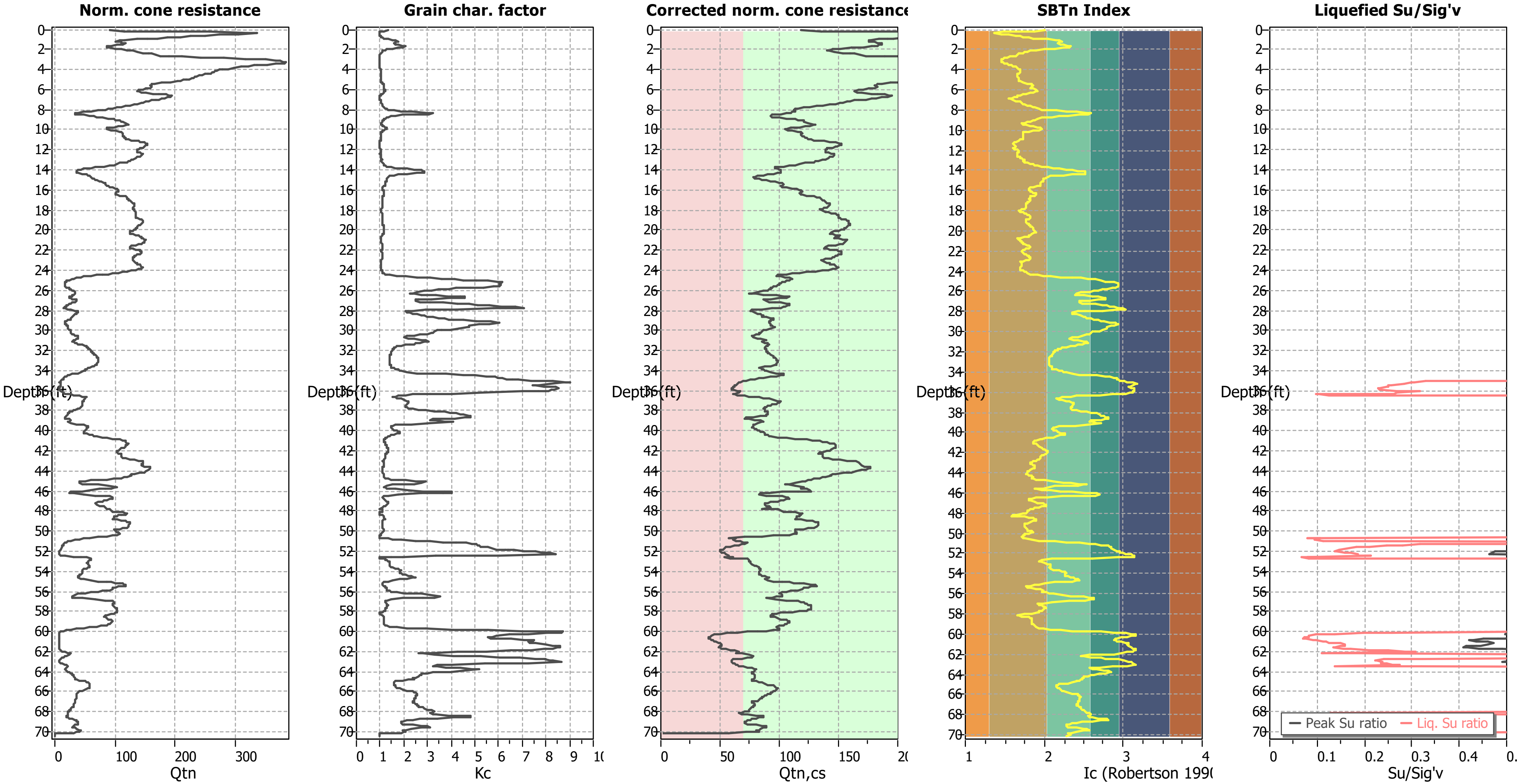
Liquefaction analysis summary plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

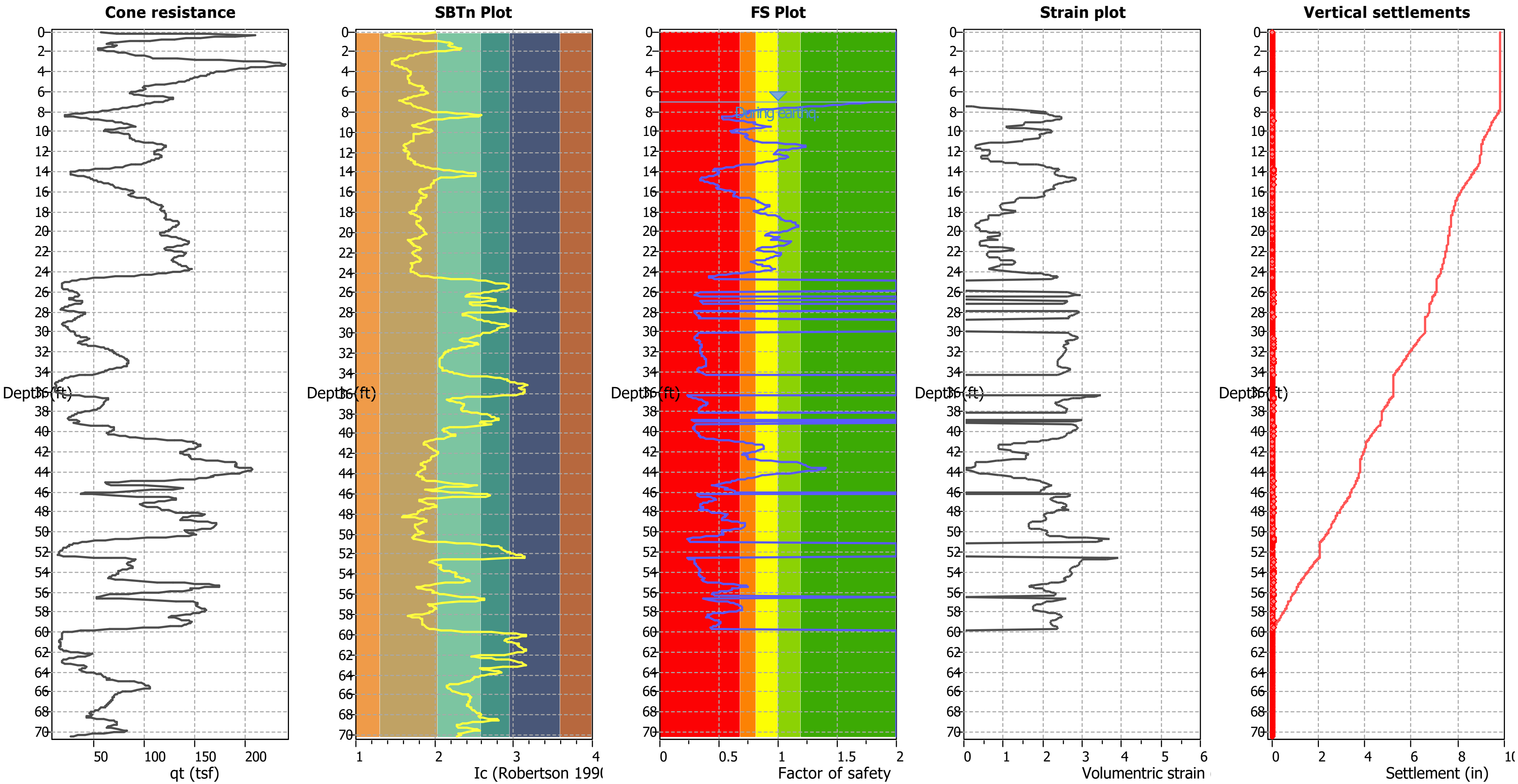
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

Estimation of post-earthquake settlements

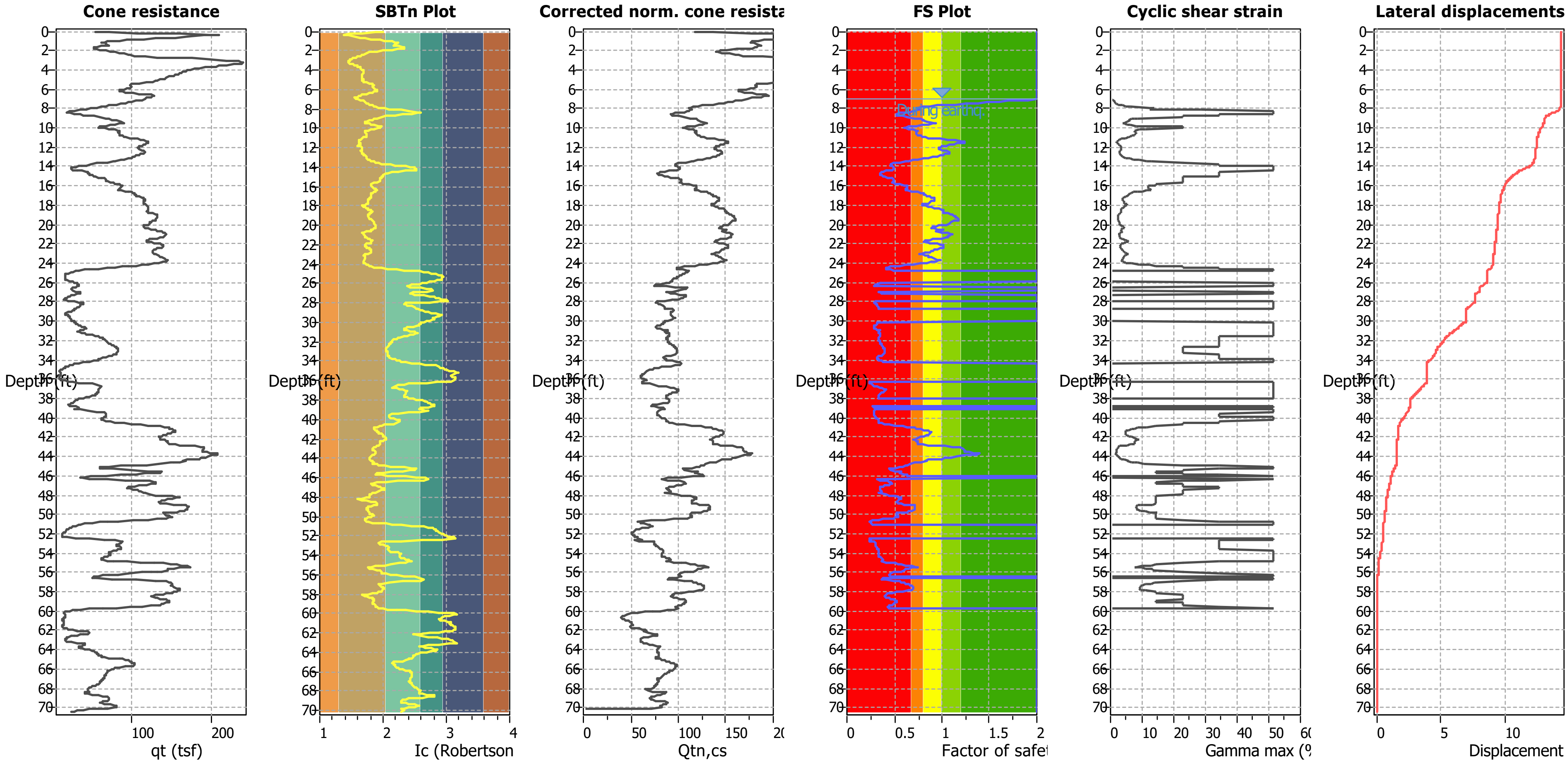


Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

Estimation of post-earthquake lateral Displacements

Geometric parameters: Gently sloping ground without free face (Slope 0.12 %)

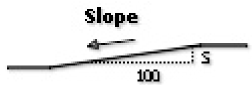


Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance

F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Surface condition



NOVA

NOVA Services, Inc.
4373 Viewridge Avenue, Suite B
San Diego, CA 92123

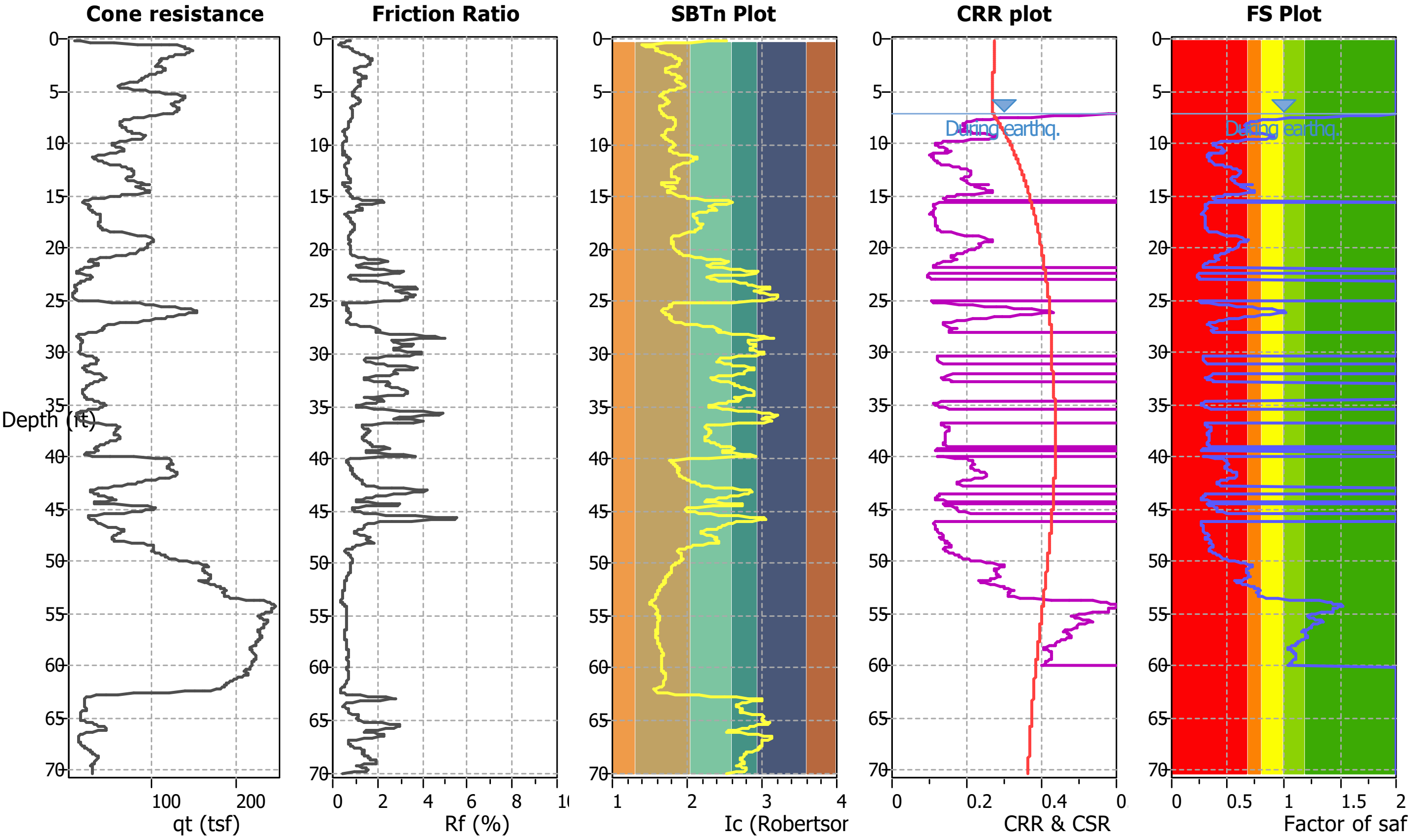
LIQUEFACTION ANALYSIS REPORT

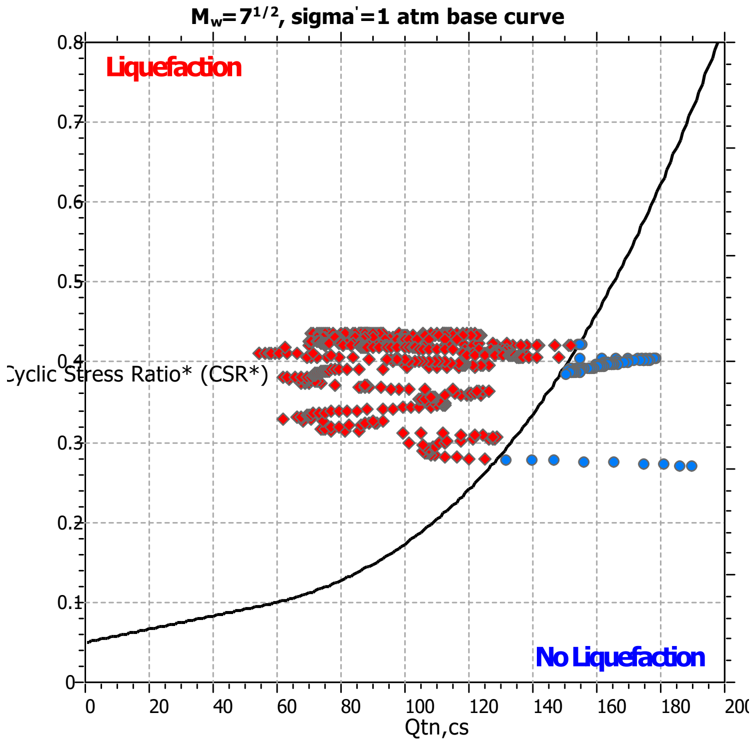
Project title : Eddy Jones Warehouse **Location : 630 Eddy Jones, Oceanside, CA**

