APPENDIX L

Storm Water Quality Management Plan and Drainage Report

CITY OF OCEANSIDE
ENGINEERING DIVISION

PRIORITY DEVELOPMENT PROJECT

STORM WATER QUALITY MANAGEMENT PLAN

FOR

ALTA OCEANSIDE

ENGINEER OF WORK

Raymond L. Martin RCE 48670 Exp. 6/30/20

PREPARED FOR:

PR II/ WOOD OCEANSIDE LLC

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DATE: May 2019, Revised July 22, 2019, October 8,2019

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:



Quick Reference Guide

Item	Project Information
Project Name	Alta Oceanside
Application Number(s)	RT19-00001
Project Address	Costa Pacifica Way, Oceanside, CA 92054
Total Parcel Area	*231430* sq. ft.
Project Description	The ALTA Oceanside property is a 5.31-acre site located in the City of Oceanside, CA, west of I-5 and south of the San Luis Rey River. Existing site is partially developed with older commercial uses along North Coast Highway and includes a private Road, Costa Pacifica Way on the north. The proposed site will have a mixed use building incorporating 309-unit apartments and retail uses accessed from North Coast Highway.
Proposed Disturbed Area	*191664* sq. ft.
Created or Replaced Impervious	*177480* 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: ALTA Oceanside
Permit Application Number: *RT19-00001*

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.

RCE 48670, 30/6/20

Engineer of Work's Signature

Raymond L. Martin

Print Name

Hunsaker & Associates

Company

10/8/2019

Date

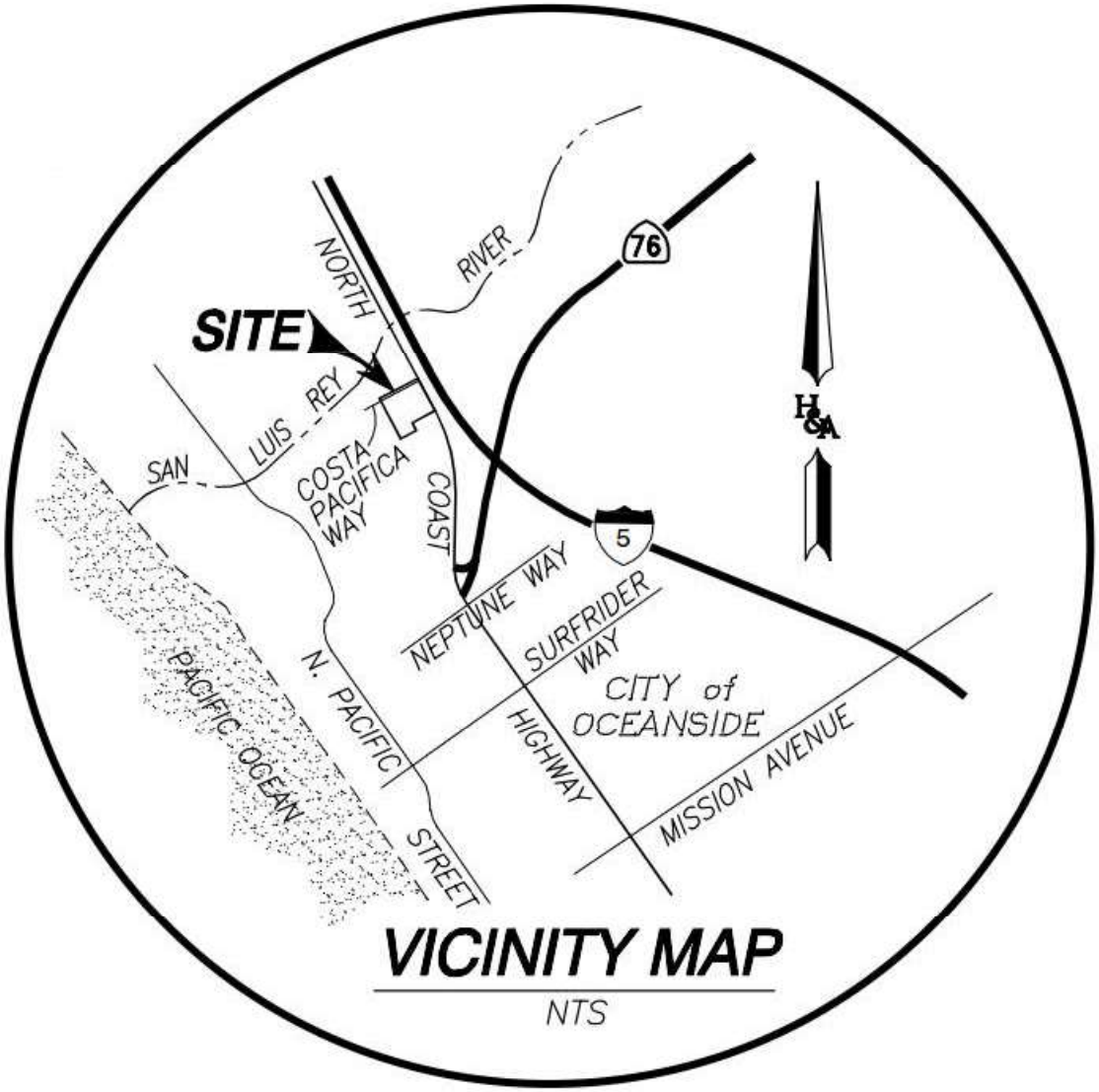


SUBMITTAL RECORD

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	1/25/2019	☒ Preliminary Design/ Planning/ CEQA ☐ Final Design	SWQMP Template initial submittal
2	5/29/2019	☒ Preliminary Design/ Planning/ CEQA ☐ Final Design	Response to plancheck is included
3	9/1/2019	☒ Preliminary Design/ Planning/ CEQA ☐ Final Design	Response to plancheck is included
4		☐ Preliminary Design/ Planning/ CEQA ☐ Final Design	

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: ALTA Oceanside	
Permit Application Number: RT19-00001	Date: 10/8/19

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:		

Form I-1 Page 2 of 2		
Step	**Answer**	**Progression**
Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the manual for guidance.	☐Yes	Consult the [City Engineer] to determine requirements. Provide discussion and identify requirements below. Go to Step 4.
	☒No	BMP Design Manual PDP requirements apply. Go to Step 4.
Discussion / justification of prior lawful approval, and identify requirements (*not required if prior lawful approval does not apply*):		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the manual for guidance.	☐Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to Step 5.
	☒No	Stop. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do <u>not</u> apply: The project discharges directly to an exempt system		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the manual for guidance.	☐Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). Stop.
	☒No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. Stop.
Discussion / justification if protection of critical coarse sediment yield areas does <u>not</u> apply: N/A - The project is exempt hydromodification requirements		

Project Type Determination Checklist			Form I-2
Project Information			
Project Name: ALTA Oceanside			
Permit Application Number: RT19-00001			
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: 177480.34 ft² (4.07 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.

Form I-2 Page 2 of 2			
Yes ☒	No ☐	(d)	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). 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.
Yes ☐	No ☒	(e)	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.
Yes ☒	No ☐	(f)	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.*

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.

The following is for redevelopment PDPs only:

The area of existing (pre-project) impervious area at the project site is: _____ ft² (A)
The total proposed newly created or replaced impervious area is: _____ ft² (B)
Percent impervious surface created or replaced (A/B)*100: _____%
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

Site Information Checklist For PDPs	Form I-3B (PDPs)
Project Summary Information	
Project Name	ALTA Oceanside
Project Address	Costa Pacifica Way Oceanside, CA 92054
Assessor's Parcel Number(s)	143-04-23, 143-04-54 (portion)
Permit Application Number	RT19-00001
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)	5.31 Acres (231,430 Square Feet)
Area to be disturbed by the project (Project Area)	4.49 Acres (191664 Square Feet)
Project Proposed Impervious Area (subset of Project Area)	4.07 Acres (177480 Square Feet)
Project Proposed Pervious Area (subset of Project Area)	0.42 Acres (14184 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

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:

Existing Land Cover Includes (select all that apply):

☐Vegetative Cover

☒Non-Vegetated Pervious Areas

☒Impervious Areas

Description / Additional Information:

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

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]:

The Alta Oceanside property is a 5.31-acre site located in the City of Oceanside, CA, west of I-5 and south of the San Luis Rey River.

The northern portion of the site drains easterly into a brow ditch, which then conveys flows into an existing storm drain lateral along Costa Pacifica Way that delivers flows into a detention basin downstream.

The central portion of the site drains easterly via overland flow into the mobile home park. The runoff is routed into the existing storm drain lateral and is delivered to the detention basin downstream.

The southwesterly portion of the site drains southwest via overland flow into the mobile home park. It reaches the San Luis Rey River through a separate storm drain system.

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The proposed site will have a mixed-use building incorporating 309-unit apartments with retail and restaurant uses. Additionally the project has associated plazas, pool area, and parking lot. Any existing imperviousness onsite will be replaced.

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

Building rooftop, roadway, sidewalks, walkways, plazas, parking lot.

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

Flow through planters and landscaped areas.

Does the project include grading and changes to site topography?

☒Yes

☐No

Description / Additional Information:

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

☒Yes

☐No

Description / Additional Information:

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): The drainage from the south and central drainage areas currently draining onto and across the existing mobile home park will be captured for treatment and routed to the San Luis Rey River via the existing back bone storm drain in Costa Pacifica Way.		
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**
Pacific Ocean Shoreline, San Luis Rey HU, at San Luis Rey River Mouth 90311000 (0.03 Miles)	Enterococcus Total Coliform Indicator Bacteria	Requires Development
San Luis Rey River & Lower Stream (West of Interstate 15) 90311000 (19 Miles)	Chloride Enterococcus Fecal Coliform Phosphorus Total Dissolved Solids Total Nitrogen as N Toxicity Indicator Bacteria	Requires Development

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 discharges into a storm drain system that conveys runoff to the San Luis Rey River, an exempt water body.

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:

N/A - The project is exempt from hydromodification requirements

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 – ALTA Oceanside project is exempt from hydromodification requirements.

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: ALTA Oceanside

Permit Application Number: RT19-00001

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:			
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:			

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:			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-5 not implemented: Trash collection will be in underground garage, not exposed to rainfall.			

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.			

If These Sources Will Be on the Project Site …	… Then Your SWQMP Shall Consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
☒ **A.** Onsite storm drain inlets ☐ Not Applicable	☒ Locations of inlets.	☒ Mark all inlets with the words "No Dumping! Flows to Bay" or similar.	☒ Maintain and periodically repaint or replace inlet markings. ☒ Provide storm water pollution prevention information to new site owners, lessees, or operators. ☐ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com. ☒ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
☒ **B.** Interior floor drains and elevator shaft sump pumps ❑ Not Applicable		☒ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	☒ Inspect and maintain drains to prevent blockages and overflow.
☒ **C.** Interior parking garages ❑ Not Applicable		☒ State that parking garage floor drains will be plumbed to the sanitary sewer.	☒ Inspect and maintain drains to prevent blockages and overflow.
☒ **D1.** Need for future indoor & structural pest control ❑ Not Applicable		☒ Note building design features that discourage entry of pests.	☒ Provide Integrated Pest Management information to owners, lessees, and operators.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
☒ **D2.** Landscape/ Outdoor Pesticide Use ☐ Not Applicable	☒ Show locations of existing trees or areas of shrubs and ground cover to be undisturbed and retained. ☒ Show self-retaining landscape areas, if any. ☒ Show storm water treatment facilities.	State that final landscape plans will accomplish all of the following. ☒ Preserve existing drought tolerant trees, shrubs, and ground cover to the maximum extent possible. ☒ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution. ☒ Where landscaped areas are used to retain or detain storm water, specify plants that are tolerant of periodic saturated soil conditions. ☒ Consider using pest-resistant plants, especially adjacent to hardscape. ☒ To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	☒ Maintain landscaping using minimum or no pesticides. ☐ See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com. ☐ Provide IPM information to new owners, lessees and operators.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
☒ **E.** Pools, spas, ponds, decorative fountains, and other water features. ❑ Not Applicable	☒ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	☒ If the City requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to City requirements.	❑ See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.
☒ **F.** Food service ❑ Not Applicable	☒ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ☒ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	☒ Describe the location and features of the designated cleaning area. ☒ Describe the items to be cleaned in this facility and how it has been sized to ensure that the largest items can be accommodated.	

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **G.** Refuse areas ☒ Not Applicable	❑ Show where site refuse and recycled materials will be handled and stored for pickup. See City requirements for sizes and other details of refuse areas. ❑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run- on and show locations of berms to prevent runoff from the area. Also show how the designated area will be protected from wind dispersal. ❑ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	❑ State how site refuse will be handled and provide supporting detail to what is shown on plans. ❑ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	❑ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative Table and Narrative**
❑ **H.** Industrial processes. ☒ Not Applicable	❑ Show process area.	❑ If industrial processes are to be located onsite, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	❑ See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.
❑ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.) ☒ Not Applicable	❑ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or runoff from area and protected from wind dispersal. ❑ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ❑ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	❑ Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of local Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release Prevention Program ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank	❑ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **J.** Vehicle and Equipment Cleaning ☒ Not Applicable	❑ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle /equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited onsite and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	❑ If a car wash area is not provided, describe measures taken to discourage onsite car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ❑ Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. ❑ Car dealerships and similar may rinse cars with water only. ❑ See Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **K.** Vehicle/Equipment Repair and Maintenance ☒ Not Applicable	❑ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to protect from rainfall, run-on runoff, and wind dispersal. ❑ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. ❑ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	❑ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ❑ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ❑ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the report, note that all of the following restrictions apply to use the site: ❑ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ❑ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ❑ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **L.** Fuel Dispensing Areas ☒ Not Applicable	❑ Fueling areas[1] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are (1) graded at the minimum slope necessary to prevent ponding; and (2) separated from the rest of the site by a grade break that prevents run-on of storm water to the MEP. ❑ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area1.] The canopy [or cover] shall not drain onto the fueling area.		❑ The property owner shall dry sweep the fueling area routinely. ❑ See the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.

1. The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
M. Loading Docks ☒ Not Applicable	❑ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct storm water away from the loading area. Water from loading dock areas should be drained to the sanitary sewer where feasible. Direct connections to storm drains from depressed loading docks are prohibited. ❑ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ❑ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		❑ Move loaded and unloaded items indoors as soon as possible. ❑ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
☒ **N.** Fire Sprinkler Test Water ☐ Not Applicable		☒ Provide a means to drain fire sprinkler test water to the sanitary sewer.	☐ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com.
O. Miscellaneous Drain or Wash Water ☒ Boiler drain lines ☒ Condensate drain lines ☒ Rooftop equipment ☒ Drainage sumps ☒ Roofing, gutters, and trim ☐ Not Applicable		☒ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ☒ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ☒ Rooftop mounted equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ☒ Any drainage sumps onsite shall feature a sediment sump to reduce the quantity of sediment in pumped water. ☒ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	

If These Sources Will Be on the Project Site …	… Then Your SWQMP shall consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
☒ **P.** Plazas, sidewalks, and parking lots. ☐ Not Applicable			☒ Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.

Site Design BMP Checklist for All Development Projects (Standard Projects and PDPs)	Form I-5

Project Identification

Project Name ALTA Oceanside

Permit Application Number: RT19-00001

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: Not feasible per Form I-7			

Summary of PDP Structural BMPs	Form I-6 (PDPs)
Project Identification	
Project Name ALTA Oceanside	
Permit Application Number: RT19-00001	
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).	
The selection, sizing, and preliminary design of stormwater treatment and other control measures in this plan was done based on City of Oceanside's BMP Design Manual to meet the requirements of the San Diego Regional Water Quality Control Board Order R9-2013- 0001. A retention analysis justifying the use of proprietary flow based biofiltration was also conducted using County of San Diego Automated Stormwater Pollutant Control Worksheets, Version 2.0, and Worksheet B.2 with results attached in this report. Results shown that the total Required Retention Volume of the project is 148 cubic-feet. Meanwhile, the area of project permeable landscape is 26325 sqft which can provide a much more onsite retention capacity than that of required. Also, the project includes 1020 square feet of compact biofiltration BMPs and there will be retention by the plant and soil media. Compact biofiltration treatment measures such as planters, and proprietary biofiltration BMP's thus will be implemented to meet Water Quality requirements. Additionally, the project will implement EPA Green Streets to treat pollutants of concern generated from the widening of the North Coast Highway and associated sidewalk. More information regarding BMP strategy will be provided during final engineering. BMP's are designed to treat 1.5 times the 85th percentile design capture volume (DCV). The calculations are included in Attachment 1. The existing soil is classified as Hydrologic soil group A, but geotechnical advises infiltration to be infeasible. (Continue on page 2 as necessary.)	

Form I-6 Page 2 of 24
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)
(Continued from page 1)

Form I-6 Page 3 of 24
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**
Structural BMP ID No. BF1 - (Compact Biofiltration DMA 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 ☐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)	Third party inspector TBD
Who will be the final owner of this BMP?	ALTA Oceanside HOA
Who will maintain this BMP into perpetuity?	ALTA Oceanside HOA
What is the funding mechanism for maintenance?	ALTA Oceanside HOA dues

Form I-6 Page 4 of 24 (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):

Flow-based treatment measures including but not limited to compact biofiltration and proprietary bio filtration BMPs will be implemented to provide treatment. Specificity regarding treatment measures will be provided during final engineering.

The compact biofiltration structural BMP for DMA-1 will treat a design capture volume of 387 cubic-feet at a flow rate of 0.054 cfs.

The DMA 1 is divided into 7 sub-areas, thus the corresponding sub BMPs are named from BMP1a to BMP1g.

BMP1a will treat a design capture volume of 42 cubic-feet at a flow rate of 0.006 cfs. BMP1b will treat a design capture volume of 48 cubic-feet at a flow rate of 0.007 cfs. BMP1c will treat a design capture volume of 86 cubic-feet at a flow rate of 0.012 cfs. BMP1d will treat a design capture volume of 53 cubic-feet at a flow rate of 0.007 cfs. BMP1e will treat a design capture volume of 60 cubic-feet at a flow rate of 0.008 cfs. BMP1f will treat a design capture volume of 58 cubic-feet at a flow rate of 0.008 cfs. BMP1g will treat a design capture volume of 52 cubic-feet at a flow rate of 0.007 cfs.

Engineer of work does not provide inspection service.

Form I-6 Page 5 of 24	
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**	
Structural BMP ID No. BF2 - (Compact Biofiltration DMA 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 ☐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)	Third party inspector TBD
Who will be the final owner of this BMP?	ALTA Oceanside HOA
Who will maintain this BMP into perpetuity?	ALTA Oceanside HOA
What is the funding mechanism for maintenance?	ALTA Oceanside HOA dues

Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Discussion (as needed):

Flow-based treatment measures including but not limited to compact biofiltration and proprietary bio filtration BMP's will be implemented to provide treatment. Specificity regarding treatment measures will be provided during final engineering.

The compact biofiltration BMP for DMA-2 will treat a design capture volume of 267 cubic-feet at a flow rate of 0.037 cfs.

The DMA 2 is divided into 5 sub-areas, thus the corresponding sub BMPs are named from BMP2a to BMP2e.

BMP2a will treat a design capture volume of 80 cubic-feet at a flow rate of 0.011 cfs. BMP2b will treat a design capture volume of 59 cubic-feet at a flow rate of 0.008 cfs. BMP2c will treat a design capture volume of 37 cubic-feet at a flow rate of 0.005 cfs. BMP2d will treat a design capture volume of 38 cubic-feet at a flow rate of 0.005 cfs. BMP2e will treat a design capture volume of 55 cubic-feet at a flow rate of 0.008 cfs.

Engineer of work does not provide inspection service.

Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No. BF3 - (Compact Biofiltration DMA 3)

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

☐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)	Third party inspector TBD
Who will be the final owner of this BMP?	ALTA Oceanside HOA
Who will maintain this BMP into perpetuity?	ALTA Oceanside HOA
What is the funding mechanism for maintenance?	ALTA Oceanside HOA dues

Form I-6 Page 8 of 24 (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):

Flow-based treatment measures including but not limited to compact biofiltration and proprietary bio filtration BMP's will be implemented to provide treatment. Specificity regarding treatment measures will be provided during final engineering.

The compact biofiltration BMP for DMA-3 will treat a design capture volume of 212 cubic-feet at a flow rate of 0.03 cfs.

The DMA 3 is divided into 3 sub-areas, thus the corresponding sub BMPs are named from BMP3a to BMP3c.

BMP3a will treat a design capture volume of 64 cubic-feet at a flow rate of 0.009 cfs.
BMP3b will treat a design capture volume of 75 cubic-feet at a flow rate of 0.011 cfs.
BMP3c will treat a design capture volume of 77 cubic-feet at a flow rate of 0.011 cfs.

Engineer of work does not provide inspection service.

Form I-6 Page 9 of 24
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**
Structural BMP ID No. BF4 - (Compact Bilfiltration DMA 4)
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 ☐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)	Third party inspector TBD
Who will be the final owner of this BMP?	ALTA Oceanside HOA
Who will maintain this BMP into perpetuity?	ALTA Oceanside HOA
What is the funding mechanism for maintenance?	ALTA Oceanside HOA dues

Form I-6 Page 10 of 24 (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): Flow-based treatment measures including but not limited to compact biofiltration and proprietary bio filtration BMP's will be implemented to provide treatment. Specificity regarding treatment measures will be provided during final engineering. The compact biofiltration BMP for DMA-4 will treat a design capture volume of 1,608 cubic-feet at a flow rate of 0.225 cfs. Engineer of work does not provide inspection service.

Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No. BF5 - (Compact Biofiltration DMA 5)

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

☐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)	Third party inspector TBD
Who will be the final owner of this BMP?	ALTA Oceanside HOA
Who will maintain this BMP into perpetuity?	ALTA Oceanside HOA
What is the funding mechanism for maintenance?	ALTA Oceanside HOA dues

Form I-6 Page 12 of 24 (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): Flow-based treatment measures including but not limited to compact biofiltration and proprietary bio filtration BMP's will be implemented to provide treatment. Specificity regarding treatment measures will be provided during final engineering. The compact biofiltration BMP for DMA-5 will treat a design capture volume of 637 cubic-feet at a flow rate of 0.089 cfs. Engineer of work does not provide inspection service.

Form I-6 Page 13 of 24
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**
Structural BMP ID No. BF6 - (Compact Biofiltration DMA 6)
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 ☐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)	Third party inspector TBD
Who will be the final owner of this BMP?	ALTA Oceanside HOA
Who will maintain this BMP into perpetuity?	ALTA Oceanside HOA
What is the funding mechanism for maintenance?	ALTA Oceanside HOA dues

Form I-6 Page 14 of 24 (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):

Flow-based treatment measures including but not limited to compact biofiltration and proprietary bio filtration BMP's will be implemented to provide treatment. Specificity regarding treatment measures will be provided during final engineering.

The compact biofiltration BMP for DMA-6 will treat a design capture volume of 391 cubic-feet at a flow rate of 0.055 cfs.

The DMA 6 is divided into 7 sub-areas, thus the corresponding sub BMPs are named from BMP6a to BMP6g.