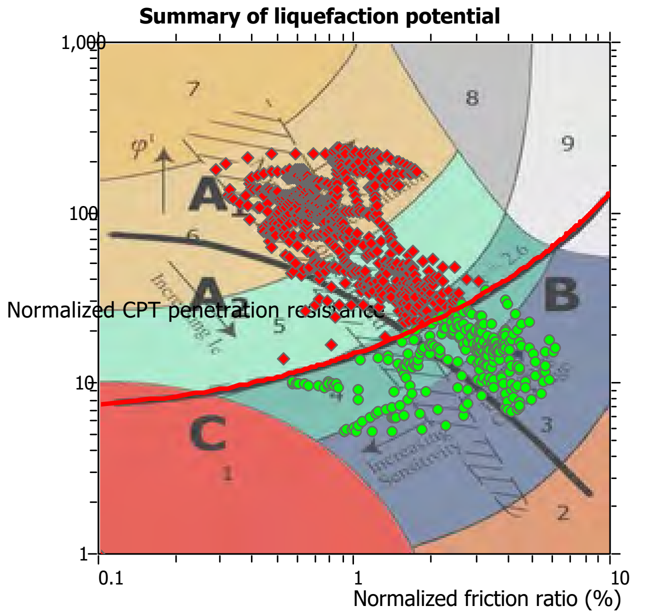
CPT file : CPT-4

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	8.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	7.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.50	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

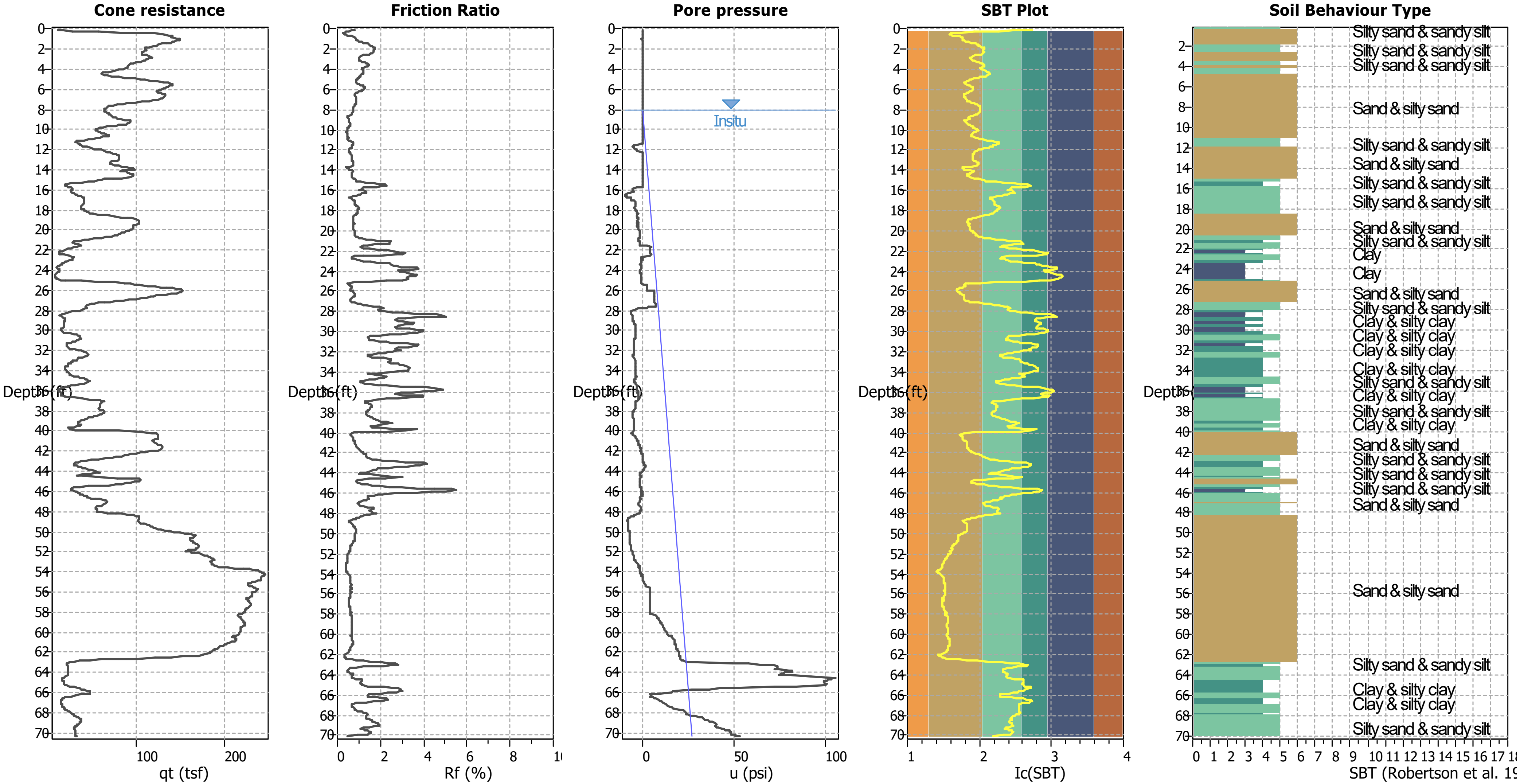






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



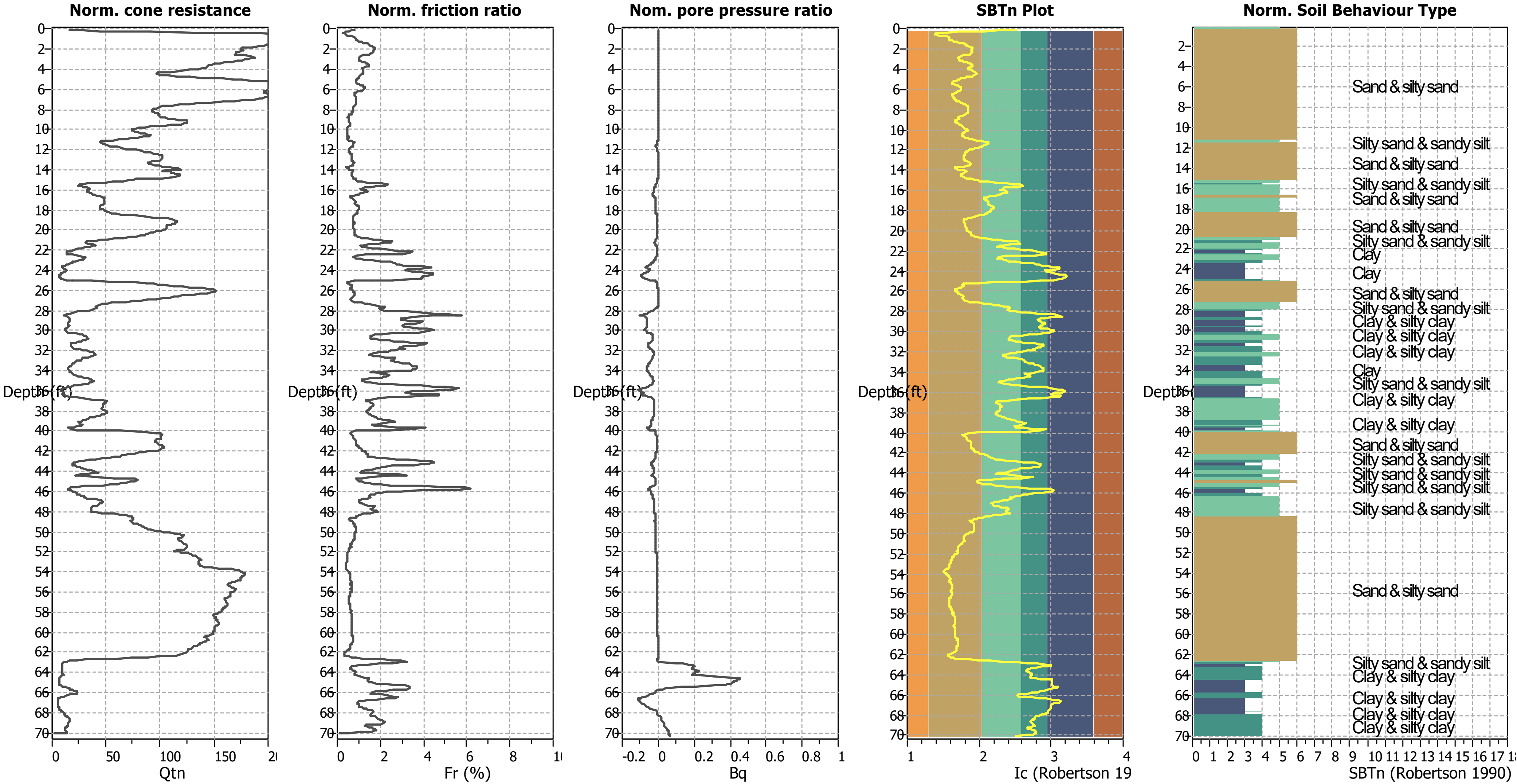
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



Input parameters and analysis data

Analysis method:	NCEER (1998)		Depth to water table (erthq.):	7.00 ft		Fill weight:	N/A
Fines correction method:	NCEER (1998)		Average results interval:	3		Transition detect. applied:	No
Points to test:	Based on Ic value		Ic cut-off value:	2.60		K_{σ} applied:	Yes
Earthquake magnitude M_w:	7.00		Unit weight calculation:	Based on SBT		Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50		Use fill:	No		Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft		Fill height:	N/A		Limit depth:	60.00 ft

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
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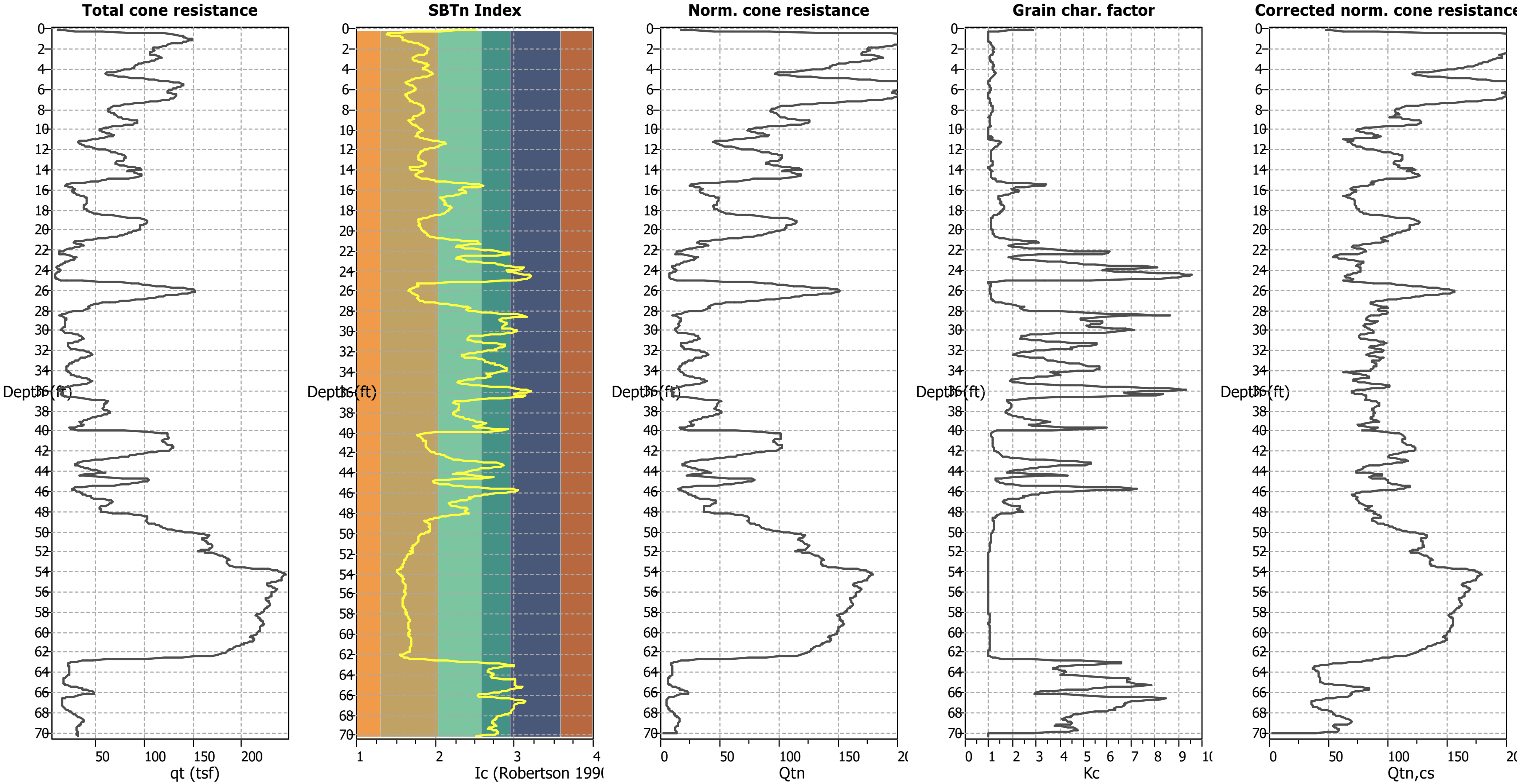
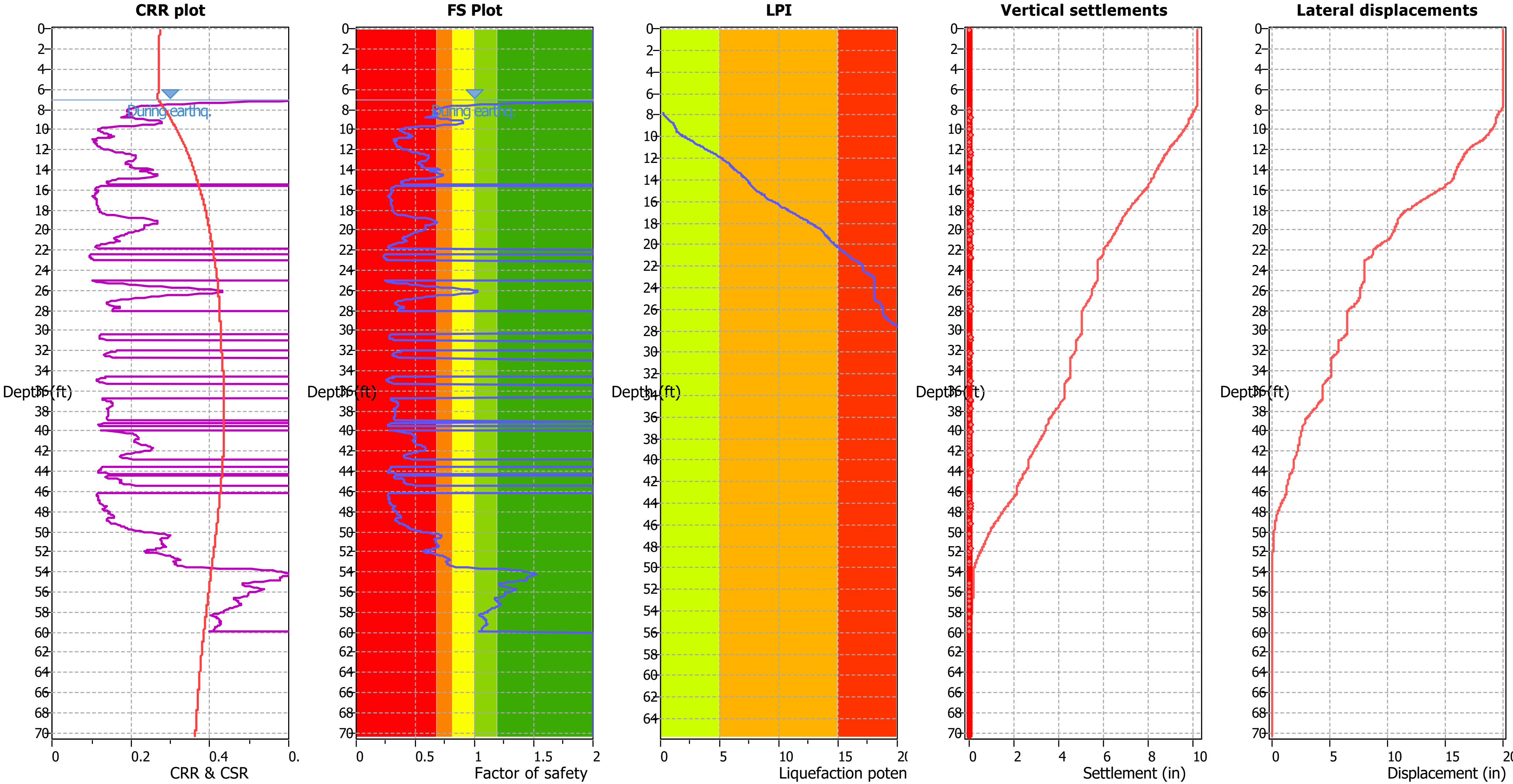
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

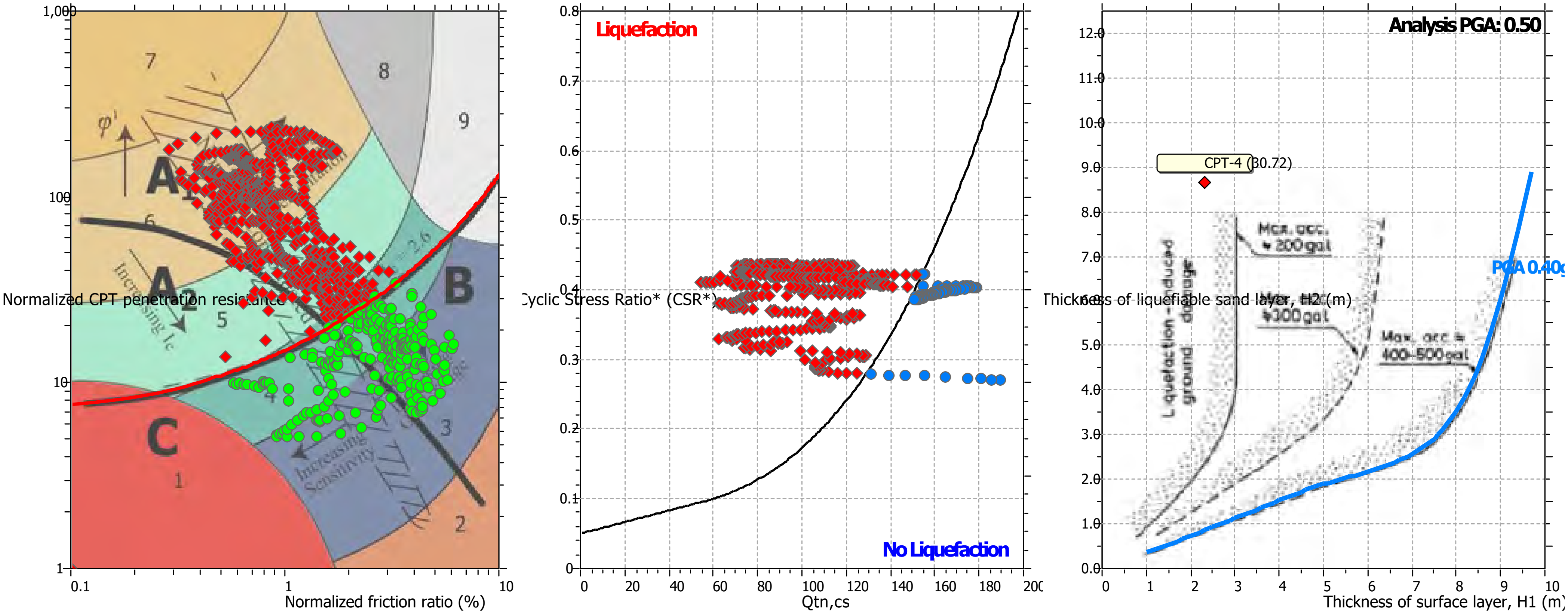
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

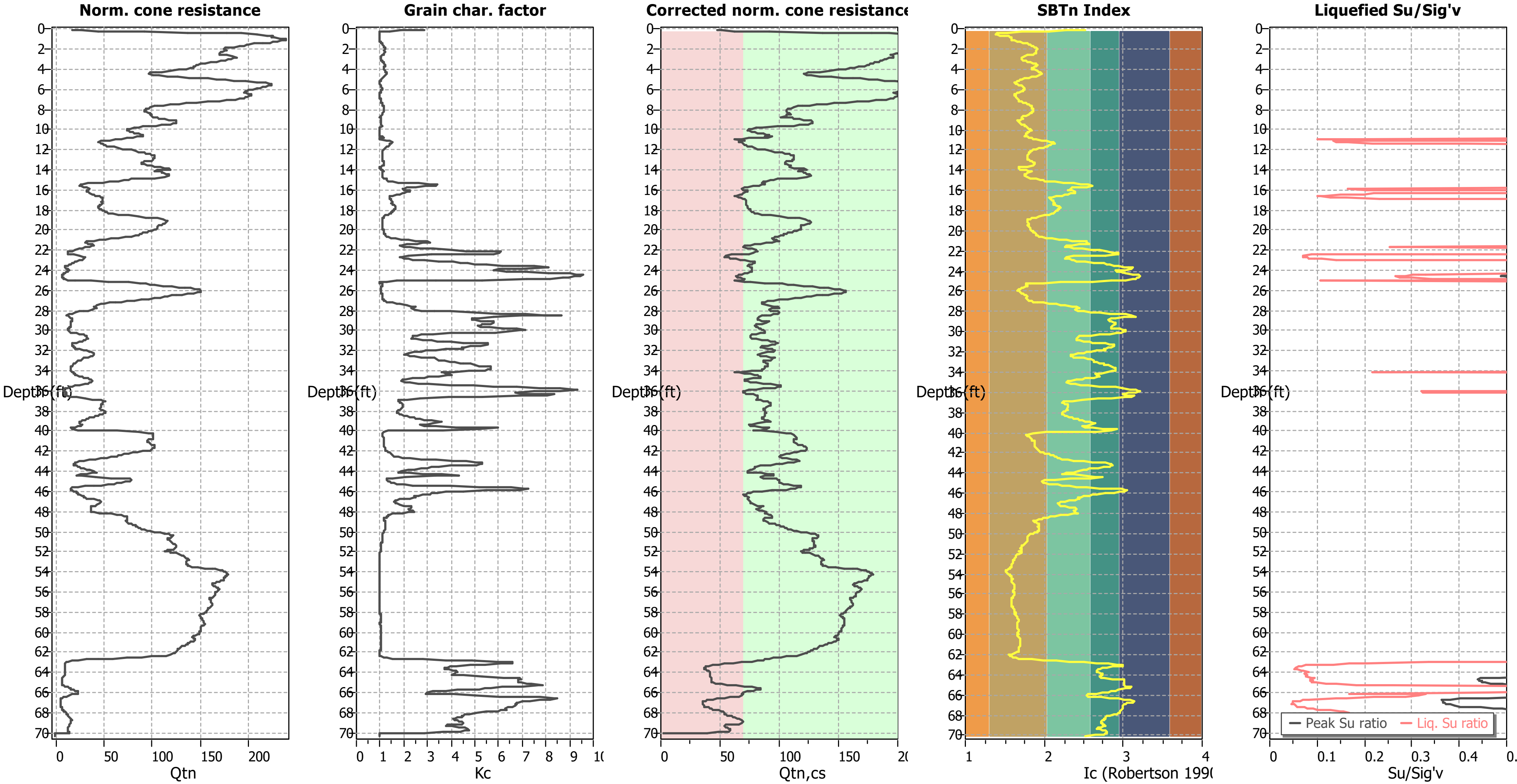
Liquefaction analysis summary plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

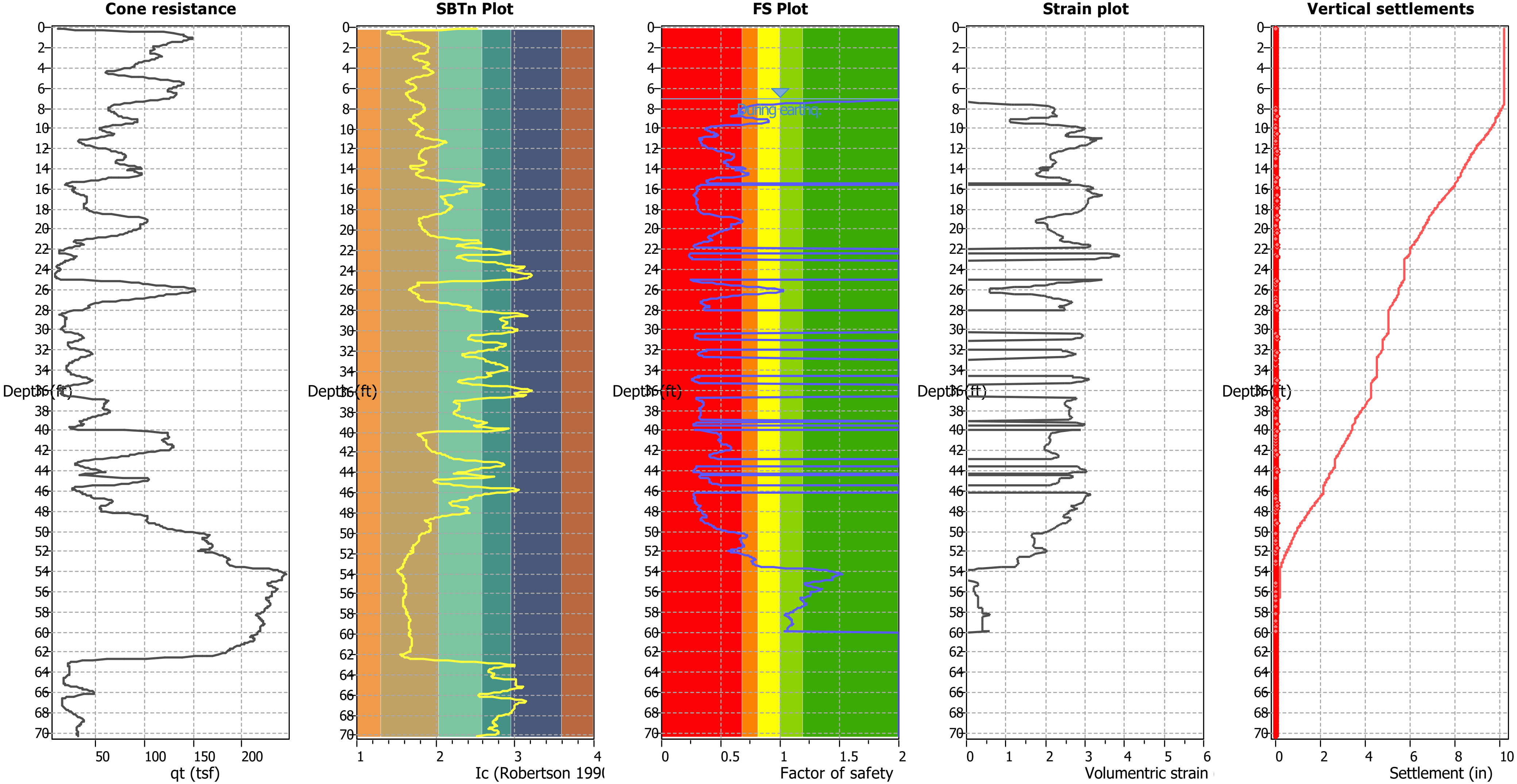
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