BMP6a will treat a design capture volume of 69 cubic-feet at a flow rate of 0.010 cfs.
BMP6b will treat a design capture volume of 52 cubic-feet at a flow rate of 0.007 cfs.
BMP6c will treat a design capture volume of 63 cubic-feet at a flow rate of 0.009 cfs.
BMP6d will treat a design capture volume of 66 cubic-feet at a flow rate of 0.009 cfs.
BMP6e will treat a design capture volume of 41 cubic-feet at a flow rate of 0.006 cfs.
BMP6f will treat a design capture volume of 44 cubic-feet at a flow rate of 0.006 cfs.
BMP6g will treat a design capture volume of 55 cubic-feet at a flow rate of 0.008 cfs.

Engineer of work does not provide inspection service.

Form I-6 Page 15 of 24
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**
Structural BMP ID No. BF7 - (Compact Biofiltration DMA 7)
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 ☐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)	Third party inspector TBD
Who will be the final owner of this BMP?	ALTA Oceanside HOA
Who will maintain this BMP into perpetuity?	ALTA Oceanside HOA
What is the funding mechanism for maintenance?	ALTA Oceanside HOA dues

Form I-6 Page 16 of 24 (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): Flow-based treatment measures including but not limited to compact biofiltration and proprietary bio filtration BMP's will be implemented to provide treatment. Specificity regarding treatment measures will be provided during final engineering. The compact biofiltration BMP for DMA-7 will treat a design capture volume of 886 cubic-feet at a flow rate of 0.124 cfs. Engineer of work does not provide inspection service.

Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No. BF8 - (Compact Biofiltration DMA 8)

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

☐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)	Third party inspector TBD
Who will be the final owner of this BMP?	ALTA Oceanside HOA
Who will maintain this BMP into perpetuity?	ALTA Oceanside HOA
What is the funding mechanism for maintenance?	ALTA Oceanside HOA dues

Form I-6 Page 18 of 24 (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): Flow-based treatment measures including but not limited to compact biofiltration and proprietary bio filtration BMP's will be implemented to provide treatment. Specificity regarding treatment measures will be provided during final engineering. The compact biofiltration BMP for DMA-8 will treat a design capture volume of 611 cubic-feet at a flow rate of 0.086 cfs. Engineer of work does not provide inspection service.

Form I-6 Page 19 of 24	
Structural BMP Summary Information **(Copy this page as needed to provide information for each individual proposed structural BMP)**	
Structural BMP ID No. BF9 - (Compact Biofiltration DMA 9)	
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 ☐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)	Third party inspector TBD
Who will be the final owner of this BMP?	ALTA Oceanside HOA
Who will maintain this BMP into perpetuity?	ALTA Oceanside HOA
What is the funding mechanism for maintenance?	ALTA Oceanside HOA dues

Form I-6 Page 20 of 24 (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): Flow-based treatment measures including but not limited to compact biofiltration and proprietary bio filtration BMP's will be implemented to provide treatment. Specificity regarding treatment measures will be provided during final engineering. The compact biofiltration BMP for DMA-9 will treat a design capture volume of 663 cubic-feet at a flow rate of 0.093 cfs. Engineer of work does not provide inspection service.

Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No. BF10 - (Compact Biofiltration DMA 10)

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

☐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)	Third party inspector TBD
Who will be the final owner of this BMP?	ALTA Oceanside HOA
Who will maintain this BMP into perpetuity?	ALTA Oceanside HOA
What is the funding mechanism for maintenance?	ALTA Oceanside HOA dues

Form I-6 Page 22 of 24 (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): Flow-based treatment measures including but not limited to compact biofiltration and proprietary bio filtration BMP's will be implemented to provide treatment. Specificity regarding treatment measures will be provided during final engineering. The compact biofiltration BMP for DMA-10 will treat a design capture volume of 363 cubic-feet at a flow rate of 0.051 cfs. The DMA 10 is divided into 4 sub-areas, thus the corresponding sub BMPs are named from BMP10a to BMP10d. BMP10a will treat a design capture volume of 90 cubic-feet at a flow rate of 0.013 cfs. BMP10b will treat a design capture volume of 123 cubic-feet at a flow rate of 0.017 cfs. BMP10c will treat a design capture volume of 58 cubic-feet at a flow rate of 0.008 cfs. BMP10d will treat a design capture volume of 91 cubic-feet at a flow rate of 0.013 cfs. Engineer of work does not provide inspection service.

Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No. BF11 - (Compact Biofiltration DMA 11)

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

☐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)	Third party inspector TBD
Who will be the final owner of this BMP?	ALTA Oceanside HOA
Who will maintain this BMP into perpetuity?	ALTA Oceanside HOA
What is the funding mechanism for maintenance?	ALTA Oceanside HOA dues

Form I-6 Page 24 of 24 (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): Flow-based treatment measures including but not limited to compact biofiltration and proprietary bio filtration BMP's will be implemented to provide treatment. Specificity regarding treatment measures will be provided during final engineering. The compact biofiltration BMP for DMA-11 will treat a design capture volume of 1,363 cubic-feet at a flow rate of 0.191 cfs. Engineer of work does not provide inspection service.

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

Date Prepared: 5/29/19	Project No.: TBD
Project Applicant: PR II/Wood OCEANSIDE, LLC	Phone:
Project Address: 7700 IRVINE CENTER DRIVE, SUITE 600 IRVINE, CA 92618	
Project Engineer: Raymond L. Martin	Phone: (858)558-4500

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 observed all constructed Low Impact Development (LID) site design, source control and treatment control BMP's required per the approved SWQMP and Construction Permit No. G15-00014; and that said BMP's appear to be 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: _____

Printed Name: _____

Title: _____

Phone No. _____

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. G15-00014; 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: _____

Printed Name: _____

Title: _____

Phone No. _____

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 (see Additional Supporting Documentation)
☒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

PROJECT BOUNDARY

DMA BOUNDARY

FLOW DIRECTION

DMA 1

DMA 2

DMA 3

DMA 4

DMA 5

DMA 6

DMA 7

DMA 8

DMA 9

DMA 10

DMA 11

GREEN STREETS (GS-1)

ROOF DRAINAGE DOWNSPOUT

STORM DRAIN

ONSITE STORM DRAIN INLETS

DMA SUB-BOUNDARY

STREET TREE

HYDROLOGIC SOIL TYPE PER NRCS WEB SOIL SURVEY: A

STRUCTURAL BMPs

FILTERRA BIOSCAPE VAULT (OR EQUIVALENT)

MODULAR WETLAND (OR EQUIVALENT)

SOURCE CONTROL BMPs (FORM I-4 IN SWQMP)
PLEASE REFER TO THE SWQMP REPORT SECTION 7 FOR PERMANENT CONTROLS AND OPERATIONAL COMPONENTS

SC-1 PREVENTION OF ILLICIT DISCHARGE TO THE MS4

SC-2 STORM DRAIN STENCILING AND SINAGE

SC-5 PROTECT TRASH STORAGE AREAS FROM RAINFALL, RUN-ON, RUNOFF, AND WIND DISPERSAL (TRASH COLLECTION IS IN UNDERGROUND GARAGE)

SC-6 ONSITE STORM DRAIN INLETS:

SC-8 LANDSCAPE/OUTDOOR PESTICIDE USE

SC-8 PLAZAS, SIDEWALKS, AND PARKING LOTS

SITE DESIGN BMPS (FORM I-5 IN SWQMP)

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-6 RUNOFF COLLECTION

SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

NOTES:

NO EXISTING NATURAL HYDROLOGIC FEATURES FOUND ON-SITE.

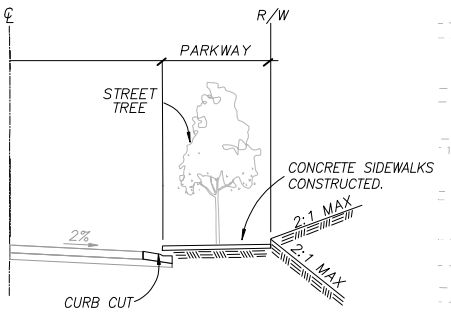
GROUNDWATER DEPTH > 20' FEET BELOW SURFACE.

SIDEWALK & EXISTING ROADS WILL BE TREATED WITH GREEN STREETS ELEMENTS AND INCLUDE STREET TREES WITH CURB CUTS.

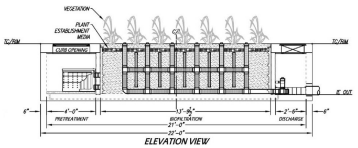
COMPACT BIOFILTRATION BMPS ARE FLOW BASED BMPS, NAMED AS BF-3 PER BMP DESIGN MANUAL.

BMP ID	BMP TYPE	DCV (cf)	Flow Rate (cfs)	DIMENSIONS (W×L) (ft)	MODEL #
BMP1a	FBV	42.05	0.006	4×4	FTBSV0404-B
BMP1b	FBV	47.89	0.007	4×4	FTBSV0404-B
BMP1c	FBV	85.83	0.012	4×4	FTBSV0404-B
BMP1d	FBV	52.61	0.007	4×4	FTBSV0404-B
BMP1e	FBV	60	0.008	4×4	FTBSV0404-B
BMP1f	FBV	58	0.008	4×4	FTBSV0404-B
BMP1g	FBV	52	0.007	4×4	FTBSV0404-B
BMP2a	FBV	80	0.011	4×4	FTBSV0404-B
BMP2b	FBV	59	0.008	4×4	FTBSV0404-B
BMP2c	FBV	37.00	0.005	4×4	FTBSV0404-B
BMP2d	FBV	37.85	0.005	4×4	FTBSV0404-B
BMP2e	FBV	55.24	0.008	4×4	FTBSV0404-B
BMP3a	FBV	64.10	0.009	4×4	FTBSV0404-B
BMP3b	FBV	75.49	0.011	4×4	FTBSV0404-B
BMP3c	FBV	77.42	0.011	4×4	FTBSV0404-B
BMP4	MW	1607.91	0.225	8×8	MWS-L-8-8
BMP5	MW	637.48	0.089	4×8	MWS-L-4-8
BMP6a	FBV	69	0.010	4×4	FTBSV0404-B
BMP6b	FBV	52	0.007	4×4	FTBSV0404-B
BMP6c	FBV	63	0.009	4×4	FTBSV0404-B
BMP6d	FBV	66	0.009	4×4	FTBSV0404-B
BMP6e	FBV	41	0.006	4×4	FTBSV0404-B
BMP6f	FBV	44.35	0.006	4×4	FTBSV0404-B
BMP6g	FBV	54.56	0.008	4×4	FTBSV0404-B
BMP7	MW	885.60	0.124	7×9	MWS-L-6-8
BMP8	MW	610.55	0.086	4×8	MWS-L-4-8
BMP9	MW	662.65	0.093	4×8	MWS-L-4-8
BMP10a	FBV	90.27	0.013	4×4	FTBSV0404-B
BMP10b	FBV	123.02	0.017	4×4	FTBSV0404-B
BMP10c	FBV	58.48	0.008	4×4	FTBSV0404-B
BMP10d	FBV	91	0.013	4×4	FTBSV0404-B
BMP11	MW	1,363	0.191	8×8	MWS-L-8-8

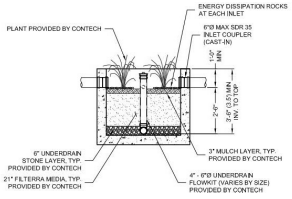
NOTE: FBV: FILTERRA BIOSCAPE VAULT (OR EQUIVALENT).
MW: MODULAR WETLAND (OR EQUIVALENT).



TYPICAL GREEN STREETS DETAIL (PVT) (NTS)



TYPICAL MODULAR WETLAND DETAIL N.T.S.



TYPICAL FILTERRA BIOSCAPE VAULT DETAIL N.T.S.

STRUCTURAL BMPs

DMA ID	DMA AREA (SQFT)	DMA TYPE	STRUCTURAL BMP	BMP ID	DCV (CU-FT)	STRUCUTRAL BMP FLOWRATE (CFS)
DMA 1	11,751	ONSITE BMPs	COMPACT BIOFILTRATION BMPs (OR SIMILAR)	BMP-1	398	0.056
DMA 2	8,485	ONSITE BMPs	COMPACT BIOFILTRATION BMPs (OR SIMILAR)	BMP-2	269	0.038
DMA 3	7,024	ONSITE BMPs	COMPACT BIOFILTRATION BMPs (OR SIMILAR)	BMP-3	217	0.030
DMA 4	36,337	ONSITE BMPs	COMPACT BIOFILTRATION BMPs (OR SIMILAR)	BMP-4	1,608	0.225
DMA 5	16,809	ONSITE BMPs	COMPACT BIOFILTRATION BMPs (OR SIMILAR)	BMP-5	637	0.089
DMA 6	11,392	ONSITE BMPs	COMPACT BIOFILTRATION BMPs (OR SIMILAR)	BMP-6	391	0.055
DMA 7	23,794	ONSITE BMPs	COMPACT BIOFILTRATION BMPs (OR SIMILAR)	BMP-7	886	0.124
DMA 8	16,444	ONSITE BMPs	COMPACT BIOFILTRATION BMPs (OR SIMILAR)	BMP-8	611	0.086
DMA 9	17,817	ONSITE BMPs	COMPACT BIOFILTRATION BMPs (OR SIMILAR)	BMP-9	663	0.093
DMA 10	9,284	ONSITE BMPs	COMPACT BIOFILTRATION BMPs (OR SIMILAR)	BMP-10	363	0.051
DMA 11	33,829	ONSITE BMPs	COMPACT BIOFILTRATION BMPs (OR SIMILAR)	BMP-11	1,363	0.191

NOTE: STRUCTURAL BMP FLOW RATE IS DIVIDED AMONG MULTIPLE UNITS WITHIN THE DMA

REGISTERED PROFESSIONAL ENGINEER RAYMOND L. MAY No. 48670 (EXP. 6/30/20) CIVIL STATE OF CALIFORNIA

PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC

PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH (858) 558-4500 FAX (858) 558-1414

DMA MAP

ALTA OCEANSIDE

OCEANSIDE, CALIFORNIA

SHEET 1 OF 1

W.O. 1321-02

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Attachment 1B – **Tabular Summary of DMAs (if separate from DMA Exhibit)**

Leave placeholder intact if not applicable.

☒Not Applicable – Tabular Summary included on DMA Exhibit

ALTA OCEANSIDE

COMPACT BIOFILTRATION BMP DMA CALCULATIONS

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1		Imp. RF	Pervious RF	% Imp	**DMA 1**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA 2**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA3**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
2					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT		SQFT		SQFT	SQFT	
3	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	PARK	0.90	0.10	0	3113.00	0.04	0.00	3113.00	311.30	2715.00	0.05	0.00	2715.00	271.50	2385.00	0.05	0.00	2385.00	238.50
7	ROOFS	0.90	0.10	100	8301.00	0.92	8301.00	0.00	7470.90	5485.00	0.90	5485.00	0.00	4936.50	4095.00	0.84	4095.00	0.00	3685.50
8	ROAD/DRIVEWAY	0.90	0.10	100	337.00	0.04	337.00	0.00	303.30	285.00	0.05	285.00	0.00	256.50	544.00	0.11	544.00	0.00	489.60
9	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11					**11751.00**	1.00	8638.00	3113.00	8085.50	**8485.00**	1.00	5770.00	2715.00	5464.50	**7024.00**	1.00	4639.00	2385.00	4413.60
12								Weighted C =	**0.69**				Weighted C =	**0.64**				Weighted C =	**0.63**
13																			
14		Imp. RF	Pervious RF	% Imp	**DMA 4**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA 5**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA 6**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
15					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT		SQFT		SQFT	SQFT	
16	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	PARK	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	2703.00	0.02	0.00	2703.00	270.30	2888.00	0.04	0.00	2888.00	288.80
20	ROOFS	0.90	0.10	100	36337.00	1.00	36337.00	0.00	32703.30	10092.00	0.70	10092.00	0.00	9082.80	7234.00	0.82	7234.00	0.00	6510.60
21	ROAD/DRIVEWAY	0.90	0.10	100	0.00	0.00	0.00	0.00	0.00	4014.00	0.28	4014.00	0.00	3612.60	1270.00	0.14	1270.00	0.00	1143.00
22	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24					**36337.00**	1.00	36337.00	0.00	32703.30	**16809.00**	1.00	14106.00	2703.00	12965.70	**11392.00**	1.00	8504.00	2888.00	7942.40
25								Weighted C =	**0.90**				Weighted C =	**0.77**				Weighted C =	**0.70**
26																			
27		Imp. RF	Pervious RF	% Imp	**DMA 7**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA 8**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA 9**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
28					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT		SQFT		SQFT	SQFT	
29	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	PARK	0.90	0.10	0	4101.00	0.02	0.00	4101.00	410.10	2977.00	0.02	0.00	2977.00	297.70	3197.00	0.02	0.00	3197.00	319.70
33	ROOFS	0.90	0.10	100	13752.00	0.69	13752.00	0.00	12376.80	10879.00	0.79	10879.00	0.00	9791.10	11804.00	0.79	11804.00	0.00	10623.60
34	ROAD/DRIVEWAY	0.90	0.10	100	5181.00	0.26	5181.00	0.00	4662.90	2588.00	0.19	2588.00	0.00	2329.20	2816.00	0.32	2816.00	0.00	2534.40
35	POOL	0.90	0.10	80	760.00	0.03	608.00	152.00	562.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37					**23794.00**	1.00	19541.00	4253.00	18012.20	**16444.00**	1.00	13467.00	2977.00	12418.00	**17817.00**	1.13	14620.00	3197.00	13477.70
38								Weighted C =	**0.76**				Weighted C =	**0.76**				Weighted C =	**0.76**
39																			
40		Imp. RF	Pervious RF	% Imp	**DMA 10**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA 11**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A					
41					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT						
42	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
43	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
44	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
45	PARK	0.90	0.10	0	1216.00	0.02	0.00	1216.00	121.60	3398.00	0.01	0.00	3398.00	339.80					
46	ROOFS	0.90	0.10	100	6471.00	0.79	6471.00	0.00	5823.90	0.00	0.00	0.00	0.00	0.00					
47	ROAD/DRIVEWAY	0.90	0.10	100	1597.00	0.19	1597.00	0.00	1437.30	30431.00	0.99	30431.00	0.00	27387.90					
48	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
49	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
50					**9284.00**	1.00	8068.00	1216.00	7382.80	**33829.00**	1.00	30431.00	3398.00	27727.70					
51								Weighted C =	**0.80**				Weighted C =	**0.82**					

ALTA OCEANSIDE

COMPACT BIOFILTRATION BMP DMA CALCULATIONS

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
58																			
59																			
60	DMA1 BREAK DOWN	Imp. RF	Pervious RF	% Imp	**DMA1a**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA1b**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA1c**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
61					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT		SQFT		SQFT	SQFT	
62	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
63	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
64	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	PARK	0.90	0.10	0	371.00	0.04	0.00	371.00	37.10	318.00	0.03	0.00	318.00	31.80	500.00	0.03	0.00	500.00	50.00
66	ROOFS	0.90	0.10	100	572.00	0.60	572.00	0.00	514.80	1047.00	0.97	1047.00	0.00	942.30	1884.00	0.97	1884.00	0.00	1695.60
67	ROAD/DRIVEWAY	0.90	0.10	100	337.00	0.35	337.00	0.00	303.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
68	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
69	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70					**1280.00**	1.00	909.00	371.00	855.20	**1365.00**	1.00	1047.00	318.00	974.10	**2384.00**	1.00	1884.00	500.00	1745.60
71								Weighted C =	**0.67**				Weighted C =	**0.71**				Weighted C =	**0.73**
72																			
73	DMA1 BREAK DOWN	Imp. RF	Pervious RF	% Imp	**DMA1d**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA1e**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA1f**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
74					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT		SQFT		SQFT	SQFT	
75	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
77	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
78	PARK	0.90	0.10	0	278.00	0.03	0.00	278.00	27.80	420.00	0.03	0.00	420.00	42.00	612.00	0.05	0.00	612.00	61.20
79	ROOFS	0.90	0.10	100	1158.00	0.97	1158.00	0.00	1042.20	1299.00	0.97	1299.00	0.00	1169.10	1242.00	0.95	1242.00	0.00	1117.80
80	ROAD/DRIVEWAY	0.90	0.10	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
83					**1436.00**	1.00	1158.00	278.00	1070.00	**1719.00**	1.00	1299.00	420.00	1211.10	**1854.00**	1.00	1242.00	612.00	1179.00
84								Weighted C =	**0.75**				Weighted C =	**0.70**				Weighted C =	**0.64**
85																			
86	DMA1 BREAK DOWN	Imp. RF	Pervious RF	% Imp	**DMA1g**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A										
87					SQFT		SQFT	SQFT											
88	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00										
89	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00										
90	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00										
91	PARK	0.90	0.10	0	614.00	0.06	0.00	614.00	61.40										
92	ROOFS	0.90	0.10	100	1099.00	0.94	1099.00	0.00	989.10										
93	ROAD/DRIVEWAY	0.90	0.10	100	0.00	0.00	0.00	0.00	0.00										
94	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00										
95	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00										
96					**1713.00**	1.00	1099.00	614.00	1050.50										
97								Weighted C =	**0.61**										

ALTA OCEANSIDE

COMPACT BIOFILTRATION BMP DMA CALCULATIONS

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
107																			
108	DMA2 BREAK DOWN	Imp. RF	Pervious RF	% Imp	**DMA2a**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA2b**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA2c**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
109					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT		SQFT		SQFT	SQFT	
110	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
111	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
112	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
113	PARK	0.90	0.10	0	320.00	0.02	0.00	320.00	32.00	326.00	0.03	0.00	326.00	32.60	415.00	0.06	0.00	415.00	41.50
114	ROOFS	0.90	0.10	100	1523.00	0.85	1523.00	0.00	1370.70	1252.00	0.94	1252.00	0.00	1126.80	790.00	0.94	790.00	0.00	711.00
115	ROAD/DRIVEWAY	0.90	0.10	100	239.00	0.13	239.00	0.00	215.10	46.00	0.03	46.00	0.00	41.40	0.00	0.00	0.00	0.00	0.00
116	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
117	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
118					**2082.00**	1.00	1762.00	320.00	1617.80	**1624.00**	1.00	1298.00	326.00	1200.80	**1205.00**	1.00	790.00	415.00	752.50
119								Weighted C =	**0.78**				Weighted C =	**0.74**				Weighted C =	**0.62**
120																			
121	DMA2 BREAK DOWN	Imp. RF	Pervious RF	% Imp	**DMA2d**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA2e**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A					
122					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT						
123	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
124	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
125	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
126	PARK	0.90	0.10	0	400.00	0.05	0.00	400.00	40.00	1254.00	0.11	0.00	1254.00	125.40					
127	ROOFS	0.90	0.10	100	811.00	0.95	811.00	0.00	729.90	1109.00	0.89	1109.00	0.00	998.10					
128	ROAD/DRIVEWAY	0.90	0.10	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
129	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
130	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
131					**1211.00**	1.00	811.00	400.00	769.90	**2363.00**	1.00	1109.00	1254.00	1123.50					
132								Weighted C =	**0.64**				Weighted C =	**0.48**					
133																			
134																			
135																			
136																			
137																			
138	DMA3 BREAK DOWN	Imp. RF	Pervious RF	% Imp	**DMA3a**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA3b**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA3c**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
139					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT		SQFT		SQFT	SQFT	
140	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
141	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
142	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
143	PARK	0.90	0.10	0	527.00	0.04	0.00	527.00	52.70	926.00	0.06	0.00	926.00	92.60	932.00	0.06	0.00	932.00	93.20
144	ROOFS	0.90	0.10	100	1140.00	0.79	1140.00	0.00	1026.00	1466.00	0.86	1466.00	0.00	1319.40	1489.00	0.85	1489.00	0.00	1340.10
145	ROAD/DRIVEWAY	0.90	0.10	100	250.00	0.17	250.00	0.00	225.00	137.00	0.08	137.00	0.00	123.30	157.00	0.09	157.00	0.00	141.30
146	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
147	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
148					**1917.00**	1.00	1390.00	527.00	1303.70	**2529.00**	1.00	1603.00	926.00	1535.30	**2578.00**	1.00	1646.00	932.00	1574.60
149								Weighted C =	**0.68**				Weighted C =	**0.61**				Weighted C =	**0.61**

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COMPACT BIOFILTRATION BMP DMA CALCULATIONS

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
155																			
156	DMA6 BREAK DOWN	Imp. RF	Pervious RF	% Imp	**DMA6a**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA6b**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA6c**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
157					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT		SQFT		SQFT	SQFT	
158	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
159	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
161	PARK	0.90	0.10	0	559.00	0.04	0.00	559.00	55.90	286.00	0.03	0.00	286.00	28.60	326.00	0.03	0.00	326.00	32.60
162	ROOFS	0.90	0.10	100	1352.00	0.86	1352.00	0.00	1216.80	1016.00	0.86	1016.00	0.00	914.40	1219.00	0.85	1219.00	0.00	1097.10
163	ROAD/DRIVEWAY	0.90	0.10	100	149.00	0.10	149.00	0.00	134.10	136.00	0.11	136.00	0.00	122.40	179.00	0.12	179.00	0.00	161.10
164	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
166					**2060.00**	1.00	1501.00	559.00	1406.80	**1438.00**	1.00	1152.00	286.00	1065.40	**1724.00**	1.00	1398.00	326.00	1290.80
167								Weighted C =	**0.68**				Weighted C =	**0.74**				Weighted C =	**0.75**
168																			
169	DMA6 BREAK DOWN	Imp. RF	Pervious RF	% Imp	**DMA6d**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA6e**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA6f**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
170					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT		SQFT		SQFT	SQFT	
171	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
172	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
173	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
174	PARK	0.90	0.10	0	348.00	0.03	0.00	348.00	34.80	223.00	0.03	0.00	223.00	22.30	273.00	0.03	0.00	273.00	27.30
175	ROOFS	0.90	0.10	100	1255.00	0.84	1255.00	0.00	1129.50	770.00	0.83	770.00	0.00	693.00	827.00	0.83	827.00	0.00	744.30
176	ROAD/DRIVEWAY	0.90	0.10	100	192.00	0.02	192.00	0.00	172.80	128.00	0.14	128.00	0.00	115.20	145.00	0.14	145.00	0.00	130.50
177	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
178	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
179					**1795.00**	0.89	1447.00	348.00	1337.10	**1121.00**	1.00	898.00	223.00	830.50	**1245.00**	1.00	972.00	273.00	902.10
180								Weighted C =	**0.74**				Weighted C =	**0.74**				Weighted C =	**0.72**
181																			
182	DMA6 BREAK DOWN	Imp. RF	Pervious RF	% Imp	**DMA6g**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A										
183					SQFT		SQFT	SQFT											
184	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00										
185	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00										
186	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00										
187	PARK	0.90	0.10	0	873.00	0.08	0.00	873.00	87.30										
188	ROOFS	0.90	0.10	100	795.00	0.64	795.00	0.00	715.50										
189	ROAD/DRIVEWAY	0.90	0.10	100	341.00	0.04	341.00	0.00	306.90										
190	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00										
191	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00										
192					**2009.00**	0.76	1136.00	873.00	1109.70										
193								Weighted C =	**0.55**										
194																			

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COMPACT BIOFILTRATION BMP DMA CALCULATIONS

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
207																			
208	DMA10 BREAK DOWN	Imp. RF	Pervious RF	% Imp	**DMA10a**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA10b**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA10c**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
209					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT		SQFT		SQFT	SQFT	
210	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
211	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
212	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
213	PARK	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	195.00	0.02	0.00	195.00	19.50
214	ROOFS	0.90	0.10	100	1402.00	0.69	1402.00	0.00	1261.80	2024.00	0.73	2024.00	0.00	1821.60	1097.00	0.83	1097.00	0.00	987.30
215	ROAD/DRIVEWAY	0.90	0.10	100	638.00	0.31	638.00	0.00	574.20	756.00	0.27	756.00	0.00	680.40	203.00	0.15	203.00	0.00	182.70
216	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
217	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
218					**2040.00**	1.00	2040.00	0.00	1836.00	**2780.00**	1.00	2780.00	0.00	2502.00	**1495.00**	1.00	1300.00	195.00	1189.50
219								Weighted C =	**0.90**				Weighted C =	**0.90**				Weighted C =	**0.80**
220																			
221	DMA10 BREAK DOWN	Imp. RF	Pervious RF	% Imp	**DMA10d**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A										
222					SQFT		SQFT	SQFT											
223	BASIN	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00										
224	INDUSTRIAL	0.90	0.10	87	0.00	0.00	0.00	0.00	0.00										
225	MULTIUSE/COMMERCIAL	0.90	0.10	77	0.00	0.00	0.00	0.00	0.00										
226	PARK	0.90	0.10	0	1021.00	0.06	0.00	1021.00	102.10										
227	ROOFS	0.90	0.10	100	1948.00	0.94	1948.00	0.00	1753.20										
228	ROAD/DRIVEWAY	0.90	0.10	100	0.00	0.00	0.00	0.00	0.00										
229	SCHOOL	0.90	0.10	80	0.00	0.00	0.00	0.00	0.00										
230	SLOPES	0.90	0.10	0	0.00	0.00	0.00	0.00	0.00										
231					**2969.00**	1.00	1948.00	1021.00	1855.30										
232								Weighted C =	**0.62**										
233																			

Attachment 1C – **Design Capture Volume Worksheet**

☒Included

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DCV CALCULATION

DMA 1 : Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.27	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.69	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	398	cubic-feet

DMA 1a : Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.03	acres
3	Area weighted runoff factor	C=	0.67	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	42	cubic-feet

DMA 1b : Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.03	acres
3	Area weighted runoff factor	C=	0.71	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	48	cubic-feet

DMA 1c : Design Capture Volume		Worksheet B-2.1		
1	B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.05	acres
3	Area weighted runoff factor	C=	0.73	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	86	cubic-feet

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DCV CALCULATION

DMA 1d : Design Capture Volume		Worksheet B-2.1		
1	B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.03	acres
3	Area weighted runoff factor	C=	0.75	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	53	cubic-feet

DMA 1e : Design Capture Volume		Worksheet B-2.1		
1	B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.04	acres
3	Area weighted runoff factor	C=	0.70	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	60	cubic-feet

DMA 1f : Design Capture Volume		Worksheet B-2.1		
1	B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.04	acres
3	Area weighted runoff factor	C=	0.64	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	58	cubic-feet

DMA 1g : Design Capture Volume		Worksheet B-2.1		
1	B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.04	acres
3	Area weighted runoff factor	C=	0.61	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	52	cubic-feet

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DCV CALCULATION

DMA 2: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.19	acres
3	Area weighted runoff factor	C=	0.64	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	269	cubic-feet

DMA 2a: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.05	acres
3	Area weighted runoff factor	C=	0.78	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	80	cubic-feet

DMA 2b: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.04	acres
3	Area weighted runoff factor	C=	0.74	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	59	cubic-feet

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DCV CALCULATION

DMA 2c: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.03	acres
3	Area weighted runoff factor	C=	0.62	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	37	cubic-feet

DMA 2d: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.03	acres
3	Area weighted runoff factor	C=	0.64	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	38	cubic-feet

DMA 2e: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.05	acres
3	Area weighted runoff factor	C=	0.48	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	55	cubic-feet

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DCV CALCULATION

DMA 3: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.16	acres
3	Area weighted runoff factor	C=	0.63	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	217	cubic-feet

DMA 3a: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.04	acres
3	Area weighted runoff factor	C=	0.68	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	64	cubic-feet

DMA 3b: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.06	acres
3	Area weighted runoff factor	C=	0.61	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	75	cubic-feet

DMA 3c: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.06	acres
3	Area weighted runoff factor	C=	0.61	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	77	cubic-feet

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DCV CALCULATION

DMA 4: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.83	acres
3	Area weighted runoff factor	C=	0.90	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	1,608	cubic-feet

DMA 5: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.39	acres
3	Area weighted runoff factor	C=	0.77	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	637	cubic-feet

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DCV CALCULATION

DMA 6: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.26	acres
3	Area weighted runoff factor	C=	0.70	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	391	cubic-feet

DMA 6a: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.05	acres
3	Area weighted runoff factor	C=	0.68	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	69	cubic-feet

DMA 6b: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.03	acres
3	Area weighted runoff factor	C=	0.74	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	52	cubic-feet

DMA 6c: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.04	acres
3	Area weighted runoff factor	C=	0.75	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	63	cubic-feet

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DCV CALCULATION

DMA 6d: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.04	acres
3	Area weighted runoff factor	C=	0.74	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	66	cubic-feet

DMA 6e: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.03	acres
3	Area weighted runoff factor	C=	0.74	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	41	cubic-feet

DMA 6f: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.03	acres
3	Area weighted runoff factor	C=	0.72	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	44	cubic-feet

DMA 6g: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.05	acres
3	Area weighted runoff factor	C=	0.55	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	55	cubic-feet

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DCV CALCULATION

DMA 7: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.55	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.76	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	886	cubic-feet

DMA 8: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.38	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.76	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	611	cubic-feet

DMA9: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.41	acres
3	Area weighted runoff factor	C=	0.76	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	663	cubic-feet

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DCV CALCULATION

DMA10: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.21	acres
3	Area weighted runoff factor	C=	0.80	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	363	cubic-feet

DMA10a: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.05	acres
3	Area weighted runoff factor	C=	0.90	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	90	cubic-feet

DMA10b: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.06	acres
3	Area weighted runoff factor	C=	0.90	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	123	cubic-feet

DMA10c: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.03	acres
3	Area weighted runoff factor	C=	0.80	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	58	cubic-feet

DMA10d: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.07	acres
3	Area weighted runoff factor	C=	0.62	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	91	cubic-feet

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DCV CALCULATION

DMA11 (BMP11): Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.78	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.82	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	1,363	cubic-feet

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 1: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	398	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	398	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.27	acres
8	using Appendix B.2)	C=	0.69	unitless
9	Calculate Flow Rate = AF x (C x i x A) x1.5	Q=	0.056	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of Compact Biofiltration BMPs. That is, if the Compact Biofiltration BMP is upstream of the project's retention and biofiltration BMPs then the Compact Biofiltration BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) Compact Biofiltration treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow rate in Line 9

3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacoty per unit shall be consistent with third party certifications.

4) Compact Biofiltration treatment control BMPs shall be sized to filter or treat the maximum flow rate of runoff produced from a rainfaill intensity of 0.2 inch of rainfall per hour, or each hour of every storm event

DMA 1a: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	42	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	42	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.03	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.67	unitless
9	Calculate Flow Rate = AF x (C x i x A) x1.5	Q=	0.006	cfs

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 1b: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	48	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	48	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.03	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.71	unitless
9	Calculate Flow Rate = AF x (C x i x A) x1.5	Q=	0.007	cfs

DMA 1c: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	86	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	86	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.05	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.73	unitless
9	Calculate Flow Rate = AF x (C x i x A) x1.5	Q=	0.012	cfs

DMA 1d: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	53	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	53	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.03	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.75	unitless
9	Calculate Flow Rate = AF x (C x i x A) x1.5	Q=	0.007	cfs

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 1e: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	60	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	60	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.04	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.70	unitless
9	Calculate Flow Rate = AF x (C x i x A) x1.5	Q=	0.008	cfs

DMA 1f: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	58	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	58	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.04	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.64	unitless
9	Calculate Flow Rate = AF x (C x i x A) x1.5	Q=	0.008	cfs

DMA 1g: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	52	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	52	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.04	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.61	unitless
9	Calculate Flow Rate = AF x (C x i x A) x1.5	Q=	0.007	cfs

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 2: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	269	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	269	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.19	acres
8	Area-weighted runoff factor	C=	0.6	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.038	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of Compact Biofiltration BMPs. That is, if the Compact Biofiltration BMP is upstream of the project's retention and biofiltration BMPs then the Compact Biofiltration BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) Compact Biofiltration treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow

3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the Compact Biofiltration treatment control BMPs shall be sized to filter or treat the maximum flow

4) rate of runoff produced from a rainfaill intensity of 0.2 inch of rainfall per hour or each hour of every storm event

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COMPACT BIOFILTRATION SIZING CALCULATION

	DMA 2a: Compact Biofiltration Design Flows	Worksheet B.6-1		
1	DCV	DCV	80	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	80	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.05	acres
8	Area-weighted runoff factor	C=	0.8	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.011	cfs

	DMA 2b: Compact Biofiltration Design Flows	Worksheet B.6-1		
1	DCV	DCV	59	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	59	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.04	acres
8	Area-weighted runoff factor	C=	0.7	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.008	cfs

	DMA 2c: Compact Biofiltration Design Flows	Worksheet B.6-1		
1	DCV	DCV	37	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	37	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.03	acres
8	Area-weighted runoff factor	C=	0.6	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.005	cfs

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 2d: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	38	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	38	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.03	acres
8	Area-weighted runoff factor	C=	0.6	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.005	cfs

DMA 2e: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	55	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	55	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.05	acres
8	Area-weighted runoff factor	C=	0.5	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.008	cfs

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 3: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	217	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	217	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.16	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.6	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.030	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of Compact Biofiltration BMPs. That is, if the Compact Biofiltration BMP is upstream of the project's retention and biofiltration BMPs then the Compact Biofiltration BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) Compact Biofiltration treatment control BMPs shall be sized to the volume in Line 4 and dlow based) e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow

3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the Compact Biofiltration treatment control BMPs shall be sized to filter or treat the maximum flow

4) rate of runoff produced from a rainfaill intensity of 0.2 inch of rainfall per hour or each hour of every storm event

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COMPACT BIOFILTRATION SIZING CALCULATION

	DMA 3a: Compact Biofiltration Design Flows	Worksheet B.6-1		
1	DCV	DCV	64	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	64	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.04	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.7	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.009	cfs

	DMA 3b: Compact Biofiltration Design Flows	Worksheet B.6-1		
1	DCV	DCV	75	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	75	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.06	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.6	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.011	cfs

	DMA 3c: Compact Biofiltration Design Flows	Worksheet B.6-1		
1	DCV	DCV	77	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	77	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.06	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.6	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.011	cfs

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 4: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	1,608	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	1,608	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.83	acres
8	Appendix B.2)	C=	0.90	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.225	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of Compact Biofiltration BMPs. That is, if the Compact Biofiltration BMP is upstream of the project's retention and biofiltration BMPs then the Compact Biofiltration BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) Compact Biofiltration treatment control BMPs shall be sized to the volume in Line 4 and dlow based) e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow

3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the Compact Biofiltration treatment control BMPs shall be sized to filter or treat the maximum flow

4) rate of runoff produced from a rainfaill intensity of 0.2 inch of rainfall per hour or each hour of every storm event

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 5: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	637	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	637	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.39	acres
8	Appendix B.2)	C=	0.77	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.089	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of Compact Biofiltration BMPs. That is, if the Compact Biofiltration BMP is upstream of the project's retention and biofiltration BMPs then the Compact Biofiltration BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) Compact Biofiltration treatment control BMPs shall be sized to the volume in Line 4 and dlow based) e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow

3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the Compact Biofiltration treatment control BMPs shall be sized to filter or treat the maximum flow

4) rate of runoff produced from a rainfaill intensity of 0.2 inch of rainfall per hour or each hour of every storm event

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 6: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	391	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	391	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.26	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.70	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.055	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of Compact Biofiltration BMPs. That is, if the Compact Biofiltration BMP is upstream of the project's retention and biofiltration BMPs then the Compact Biofiltration BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) Compact Biofiltration treatment control BMPs shall be sized to the volume in Line 4 and dlow based) e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow

3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the Compact Biofiltration treatment control BMPs shall be sized to filter or treat the maximum flow

4) rate of runoff produced from a rainfaill intensity of 0.2 inch of rainfall per hour or each hour of every storm event

DMA 6a: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	69	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	69	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.05	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.68	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.010	cfs

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COMPACT BIOFILTRATION SIZING CALCULATION

	DMA 6b: Compact Biofiltration Design Flows	Worksheet B.6-1		
1	DCV	DCV	52	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	52	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.03	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.74	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.007	cfs

	DMA 6c: Compact Biofiltration Design Flows	Worksheet B.6-1		
1	DCV	DCV	63	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	63	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.04	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.75	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.009	cfs

	DMA 6d: Compact Biofiltration Design Flows	Worksheet B.6-1		
1	DCV	DCV	66	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	66	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.04	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.74	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.009	cfs

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 6e: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	41	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	41	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.03	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.74	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.006	cfs

DMA 6f: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	44	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	44	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.03	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.72	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.006	cfs

DMA 6g: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	55	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	55	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.05	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.55	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.008	cfs

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 7: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	886	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	886	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.55	acres
8	Appendix B.2)	C=	0.76	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.124	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of Compact Biofiltration BMPs. That is, if the Compact Biofiltration BMP is upstream of the project's retention and biofiltration BMPs then the Compact Biofiltration BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) Compact Biofiltration treatment control BMPs shall be sized to the volume in Line 4 and dlow based) e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow

3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the Compact Biofiltration treatment control BMPs shall be sized to filter or treat the maximum flow

4) rate of runoff produced from a rainfaill intensity of 0.2 inch of rainfall per hour or each hour of every storm event

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 8: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	611	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	611	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.38	acres
8	Appendix B.2)	C=	0.76	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.086	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of Compact Biofiltration BMPs. That is, if the Compact Biofiltration BMP is upstream of the project's retention and biofiltration BMPs then the Compact Biofiltration BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) Compact Biofiltration treatment control BMPs shall be sized to the volume in Line 4 and dlow based) e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow

3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the Compact Biofiltration treatment control BMPs shall be sized to filter or treat the maximum flow

4) rate of runoff produced from a rainfaill intensity of 0.2 inch of rainfall per hour or each hour of every storm event

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 9: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	663	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	663	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.41	acres
8	Appendix B.2)	C=	0.76	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.093	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of Compact Biofiltration BMPs. That is, if the Compact Biofiltration BMP is upstream of the project's retention and biofiltration BMPs then the Compact Biofiltration BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) Compact Biofiltration treatment control BMPs shall be sized to the volume in Line 4 and dlow based) e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow

3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the Compact Biofiltration treatment control BMPs shall be sized to filter or treat the maximum flow

4) rate of runoff produced from a rainfaill intensity of 0.2 inch of rainfall per hour or each hour of every storm event

ALTA OCEANSIDE
COMPACT BIOFILTRATION SIZING CALCULATION

DMA 10: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	363	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	363	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.21	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.80	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.051	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of Compact Biofiltration BMPs. That is, if the Compact Biofiltration BMP is upstream of the project's retention and biofiltration BMPs then the Compact Biofiltration BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) Compact Biofiltration treatment control BMPs shall be sized to the volume in Line 4 and dlow based) e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow

3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the Compact Biofiltration treatment control BMPs shall be sized to filter or treat the maximum flow

4) rate of runoff produced from a rainfaill intensity of 0.2 inch of rainfall per hour or each hour of every storm event

DMA 10a: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	90	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	90	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.05	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.90	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.013	cfs

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 10b: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	123	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	123	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.06	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.90	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.017	cfs

DMA 10c: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	58	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	58	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.03	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.80	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.008	cfs

DMA 10d: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	91	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	91	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.07	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.62	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.013	cfs

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COMPACT BIOFILTRATION SIZING CALCULATION

DMA 11 Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	1,363	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	1,363	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.78	acres
8	Appendix B.2)	C=	0.82	unitless
9	Calculate Flow Rate = AF x (C x i x A)x1.5	Q=	0.191	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of Compact Biofiltration BMPs. That is, if the Compact Biofiltration BMP is upstream of the project's retention and biofiltration BMPs then the Compact Biofiltration BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) Compact Biofiltration treatment control BMPs shall be sized to the volume in Line 4 and dlow based) e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow

3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the Compact Biofiltration treatment control BMPs shall be sized to filter or treat the maximum flow

4) rate of runoff produced from a rainfaill intensity of 0.2 inch of rainfall per hour or each hour of every storm event

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	BMP1	BMP2	BMP3	BMP4	BMP5	BMP6	BMP7	BMP8	BMP9	BMP10	unitless
	2	85th Percentile Rainfall Depth	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	inches
	3	Predominant NRCS Soil Type Within BMP Location	A	A	A	A	A	A	A	A	A	A	unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	unitless
	5	Nature of Restriction	Soil Type	Soil Type	Soil Type	Soil Type	Soil Type	Soil Type	Soil Type	Soil Type	Soil Type	Soil Type	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	No	No	No	No	No	No	No	No	yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	percentage
	12	Fraction of DCV Requiring Retention	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	ratio
	13	Required Retention Volume	8	5	4	32	13	8	18	12	13	7	cubic-feet

No Warning Messages

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

Category	#	Description	*i*	Units
Basic Analysis	1	Drainage Basin ID or Name	BMP 11	unitless
	2	85th Percentile Rainfall Depth	0.59	inches
	3	Predominant NRCS Soil Type Within BMP Location	A	unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	unitless
	5	Nature of Restriction	Soil Type	unitless
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.006	in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	4.5%	percentage
	12	Fraction of DCV Requiring Retention	0.02	ratio
	13	Required Retention Volume	27	cubic-feet

No Warning Messages

Retention Calculation

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COMPACT BIOFILTRATION BMP DMA CALCULATIONS

DMA ID	BMP ID	BMP TYPE	DCV (cf)	Flow Rate (cfs)	DIMENSIONS (W×L) (ft)	MODEL #	REQUIRED RETENTION VOLUME (cf) per Worksheet B.2	SURFACE AREA (ft2)	DEPTH	PERCENT VOID SPACE FOR RETENTION	VOLUME RETAINED BY UNIT	VOLUME RETAINED BY DMA
DMA1	BMP1a	FBV	42.05	0.006	4×4	FTBSV0404-B	8.00	16.00	2.42	0.40	15.49	108.42
	BMP1b	FBV	47.89	0.007	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP1c	FBV	85.83	0.012	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP1d	FBV	52.61	0.007	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP1e	FBV	60	0.008	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP1f	FBV	58	0.008	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP1g	FBV	52	0.007	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
DMA2	BMP2a	FBV	80	0.011	4×4	FTBSV0404-B	5	16.00	2.42	0.40	15.49	77.44
	BMP2b	FBV	59	0.008	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP2c	FBV	37.00	0.005	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP2d	FBV	37.85	0.005	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP2e	FBV	55.24	0.008	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
DMA3	BMP3a	FBV	64.10	0.009	4×4	FTBSV0404-B	4.00	16.00	2.42	0.40	15.49	46.46
	BMP3b	FBV	75.49	0.011	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP3c	FBV	77.42	0.011	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
DMA4	BMP4	MW	1607.91	0.225	8×8	MWS-L-8-8	32.00	32.00	3.00	0.48	46.08	46.08
DMA5	BMP5	MW	637.48	0.089	4×8	MWS-L-4-8	13.00	16.00	3.00	0.48	23.04	23.04
DMA6	BMP6a	FBV	69	0.010	4×4	FTBSV0404-B	8.00	16.00	2.42	0.40	15.49	108.42
	BMP6b	FBV	52	0.007	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP6c	FBV	63	0.009	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP6d	FBV	66	0.009	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP6e	FBV	41	0.006	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP6f	FBV	44.35	0.006	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP6g	FBV	54.56	0.008	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
DMA7	BMP7	MW	885.60	0.124	6x8	MWS-L-6-8	18.00	24.00	3.00	0.48	34.56	34.56
DMA8	BMP8	MW	610.55	0.086	4×8	MWS-L-4-8	12.00	16.00	3.00	0.48	23.04	23.04
DMA9	BMP9	MW	662.65	0.093	4×8	MWS-L-4-8	13.00	16.00	3.00	0.40	19.20	19.20
DMA10	BMP10a	FBV	90.27	0.013	4×4	FTBSV0404-B	7.00	16.00	2.42	0.40	15.49	61.95
	BMP10b	FBV	123.02	0.017	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP10c	FBV	58.48	0.008	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
	BMP10d	FBV	91	0.013	4×4	FTBSV0404-B		16.00	2.42	0.40	15.49	
DMA11	BMP11	MW	1,363	0.191	8×8	MWS-L-8-8	27.00	32.00	3.00	0.48	46.08	46.08
NOTE:	FBV: FILTERRA BIOSCAPE VAULT (OR EQUIVALENT).											
	MW: MODULAR WETLAND (OR EQUIVALENT).											