Estimation of post-earthquake settlements

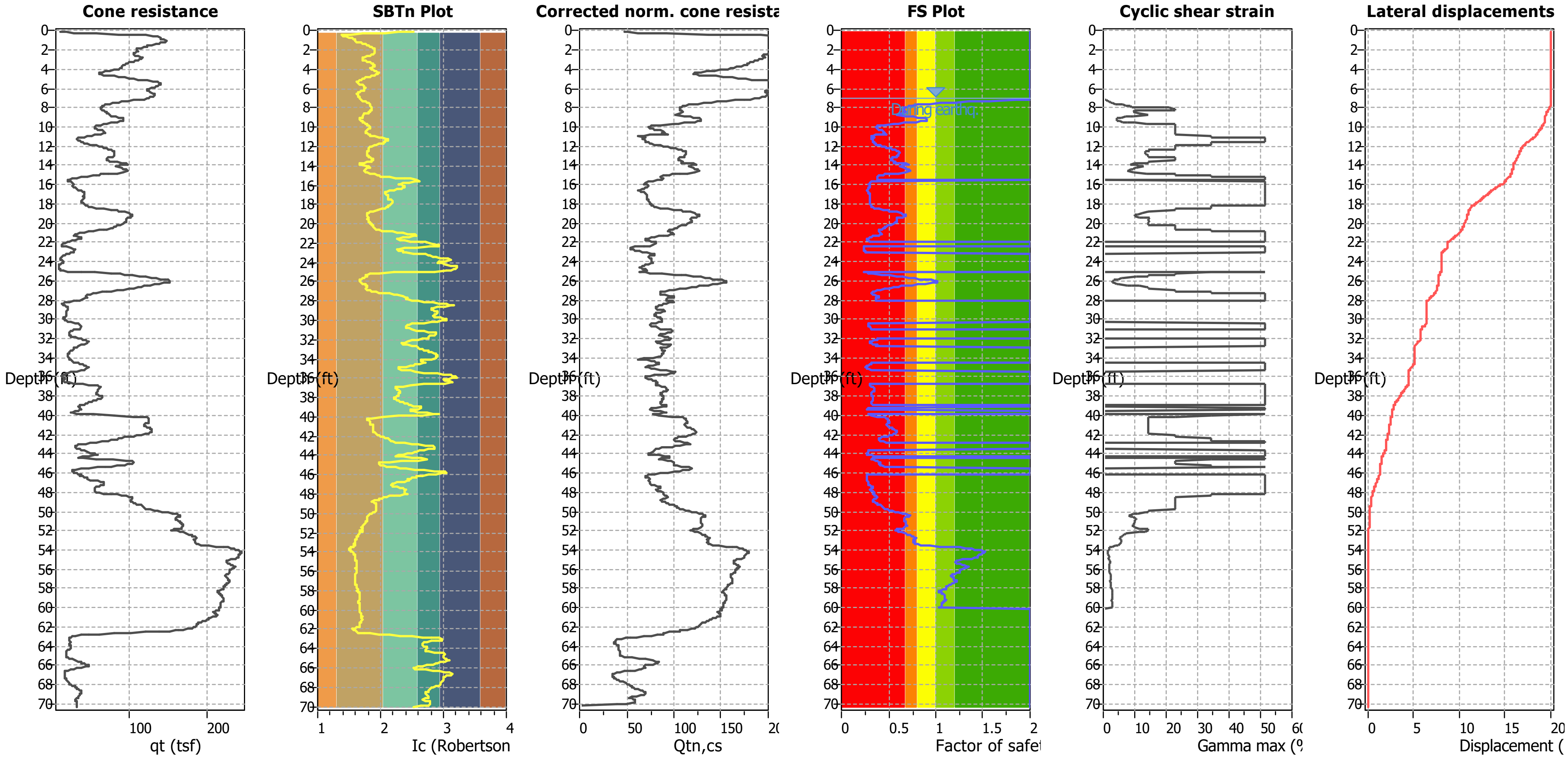


Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

Estimation of post-earthquake lateral Displacements

Geometric parameters: Gently sloping ground without free face (Slope 0.12 %)



Abbreviations

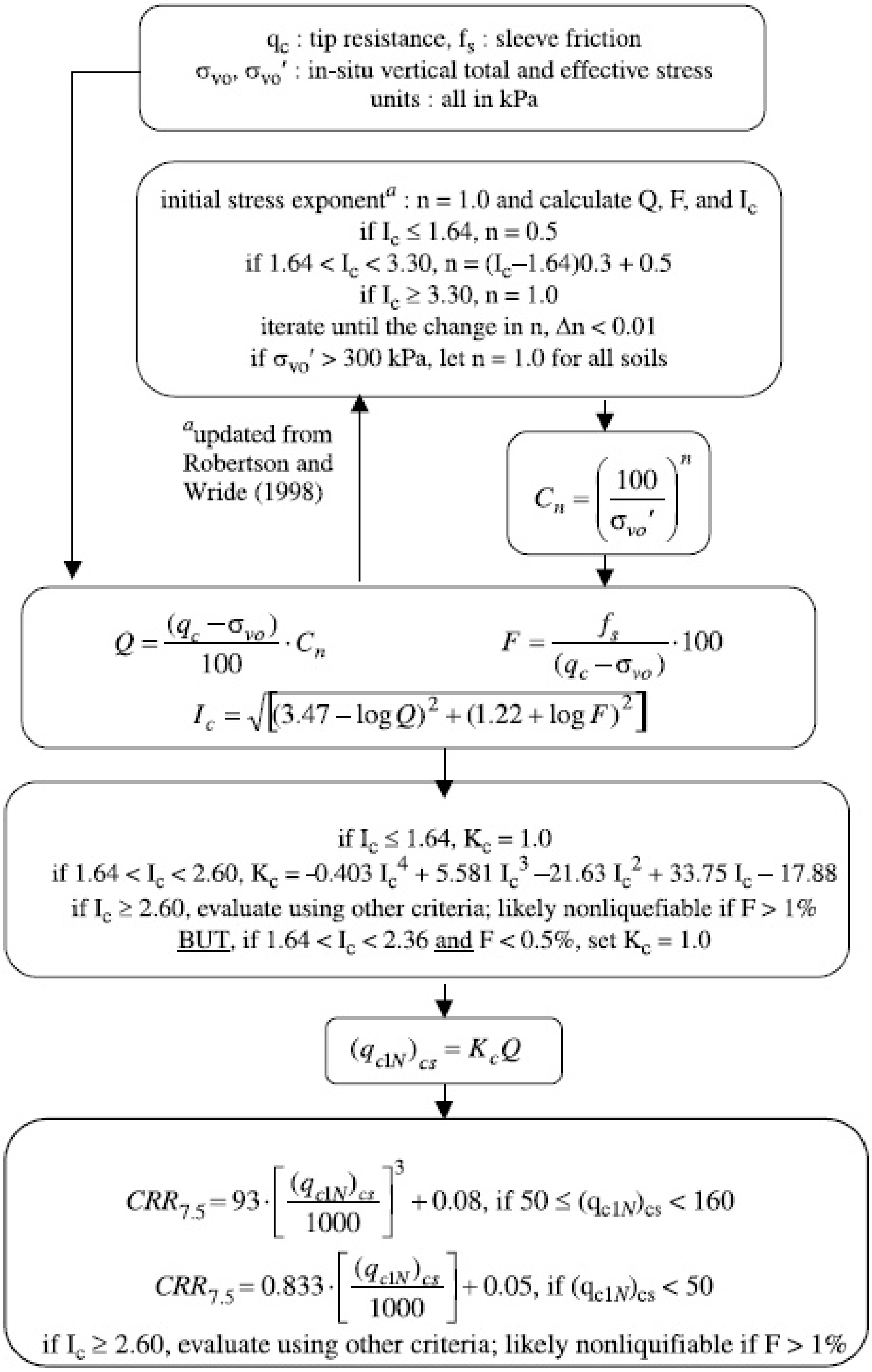
q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$Q_{tn,cs}$: Equivalent clean sand normalized CPT total cone resistance

F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Surface condition

Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

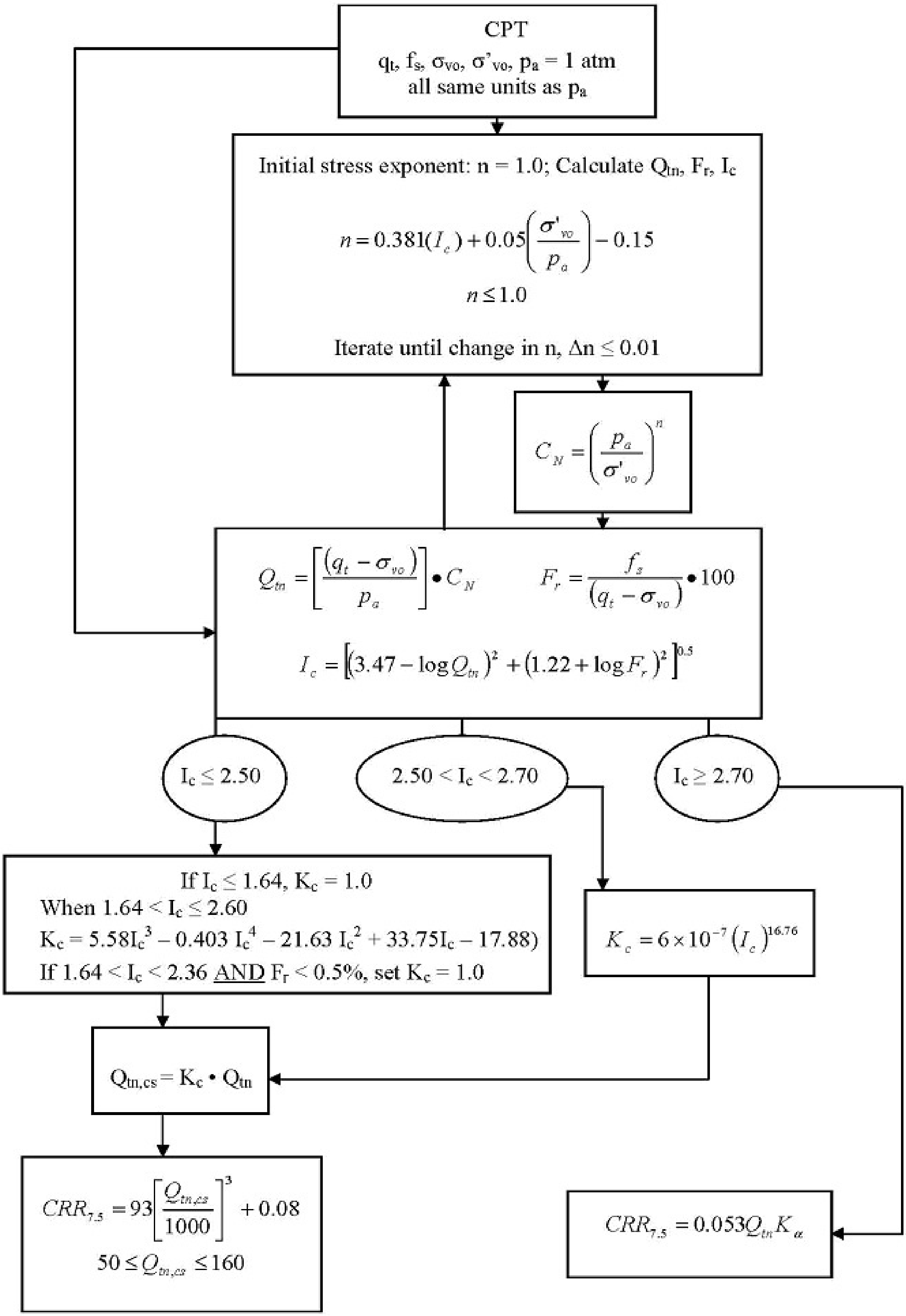
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:



[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

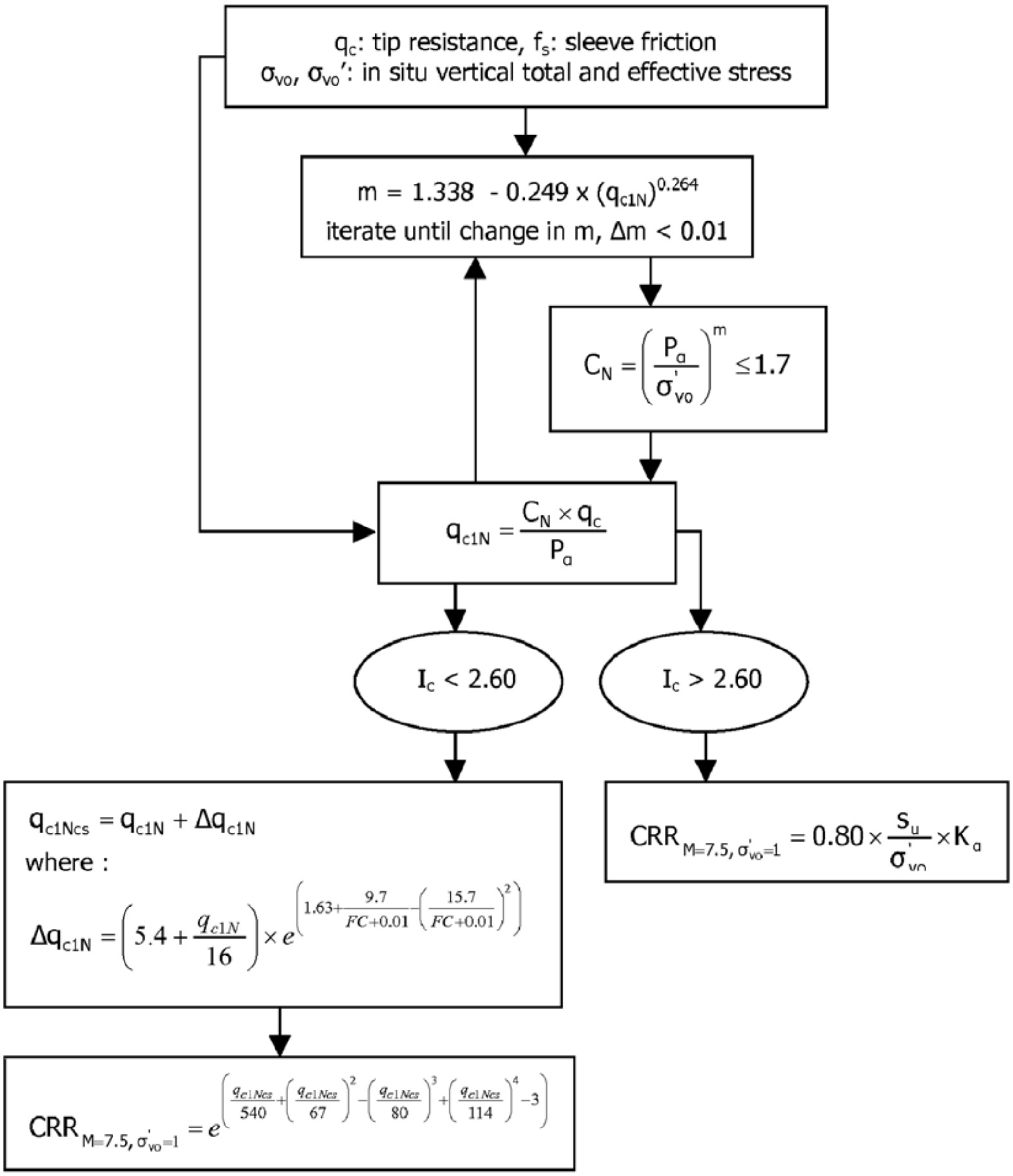
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. This procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:

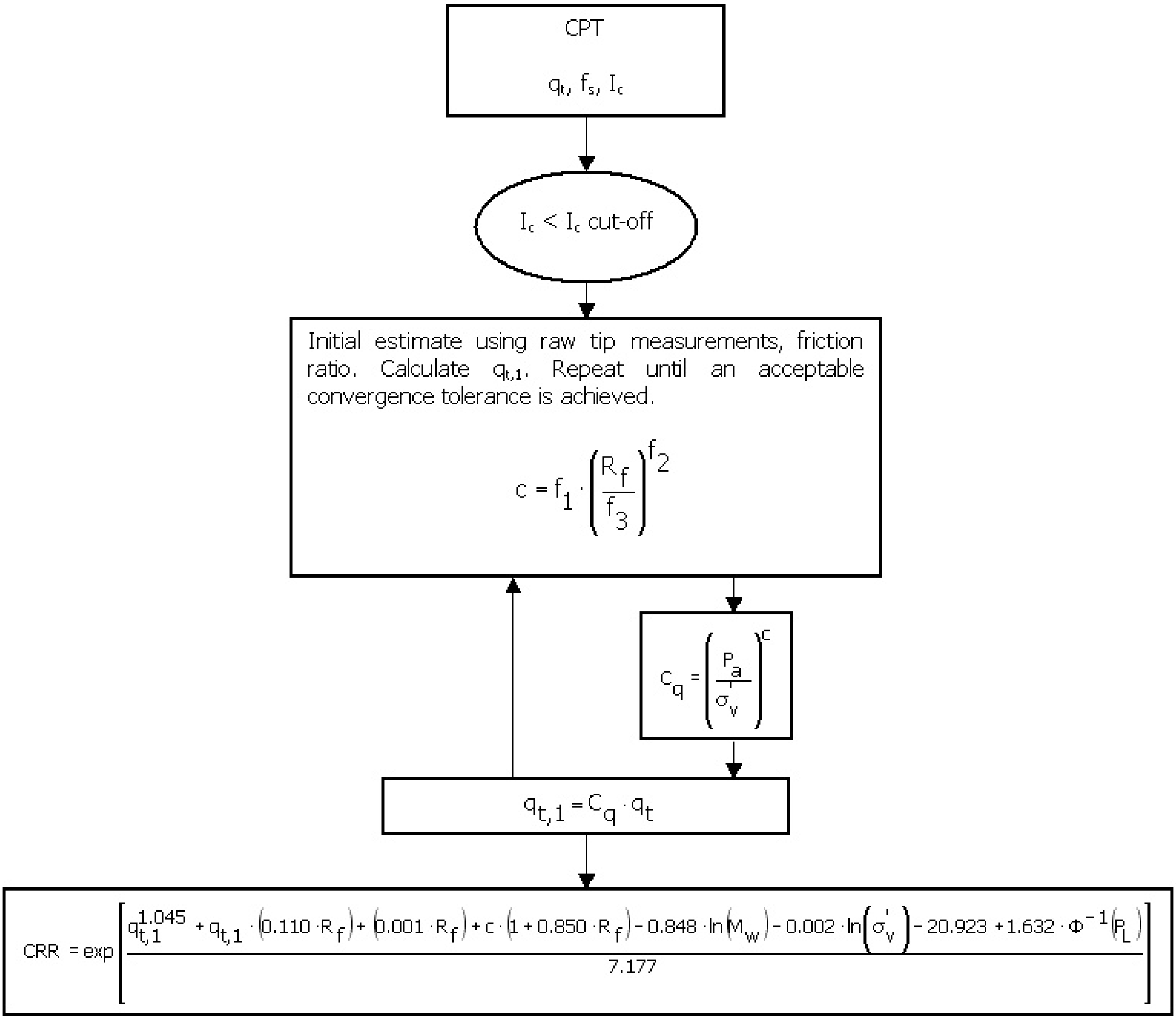


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)



Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)



Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma_v'=1atm}}{CSR_{M=7.5,\sigma_v'=1atm}}$$

$$CSR_{M=7.5,\sigma_v'=1atm} = 0.65 \frac{\sigma_v}{\sigma_v'} \frac{a_{\max}}{g} r_d \frac{1}{MSF} \frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z) + \beta(z) \cdot M\right]$$

$$\alpha(z) = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$

$$\beta(z) = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$

$$K_\sigma = 1 - C_\sigma \ln\left(\frac{\sigma_v'}{P_a}\right) \le 1.1$$

$$C_\sigma = \frac{1}{37.3 - 8.27\left(q_{c1Ncs}\right)^{0.264}} \le 0.3$$

$$MSF = 1 + \left(MSF_{max} - 1\right)\left(8.64 \exp\left(\frac{-M}{4}\right) - 1.325\right)$$

$$MSF_{max} = 1.09 + \left(\frac{q_{c1Ncs}}{180}\right)^3 \le 2.2$$

σ_v' *and* σ_v *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma_v'=1atm} = \exp\left(\frac{q_{c1Ncs}}{113} + \left(\frac{q_{c1Ncs}}{1000}\right)^2 - \left(\frac{q_{c1Ncs}}{140}\right)^3 + \left(\frac{q_{c1Ncs}}{137}\right)^4 - 2.80\right)$$

$$q_{c1Ncs} = q_{c1N} + \Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9 + \frac{q_{c1N}}{14.6}\right) \exp\left(1.63 - \frac{9.7}{FC+2} - \left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_N \frac{q_c}{P_a}$$

$$C_N = \left(\frac{P_a}{\sigma_v'}\right)^m \le 1.7$$

$$m = 1.338 - 0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264 \le m \le 0.782$$

$$FC = 80\left(I_C + C_{FC}\right) - 137 \quad with \quad 0\% \le FC \le 100\%$$

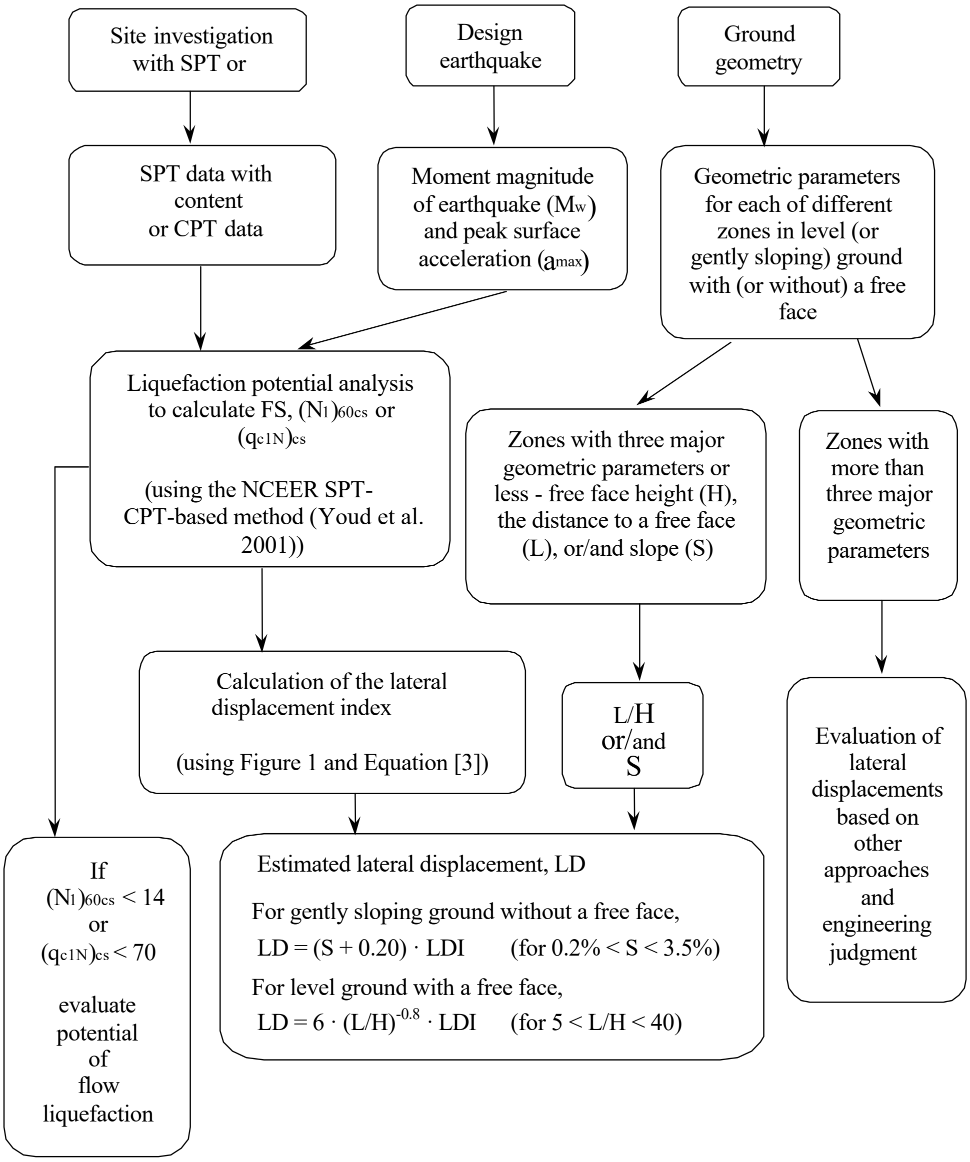
$$I_c = \left[\left(3.47 - \log(Q)\right)^2 + \left(1.22 + \log(F)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c - \sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma_{vc}'}\right)^n \quad with\ 0.5 \le n \le 1.0\ per\ Robertson\ \&\ Wride\ (1998)$$

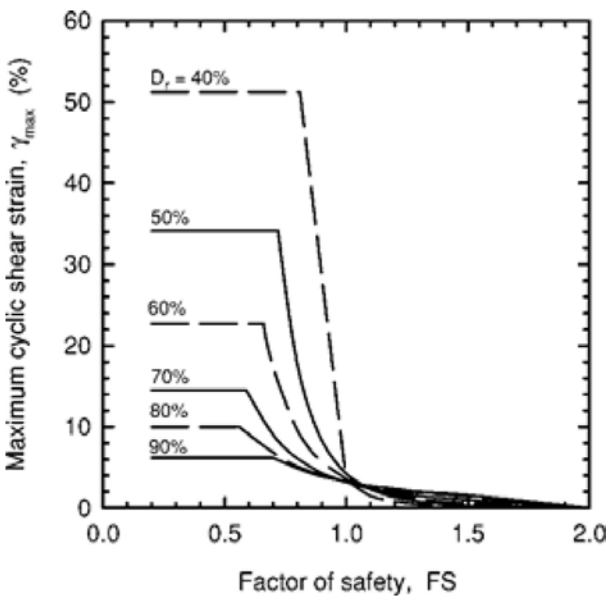
$$F = \left(\frac{f_s}{q_c - \sigma_{vc}}\right) \cdot 100\%$$

σ_v' *at time of CPT sounding*

Procedure for the evaluation of liquefaction-induced lateral spreading displacements



[1] Flow chart illustrating major steps in estimating liquefaction-induced lateral spreading displacements using the proposed approach



[1] **Figure 1**

$$LDI = \int_0^{Z_{max}} \gamma_{max} \, dz$$

[1] **Equation [3]**

[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

Procedure for the estimation of seismic induced settlements in dry sands

Average shear stress, τ_{av}

$$\tau_{av} = CSR^{*} \cdot \sigma_{v0}' = 0.65 \cdot \frac{\alpha_{max}}{g} \cdot \sigma_{v0} \cdot \tau_{a}$$

↓

Estimate small shear strain modulus, G_0

$$G_0 = 0.0188 \cdot \left[10^{(0.55 I_c - 1.68)}\right] \cdot (q_t - \sigma_v)$$

↓

Estimate shear strain amplitude, γ

(based on Pradel (1998))

$$\gamma = \left[\frac{1 + \alpha \cdot e^{bR}}{1 + \alpha}\right] \cdot R \cdot 100\ (\%)$$

$$R = \frac{\tau_{av}}{G_0} \text{ (Note } \tau_{av} \text{ and } G_0 \text{ same units)}$$

$$\alpha = 0.0389 \cdot \left(\frac{\sigma_v}{p_a}\right) + 0.124$$

$$b = 6400 \cdot \left(\frac{\sigma_v}{p_a}\right)$$

↓

Estimate volumetric strain in 15 cycles

$$\varepsilon_{vol(15)} = \gamma \cdot \left[\frac{(N_1)_{60cs}}{20}\right]^{-1.20}$$

$$(N_1)_{60,cs} = \frac{Q_{tn,cs}}{8.5 \cdot \left[1 - \frac{I_c}{4.6}\right]}$$

↓

Volumetric strain in design earthquake

$$\Sigma_{vol} = \varepsilon_{vol(15)} \cdot \left[\frac{N_c}{15}\right]^{0.45}$$

$$N_c = (M - 4)^{2.17}$$

↓

Seismic settlement, s

$$s = 2 \cdot \int_0^{GWT} \Sigma_{vol} \cdot dz$$

Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, Symposium in honor of professor I. M. Idriss, San Diego, CA

Liquefaction Potential Index (LPI) calculation procedure

Calculation of the Liquefaction Potential Index (LPI) is used to interpret the liquefaction assessment calculations in terms of severity over depth. The calculation procedure is based on the methology developed by Iwasaki (1982) and is adopted by AFPS.

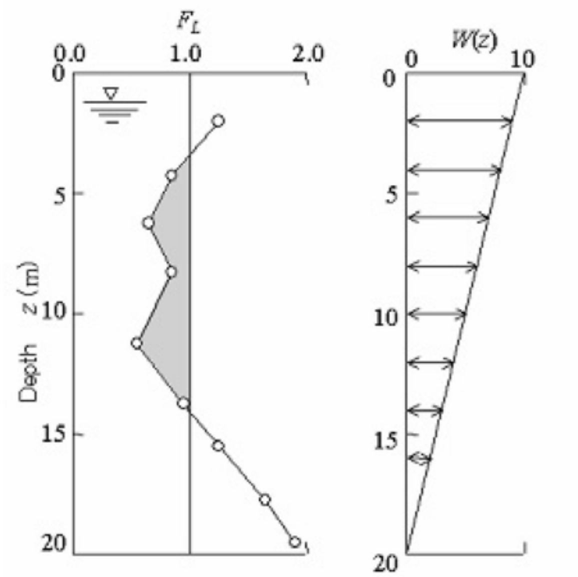
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\textbf{LPI} = \int_0^{20} (10 - 0{,}5_z) \times F_L \times d_z$$

where:
F_L = 1 - F.S. when F.S. less than 1
F_L = 0 when F.S. greater than 1
z depth of measurment in meters

Values of LPI range between zero (0) when no test point is characterized as liquefiable and 100 when all points are characterized as susceptible to liquefaction. Iwasaki proposed four (4) discrete categories based on the numeric value of LPI:

- LPI = 0 : Liquefaction risk is very low
- 0 < LPI <= 5 : Liquefaction risk is low
- 5 < LPI <= 15 : Liquefaction risk is high
- LPI > 15 : Liquefaction risk is very high



Graphical presentation of the LPI calculation procedure

Shear-Induced Building Settlement (Ds) calculation procedure

The shear-induced building settlement (Ds) due to liquefaction below the building can be estimated using the relationship developed by Bray and Macedo (2017):

$$Ln(Ds) = c1 + c2 * LBS + 0.58 * Ln\left(Tanh\left(\frac{HL}{6}\right)\right) +$$
$$4.59 * Ln(Q) - 0.42 * Ln(Q)^2 - 0.02 * B +$$
$$0.84 * Ln(CAVdp) + 0.41 * Ln(Sa1) + \varepsilon$$

where Ds is in the units of mm, c1= -8.35 and c2= 0.072 for LBS ≤ 16, and c1= -7.48 and c2= 0.014 otherwise. Q is the building contact pressure in units of kPa, HL is the cumulative thickness of the liquefiable layers in the units of m, B is the building width in the units of m, CAVdp is a standardized version of the cumulative absolute velocity in the units of g-s, Sa1 is 5%-damped pseudo-acceleration response spectral value at a period of 1 s in the units of g, and ε is a normal random variable with zero mean and 0.50 standard deviation in Ln units. The liquefaction-induced building settlement index (LBS) is:

$$LBS = \sum W * \frac{\varepsilon_{shear}}{z} dz$$

where z (m) is the depth measured from the ground surface > 0, W is a foundation-weighting factor wherein W = 0.0 for z less than Df, which is the embedment depth of the foundation, and W = 1.0 otherwise. The shear strain parameter (ε_shear) is the liquefaction-induced free-field shear strain (in %) estimated using Zhang et al. (2004). It is calculated based on the estimated Dr of the liquefied soil layer and the calculated safety factor against liquefaction triggering (FSL).