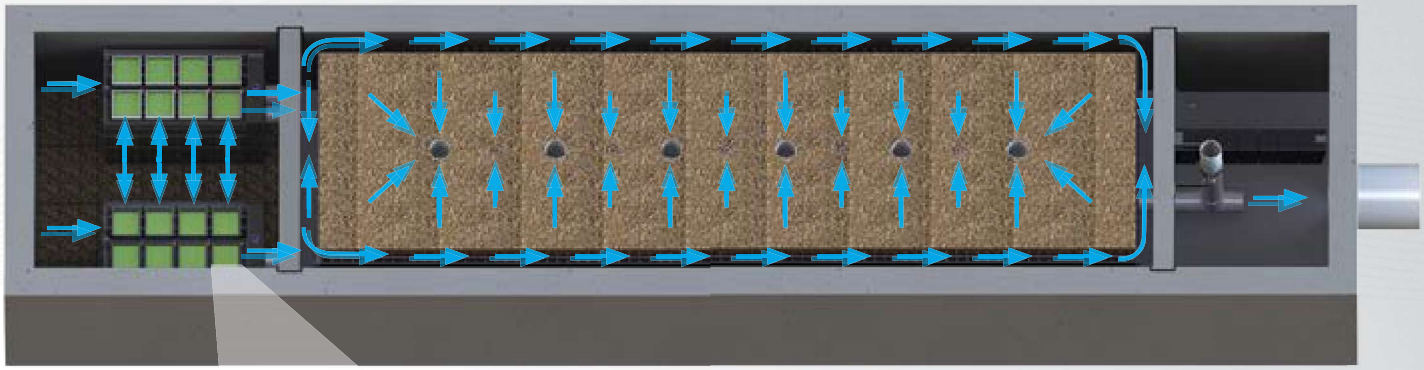
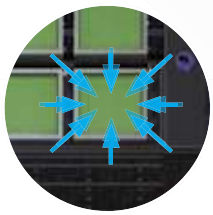


Fig. 2 - Top View

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



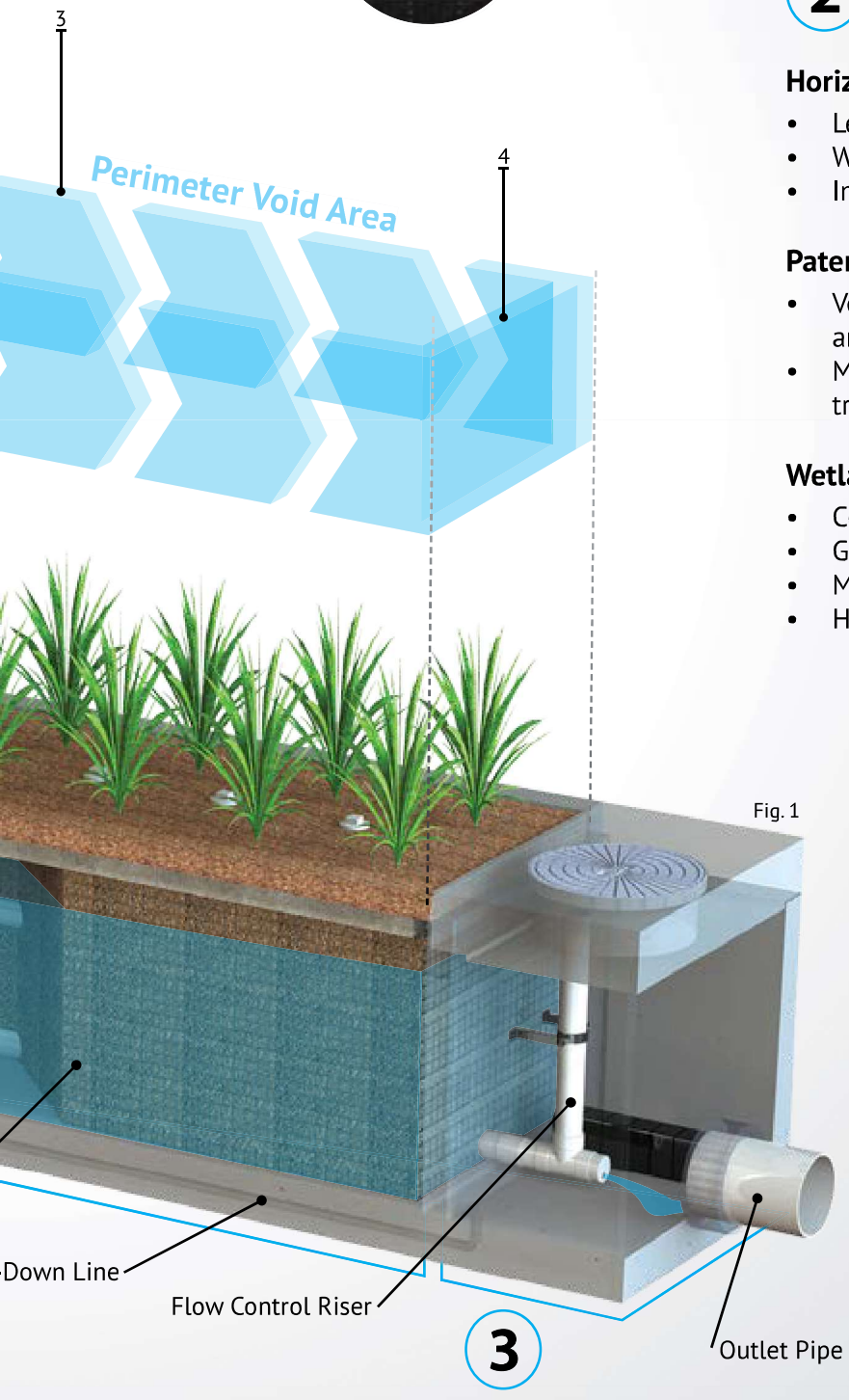


Fig. 1

2 Biofiltration

Horizontal Flow

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

Patented Perimeter Void Area

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

WetlandMEDIA

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

3 Discharge

Flow Control

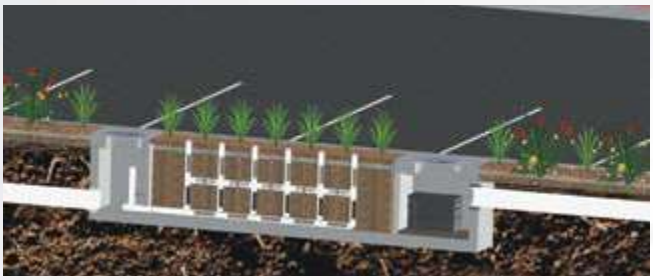
- Orifice plate controls flow of water through WetlandMEDIA to a level lower than the media's capacity.
- Extends the life of the media and improves performance

Drain-Down Filter

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

Flow Based Sizing

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



Treatment Flow Sizing Table

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

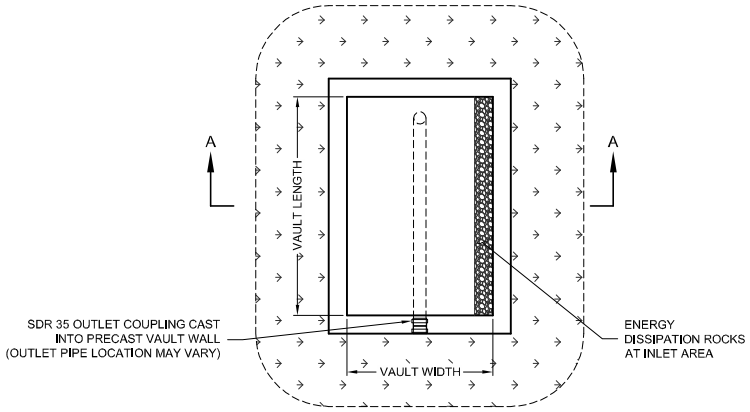
Volume Based Sizing

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

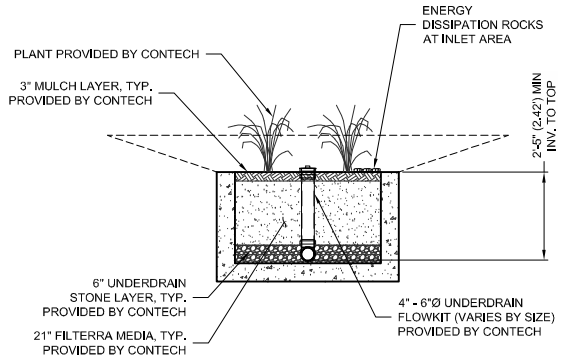


Treatment Volume Sizing Table

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



PLAN VIEW



SECTION A-A

FTBSV-B CONFIGURATION				
DESIGNATION	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (L x W)	OUTLET PIPE
FTBSV0404-B	ALL	4 x 4	4 x 4	4" SDR 35
FTBSV0604-B	N/A CA	6 x 4	6 x 4	4" SDR 35
FTBSV0606-B	ALL	6 x 6	6 x 6	4" SDR 35
FTBSV06504-B	CA ONLY	6.5 x 4	6.5 x 4	4" SDR 35
FTBSV078045-B	MID-ATL ONLY	7.83 x 4.5	7.83 x 4.5	4" SDR 35
FTBSV0804-B	N/A MID-ATL	8 x 4	8 x 4	4" SDR 35
FTBSV0806-B	ALL	8 x 6	8 x 6	4" SDR 35
FTBSV1006-B	ALL	10 x 6	10 x 6	6" SDR 35
FTBSV1206-B	ALL	12 x 6	12 x 6	6" SDR 35
FTBSV1307-B	ALL	13 x 7	13 x 7	6" SDR 35
FTBSV1408-B	CALL CONTECH	14 x 8	14 x 8	6" SDR 35
FTBSV1608-B	CALL CONTECH	16 x 8	16 x 8	6" SDR 35
FTBSV1808-B	CALL CONTECH	18 x 8	18 x 8	6" SDR 35
FTBSV2008-B	CALL CONTECH	20 x 8	20 x 8	6" SDR 35
FTBSV2208-B	CALL CONTECH	22 x 8	22 x 8	6" SDR 35

N/A = NOT AVAILABLE

INTERNAL PIPE CONFIGURATION MAY VARY
DEPENDING UPON OUTLET LOCATION.

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 6,027,272; 6,569,321; 7,425,687; 7,426,341; 7,959,413; RELATED FOREIGN PATENTS.

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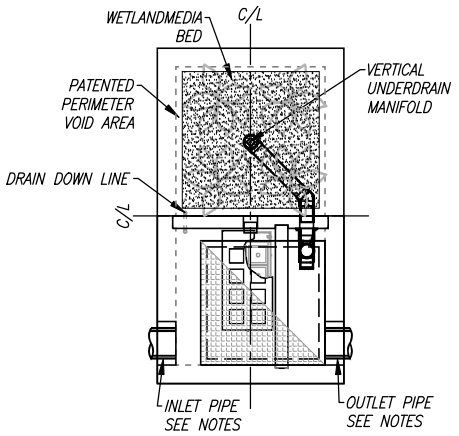
CONTECH ENGINEERED SOLUTIONS LLC
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9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

FILTERRA BIOSCAPE VAULT OFFLINE - BASIN (FTBSV-B) CONFIGURATION DETAIL

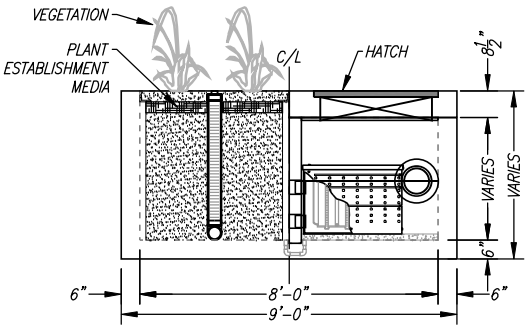
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SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.225	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			USER FILL (CF
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	36" X 36"	OPEN PLANTER	N/A
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



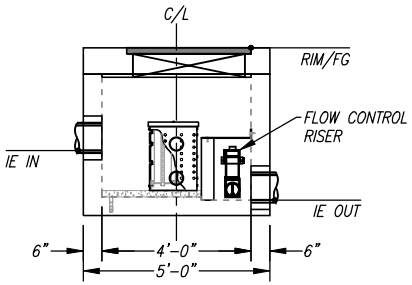
PLAN VIEW



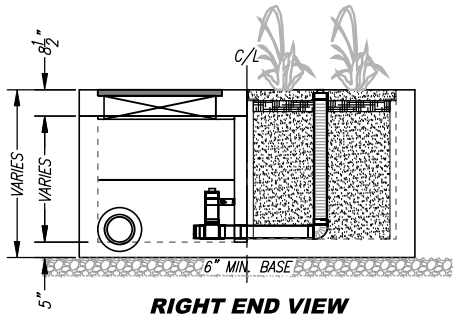
LEFT END VIEW

INSTALLATION NOTES

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7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.



ELEVATION VIEW



RIGHT END VIEW

GENERAL NOTES

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2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.

TREATMENT FLOW (CFS)	0.225
OPERATING HEAD (FT)	6.6
PRETREATMENT LOADING RATE (GPM/SF)	3.9
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
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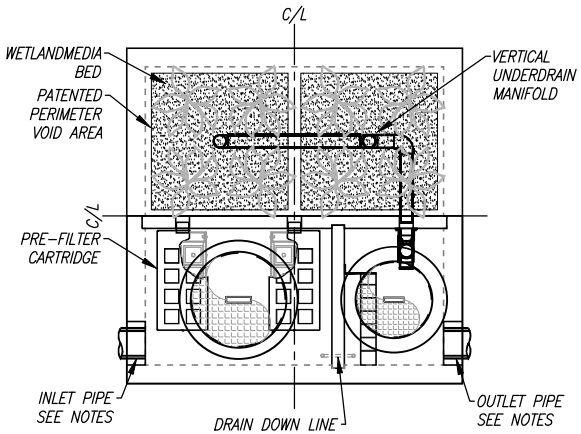
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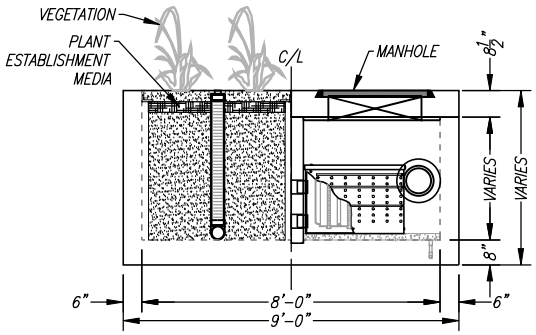
MWS-L-4-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.225	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			USER FILL (CF
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	ø30"	OPEN PLANTE	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUC



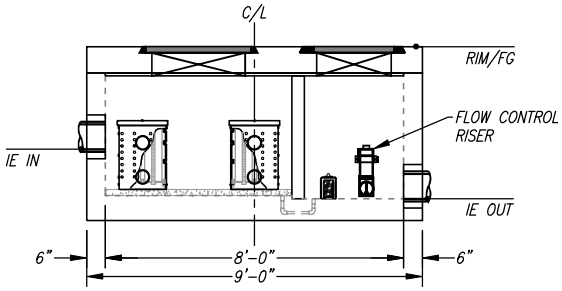
PLAN VIEW



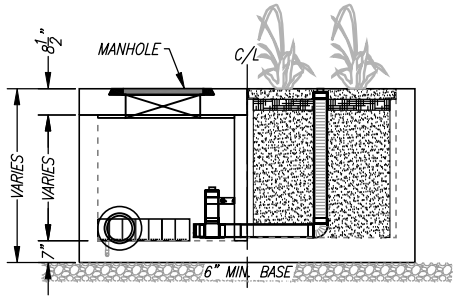
LEFT END VIEW

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ELEVATION VIEW



RIGHT END VIEW

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TREATMENT FLOW (CFS)	0.225
OPERATING HEAD (FT)	6.6
PRETREATMENT LOADING RATE (GPM/SF)	3.9
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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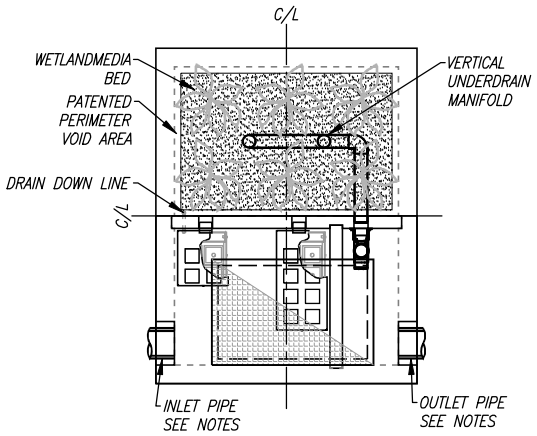
Bio Clean
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MWS-L-8-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

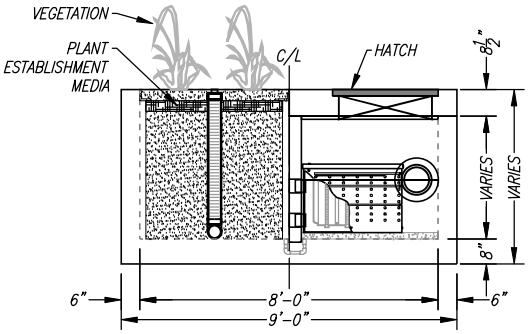
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SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.225	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			USER FILL (CF
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	30" X 48"	OPEN PLANTE	N/A
NOTES:			

* PRELIMINARY NOT FOR CONSTRUC



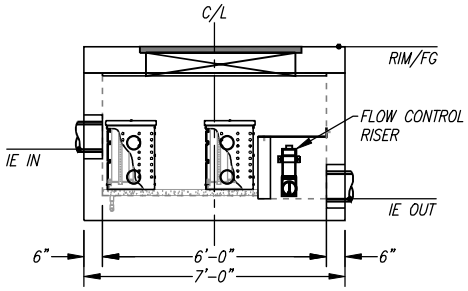
PLAN VIEW



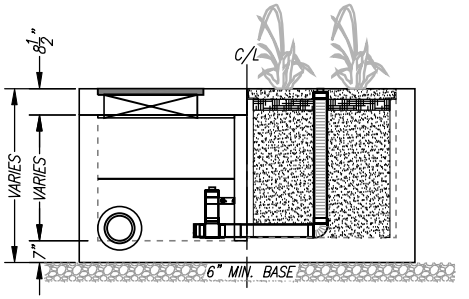
LEFT END VIEW

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ELEVATION VIEW



RIGHT END VIEW

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TREATMENT FLOW (CFS)	0.225
OPERATING HEAD (FT)	6.6
PRETREATMENT LOADING RATE (GPM/SF)	3.9
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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

PROPRIETARY AND CONFIDENTIAL:
THE INFORMATION CONTAINED IN THIS DOCUMENT IS THE SOLE PROPERTY OF FORTERRA AND ITS COMPANIES. THIS DOCUMENT, NOR ANY PART THEREOF, MAY BE USED, REPRODUCED OR MODIFIED IN ANY MANNER WITH OUT THE WRITTEN CONSENT OF FORTERRA.

Bio Clean
A Forterra Company

MWS-L-6-8-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

Harvest and Use Feasibility Checklist	Attachment 1D: Form I-7

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

☒ Toilet and urinal flushing

☒ Landscape irrigation

☐ Other: _____

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

Land Use: Residential. 36 hour: 14GAL/Resident*52 Units*3Residents/unit= 2184GAL ->291cubic feet

General Landscape: Low plant use. 1470GAL/AC *0.3AC= 441GAL -> 59 cubic feet

3. Calculate the DCV using worksheet B-2.1.

DCV = 7406 cubic feet (total DCV)

0.25 DCV = 1851.5 cubic feet

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

1820

Is harvest and use feasible based on further evaluation?

☐ Yes, refer to Appendix E to select and size harvest and use BMPs.

☒ No, select alternate BMPs.

Categorization of Infiltration Feasibility Condition	Attachment 1E: Form I-8

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.	☐	☒

Provide basis:

Per Geotechnical Report the maximum recommended infiltration rate is 0.006 inches per hour.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

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.	☐	☒

Provide basis:

As per City of Oceanside BMP Design Manual, Appendix C.2 factors determined by Geotechnical Engineer precludes us from considering infiltration approach, hence no infiltration BMPs are proposed and detailed assessment of all the other factors was not completed.

Geotechnical report provided by Leighton and Associates determines that infiltrate BMP can create adverse groundwater conditions on the project site. Excerpt of report is included in attachment 6 to support other factors per Appendix C.2.7.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

Attachment 1E: Form I-8 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: Per the geotechnical report provided by Leighton and Associates, groundwater was not encountered up to a depth of 30 feet. As per Appendix C.2 factors determined by Geotechnical Engineer precludes us from considering infiltration approach, hence no infiltration BMPs are proposed and detailed screened is not required. 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: There are no ephemeral streams within or near the project and not groundwater was encountered during Leighton and Associate's report. 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	☐Full Infiltration ☒No	

*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

Attachment 1E: Form I-8 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.	☐	☒

Provide basis:

Per Geotechnical Report the maximum recommended infiltration rate is 0.006 inches per hour.

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.	☐	☒

Provide basis:

As per City of Oceanside BMP Design Manual, Appendix C.2 factors determined by Geotechnical Engineer precludes us from considering infiltration approach, hence no infiltration BMPs are proposed and detailed assessment of all the other factors was not completed.