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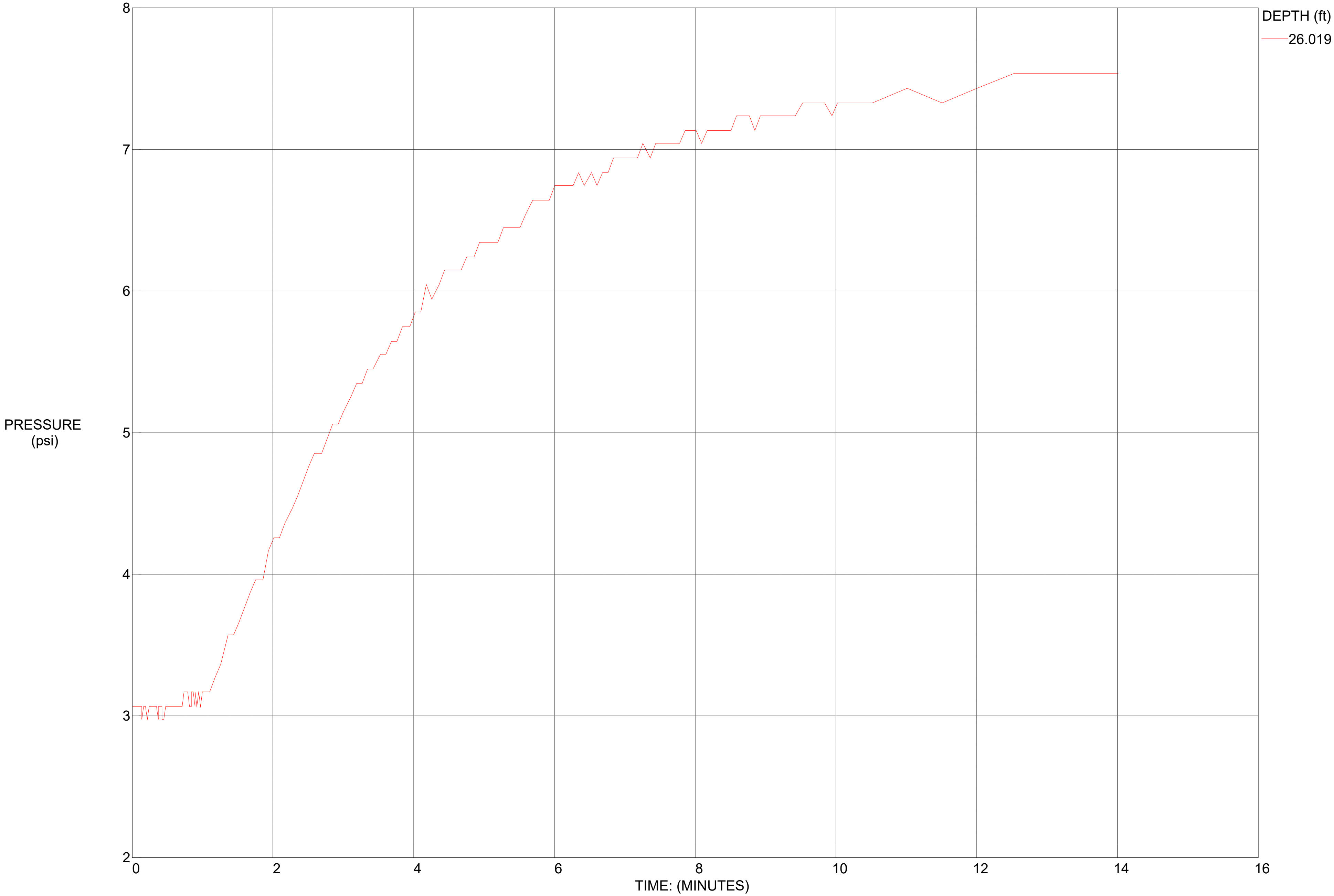
TEST ID: C-4

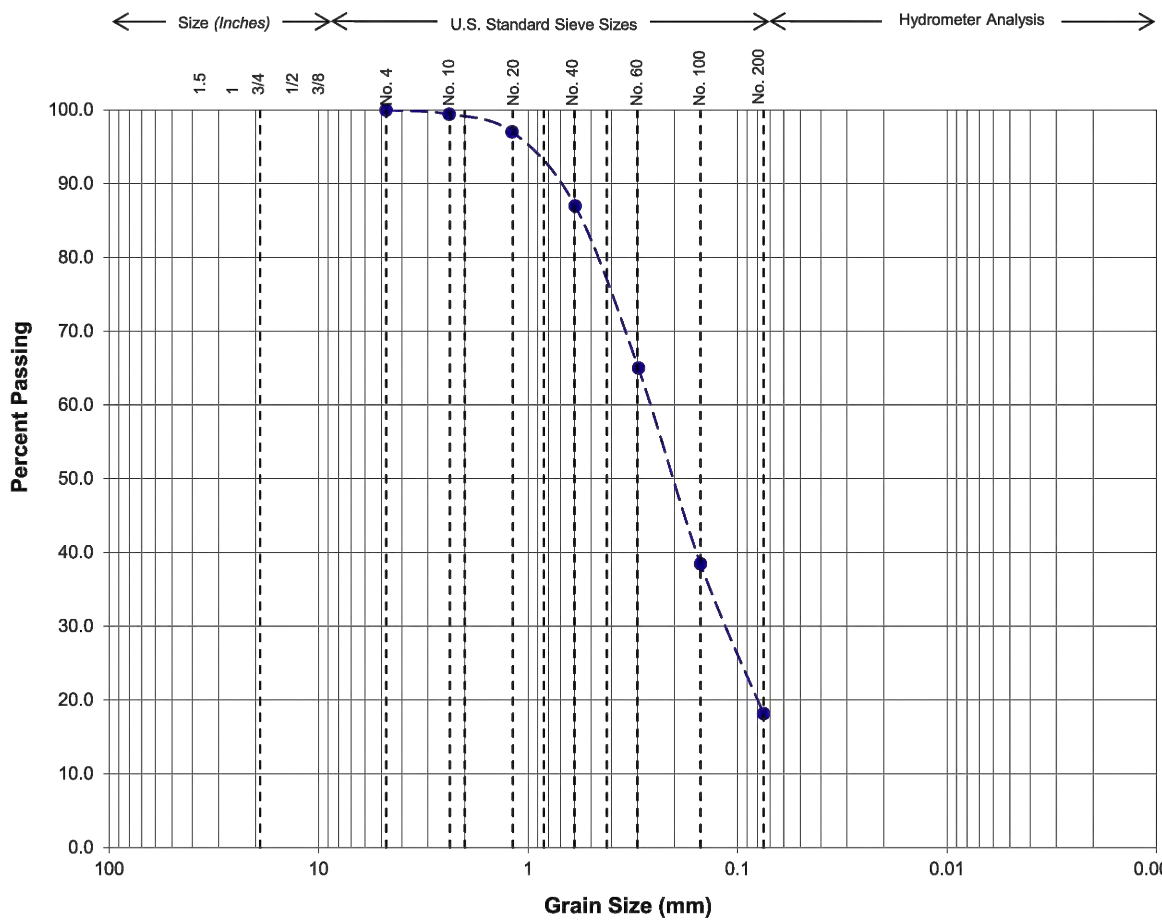


PRESSURE
(psi)
8
7
6
5
4
3
2
0
2
4
6
8
10
12
14
16
TIME: (MINUTES)
DEPTH (ft)
26.019

APPENDIX D
LABORATORY TESTING

Laboratory tests were performed in accordance with the generally accepted American Society for Testing and Materials (ASTM) test methods or suggested procedures. Brief descriptions of the tests performed are presented below:

- **CLASSIFICATION:** *Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soils Classification System and are presented on the exploration logs in Appendix B.*
- **GRADATION ANALYSIS (ASTM D6913):** *Tests were performed on selected representative soil samples in general accordance with ASTM D422. The grain size distributions of selected samples were determined in accordance with ASTM D6913. The results of the tests are summarized on Figure D.2 through Figure D.4.*
- **ATTERBERG LIMITS (ASTM D 4318):** *Tests were performed on selected representative fine-grained soil samples to evaluate the liquid limit, plastic limit, and plasticity index in general accordance with ASTM D 4318. These test results were utilized to evaluate the soil classification in accordance with the Unified Soil Classification System.*
- **EXPANSION INDEX (ASTM D4829):** *The expansion index of selected materials was evaluated in general accordance with ASTM D4829. Specimens were molded under a specified compactive energy at approximately 50 percent saturation (plus or minus 1 percent). The prepared 1-inch thick by 4-inch diameter specimens were loaded with a surcharge of 144 pounds per square foot and were inundated with tap water. Readings of volumetric swell were made for a period of 24 hours.*
- **R-VALUE (ASTM D 2844):** *The resistance Value, or R-Value, for near-surface site soils were evaluated in general accordance with California Test (CT) 301 and ASTM D 2844. Samples were prepared and evaluated for exudation pressure and expansion pressure. The equilibrium R-value is reported as the lesser or more conservative of the two calculated results.*
- **CORROSIVITY TEST (CAL. TEST METHOD 417, 422, 643):** *Soil PH, and minimum resistivity tests were performed on a representative soil sample in general accordance with test method CT 643. The sulfate and chloride content of the selected sample were evaluated in general accordance with CT 417 and CT 422, respectively.*



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample Location: B - 2

Depth (ft): 0 - 5

USCS Soil Type: SM

Passing No. 200 (%): 18

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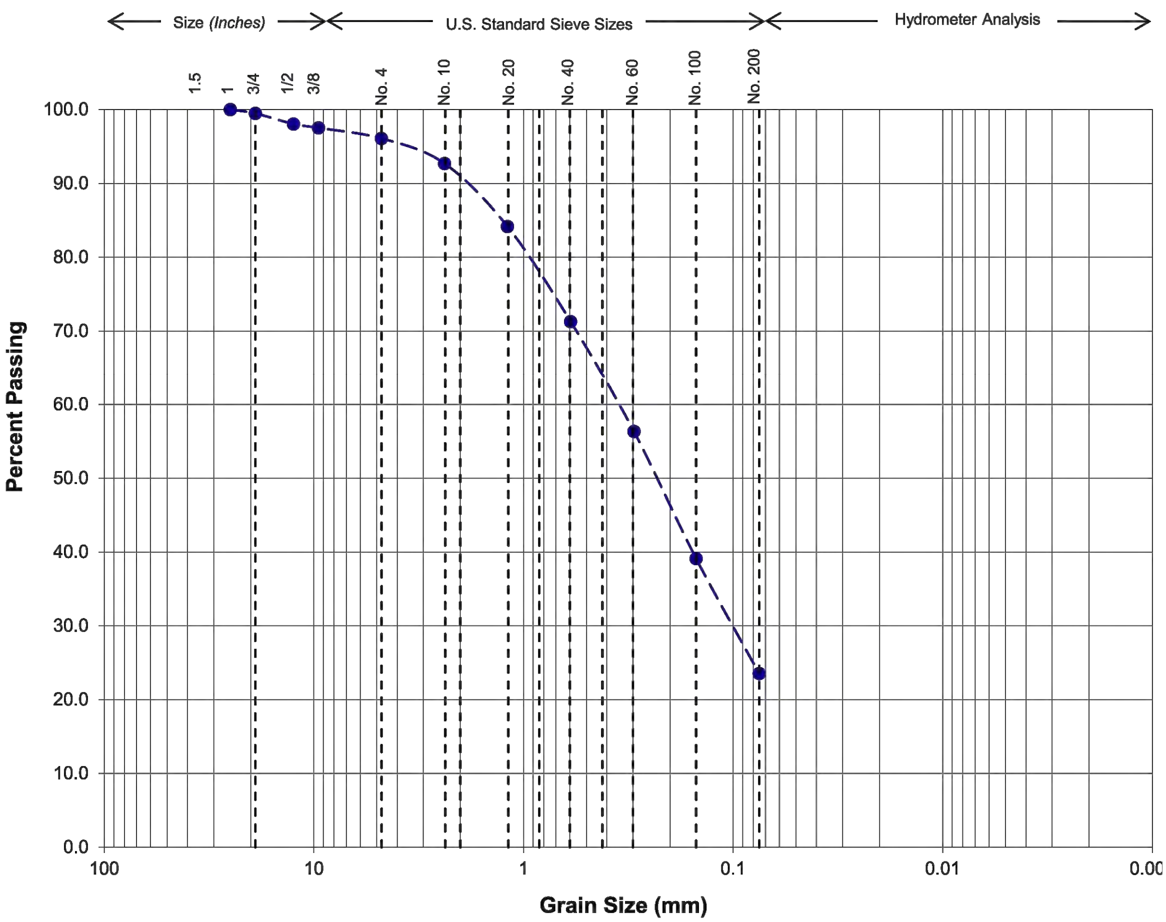
CLASSIFICATION TEST RESULTS

PROPOSED INDUSTRIAL DEVELOPMENT

260 EDDY JONES WAY,

OCEANSIDE, CA 92058

BY: GN	DATE: OCT 2021	PROJECT: 2021176	FIGURE: D.2



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample Location:	B - 4
Depth (ft):	0 - 5
USCS Soil Type:	SC-SM
Passing No. 200 (%):	24

Atterberg Limits (ASTM D4318):

Liquid Limit, LL:	24
Plastic Limit, PL:	19
Plasticity Index, PI:	5

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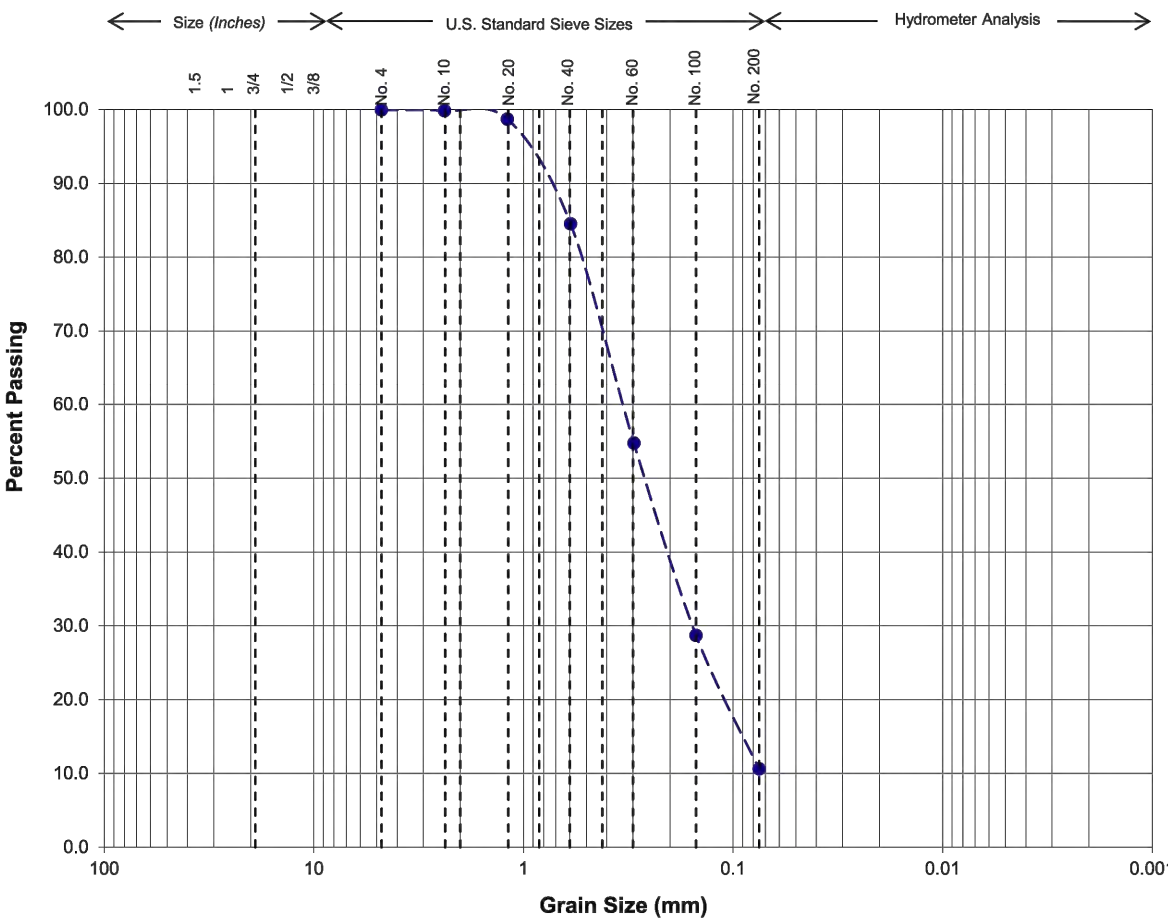
CLASSIFICATION TEST RESULTS

PROPOSED INDUSTRIAL DEVELOPMENT
260 EDDY JONES WAY,
OCEANSIDE, CA 92058

BY: GN	DATE: OCT 2021	PROJECT: 2021176	FIGURE: D.3



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample Location: P - 1

Depth (ft): 0 - 5

USCS Soil Type: SP-SM

Passing No. 200 (%): 11

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CLASSIFICATION TEST RESULTS

PROPOSED INDUSTRIAL DEVELOPMENT

260 EDDY JONES WAY,

OCEANSIDE, CA 92058

BY: GN	DATE: OCT 2021	PROJECT: 2021176	FIGURE: D.4

Expansion Index (ASTM D4829)

Sample Location	Sample Depth (ft.)	Expansion Index	Expansion Potential
B - 2	0 - 5	0	Very Low
B - 4	0 - 5	2	Very Low

Resistance Value (Cal. Test Method 301 & ASTM D2844)

Sample Location	Sample Depth (ft.)	R-Value
B - 1	0 - 5	54
B - 4	0 - 5	39

Corrosivity (Cal. Test Method 417,422,643)

Sample Location	Sample Depth (ft.)	pH	Resistivity (Ohm-cm)	Sulfate Content (ppm)	Sulfate Content (%)	Chloride Content (ppm)	Chloride Content (%)
B - 2	0 - 5	8.6	970	270	0.027	32	0.003
B - 4	0 - 5	7.2	920	45	0.005	64	0.006

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LAB TEST RESULTS

PROPOSED INDUSTRIAL DEVELOPMENT
260 EDDY JONES WAY,
OCEANSIDE, CA 92058

BY: GN	DATE: OCT 2021	PROJECT: 2021176	FIGURE: D.5

APPENDIX E

WORKSHEET C.4-1: CATEGORIZATION OF INFILTRATION FEASIBILITY

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

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1	
Part 1 - Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?**			
Criteria	Screening Question	**Yes**	**No**
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: *The infiltration rate of the existing soils at locations P-1 and P-2, based on the on-site infiltration study was calculated to be less than 0.5 inches per hour (0.45 and 0.12 inches per hour for P-1 and P-2, respectively) after applying a minimum factor of safety (F) of F=2.*			
2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X
Provide basis: *No. See Criterion 1.*			

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: *Water contamination was not evaluated by NOVA Services.* Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	**Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: *The potential for water balance was not evaluated by NOVA Services.* Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration** If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2	*Proceed to Part 2*	

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

Worksheet C.4-1 Page 3 of 4			
Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria **Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?**			
Criteria	Screening Question	**Yes**	**No**
5	**Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	
Provide basis: *The infiltration rate of the existing soils at locations P-1 and P-2, based on the on-site infiltration study was calculated to be less than 0.5 inches per hour and greater than 0.01 (0.45 and 0.12 inches per hour for P-1 and P-2, respectively) after applying a minimum factor of safety (F) of F=2.* *The soil and geologic conditions allow for infiltration in an appreciable rate and volume, however, not without increasing geotechnical hazards.* Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
6	**Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X
Provide basis: *C2.1 A geologic investigation was performed at the subject site. See NOVA 2021.* *C2.2 Settlement and soil volume change due to stormwater infiltration is a concern with underlying soils with the potential for liquefaction.* *C2.3 Infiltration has the potential to cause slope failures. BMPs are to be sited a minimum of 50 feet away from any slope.* *C2.4 BMPs are to be sited a minimum of 10 feet away from all underground utilities.* *C2.5 Stormwater infiltration can result in damaging ground water mounding during wet periods.* *C2.6 Infiltration has the potential to increase lateral pressure and reduce soil strength which can impact foundations and retaining walls. BMPs are to be sited a minimum of 10 feet away from any foundations or retaining walls.* *C2.7 Other Factors: The complete design is not known at this point. Based on the liquefaction potential of the underlying soils and proximity to groundwater, it is NOVA's judgment that the site is not suitable for permanent stormwater BMPs.*			

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		

Provide basis:

Water contamination was not evaluated by NOVA Services.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

8	**Can infiltration be allowed without violating downstream water rights**? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		

Provide basis:

The potential for water balance was not evaluated by NOVA Services.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

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

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

C.5 Feasibility Screening Exhibits

Table C.5-1 lists the feasibility screening exhibits that were generated using readily available GIS data sets to assist the project applicant to screen the project site for feasibility.

Table C.5-1: Feasibility Screening Exhibits

Figures	Layer	Intent/Rationale	Data Sources
C.1 Soils	Hydrologic Soil Group – A, B, C, D	Hydrologic Soil Group will aid in determining areas of potential infiltration	SanGIS http://www.sangis.org/
	Hydric Soils	Hydric soils will indicate layers of intermittent saturation that may function like a D soil and should be avoided for infiltration	USDA Web Soil Survey. Hydric soils, (ratings of 100) were classified as hydric. http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm
C.2: Slopes and Geologic Hazards	Slopes >25%	BMPs are hard to construct on slopes >25% and can potentially cause slope instability	SanGIS http://www.sangis.org/
	Liquefaction Potential	BMPs (particularly infiltration BMPs) must not be sited in areas with high potential for liquefaction or landslides to minimize earthquake/landslide risks	SanGIS http://www.sangis.org/
	Landslide Potential		SanGIS Geologic Hazards layer. Subset of polygons with hazard codes related to landslides was selected. This data is limited to the City of San Diego Boundary. http://www.sangis.org/
C.3: Groundwater Table Elevations	Groundwater Depths	Infiltration BMPs will need to be sited in areas with adequate distance (>10 ft) from the groundwater table	GeoTracker. Data downloaded for San Diego county from 2014 and 2013. In cases where there were multiple measurements made at the same well, the average was taken over that year. http://geotracker.waterboards.ca.gov/data_download_by_county.asp
C.4: Contaminated Sites	Contaminated soils and/or groundwater sites	Infiltration must limited in areas of contaminated soil/groundwater	GeoTracker. Data downloaded for San Diego county and limited to active cleanup sites http://geotracker.waterboards.ca.gov/