Geotechnical report provided by Leighton and Associates determines that infiltrate BMP can create adverse groundwater conditions on the project site. Excerpt of report is included in attachment 6 to support other factors per Appendix C.2.7.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

Attachment 1E: Form I-8 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: Further Screening not required. 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: Further Screening not required. 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 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.** If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.**	☐Partial Infiltration ☒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

ATTACHMENT 2
BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

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

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☐Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☐Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐6.2.1 Verification of Geomorphic Landscape Units Onsite ☐6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
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:

Alta Oceanside is hydromodification exempt

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.

Placeholder – **Hydromodification Management Exhibit**

Replace placeholder with required exhibit.

Leave placeholder intact if not applicable.

Not Applicable

Placeholder – **WMAA Exhibit**

Replace placeholder with required exhibit.

Leave placeholder intact if not applicable.

Not Applicable

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

Replace placeholder with required calculations/documentation.

Leave placeholder intact if not applicable.

☒Not Applicable

Downstream Systems Sensitivity to Course Sediment		Form I-10	
When it has been determined that potential critical coarse sediment yield areas exist within the project site, the next step is to determine whether downstream systems would be sensitive to reduction of coarse sediment yield from the project site. Use this form to document the evaluation of downstream systems requirements for preservation of coarse sediment supply.			
Project Name:			
Project Tracking Number / Permit Application Number: RT19-00001			
1	Will the project discharge runoff to a hardened MS4 system (pipe or lined channel) or an un-lined channel?	☐ Hardened MS4 system	Go to 2
		☐ Un-lined channel	Go to 4
2	Will the hardened MS4 system convey sediment (e.g., a concrete-lined channel with steep slope and cleansing velocity) or sink sediment (e.g., flat slopes, constrictions, treatment BMPs, or ponds with restricted outlets within the system will trap sediment and not allow conveyance of coarse sediment from the project site to an un-lined system).	☐ Convey	Go to 3
		☐ Sink	Go to 7
3	What kind of receiving water will the hardened MS4 system convey the sediment to?	☐ Un-lined channel	Go to 4
		☐ Lake ☐ Reservoir ☐ Bay	Go to 7
		☐ Lagoon ☐ Ocean	Go to 6
4	Is the un-lined channel impacted by deposition of sediment? This condition must be documented by the local agency.	☐ Yes	Go to 7
		☐ No	Go to 5

Form I-10 Page 2 of 2	
5	End – Preserve coarse sediment supply to protect un-lined channels from accelerated erosion due to reduction of coarse sediment yield from the project site unless further investigation determines the sediment is not critical to the receiving stream. Sediment that is critical to receiving streams is the sediment that is a significant source of bed material to the receiving stream (bed sediment supply) (see Section 6.2.3 and Appendix H.2 of the manual).
6	End – Provide management measures for preservation of coarse sediment supply (protect beach sand supply).
7	End – Downstream system does not warrant preservation of coarse sediment supply, no measures for protection of critical coarse sediment yield areas onsite are necessary. Use the space below to describe the basis for this finding for the project.

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

Not Applicable

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).

Structural BMP Maintenance Information

TABLE 7-2. Maintenance Indicators and Actions for Vegetated BMPs

Typical Maintenance Indicator(s) for Vegetated BMPs	Maintenance Actions
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 than the design height of the vegetation per original plans when applicable (e.g. a vegetated swale may require a minimum vegetation height).
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the City Engineer shall be contacted prior to any additional repairs or reconstruction.
Standing water in vegetated swales	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, loosening or replacing top soil to allow for better infiltration, or minor re-grading for proper drainage. If the issue is not corrected by restoring the BMP to the original plan and grade, the City Engineer shall be contacted prior to any additional repairs or reconstruction.

Typical Maintenance Indicator(s) for Vegetated BMPs	Maintenance Actions
Standing water in bioretention, biofiltration with partial retention, or biofiltration areas, or flow-through planter boxes for longer than 96 hours following a storm event*	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains (where applicable), or repairing/replacing clogged or compacted soils.
Obstructed inlet or outlet structure	Clear obstructions.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.
*These BMPs typically include a surface ponding layer as part of their function which may take 96 hours to drain following a storm event.	

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.

Stormwater BMP Plan Sheet(s)

TENTATIVE MAP/ MIXED USE DEVELOPMENT PLAN/ REGULAR COASTAL PERMIT

ALTA OCEANSIDE

CITY OF OCEANSIDE, CALIFORNIA

ARCHITECTURE SUMMARY TABLES

SUMMARY TABLES SHOWN BELOW ARE PER ARCHITECTS PLAN SET AND SUBJECT TO REVISION.

BUILDING 1 - RESIDENTIAL BUILDING SUMMARY

UNITS	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	%	TOTAL
1 BEDROOMS							
A1	7	7	8	8	8	12.3%	38
A2	1	1	1	1	1	1.6%	5
A3	1	2	2	2	2	2.9%	9
A4	14	16	15	13	11	25.3%	79
A5	6	7	8	8	8	12.0%	37
A6	2					0.6%	2
A7	0	1	1	1	1	1.3%	13
TOTAL	31	34	35	33	31	56.0%	182
2 BEDROOMS							
B2	1	1	1	1	1	1.5%	5
B4	12	16	17	17	17	25.0%	79
B5	4	5	7	7	8	9.7%	30
TOTAL	17	23	25	25	26	36.3%	114
3 BEDROOMS							
C1	2	3	3	3	2	4.2%	13
TOTAL	2	3	3	3	2	4.2%	13
GRAND TOTAL	50	60	63	61	59	100.0%	309

UNIT TYPE COUNT AND AREA

UNIT TYPE	UNIT NET S.F.	QUANTITY	TOTAL NET S.F.	%	TOTAL UNIT %
A1	808	38	30,704	12.3%	49.0%
A2	842	5	3,210	1.6%	
A3	787	9	6,903	2.9%	
A4	759	78	59,202	25.2%	
A5	747	37	27,639	12.0%	
A6	838	2	1,676	0.6%	
A7	834	13	10,842	4.2%	
B3	1,085	5	5,425	1.6%	46.9%
B4	1,087	79	85,873	25.6%	
B5	1,134	30	34,020	9.7%	
C1	1,338	13	17,394	4.2%	4.2%
TOTAL		309	279,288	100%	

CODE SUMMARY

2016 CALIFORNIA BUILDING CODE, PART 2
2016 CALIFORNIA ELECTRICAL CODE, PART 3
2016 CALIFORNIA MECHANICAL CODE, PART 4
2016 CALIFORNIA PLUMBING CODE, PART 5
2016 CALIFORNIA ENERGY CODE, PART 6
2016 CALIFORNIA FIRE CODE, PART 9
2016 CALIFORNIA GREEN BUILDING STANDARDS CODE
CALIFORNIA CODE OF REGULATIONS - TITLE24
2010 ADA STANDARDS FOR ACCESSIBLE DESIGN (APPLIES TO PUBLIC SPACES)
1988 FHA(M)& AND 91/17.1 (APPLIES TO TENANT COMMON USE SPACES)
1988 FHA(M) APPLIES TO TENANT COVERED DWELLING UNIT'S.

PROJECT DESCRIPTION

A 309 UNIT MULTIFAMILY APARTMENT(S) (PRIVATELY FUNDED) PROJECT CONSISTING OF A 4 & 5-STORY TYPE III-A RESIDENTIAL BUILDING (309 UNITS) (SURROUNDING A 5-LEVEL TYPE I-A PARKING STRUCTURE WITH 5,422 S.F. OF RETAIL.

GROSS LAND AREA (IN ACRES):	5.31
TOTAL UNITS:	309
DENSITY (DWELLING UNITS PER ACRE):	58.19

EXISTING AND PROPOSED USES

EXISTING USE:	COMMERCIAL
PROPOSED USES(S):	MIXED USE RESIDENTIAL DEVELOPMENT - 309 UNITS / 5,422 S.F. RETAIL

PLANNING / ZONING SUMMARY

GENERAL PLAN: DOWNTOWN
ZONING: DOWNTOWN SUBDISTRICT 7B
DENSITY: 58.19 DU/ACRE

TYPE OF CONSTRUCTION	NUMBER OF STORIES	USE / OCCUPANCY	TYPE OF SPRINKLER SYSTEM
IA & IIIA	4 & 5	S-2 / R-2 / A-3 / B / M	NFPA 13

PARKING AND LOADING PROVIDED (VEHICLE)

TOTAL PARKING PROVIDED (9'-6"X18'-0")					528
PARKING PROVIDED AT PARKING STRUCTURE					503
SURFACE PARKING PROVIDED					25
SHARED RETAIL AND GUEST PARKING PROVIDED (INCLUDED IN PARKING COUNT)					34
DESIGNATED USPEDELIVERY PARKING STALL REQUIRED					1
NOTE: A DEDICATED PARALLEL PARKING SPACE AT NORTH COAST HIGHWAY HAS BEEN PROVIDED					
REQUIRED LOADING AREA					1
NOTE: A 12' 3.35" X 14' HIGH LOADING AREA HAS BEEN PROVIDED AT THE MOVE-IN AREA					
ACCESSIBLE PARKING REQUIRED (9'-0"x18'-0")					
PARKING TYPE PER USE	QUANTITY	RATIO	REQUIRED	OF REQUIRED: STANDARD	OF REQUIRED: VAN
HC - RESIDENTS (NOT INCLUDED IN PARKING COUNT)	434	0.02	9	7	2
HC - SHARED PARKING - RETAIL AND GUEST (INCLUDED IN PARKING COUNT)	94	0.05	5	4	1
TOTAL			14	11	3
TOTAL ACCESSIBLE PARKING PROVIDED: (INCLUDES 2 EV)					16

BUILDING AREA

RESIDENTIAL:	402,543 S.F.
GARAGE:	166,214 S.F.

ALLOWABLE BUILDING HEIGHT AND NUMBER OF STORIES

IN FEET ABOVE GRADE PLANE

BUILDING TYPE	CONSTRUCTION TYPE	OCCUPANCY CLASSIFICATION	AUTOMATIC SPRINKLER SYSTEM	REQUIRED: BUILDING HEIGHT PER TABLE 504.3	REQUIRED: NUMBER OF STORIES PER TABLE 504.4	PROVIDED: BUILDING HEIGHT PER TABLE 504.3	PROVIDED: NUMBER OF STORIES PER TABLE 504.4
RESIDENTIAL BUILDING	TYPE III-A	R-2/A-3/B/M	S	65 FEET	5 STORIES	59 FEET	5 STORIES
PARKING STRUCTURE	TYPE I-A	S-2	S	UL	UL	UL	UL

SPRINKLER CLASSIFICATIONS:
NS = Buildings not equipped throughout with an automatic sprinkler system;
S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1;
S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2;
S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

SITE OPEN SPACE SUMMARY

LOCATIONS	TOTALS S.F.
COMMON OPEN SPACE (COURTYARDS, ROOF DECK, NON-STREET SIDE YARDS)	42,997
PRIVATE OPEN SPACE (PATIO AND BALCONIES)	22,822
TOTAL OPEN SPACE PROVIDED:	65,729
TOTAL OPEN SPACE PER UNIT:	213

LEGEND

PROPOSED PROJECT BOUNDARY
PROPOSED LOT LINE
PROPOSED EASEMENT LINE
PROPOSED SEWER MAIN WITH MANHOLE (SEE SEWER ANALYSIS FOR PIPE SIZES)
EXISTING SEWER MAIN WITH MANHOLE
PROPOSED WATER MAIN WITH FIRE HYDRANT (SEE WATER ANALYSIS FOR PIPE SIZES)
EXISTING WATER MAIN WITH FIRE HYDRANT
PROPOSED FORCE SEWER MAIN
LIMITS OF GRADING
PROPOSED CENTERLINE STREET ELEVATION — 518.2
EXISTING CENTERLINE STREET ELEVATION — (255.5)
% OF CENTERLINE STREET GRADE — 2%
PROPOSED RETAINING OR PLANTABLE WALL
EXISTING CONTOURS
PROPOSED CONTOURS
PROPOSED SLOPE (2:1 MAX)
PROPOSED STREET LIGHT
EXISTING STREET LIGHT
EXISTING STORM DRAIN SYSTEM
PROPOSED STORM DRAIN SYSTEM
EXISTING MAP INFORMATION — LOT 270
WATER METER AND BACKFLOW
STORM WATER QUALITY BMP
FLOW THROUGH PLANTER
PRIVATE AREA DRAIN
PROPOSED TRANSFORMER

ABBREVIATIONS

ELEV.	ELEVATION	R/W	RIGHT OF WAY
FL	FLOW LINE	RCP	REINFORCED CONCRETE PIPE
FM	SEWER FORCE MAIN	SD	STORM DRAIN
FS	FINISH SURFACE	SF	GROSS SQ. FT.
GB	GRADE BREAK	TW	TOP OF WALL
IE	INVERT ELEVATION	VC	VERTICAL CURVE
MH	MANHOLE	AC.	ACRE
NTS	NOT TO SCALE	TYP.	TYPICAL
CL	CENTERLINE	GFS	GARAGE FINISH SURFACE

PUBLIC UTILITIES AND DISTRICT

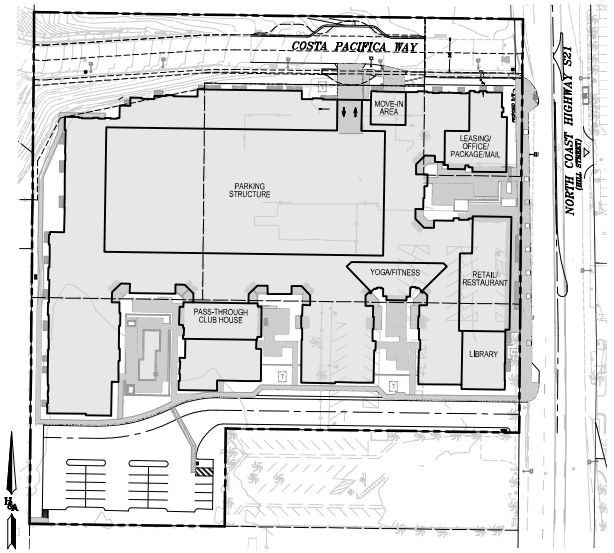
SEWER	CITY OF OCEANSIDE
WATER	CITY OF OCEANSIDE
STORM DRAIN	CITY OF OCEANSIDE
ELECTRICAL AND GAS	SAN DIEGO GAS & ELECTRIC
FIRE	CITY OF OCEANSIDE
POLICE	CITY OF OCEANSIDE
SCHOOLS	OCEANSIDE UNIFIED SCHOOL DISTRICT
TELEPHONE	PACIFIC BELL
CABLE	COX CABLE

GENERAL NOTES

1. SITE AREA DATA:
   GROSS SITE AREA: 5.31 ACRE (PER ALTA 231,434 SF/5.313 AC)
   NET SITE AREA: 5.31 ACRE (PER ALTA 231,434 SF/5.313 AC)
2. TOTAL NUMBER OF EXISTING/PROPOSED LOTS:
   EXISTING LOTS: 5
   PROPOSED LOTS: 1
3. DENSITY PROPOSED:
   GROSS SITE DENSITY: 58 DU'S/AC
   (309 UNITS/ 5.31 AC WITH 35% DENSITY BONUS)
4. TOTAL FLOOR AREA: PLEASE SEE ARCHITECTURAL PLAN SET FOR DETAILS
5. EXISTING GENERAL PLAN DESIGNATION - DOWNTOWN (NO CHANGE PROPOSED)
6. EXISTING ZONING - DOWNTOWN (D) DISTRICT, SUBDISTRICT 7B (NO CHANGE PROPOSED)
7. LOT COVERAGE CALCULATIONS:
   BUILDING AREA 117,850 SF 50.9%
   STREET PAVEMENT AREA 42,111 SF 18.2%
   LANDSCAPE AREA 71,469 SF 30.9%

GRADING NOTES

1. TOTAL AMOUNT OF SITE TO BE GRADED: 4.39 ACRES, % OF TOTAL SITE: 80%
2. AMOUNT OF SITE WITH 25 PERCENT SLOPES OR GREATER: 0.246AC, (MANUFACTURED SLOPES)
3. AMOUNT OF CUT: 1,975 CY (RAW VOLUMES)
   AMOUNT OF FILL: 9,335 CY
   AMOUNT OF IMPORT: 7,360 CY (RAW VOLUMES)
4. MAX. HEIGHT OF FILL SLOPES: 6.0 FEET MAX 2:1 SLOPE RATIO
   MAX. HEIGHT OF CUT SLOPES: 2.7 FEET
5. RETAINING WALLS: LENGTH= 707.5 FEET; MAX. HEIGHT 5 FEET.



PROJECT MAP

SCALE: 1" = 60'

DRAINAGE STUDY

DRAINAGE STUDY FOR ALTA OCEANSIDE HAS BEEN PREPARED BY HUNSAKER & ASSOCIATES DATED 1/25/19

STORM WATER

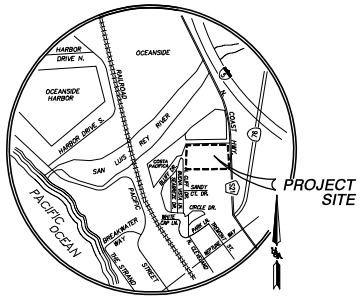
STORM WATER QUALITY MANAGEMENT PLAN FOR ALTA OCEANSIDE HAS BEEN PREPARED BY HUNSAKER & ASSOCIATES DATED 5/29/19

LEGAL DESCRIPTION

SEE SHEET C4 FOR COMPLETE LEGAL DESCRIPTION.
PRELIMINARY TITLE REPORT DATED OCTOBER 11, 2018 FROM FIRST AMERICAN TITLE CO.

ASSESSOR'S PARCEL NUMBER

143-040-20, 22, 23, 26, 54



VICINITY MAP
NTS

SHT.#	SHEET INDEX
C-1	TITLE SHEET
C-2	TENTATIVE MAP/DEVELOPMENT PLAN PRELIMINARY GRADING PLAN
C-3	EXISTING CONDITIONS MAP
C-4	DETAILS
C-5	UNDERGROUND UTILITIES/STRIPING PLAN
C-6	RECORD BOUNDARY AND EASEMENTS

PROJECT DESCRIPTION

THE PROPOSED PROJECT IS A MIXED-USE DEVELOPMENT THAT INCLUDES COMMERCIAL/RETAIL SPACE AT THE GROUND LEVEL FRONTING COAST HIGHWAY, COMBINED WITH RESIDENTIAL APARTMENT UNITS. THE MAIN BUILDING USES A 'WRAP' DESIGN IN WHICH THE RESIDENTIAL UNITS AND COMMERCIAL SPACE WRAP AROUND AN ABOVE GRADE PARKING STRUCTURE, WHICH SCREENS PARKING AND PROVIDES FOR ARCHITECTURAL TREATMENT ON ALL SIDES OF THE BUILDING. THE PROJECT INCORPORATES AFFORDABLE HOUSING UNITS UNDER THE STATE DENSITY BONUS PROGRAM. A TOTAL OF 309 UNITS ARE PROPOSED.

GENERAL DESIGN NOTES

1. CUT/FILL SLOPES ARE 2: 1 OR FLATTER UNLESS OTHERWISE SPECIFIED.
2. GRADING SHOWN HEREON IS PRELIMINARY AND MAY BE SUBJECT TO CHANGE IN FINAL ENGINEERING CONSISTENT WITH THE CITY OF OCEANSIDE SUBSTANTIAL CONFORMANCE GUIDELINES.
3. DRAINAGE FACILITIES TO BE CONSTRUCTED PER THE CITY OF OCEANSIDE STANDARDS.
4. THE DRAINAGE SYSTEM FOR THIS PROJECT WILL BE PRIVATE.
5. ALL LENGTHS, DISTANCES, LOT DIMENSIONS AND CURVE RADII ARE APPROXIMATE.
6. SOURCE OF TOPOGRAPHY: BY HUNSAKER & ASSOCIATES, FLOWN OCTOBER 1 2018
7. BENCHMARK: STATION NO. 1071 PER ROS 21787. 4" USACOE BRASS DISK IN CONCRETE FOUNDATION STAMPED "0396B 1979" NAVD 88 ELEV. 9.63'
8. ALL UTILITIES SHALL BE UNDERGROUND AND EASEMENTS PROVIDED AS NECESSARY.
9. WATER SYSTEM TO BE INSTALLED IN ACCORDANCE WITH THE STANDARDS OF THE CITY OF OCEANSIDE WATER UTILITIES DEPARTMENT.
10. PROPOSED SANITARY SEWER SYSTEM TO BE CONNECTED TO CITY OF OCEANSIDE SEWER SYSTEM IN ACCORDANCE WITH THE STANDARDS OF THE CITY OF OCEANSIDE WATER UTILITIES DEPARTMENT.
11. PEDESTRIAN STREET RAMPS SHALL INCLUDE TRUNCATED DOMES AND BE CONSTRUCTED TO THE SATISFACTION OF THE CITY ENGINEER.
12. TRASH PICKUP FOR THE BUILDING WILL BE ACCESSED VIA COSTA PACIFICA WAY. SEE ARCHITECTURAL PLANS AND SITE PLAN FOR SPECIFIC DUMPSTER LOCATION. TRASH CONTAINERS (DUMPSTERS) ARE WITHIN SEPARATE TRASH ROOMS LOCATED IN THE GARAGE.
13. BUILDING ADDRESS NUMBER SHALL BE VISIBLE AND LEGIBLE FROM THE STREET OR ROAD FRONTING THE PROPERTY.
14. FIRE ACCESS ROADWAY SIGNS OR RED CURBS WILL BE PROVIDED IN ACCORDANCE WITH BFLS POLICY A-96-1.
15. PRECISE SUBSURFACE DRAINAGE TO BE DETERMINED IN FINAL ENGINEERING.
16. THE PROPERTY IS NOT LOCATED WITHIN A FLOOD ZONE. FIRM MAP#06073C0734H, PANEL 734 OF 2375
17. ALL LANDSCAPE AND IRRIGATION SHALL CONFORM TO THE CITY OF OCEANSIDE LANDSCAPE ORDINANCE.
18. SEE LANDSCAPE PLANS FOR PLANTING PALETTE/PLACEMENT, FENCE/WALL HEIGHTS AND DETAILS, PROJECT SIGNAGE, PROMENADE WALKWAY, INTERIOR OPEN PATIO DETAILS.
19. IMPROVEMENTS SUCH AS DRIVEWAYS, UTILITIES, DRAINS AND WATER AND SEWER LATERALS SHALL BE DESIGNED SO AS TO NOT PROHIBIT THE PLACEMENT OF STREET TREES, ALL TO THE SATISFACTION OF THE CITY ENGINEER.
20. SEE ARCHITECTURAL PLANS FOR BUILDING FLOOR PLANS/ELEVATIONS, PROJECT CROSS SECTIONS, PARKING STRUCTURE LAYOUT, PARKING STALL NUMBERING, ROOFTOP EQUIPMENT ENCLOSURES, PATIOS/STOOPS, BUILDING HEIGHTS, TRASH CONTAINER DETAILS, OVERALL BUILDING MATERIALS AND FIRE LANES.
21. ALL BUILDINGS PROPOSED ARE SPRINKLERED. BY SEPERATE SUBMITTAL AND PERMIT
22. POST INDICATOR VALVES, FIRE DEPARTMENT CONNECTIONS, AND ALARM BELL ARE TO BE LOCATED IN THE ADDRESS/ACCESS SIDE OF THE STRUCTURE PER UFC 1001.4.
23. GRADING, STAGING AND STORAGE AREAS SHALL BE DETERMINED AT FINAL ENGINEERING.
24. ALL STREETS LESS THAN 32 FEET WIDE SHALL BE POSTED "NO PARKING FIRE LANE" PER VEHICLE CODE SECTION 22500.1 AND IN ACCORDANCE WITH THE FIRE DEPARTMENT STANDARD GUIDELINES FOR EMERGENCY ACCESS.
25. DEVELOPER TO INSTALL STREET LIGHTS.

PROJECT TEAM

CIVIL ENGINEER
HUNSAKER & ASSOCIATES SD, INC.
9707 WAPLES STREET
SAN DIEGO, CA 92121
(858) 558-4500

ARCHITECT
ARCHITECTS ORANGE
144 N. ORANGE STREET
ORANGE, CA 92866
(714) 639-9860

GEOTECHNICAL
LEIGHTON AND ASSOCIATES, INC.
3934 MURPHY CANYON ROAD, STE B205
SAN DIEGO, CA 92123
(858) 292-0771

LANDSCAPE ARCHITECT
MJS LANDSCAPE ARCHITECT
507 30TH STREET
NEWPORT BEACH, CA 92663
(949) 675-9965

APPLICANT
PR II/WOOD OCEANSIDE, LLC
7700 IRVINE CENTER DRIVE, SUITE 600
IRVINE, CA 92618

DRY UTILITY CONSULTANT
UTILITY SPECIALIST SOUTHWEST, INC
4429 MORENA BLVD.
SAN DIEGO, CA 92117
(858) 866-8565

BRIAN PIANCA — 05/29/19
(415) 888--8537 — DATE

APPLICANT REPRESENTATIVE
THE LIGHTFOOT PLANNING GROUP
5900 PASTEUR COURT, SUITE 110
CARLSBAD, CA 92008
(760) 692-1924

REGISTERED PROFESSIONAL ENGINEER — RAYMOND L. MARTIN — NO. 48670 EXP. 6/30/20 — CIVIL — STATE OF CALIFORNIA

RAYMOND L. MARTIN — R.C.E. 48670 — 01/29/19 — DATE

TENTATIVE MAP - RT19-00001
MIXED USE DEVELOPMENT PLAN - RD19-00001
REGULAR COASTAL PERMIT RRP - RRP19-00001

PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC.
PLANNING: 9707 Waples Street, San Diego, CA 92121
ENGINEERING: (858) 558-4500
SURVEYING: FAX (858) 558-1414

NO.	REVISIONS	DATE	BY
1	1st SUBMITTAL	01/29/19	H&A
2	2st SUBMITTAL	05/29/19	H&A
3	3rd SUBMITTAL	07/19/19	H&A
4			
5			
6			
7			
8			

TENTATIVE MAP/ MIXED USE DEVELOPMENT PLAN/ REGULAR COASTAL PERMIT

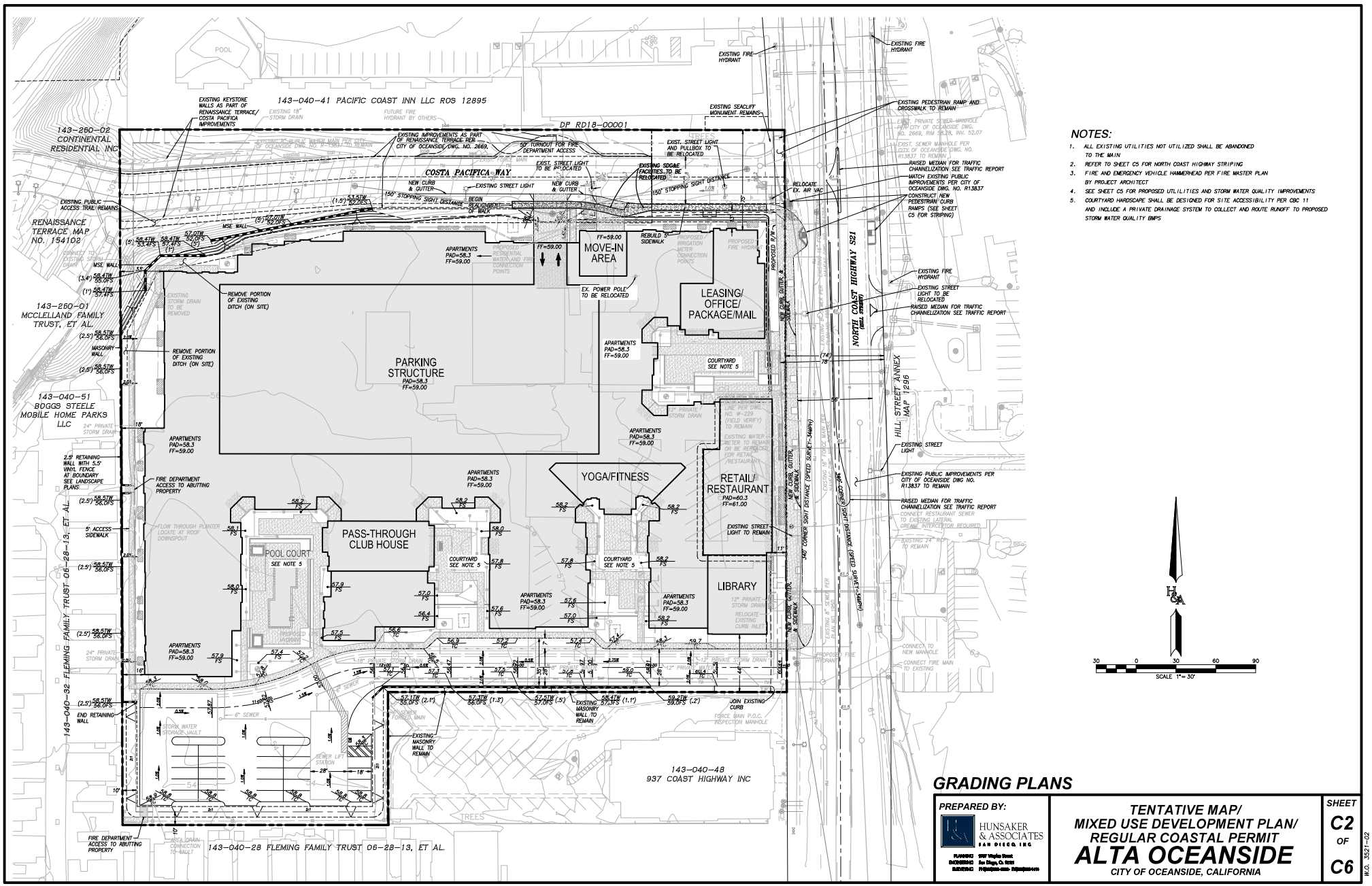
ALTA OCEANSIDE

CITY OF OCEANSIDE, CALIFORNIA

SHEET C1 OF C6

W.O. 3521-02

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NOTES:

1. ALL EXISTING UTILITIES NOT UTILIZED SHALL BE ABANDONED TO THE MAIN
2. REFER TO SHEET C5 FOR NORTH COAST HIGHWAY STRIPING
3. FIRE AND EMERGENCY VEHICLE HAMMERHEAD PER FIRE MASTER PLAN BY PROJECT ARCHITECT
4. SEE SHEET C5 FOR PROPOSED UTILITIES AND STORM WATER QUALITY IMPROVEMENTS
5. COURTYARD HARDSCAPE SHALL BE DESIGNED FOR SITE ACCESSIBILITY PER CBC 11 AND INCLUDE A PRIVATE DRAINAGE SYSTEM TO COLLECT AND ROUTE RUNOFF TO PROPOSED STORM WATER QUALITY BMPS

GRADING PLANS

PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC

PLANNING 9707 Waples Street
ENGINEERING San Diego, CA 92121
SURVEYING tel (858) 558-4500 fax (858) 558-1414

TENTATIVE MAP/
MIXED USE DEVELOPMENT PLAN/
REGULAR COASTAL PERMIT

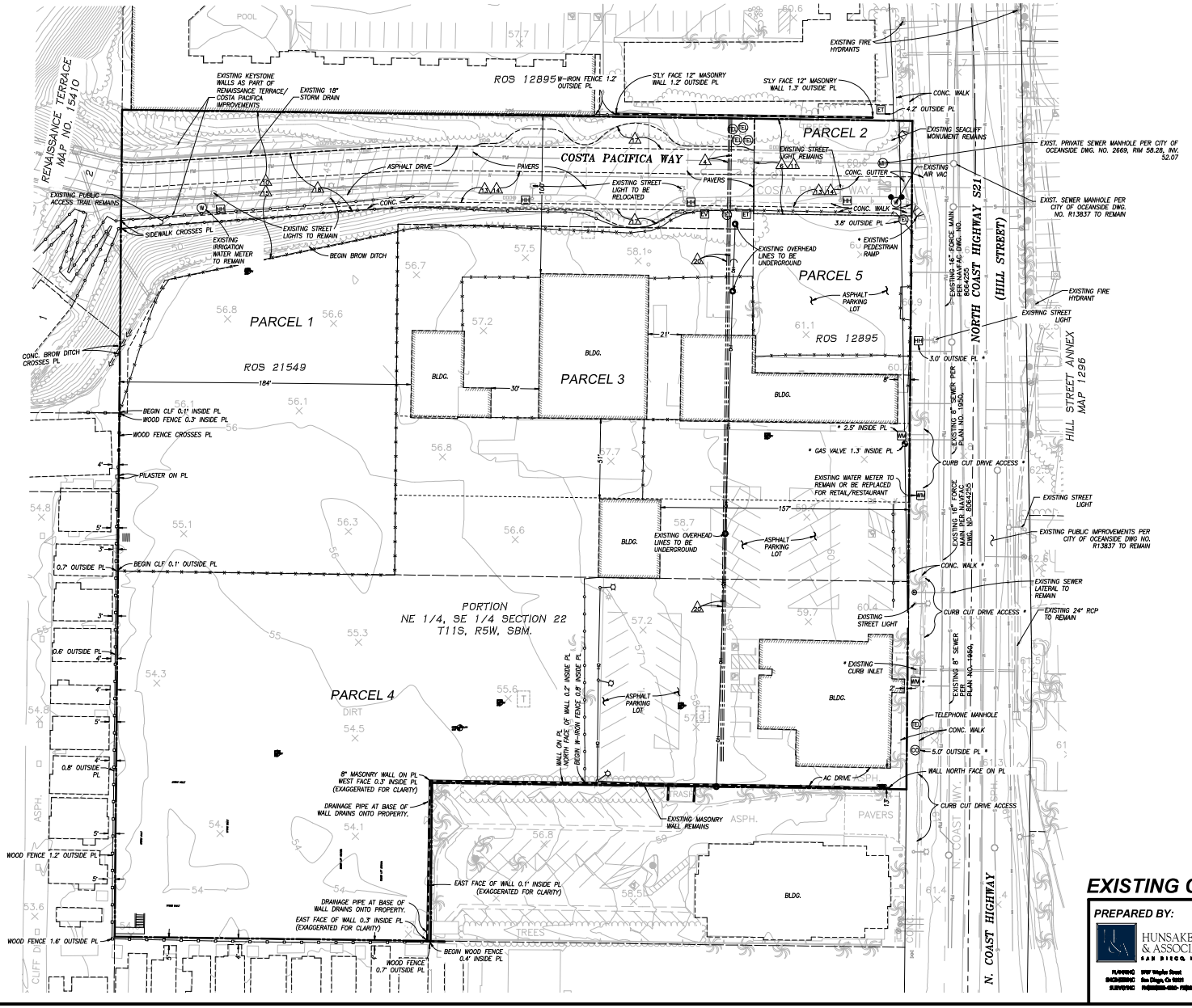
ALTA OCEANSIDE

CITY OF OCEANSIDE, CALIFORNIA

SHEET C2 OF C6

W.O. 3521-02

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LEGEND (THIS SHEET)

- INDICATES ALTA SURVEY BOUNDARY
- INDICATES 8" MASONRY WALL (UNLESS OTHERWISE NOTED)
- INDICATES BROW DITCH FLOWLINE
- INDICATES BUILDING OVERHANG
- INDICATES BUILDING FOOTPRINT
- INDICATES CHAIN LINK FENCE (UNLESS OTHERWISE NOTED)
- INDICATES 6' WOOD FENCE WITH RAZOR WIRE
- INDICATES WROUGHT IRON FENCE
- INDICATES OVERHEAD UTILITY LINE
- INDICATES EXISTING WATERLINE PER PUBLIC RECORD
- INDICATES EXISTING SANITARY SEWER FORCE MAIN PER PUBLIC RECORD
- INDICATES EXISTING UNDERGROUND CABLE TELEVISION PER PUBLIC RECORD
- INDICATES EXISTING UNDERGROUND GAS LINE PER PUBLIC RECORD
- INDICATES EXISTING STORM DRAIN LINE PER PUBLIC RECORD
- INDICATES EXISTING UNDERGROUND ELECTRICAL LINE PER PUBLIC RECORD
- INDICATES EXISTING UNDERGROUND TELEPHONE LINE PER PUBLIC RECORD
- INDICATES EXISTING SANITARY SEWER PER PUBLIC RECORD
- BLDG. INDICATES BUILDING
- COR. INDICATES CORNER
- CLF INDICATES CHAIN LINK FENCE
- HH INDICATES ELECTRIC HAND HOLE
- ET INDICATES ELECTRIC TRANSFORMER PAD
- EV INDICATES ELECTRIC VAULT
- INDICATES EASEMENT SEE SHEET C6
- INDICATES FIRE HYDRANT
- INDICATED GUARD BOLLARD
- INDICATES GUY ANCHOR
- INDICATES UTILITY POLE
- INDICATES PEDESTRIAN RAMP
- PL INDICATES PROPERTY LINE
- CO INDICATES SEWER CLEANOUT
- MH INDICATES SEWER MANHOLE (UNLESS OTHERWISE NOTED)
- INDICATES STREET LIGHT
- INDICATES STORM DRAIN CURB INLET W/ MANHOLE
- TEL INDICATES TELEPHONE PEDESTAL (UNLESS OTHERWISE NOTED)
- INDICATES TRAFFIC SIGN (UNLESS OTHERWISE NOTED)
- WM INDICATES WATER METER
- W INDICATES WATER STRUCTURE
- INDICATES WATER VALVE (UNLESS OTHERWISE NOTED)
- W-IRON INDICATES WROUGHT IRON

NOTE

* EXISTING IMPROVEMENTS ALONG COAST HIGHWAY FRONTAGE SHALL BE REMOVED OR RELOCATED TO IMPLEMENT THIS PROJECT

SEE ITEM UNDER "TABLE "A" NOTES" IN REGARDS TO THE SPECIFICS OF THE UTILITIES REFLECTED HEREON.

EXISTING CONDITIONS MAP

PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC
PLANNING ENGINEERING SURVEYING
9707 Waples Street San Diego, Ca 92121 (858)558-4500 FAX(858)558-1414

TENTATIVE MAP/ MIXED USE DEVELOPMENT PLAN/ REGULAR COASTAL PERMIT

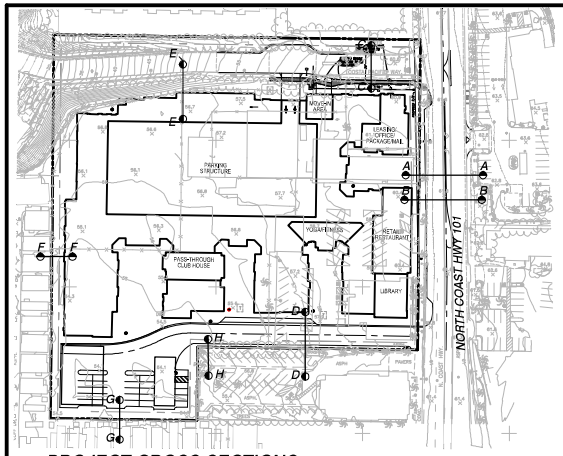
ALTA OCEANSIDE

CITY OF OCEANSIDE, CALIFORNIA

SHEET C3 OF C6

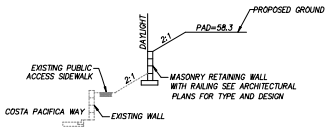
W.O. 3521-02

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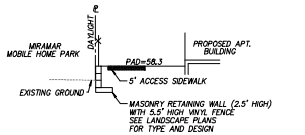
PROJECT CROSS SECTIONS

SCALE: 1"=80'



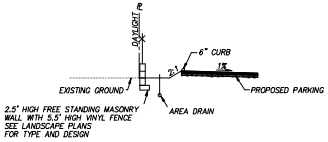
SECTION E-E

NORTHERLY SECTION THROUGH COSTA PACIFICA NTS



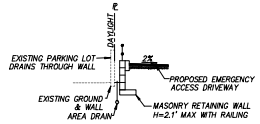
SECTION F-F

WESTERLY SECTION THROUGH MOBILE HOME PARK NTS



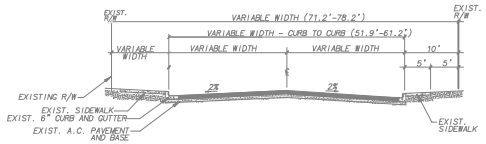
SECTION G-G

SOUTHERLY SECTION THROUGH MOBILE HOME PARK NTS



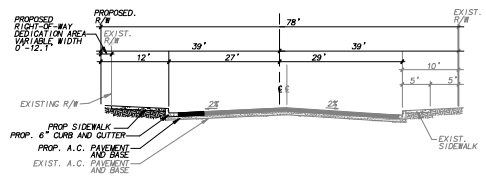
SECTION H-H

SOUTHERLY SECTION THROUGH EXISTING HOTEL NTS



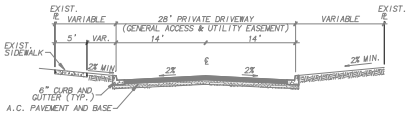
A NORTH COAST HIGHWAY 101 — EXISTING PUBLIC STREET

SECONDARY ARTERIAL – 25 MPH POSTED SPEED LIMIT
34 MPH SPEED LIMIT SURVEY CONDUCTED BY THE CITY OF OCEANSIDE ENGINEERING DIVISION ON 12-06-05. NTS



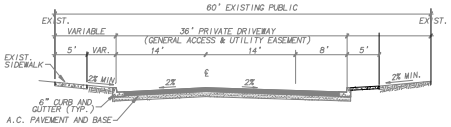
B NORTH COAST HIGHWAY 101 — PROPOSED PUBLIC STREET W/ PROPOSED R/W DEDICATION

SECONDARY ARTERIAL – 25 MPH POSTED SPEED LIMIT
34 MPH SPEED LIMIT SURVEY CONDUCTED BY THE CITY OF OCEANSIDE ENGINEERING DIVISION ON 12-06-05. NTS



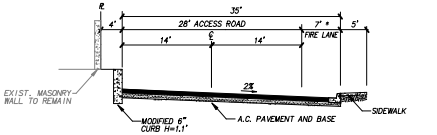
C COSTA PACIFICA WAY — WESTERN SECTION EXISTING PRIVATE STREET

PRIVATE DRIVEWAY (NO PARKING) NTS



D COSTA PACIFICA WAY — PROPOSED WIDENING — EASTERN SECTION EXISTING PRIVATE STREET

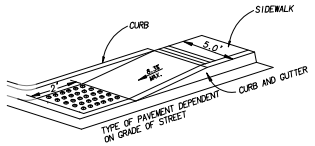
PRIVATE DRIVEWAY (NO PARKING) NTS



E EMERGENCY/ACCESS ROAD — PROPOSED PRIVATE DRIVEWAY

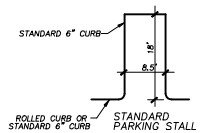
PRIVATE DRIVEWAY (NO PARKING) NTS

* WIDENED WHERE SHOWN ON PLANS FOR AERIAL LADDER ACCESS



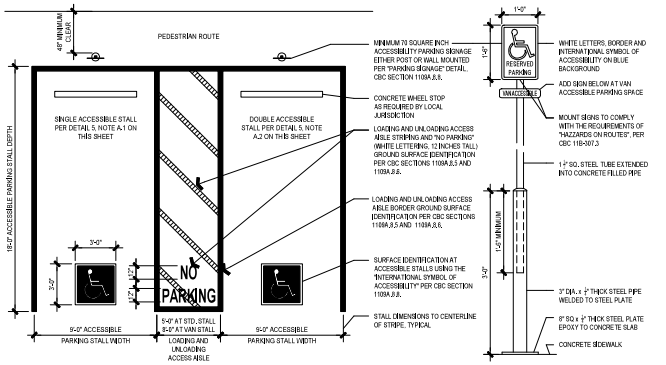
PEDESTRIAN RAMP

NOTE: RAMP PER CBC CHAP. 11A, SECTION 1112A REQUIREMENTS NTS



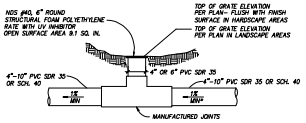
STANDARD PARKING DETAIL — PRIVATE

NO COMPACT PARKING NTS



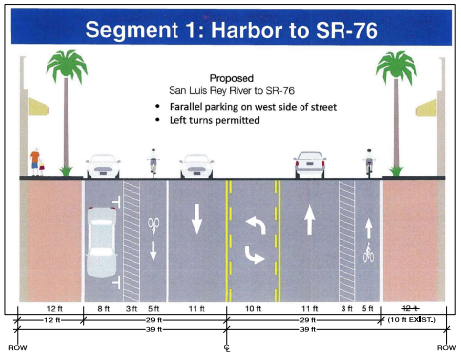
ACCESSIBLE PARKING DETAIL — PRIVATE

NTS



AREA DRAIN DETAIL

NOTE: CONTRACTOR TO EXTEND AREA DRAINS AT SIDING FINISHED GROUND AND CAP. AFTER LANDSCAPING IS COMPLETE, REMOVE CAP AND PLACE GRATE TO FINISHED GRADE. NTS



STRIPING SECTION — PRIVATE

SEE SHEET C5 FOR STRIPING PLAN
SOURCE: COAST HIGHWAY CORRIDOR PLAN NTS

DETAILS

PREPARED BY:

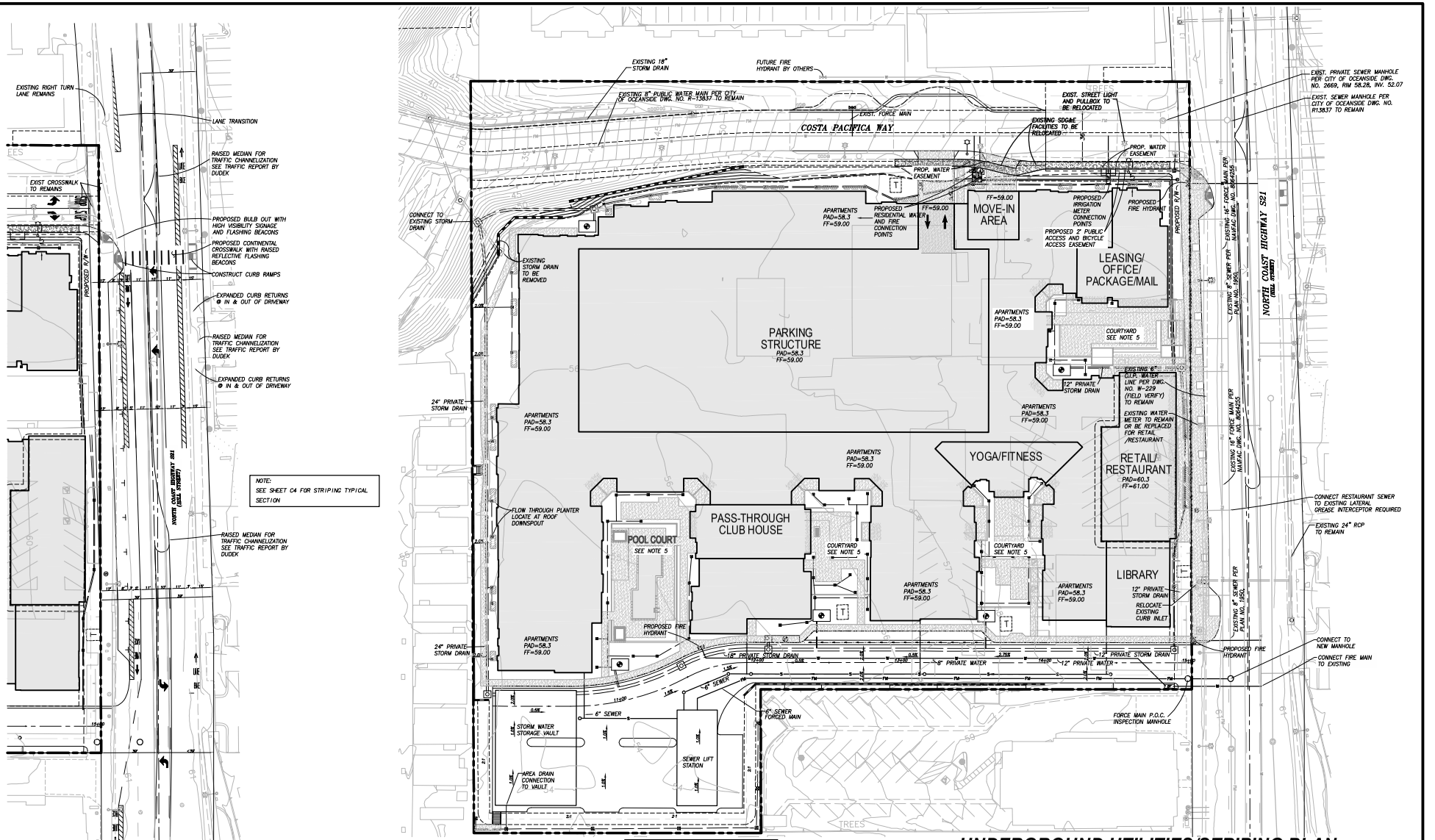
HUNSAKER & ASSOCIATES SAN DIEGO, INC

PLANNING: 9707 Waples Street, San Diego, CA 92121
ENGINEERING: PH(858)558-4500 FX(858)558-1414
SURVEYING:

TENTATIVE MAP/
MIXED USE DEVELOPMENT PLAN/
REGULAR COASTAL PERMIT
ALTA OCEANSIDE
CITY OF OCEANSIDE, CALIFORNIA

SHEET C4 OF C6

R:\1535\APN\Tentative Map\TM Sheet 4.dwg[Jul-19-2018 10:08]



UNDERGROUND UTILITIES/STRIPING PLAN

PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC
PLANNING ENGINEERING SURVEYING
9707 Waples Street San Diego, CA 92121

TENTATIVE MAP/
MIXED USE DEVELOPMENT PLAN/
REGULAR COASTAL PERMIT

ALTA OCEANSIDE

CITY OF OCEANSIDE, CALIFORNIA

SHEET C5 OF C6

W.O. 3521-02

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LEGAL DESCRIPTION

REAL PROPERTY IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA DESCRIBED AS FOLLOWS:

PARCEL 1: (APN: 143-040-23-00 AND A PORTION OF 143-040-54-00)

THAT PORTION OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 22, TOWNSHIP 11 SOUTH, RANGE 5 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHEAST CORNER OF SAID NORTHEAST QUARTER OF THE SOUTHEAST QUARTER; THENCE WEST ALONG THE SOUTH LINE OF SAID NORTHEAST QUARTER OF THE SOUTHEAST QUARTER, 370.00 FEET, MORE OR LESS, TO A POINT IN THE WEST RIGHT OF WAY LINE OF HILL STREET; THENCE NORTH ALONG SAID WEST RIGHT OF WAY LINE, 710.48 FEET, MORE OR LESS, TO THE SOUTHEAST CORNER OF THE LANDS CONVEYED TO THE CALIFORNIA PETROLEUM CORPORATION, A CORPORATION, BY DEED DATED DECEMBER 20, 1926 AND RECORDED DECEMBER 20, 1926 AND RECORDED DECEMBER 23, 1926 IN BOOK 1315, PAGE 15 OF DEEDS; THENCE WEST ALONG THE SOUTH LINE OF THE LANDS SO CONVEYED, 100.00 FEET; THENCE NORTH ALONG THE WEST LINE OF THE LANDS SO CONVEYED, 90.72 FEET TO THE NORTHWEST CORNER OF THE LAND SO CONVEYED BEING THE TRUE POINT OF BEGINNING; THENCE CONTINUING NORTH ALONG THE NORTHERLY PROLONGATION OF THE LAND SO CONVEYED 70.00 FEET; THENCE WEST ON A LINE PARALLEL WITH SAID SOUTH LINE OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER, 400.0 FEET; THENCE SOUTH PARALLEL WITH SAID WESTERLY RIGHT OF WAY LINE OF HILL STREET, 291.36 FEET; THENCE EAST PARALLEL WITH SAID SOUTH LINE OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER, A DISTANCE OF 175.00 FEET; THENCE NORTH PARALLEL WITH SAID WESTERLY LINE OF HILL STREET, 221.36 FEET; THENCE EAST PARALLEL WITH SAID SOUTH LINE OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER, 225.00 FEET TO THE TRUE POINT OF BEGINNING.

PARCEL 1A (NON PLOTTABLE):

NON-EXCLUSIVE APPURTENANT EASEMENTS FOR UTILITIES AND DRAINAGE AS SET FORTH IN THAT CERTAIN AGREEMENT AND RECIPROCAL GRANT OF EASEMENTS EXECUTED BY AND BETWEEN CH OCEANSIDE, LLC, A DELAWARE LIMITED LIABILITY COMPANY AND CONTINENTAL RESIDENTIAL, INC., A CALIFORNIA CORPORATION, RECORDED DECEMBER 15, 2005 AS DOCUMENT NO. 2005-1077596 OF OFFICIAL RECORDS.

PARCEL 2: (APN: 143-040-54-00)

BEING THAT PORTION OF THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 22, TOWNSHIP 11 SOUTH, RANGE 5 WEST, SAN BERNARDINO MERIDIAN, GRANTED ON OCTOBER 22, 1940, BY DAVID RORICK AND MAUREEN RORICK TO THE CITY OF OCEANSIDE FOR STREET AND SIDEWALK PURPOSES AND DESCRIBED IN THAT CERTAIN GRANT DEED RECORDED ON OCTOBER 25, 1940, IN BOOK 1087 PAGE 186 OF OFFICIAL RECORDS MORE PARTICULARLY KNOWN AND DESCRIBED AS FOLLOWS:

COMMENCING AT A POINT IN THE SOUTH LINE OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 22, TOWNSHIP 11 SOUTH, RANGE 5 WEST, S.B.M., DISTANT ALONG SAID LINE 370 FEET WESTERLY FROM THE EAST LINE OF SAID SECTION, SAID POINT BEING ON THE WESTERLY LINE OF HILL STREET; THENCE NORTH 0° 19' EAST ALONG THE SAID WESTERLY LINE OF HILL STREET 811.20 FEET FOR THE TRUE POINT OF BEGINNING; THENCE WEST 100 FEET ALONG THE NORTHERLY LINE OF THE LOT OF LAND CONVEYED BY FRANK A. MURCH AND IONE L. MURCH TO CALIFORNIA PETROLEUM CORPORATION (NOW THE TEXAS COMPANY) BY DEED DATED DECEMBER 20, 1926, AND RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY IN BOOK 1315 OF DEEDS AT PAGE 15; THENCE NORTH 0° 19' EAST PARALLEL WITH THE SAID LINE OF HILL STREET 60 FEET; THENCE EAST 100 FEET TO THE SAID LINE OF HILL STREET; THENCE SOUTH 0° 19' WEST ALONG SAID LINE OF HILL STREET 60 FEET TO THE POINT OF BEGINNING.

PARCEL 3: (APN: 143-040-22-00)

THAT PORTION OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 22, 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:

COMMENCING AT THE SOUTHEAST CORNER OF SAID NORTHEAST QUARTER OF THE SOUTHEAST QUARTER; THENCE WEST ALONG THE SOUTH LINE OF SAID NORTHEAST QUARTER OF THE SOUTHEAST QUARTER, 370.00 FEET, MORE OR LESS, TO A POINT IN THE WEST RIGHT OF WAY LINE OF HILL STREET; THENCE NORTH ALONG SAID WEST RIGHT OF WAY LINE, 579.84 FEET TO THE TRUE POINT OF BEGINNING OF THE WITHIN DESCRIBED PARCEL OF LAND; THENCE FROM SAID TRUE POINT OF BEGINNING CONTINUING NORTH ALONG SAID WEST RIGHT OF WAY LINE, 130.64 FEET, MORE OR LESS, TO THE SOUTHEAST CORNER OF THE LANDS CONVEYED TO THE CALIFORNIA PETROLEUM CORPORATION, BY DEED DATED DECEMBER 20, 1926, AND RECORDED DECEMBER 23, 1926 IN BOOK 1315, PAGE 15 OF DEEDS, RECORDS OF SAN DIEGO COUNTY; THENCE WEST ALONG THE SOUTH LINE OF THE LANDS SO CONVEYED, 100.00 FEET; THENCE NORTH ALONG THE WEST LINE OF THE LANDS SO CONVEYED, 90.72 FEET TO THE SOUTHEAST CORNER OF LAND DESCRIBED IN DEED TO ALBERT ZAISER, ET UX, RECORDED SEPTEMBER 22, 1958 AS FILE NO. 156643 OF OFFICIAL RECORDS OF SAID COUNTY; THENCE WESTERLY ALONG THE SOUTHERLY LINE OF SAID ZAISER LAND, 225.00 FEET TO THE EASTERLY LINE OF LAND DESCRIBED IN DEED TO ALBERT ZAISER, ET UX, RECORDED MARCH 16, 1956 AS FILE NO. 36384 OF OFFICIAL RECORDS OF SAID COUNTY; THENCE SOUTHERLY ALONG SAID EASTERLY LINE PARALLEL WITH THE WESTERLY LINE OF HILL STREET, 221.36 FEET; THENCE EAST ON A LINE PARALLEL WITH THE SOUTH LINE OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER, 325.00 FEET, MORE OR LESS, TO THE HEREINBEFORE DESCRIBED TRUE POINT OF BEGINNING.

PARCEL 4: (APN: 143-040-26-00)

ALL THAT PORTION OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 22, TOWNSHIP 11 SOUTH, RANGE 5 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF OCEANSIDE, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF, DESCRIED AS FOLLOWS:

COMMENCING AT THE SOUTHEASTERLY CORNER OF SAID NORTHEAST QUARTER OF THE SOUTHEAST QUARTER; THENCE WEST ALONG THE SOUTH LINE OF SAID NORTHEAST QUARTER OF THE SOUTHEAST QUARTER, 370.00 FEET, MORE OR LESS, TO A POINT IN THE WEST LINE OF HILL STREET, THENCE NORTH ALONG THE WEST LINE OF HILL STREET, 448.48 FEET TO A POINT BEING THE POINT OF INTERSECTION OF THE WEST LINE OF HILL STREET WITH THE NORTH LINE OF LAND CONVEYED BY F. A. MURCH, ET UX, TO B. MALMSTROM, ET UX, BY DEED RECORDED SEPTEMBER 18, 1931 IN BOOK 43, PAGE 78 OF OFFICIAL RECORDS AND THE TRUE POINT OF BEGINNING; THENCE WEST PARALLEL WITH THE SOUTH LINE OF SAID NORTHEAST QUARTER OF THE SOUTHEAST QUARTER BEING ALONG THE NORTH LINE OF SAID LAND CONVEYED TO MALMSTROM AND ALONG THE NORTH LINE OF LAND CONVEYED TO DAVID RORICK JR., ET UX, TO WILLIAM L. D. HAMILTON, ET UX, AND GEORGE A. STRAHAN, ET UX, BY DEED RECORDED AUGUST 30, 1946 IN BOOK 2225, PAGE 138 OF OFFICIAL RECORDS, A DISTANCE OF 300 FEET TO THE NORTHWEST CORNER OF SAID HAMILTON AND STRAHAM LAND; THENCE SOUTH PARALLEL WITH HILL STREET BEING ALONG THE WEST LINE OF SAID HAMILTON AND STRAHAM LAND, A DISTANCE OF 100 FEET TO THE SOUTHWEST CORNER OF HAMILTON AND STRAHAM LAND, BEING ALSO A POINT ON THE NORTH LINE OF LAND CONVEYED BY GUST SCHEUNEMANN, ET UX, TO JACK WEBERG, ET UX, BY DEED RECORDED NOVEMBER 6, 1923 IN BOOK 968, PAGE 190 OF DEEDS; THENCE WEST PARALLEL WITH THE SOUTH LINE OF SAID NORTHEAST QUARTER OF THE SOUTHEAST QUARTER BEING ALONG THE NORTH LINE OF SAID LAND CONVEYED TO WEBERG, A DISTANCE OF 200 FEET TO THE NORTHWEST CORNER OF SAID WEBERG LAND; THENCE NORTH PARALLEL WITH THE EAST LINE OF SAID NORTHEAST QUARTER OF THE SOUTHEAST QUARTER; A DISTANCE OF 231.36 FEET TO THE SOUTHWEST CORNER OF LAND CONVEYED BY DAVID RORICK, JR. TO CHARLES BURKE, ET UX, THENCE EAST PARALLEL WITH SAID SOUTH LINE OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER BEING ALONG THE SOUTH LINE OF SAID LAND CONVEYED TO BURKE, A DISTANCE OF 500.00 FEET TO THE WEST LINE OF HILL STREET; THENCE SOUTH ALONG THE WEST LINE OF HILL STREET, 131.36 FEET TO THE TRUE POINT OF BEGINNING.

PARCEL 5: (APN: 143-040-20-00)

THE NORTH 100.72 FEET OF THE SOUTH 811.20 FEET OF THE WEST 100 FEET OF THE EAST 470 FEET OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 22, TOWNSHIP 11 SOUTH, RANGE 5 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF OCEANSIDE, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF.

BASIS OF BEARINGS

THE BASIS OF BEARINGS IS THE CALIFORNIA COORDINATE ZONE 6, 2011.00 EPOCH, NORTH AMERICAN DATUM OF 1983 (NAD83), GRID BEARING BETWEEN STATIONS 1071 AND 1016 PER RECORD OF SURVEY NO. 21787.
I.E. N74°35'14"E

REFERENCED BEARINGS FROM OTHER DOCUMENTS/DEEDS MAY OR MAY NOT BE IN TERMS OF SAID SYSTEM.

THE COMBINED SCALE FACTOR AT STATION 1071 1 IS 0.99996151.
GRID DISTANCE = GROUND DISTANCE X COMBINED SCALE FACTOR.

ALL DISTANCES SHOWN ARE GROUND UNLESS OTHERWISE NOTED.

TITLE REFERENCE

THIS IS BASED ON THE TITLE INSURANCE COMMITMENT ISSUED BY FIRST AMERICAN TITLE COMPANY AS COMMITMENT NO. NHSC-5759917 DATED OCTOBER 11, 2018.

△ INDICATES EXCEPTION NUMBER REFERENCE IN THE PRELIMINARY REPORT.

PARCEL X INDICATES PARCEL NUMBER REFERENCED IN THE PRELIMINARY REPORT.

ASSESSOR PARCEL NO.

143-040-20
143-040-22
143-040-23
143-040-26
143-040-54

EASEMENTS

THE FOLLOWING MATTERS AFFECT PARCELS 1 AND 2:

△1 AN EASEMENT FOREITHER OR BOTH POLE LINES, UNDERGROUND CONDUITS, INGRESS, EGRESS AND INCIDENTAL PURPOSES, RECORDED MARCH 5, 1928 IN BOOK 1451, PAGE 74 OF DEEDS. IN FAVOR OF: SAN DIEGO CONSOLIDATED GAS AND ELECTRIC COMPANY AFFECTS: PARCEL 1 TO BE QUITCLAIMED.

5. AN EASEMENT TO CONSTRUCT, PLACE, REMOVE, OPERATE, INSPECT, MAINTAIN AND REPLACE POLE AND TWO ANCHORS AND AERIAL CABLE WITH THE NECESSARY WIRES, FIXTURES AND INCIDENTAL PURPOSES, RECORDED AUGUST 27, 1937 IN BOOK 695, PAGE 5 OF OFFICIAL RECORDS. IN FAVOR OF: SOUTHERN CALIFORNIA TELEPHONE COMPANY AFFECTS: PARCELS 1 AND 2 THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION TO BE QUITCLAIMED.

△3 AN EASEMENT FOR ROAD AND INCIDENTAL PURPOSES, RECORDED SEPTEMBER 28, 1935 IN BOOK 438, PAGE 172 OF OFFICIAL RECORDS. IN FAVOR OF: THE TEXAS COMPANY, A CORPORATION AFFECTS: PARCEL 2 TO REMAIN.

△4 THE TERMS, PROVISIONS AND EASEMENT(S) CONTAINED IN THE DOCUMENT ENTITLED "AGREEMENT AND RECIPROCAL GRANT OF EASEMENTS" RECORDED DECEMBER 15, 2005 AS INSTRUMENT NO. 2005-1077596 OF OFFICIAL RECORDS. AFFECTS PARCEL 1. THE LANDSCAPE EASEMENT IS TO BE REDUCED PER PARAGRAPH ON SAID EASEMENT

△11 AN EASEMENT FOR PUBLIC UTILITIES, INGRESS, EGRESS AND INCIDENTAL PURPOSES, RECORDED MARCH 09, 2006 AS INSTRUMENT NO. 2006-0163701 OF OFFICIAL RECORDS. IN FAVOR OF: CITY OF OCEANSIDE AFFECTS: PARCEL 2 AS DESCRIBED THEREIN TO REMAIN.

12. AN EASEMENT FOR PUBLIC UTILITIES, INGRESS, EGRESS AND INCIDENTAL PURPOSES, RECORDED JULY 31, 2006 AS INSTRUMENT NO. 2006-0538877 OF OFFICIAL RECORDS. IN FAVOR OF: SAN DIEGO GAS & ELECTRIC COMPANY AFFECTS: PARCEL IS THE EXACT LOCATION AND EXTENT OF SAID EASEMENT IS NOT DISCLOSED OF RECORD TO REMAIN.

△14 AN EASEMENT FOR PUBLIC GENERAL UTILITY FOR FIRE ACCESS AND WATER AND INCIDENTAL PURPOSES, RECORDED SEPTEMBER 15, 2006 AS INSTRUMENT NO. 2006-0658154 OF OFFICIAL RECORDS. IN FAVOR OF: CITY OF OCEANSIDE AFFECTS: PARCELS 1 AND 2 TO REMAIN.

△15 AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES, RECORDED OCTOBER 20, 2006 AS INSTRUMENT NO. 2006-0746423 OF OFFICIAL RECORDS. IN FAVOR OF: SAN DIEGO GAS & ELECTRIC COMPANY AFFECTS: PARCEL 1 TO BE QUITCLAIMED.

16. AN EASEMENT FOR AERIAL AND UNDERGROUND TELECOMMUNICATIONS EQUIPMENT AND INCIDENTAL PURPOSES, RECORDED FEBRUARY 27, 2007 AS INSTRUMENT NO. 2007-0130933 OF OFFICIAL RECORDS. IN FAVOR OF: COXCOM INC., D/B/A COX COMMUNICATIONS SAN DIEGO AFFECTS: PARCEL 1 THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION TO BE QUITCLAIMED.

△17 AN EASEMENT FOR PUBLIC ACCESS EASEMENT FOR PEDESTRIAN AND BICYCLE ACCESS AND INCIDENTAL PURPOSES, RECORDED JANUARY 23, 2008 AS INSTRUMENT NO. 2008-0031124 OF OFFICIAL RECORDS. IN FAVOR OF: CITY OF OCEANSIDE AFFECTS: PARCEL 1 TO REMAIN.

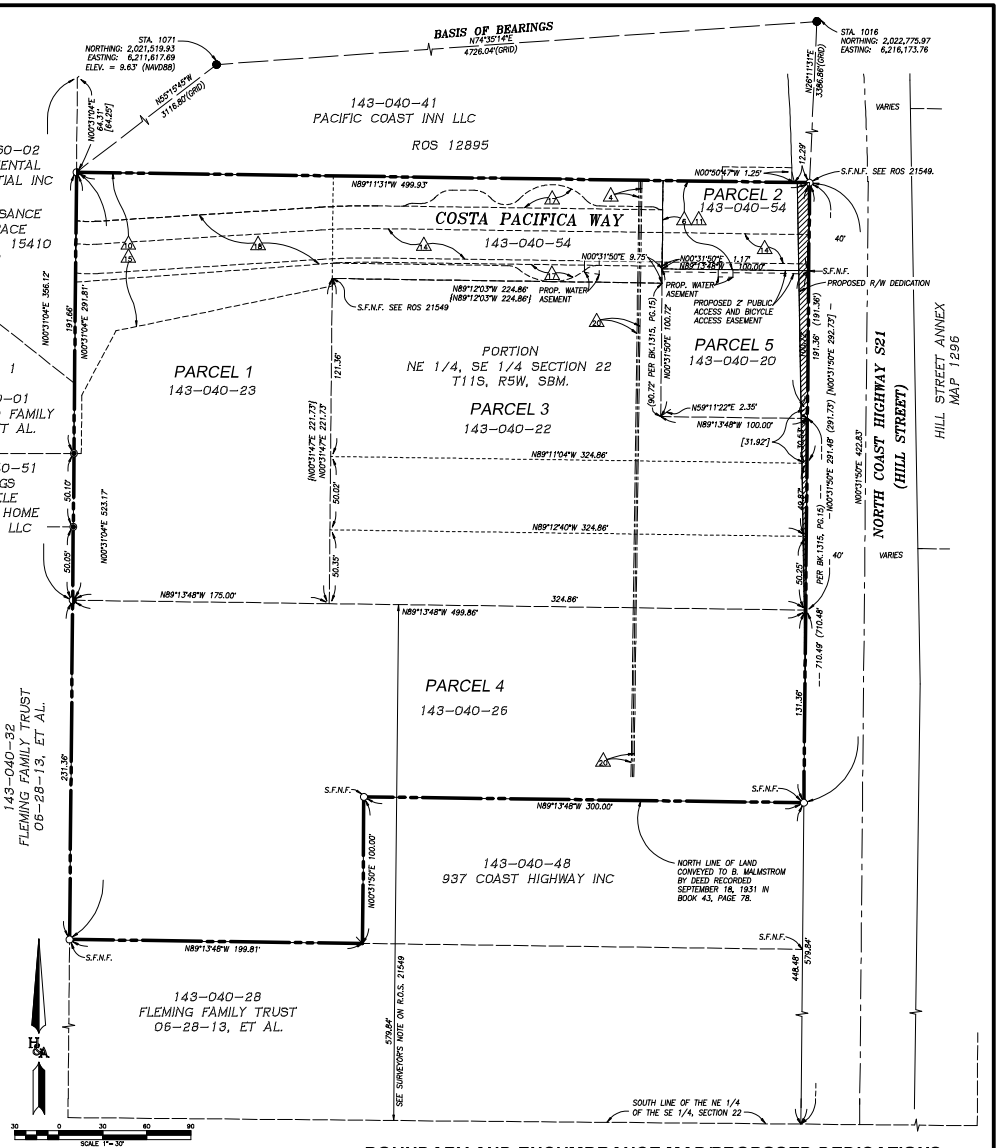
△18 AN EASEMENT FOR PUBLIC ACCESS EASEMENT FOR PEDESTRIAN AND BICYCLE ACCESS AND INCIDENTAL PURPOSES, RECORDED MARCH 24, 2009 AS INSTRUMENT NO. 2009-0147378 OF OFFICIAL RECORDS. IN FAVOR OF: CITY OF OCEANSIDE AFFECTS: THE LAND TO REMAIN

THE FOLLOWING MATTERS AFFECT PARCELS 3, 4 AND 5:

19. AN EASEMENT FOR PUBLIC UTILITIES, INGRESS AND EGRESS AND INCIDENTAL PURPOSES, RECORDED JANUARY 4, 1925 IN BOOK 1137 OF DEEDS, PAGE 352. IN FAVOR OF: SAN DIEGO GAS & ELECTRIC COMPANY AFFECTS: PARCEL 4 AS DESCRIBED THEREIN THE EXACT LOCATION AND EXTENT OF SAID EASEMENT IS NOT DISCLOSED OF RECORD TO BE QUITCLAIMED.