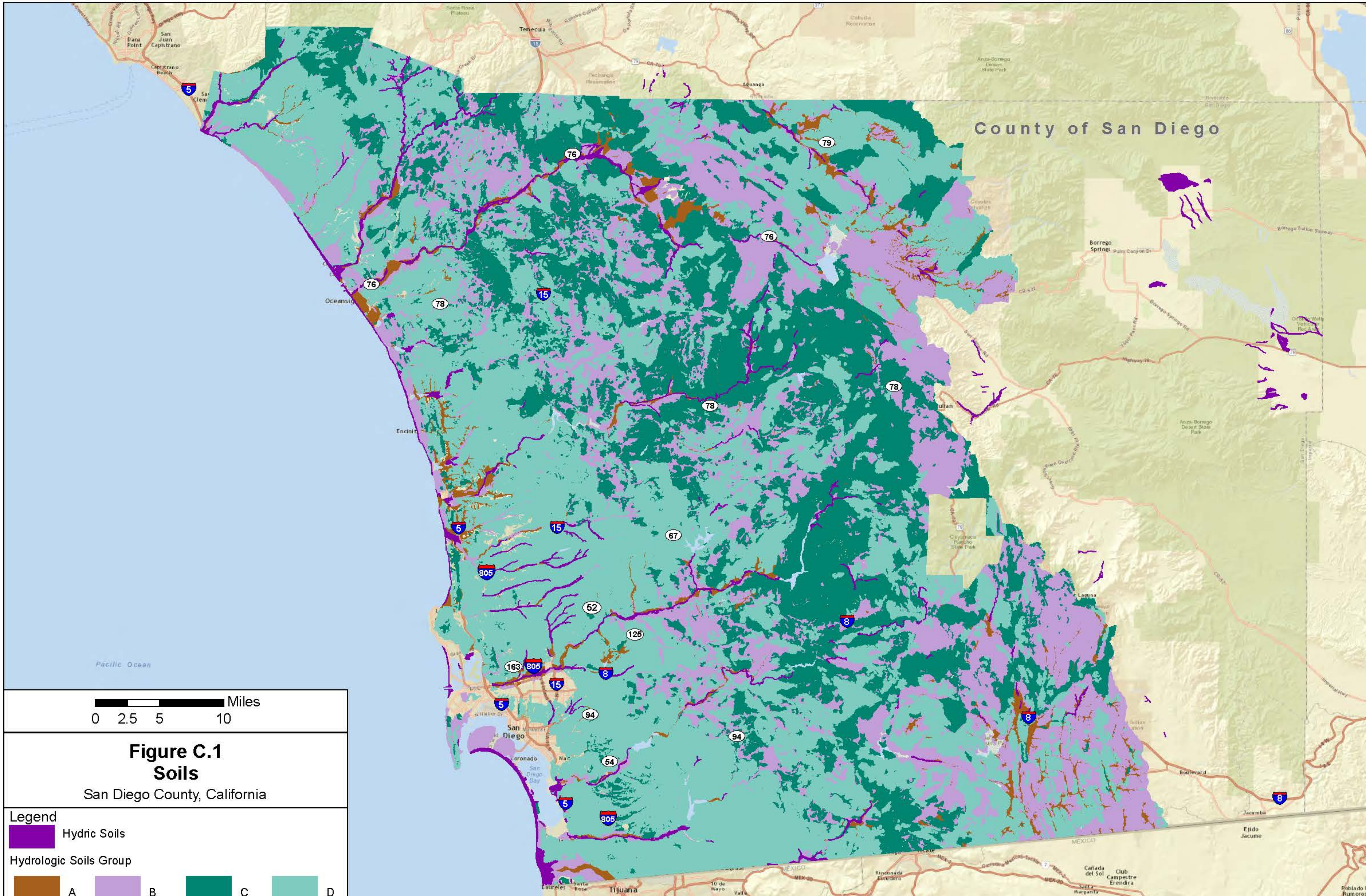

Figure C.1
Soils
San Diego County, California

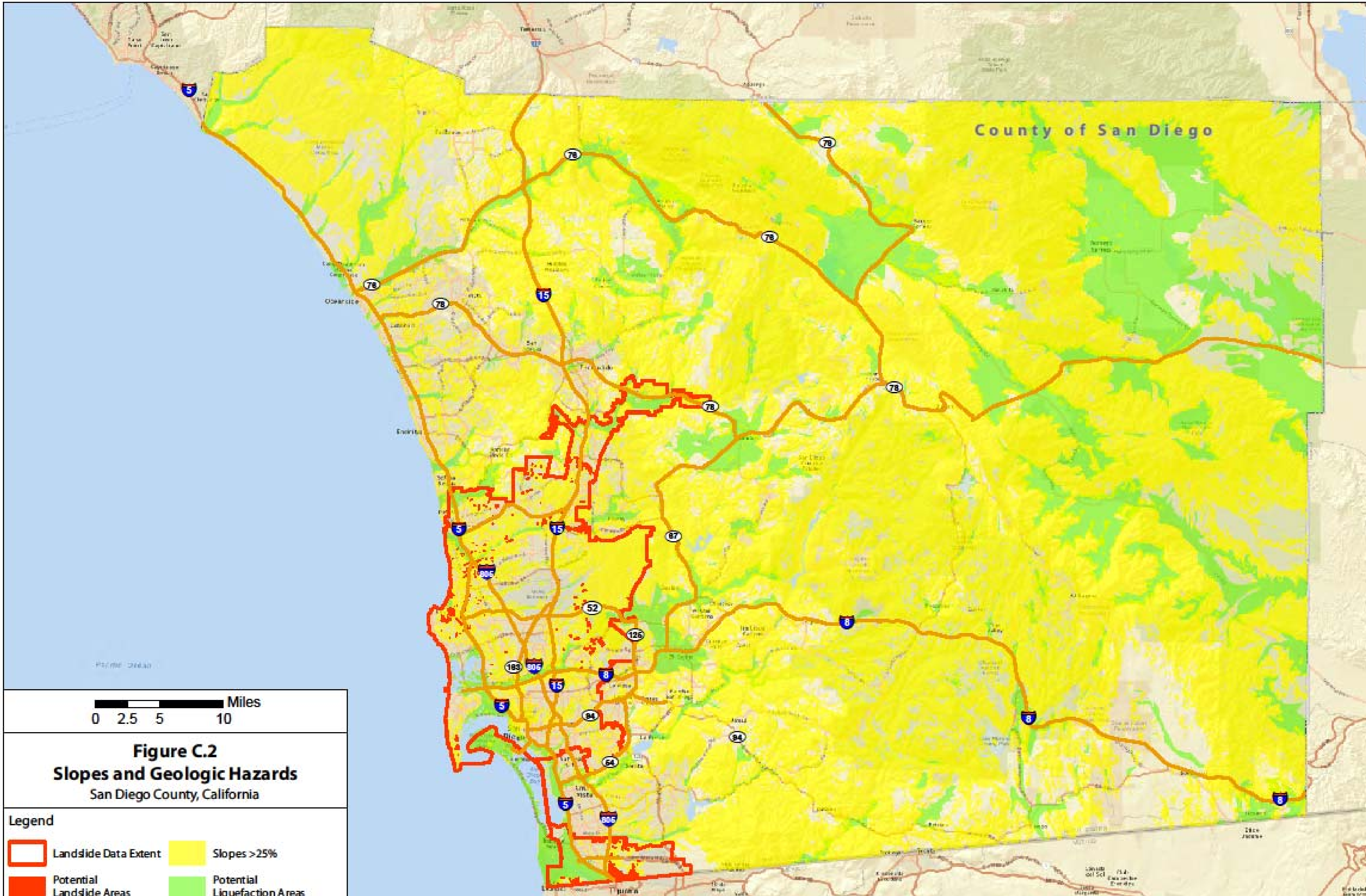

Figure C.2
Slopes and Geologic Hazards
San Diego County, California

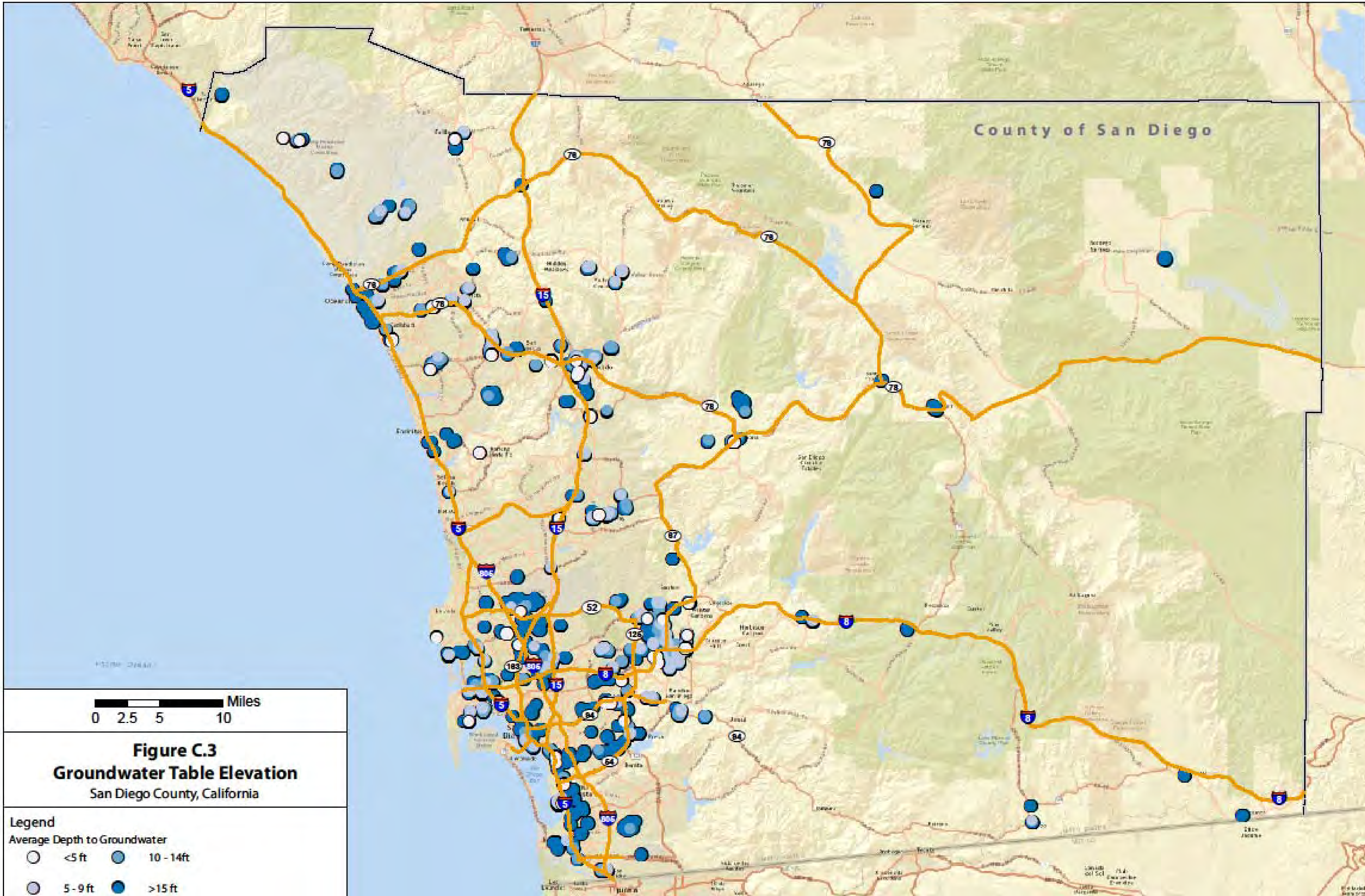

Figure C.3
Groundwater Table Elevation
San Diego County, California

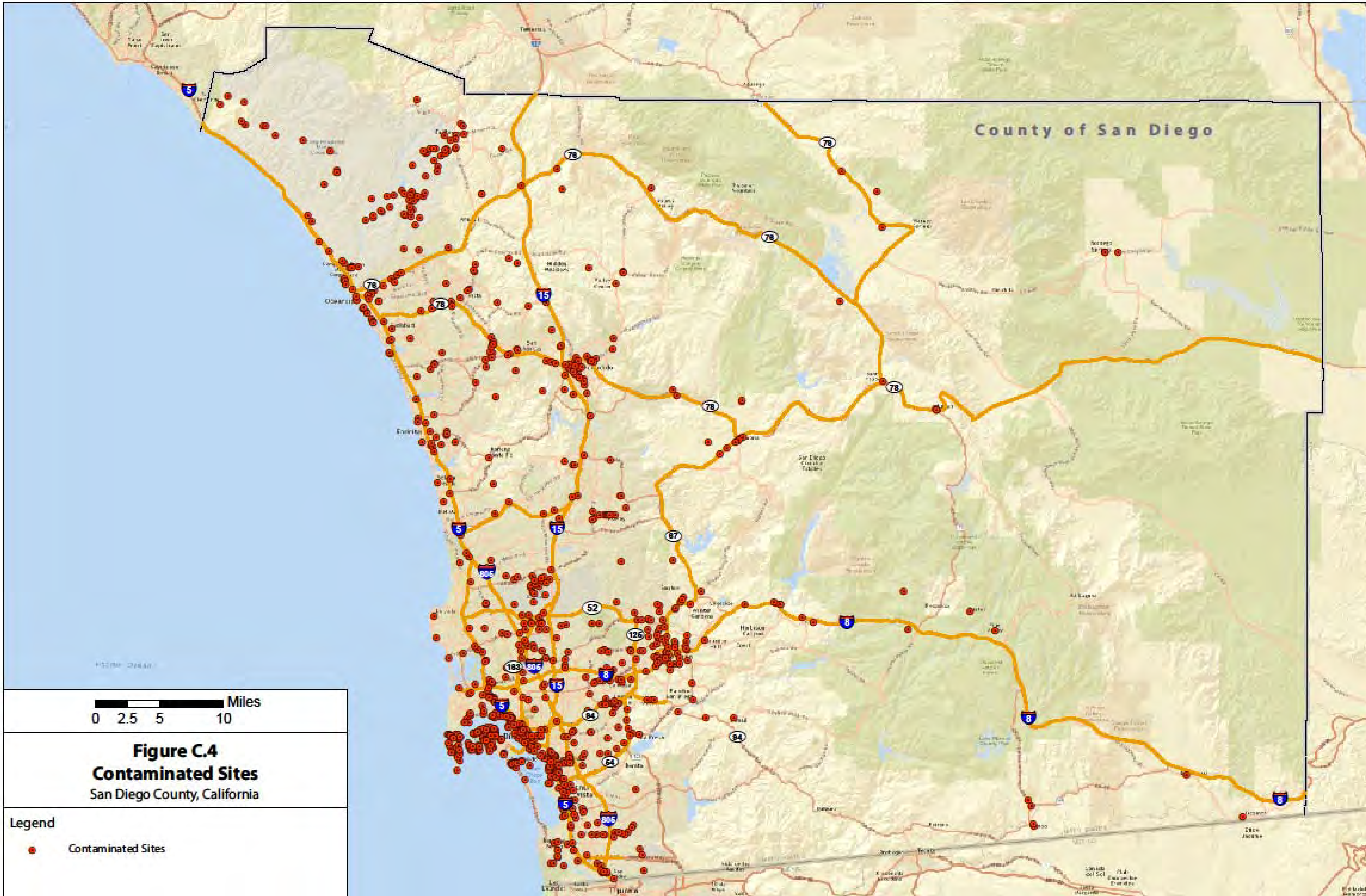

Figure C.4
Contaminated Sites
San Diego County, California

ATTACHMENT 7
Storm Water Quality Assessment Form

This is the cover sheet for Attachment 7.

City of Oceanside – Engineering Division – Clean Water Program

STORM WATER QUALITY ASSESSMENT FOR PLANNING, ENGINEERING, AND BUILDING PERMIT APPLICATIONS

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

Section 1 – Project Information	
Applicant Name: Adam Robinson / RAF Pacifica Group	Phone Number: (760) 473-8838
Project Name: Eddie Jones Industrial	Project Site Address: 250 Eddie Jones Way, Oceanside, CA
Permit Applications Number(s): D22-00001, CUP22-00001	Assessor Parcel Number(s): 145-021-29, -30, & -32-00
Project Description: Proposed +/- 540,000 SF warehouse / shipping facility on 31.79 AC site	Project Disturbed Area (square feet): 1,157,378 SF (26.57 AC)
Existing Impervious Area (square feet): 591,152 SF	Created or Replaced Impervious Area (square feet): 1,065,714 SF

Section 2 – Identify Applicable Priority Development Project Categories (Check All Boxes that Apply)	
☐	**New Development Project** – A project that creates 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
☒	**Redevelopment Project** – A project that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
☐	**Restaurants** – Category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812); where new or redevelopment projects create and/or replace 5,000 square feet or more impervious surface (collectively over the entire project site).
☐	**Hillside Development** – Category includes development on any natural slope that is twenty-five percent or greater; where new or redevelopment projects create and/or replace 5,000 square feet or more impervious surface (collectively over the entire project site).
☐	**Parking Lots** – Category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce; where new or redevelopment projects create and/or replace 5,000 square feet or more impervious surface (collectively over the entire project site).
☐	**Streets, Roads, Highways, Freeways, and Driveways** – Category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles; where new or redevelopment projects that create and/or replace 5,000 square feet or more impervious surface (collectively over the entire project site).
☒	**Water Quality Environmentally Sensitive Area** – New or redevelopment projects that create and/or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharge directly to a Water Quality Environmentally Sensitive Area (WQESA). “Discharge directly to” includes flow that is conveyed overland a distance of 200 feet or less from the project to the WQESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands).
☐	**Automotive Repair Shop** – Category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539, where new or redevelopment projects create and/or replace 5,000 square feet or more impervious surface (collectively over the entire project site).
☐	**Retail Gasoline Outlet (RGOs)** – Category includes RGOs that meet the following criteria (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day; where new or redevelopment projects create and/or replace 5,000 square feet or more impervious surface (collectively over the entire project site).
☒	**Development Projects greater than one acre** – New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction.

Section 3 – Identify Projects Not Subject to Permanent Stormwater Requirements (Check All Boxes that Apply)	
☐	The project consists of work entirely within an existing structure.
☐	The project consists of construction of overhead or underground utilities (no new impervious surfaces).
☐	The project consists of routine maintenance.
☐	The project consists of less than 50 yards of grading and presents no opportunities to improve water quality.
Section 4 – Project Category Determination	
☒	**Priority Development Project**: If any item in Section 2 is applicable, the project is a Priority Development Project. **Please prepare a PDP SWQMP for the project.**
☐	**Standard Development Project**: If none of the items in Section 2 or 3 are applicable, the project is a Standard Development Project. **Please prepare an SDP SWQMP.**
☐	**Project Not Subject to Permanent Stormwater Requirements:** If any item in Section 3 is applicable, the project is not subject to Permanent Stormwater Requirements. **Please submit the project plans with this form.** **Note:** Projects in this category are subject to typical pollution prevention measures outlined by the pollution prevention checklist on the following page.

Section 5 – Applicant Certification	
Name of Responsible Party: Adam Robinson for: RAF Pacifica Group	Title: President
Email Address (optional) adam@rafpg.com	Phone Number: (760) 473-8838

I understand and acknowledge the City of Oceanside has adopted minimum requirements, as mandated by the San Diego Regional Water Quality Control Board – Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100 (NPDES NO. CAS0109266) for mitigating impacts associated with urban runoff, including storm water from construction and land development activities. I certify this assessment has been accurately completed to the best of my knowledge and is consistent with the proposed project. I acknowledge that non-compliance with the City Best Management Practice (BMP) Design Manual, Grading Ordinance, and Erosion Control Ordinance may result in enforcement action by the City, the California State Water Resources Control Board, and/or the San Diego Regional Water Quality Control Board. Enforcement action may include stop work orders, notice of violation, fines, or other actions.

Applicant Signature:	Date: 11-1-22

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

Project Activity	Yes	No	Required Pollution Prevention
Trash & Waste Generation ***<u>**REQUIRED FOR ALL PROJECTS**</u>***	☐	☐	• Train/inform all employees of pollution prevention requirements • Collect and contain all construction trash, waste, and debris • Promptly contain and clean any spill on site • Routinely inspect site, remove loose trash and prevent spills • Properly dispose of any hazardous materials • Do not wash down surfaces unless water is collected or directed to landscape • Permanent trash collection areas require full structure/enclosure
Digging of Dirt – excavation, trenching, or grading	☐	☐	• Do not allow dirt to migrate into street, sidewalk, or storm drain • Preserve existing vegetation where feasible • Perimeter site controls such as silt fence or straw wattles • Cover exposed dirt using mulch, tarps, or erosion control devices • Install and secure tarps over dirt piles • Routinely sweep site to remove dirt
Landscaping and Irrigation Systems	☐	☐	• Do not store landscape materials in street • Do not allow dirt to migrate into street, sidewalk, or storm drain • Test irrigation system and prevent runoff/overspray • Install and secure tarps over piles of mulch or soil • Routinely sweep site to remove mulch or soil • Do not wash down surfaces unless water is collected or directed to landscape
Concrete, Paint, Mortar, or Stucco Work	☐	☐	• Contain wet mixing areas within confined area • Do not allow material to travel into site soil, street, or storm drain • Properly dispose of waste material
Temporary Storage of Materials Outside	☐	☐	• Elevate material off ground where possible, such as on pallets • Install and secure tarps over materials
Demolition of Structures	☐	☐	• Follow Required Pollution Prevention for "Digging of Dirt"
New Structure – house addition, shed, etc.	☐	☐	• Follow Required Pollution Prevention for "Digging of Dirt" • Direct downspouts to landscape, where feasible • Consider rainwater harvesting • Preserve existing vegetation and drainage patterns, where feasible
Patio, Driveway, or Sidewalk	☐	☐	• Consider use of pervious pavers or pervious concrete (refer to Section 3 of page 4 for routine maintenance information) • Direct runoff to landscape areas, where feasible
Re-Roofing	☐	☐	• Contain removed roof debris in waste containers • Follow Required Pollution Prevention for "Temporary Storage of Materials Outside"
Washing of Material, Equipment, or Surface	☐	☐	• Do not wash down surfaces unless water is collected or directed to landscape
Draining of Water Heater, Pool, or Spa	☐	☐	• Direct drain water to landscape areas where possible • Contact Stormwater Division if considering draining to sanitary system cleanout or storm drain system (760-643-2804)
Storm Drain at Industrial or Commercial Property	☐	☐	• Install "No Dumping" or similar signage at each storm drain inlet

Completion Guidance

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

Section 1 – Project Information

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

Section 2 – Identify Applicable Priority Development Project Categories

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

Section 3 – Identify Projects Not Subject to Permanent Stormwater Requirements

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

Section 4 – Project Category Determination

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

Section 5 – Applicant Certification

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

[Insert other supporting documentation here]