△20 AN EASEMENT FOR PUBLIC UTILITIES, INGRESS AND EGRESS AND INCIDENTAL PURPOSES, RECORDED MARCH 5, 1928 IN BOOK 1451 OF DEEDS, PAGE 74, IN FAVOR OF: SAN DIEGO CONSOLIDATED GAS AND ELECTRIC COMPANY AFFECTS: PARCELS 3 AND 4 AS DESCRIBED THEREIN TO BE QUITCLAIMED.

21. AN EASEMENT FOR PUBLIC UTILITIES, INGRESS AND EGRESS AND INCIDENTAL PURPOSES, RECORDED AUGUST 27, 1937 IN BOOK 695, PAGE 5 OF OFFICIAL RECORDS. IN FAVOR OF: SOUTHERN CALIFORNIA TELEPHONE COMPANY AFFECTS: THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION TO REMAIN.



BOUNDARY AND ENCUMBRANCE MAP/PROPOSED DEDICATIONS

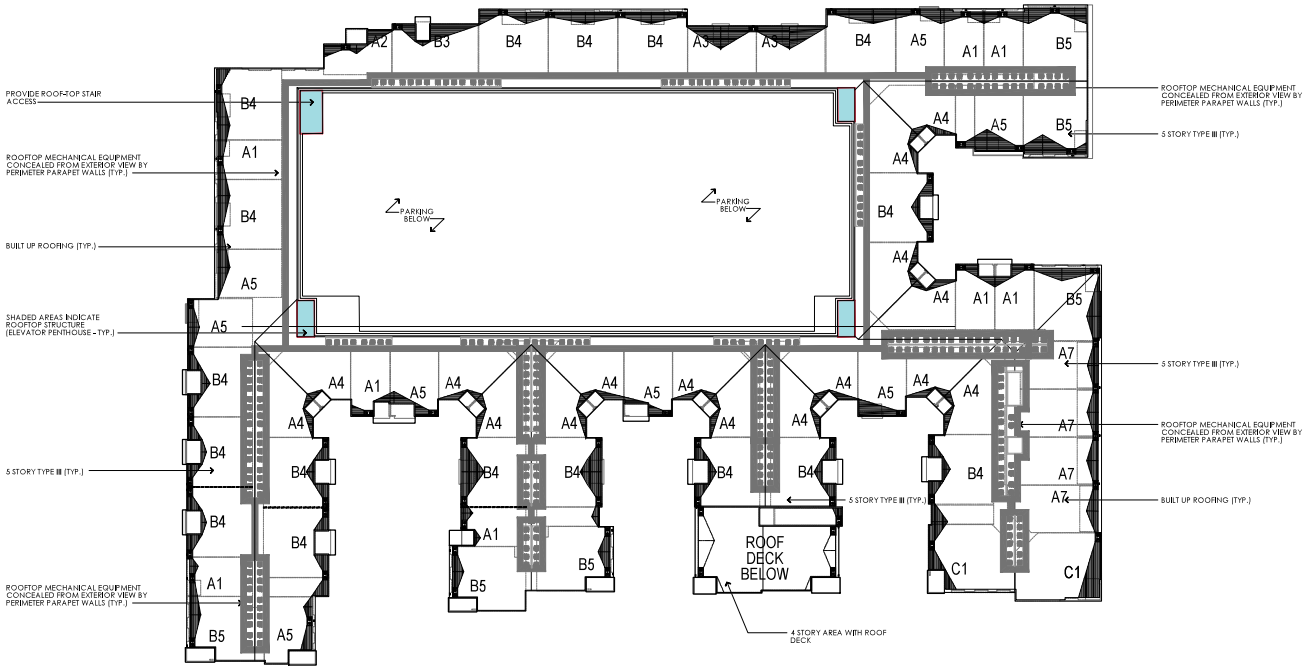
PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC.
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING (858)558-4500 - FAX(858)558-1414

TENTATIVE MAP/
MIXED USE DEVELOPMENT PLAN/
REGULAR COASTAL PERMIT
ALTA OCEANSIDE
CITY OF OCEANSIDE, CALIFORNIA

SHEET C6 OF C6

W.O. 3521-02

R:\1535\ePln\Tentative Map\TM Sheet 6.dwg[]Jul-19-2019:15:24



LEGEND

- LEASING / AMENITY
- PARKING STRUCTURE
- RESIDENTIAL
- RETAIL

NORTH

1"=30'-0" 0 15' 30' 60' 90'

BUILDING 1 COMPOSITE PLAN - LEVEL 6 / ROOF PLAN

A2.6

ALTA OCEANSIDE

WOOD PARTNERS

OCEANSIDE, CA

DATE: 05-29-19
JOB NO.: 2018-207

ARCHITECTS ORANGE
144 NORTH ORANGE ST., ORANGE, CA 92866
(714) 639-9860

ARCHITECTS ORANGE

Friday, May 10, 2019 3:11:17 PM
S:\2018\2018-207 WOOD PARTNERS OCEANSIDE\ENTITLEMENTS\18-207_A2.0 - A2.6 BUILDING 1 COMPOSITE PLANS.DWG

ATTACHMENT 5
Drainage Report

This is the cover sheet for Attachment 5.

ALTA Oceanside

Preliminary Drainage Study

City of Oceanside, California

Prepared for:

PR II/ WOOD OCEANSIDE LLC

7700 IRVINE CENTER DRIVE, SUITE 600

IRVINE, CA 92618

W.O. 3521-02

January 25, 2019
Revised July 12, 2019
Revised October 8, 2019

Prepared by:

Hunsaker & Associates
9707 Waples St.
San Diego, CA 92121
(858) 558-4500

Raymond L. Martin, RCE # 48670 — 10/8/19 Date

REGISTERED PROFESSIONAL ENGINEER
RAYMOND L. MARTIN
No. 48670
Exp. 06/30/20
CIVIL
STATE OF CALIFORNIA

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   2 – Soils Information
   3 – Runoff Coefficient Determination
   4 – Existing & Proposed Hydrology Calculations and Exhibits
   5 – Flood attenuation Calcs; Underground Storm Vault
   6 – Hydraulic Analysis of Existing Storm Drain System

1. Introduction

1.1. Scope of Work

The purpose of this study is to provide hydrology calculations in support of a proposed mixed use development containing apartments and retail in the City of Oceanside, California. This report will quantify runoff for the 100-year frequency storm event and recommend storm drain infrastructure needed to safely convey stormwater through the site. Treatment of storm water runoff from the site has been addressed in a separate report entitled “Stormwater Quality Management Plan for Alta Oceanside” prepared by Hunsaker & Associates, San Diego.

1.2. Existing Condition

The ALTA Oceanside property is a 5.31-acre site located in the City of Oceanside, CA, west of I-5 and south of the San Luis Rey River. The property is accessible from North Coast Highway by Costa Pacifica Way, an existing paved road that was constructed on this property by the Renaissance Terrace project, currently known as the Seacliff project located to the west (Map No 15410). A commercial hotel development bounds the property to the north, per Map No 12895. The site is bounded to the west and south by the MiraMar mobile home community (APN 143-040-26) and a hotel (APN 143-040-22). Refer to the project vicinity map located in appendix 1.

An approved drainage study for Renaissance Terrace was completed by PDC in 2006. The PDC drainage study’s calculations include runoff from the northern and central portion of ALTA Oceanside. We have reviewed the study and accept it as correct. We have incorporated the hydrology from that report, into our existing condition hydrology. The drainage report can be found in appendix 6 of this report.

The Renaissance Terrace project constructed a backbone storm drain system within Costa Pacifica Way that conveys runoff to San Luis Rey River. Prior to discharge to the river, a detention basin located immediately south accepts runoff and provides flood attenuation for the 10-year storm to meet Coastal Zone requirements of that project. The basin was sized by a separate report prepared by Rick Engineering entitled “Water Resources Technical Report” dated April 2001. See Appendix 6, for as builts for the existing storm drain system.

In the area of this project, the backbone storm drain system includes two curb inlets (existing condition nodes 220 and 205), to collect runoff from the street. An 18” RCP connects these inlets as part of the backbone system.

The drainage patterns across the project site are described below and generally divide the site into three drainage areas: northerly, central and southwesterly, each of which has drainage patterns that travel overland from east to west.

The **Northerly** drainage area is identified by nodes 185-195. This area drains east to west from North Coast Hwy to the westerly project boundary, where it is intercepted by a brow ditch that directs runoff northerly into an existing storm drain lateral at Node 195 that connects to the backbone storm drain system constructed by Renaissance Terrace in Costa Pacifica Way. The connection point is at node 205 on Costa Pacifica Way, which will become a point of analysis to determine any impacts on the system after development by the ALTA Oceanside project.

The **Central** drainage area is delineated by nodes 145, 150 and 155. This area also drains east to west through the project site, but discharges to the adjacent mobile home park overland. After storm flows traverse the mobile home park, runoff is intercepted by a ditch and catch basin prior to entering the Renaissance Terrace project, and is routed through the Renaissance Terrace storm drain laterals to the backbone storm drain system. The connection point is at node 180.

The **Southwesterly** drainage area drains southwest through the MiraMar mobile home park via overland flow. This area drains around the Renaissance Terrace project and drains to the San Luis Rey River north of the project. Southwesterly Drainage area also receives

Project area adjacent to **North Coast Highway** drains into and existing storm drain through an inlet near the south east corner of the project boundary which discharges to San Luis Rey River.

See **Appendix 4** for calculations of existing peak runoff from the site.

According to the FEMA Flood Insurance Rate Map (FIRM) for this site, the project is located in an unshaded Zone X, which is defined as “Areas determined to be outside the 500-year floodplain”. Refer to the FIRM Map in **Appendix 1**.

NRCS Soils report shows onsite soils as Hydrologic Soil Group “A”. A soils report was completed by Leighton in August, 2017. According to the Leighton report, the project consists of Huerhuero loam soil, which is classified as Hydrologic Soil Group “A”. Refer to **Appendix 2** for NRCS soils information.

1.3. Proposed Condition

This project proposes to develop the site with a mixed use building containing 309 apartments and retail uses. A design requirement is to collect and treat all runoff prior to discharging from the site. Since there is not an existing offsite storm drain system to receive runoff from the central or southwesterly drainage areas, we propose to route all storm water runoff to the existing backbone system in Costa Pacifica Way. An underground vault is recommended to attenuate the runoff from these areas prior to discharge into the existing system. The effect of this diversion on that system is discussed in the next section; however, we suggest that the diversion is a benefit to the MiraMar mobile home park in terms of eliminating overland discharge and nuisance water flow within that community. See **Appendix 4** for calculations of proposed condition run-off. Additionally, the project will also widen the North Coast Highway.

Storm drain design onsite includes three storm drains to convey runoff to the north.

- Flows from Costa Pacifica Way and adjacent project areas will be collected at an existing inlet and flows downstream within the storm drain system towards Renaissance Terrace.
- Flows from onsite drainage areas including the planter/roof drains and courtyard drains will flow southwesterly and around the building before it eventually confluence with the aforementioned flows toward the northwest corner as the storm drain turns southwest adjacent to Renaissance Terrace.

1.4. Effect of Diversion

As mentioned above, the project proposes to divert runoff away from the MiraMar mobile home park, routing of all runoff to the northwest into the existing backbone storm drain system in Costa Pacifica Way. Some of this drainage (the central area) is tributary to the storm drain system constructed by the renaissance Terrace project and the diversion is a change in routing.

The confluence analysis is at node 195 where the site's runoff entered the backbone system into a Type F Catch Basin. The proposed conditions model provides a peak Q occurring at the shorter time of concentration, where higher intensities create the highest peak flow. Essentially the short time represents a point in the storm where no runoff from the upper areas of the Central and Southwest Basin would arrive in the system because of its longer travel time, but the peak occurs because of the intensity of the storm delivering runoff from the northern sub-basin that includes Costa Pacifica Way. Later in the storm, when the peak flow from the central and southwestern basin arrives, having been delayed by the proposed underground storm vault, the lower intensity doesn't indicate a higher flow rate than at this earlier peak.

Of particular interest is the flow data results at node 180, the existing confluence point of runoff from the central and northerly portions of the project site. At this point, the inflow from the lateral collecting site area from our existing central drainage area is reduced because of the diversion of the central drainage area into the backbone system as discussed above. This point represents the most downstream point where the effect of the rerouting and attenuation of drainage onsite is experienced, and the calculations show a reduction of peak flow here. The results are tabulated in Section 3 of this report.

The proposed diversion increases drainage area tributary to the backbone system. As discussed above, the hydrology shows no increase in peak runoff, achieved by inclusion of the proposed attenuation vault that reduces peak runoff flow rates from this facility to approximately 1 cfs. The attenuation simulation result is in Appendix 5. The vault detains runoff from the southwestern portion of the site, releasing that volume of water slowly and at a time much later in the storm event, such that the downstream detention basin has had opportunity to manage the peak flows prior to receiving runoff from the southwestern portion of this site.

2. Methodology

1.1. Hydrology

The Rational Method as described in the June 2003 San Diego County Hydrology Manual (SDCHM), Section 3, was used for the hydrologic calculations for this project. The Rational Method formula is expressed as follows:

$Q = C\ I\ A$

$I = 7.44P_6T^{-0.645}$

$T = [1.8(1.1-C)\sqrt{D}] / (s^{1/3})$

Where:

Q = Peak discharge, in cubic feet per second (cfs).
C = Runoff coefficient, proportion of the rainfall that runs off the surface. The C coefficient was obtained from Table 3-1 of the SDCHM. It has no units and is based on the soil group and the development type for the drainage sub-area.
A = Drainage area contributing to the design location (ac).
I = Average rainfall intensity (in/hr). The formula can be found on Figure 3-2 of the SDCHM.
P_6 = 6-hour precipitation (in). This value was taken from the 6-hour isopluvial maps found in Appendix B of the SDCHM.
T = Time of concentration (min). The formula can be found on Figure 3-3 of the SDCHM.
D = Longest flow path distance (ft).
S = Slope along the flow path (%).

<u>Confluence Analysis</u>
Calculate the peak Q, T_c, and I for each of the independent drainage systems at the point of the junction. These values will be used for the MRM calculations. At the junction of two or more independent drainage systems, the respective peak flows are combined to obtain the maximum flow out of the junction at T_c. Based on the approximation that total runoff increases directly in proportion to time, a general equation may be written to determine the maximum Q and its corresponding T_c using the peak Q, T_c , and I for each of the independent drainage systems at the point immediately before the junction. The general equation requires that contributing Q's be numbered in order of increasing T_c . Let Q_1 , T_1 , and I_1 correspond to the tributary area with the shortest T_c . Likewise, let Q_2 , T_2 , and I_2 correspond to the tributary area with the next longer T_c ; Q_3 , T_3 , and I_3 correspond to the tributary area with the next longer T_c ; and so on. When only two independent drainage systems are combined, leave Q_3 , T_3 , and I_3 out of the equation. Combine the independent drainage systems using the junction equation below:

Junction Equation: T 1 < T 2 < T 3

$Q_{T1}=Q_1+T_1/T_2Q_2+T_1/T_3Q_3$

$Q_{T2}-Q_2+I_2/I_1Q_2+T_2/T_3Q_3$

$Q_{T3}=Q_3+I_3/I_1Q_1+I_3/I_2Q_2$

3. Results

The results from both the existing and proposed Rational Method hydrology calculations for the 100-year return event are listed below.

Table 1: Hydrology Results

	Q (cfs)		Tc (min)		Area (ac)	
Node #	EX	PR	EX	PR	EX	PR
195	1.28	6.25	15.22	7.07	0.83	5.2
205	5.90	10.56	5.23	7.18	1.94	6.2
235	9.84	11.97	5.78	7.3	2.3	6.4
180	25.2	24.7	6.9	8.2	6.12	9.5

Hydrology calculations for the project indicate an increase in runoff at the point of connection to the existing storm drain system in Costa Pacifica Way (Node 195) and an overall decrease in peak flow at the downstream end of existing system (node 180) prior to discharge to the existing detention basin.

The hydraulic analysis in this report focuses on the existing system between nodes 180 and 195 where there is an increase in peak flow. Hydraulic analysis of the existing system showed adequate excess capacity exists in the system between these nodes where the gradient is steeper. Therefore, the existing storm drain system is not impacted by the flow increase and is capable of safely conveying the increased peak flow rate. See Appendix six for the hydraulic analysis.

The proposed detention vault attenuates drainage from the southern portion of the site, mitigating peak flow rates for the diverted area without impact to the existing storm drain system.

4. Conclusions

The proposed storm drain system is designed to safely convey the peak 100-year storm drain to the existing system in Costa Pacifica Way.

The existing system has sufficient conveyance capacity upstream of Node 180 to accept the proposed runoff from the site.

There is no adverse impact from the proposed development on existing detention basin as there is reduction in peak flow rate into the basin and onsite detention of storm water volume from the south portion of the developed site releases that volume of water slowly and at a time much later in the storm event, such that the downstream detention basin has had opportunity to manage the peak flows prior to receiving runoff from the south portion of this site.

The abutting MiraMar mobile home park will be benefitted due to the diversion of overland flow to the storm drain system, avoiding existing discharges under the fence at the property line.

Existing inlets along north coast highway will not experience an increase in runoff in the proposed condition as there will be no increase in impervious area draining to them.

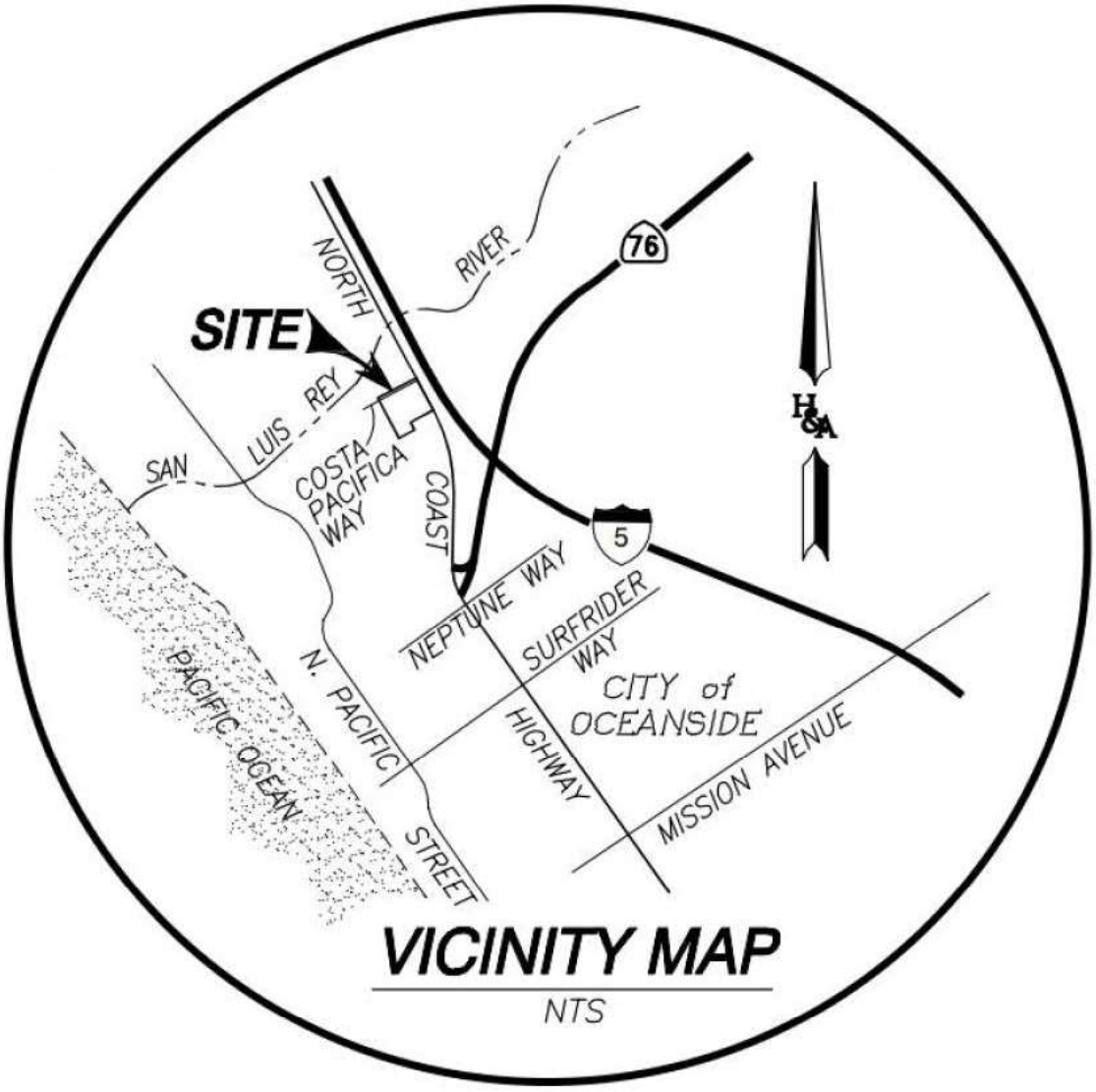
5. References

“Drainage Report, Renaissance Terrace”, Prepared by Project Design Consultants, dated March 2006.

“Water Resources Technical Report” prepared by Rick Engineering dated April, 2001.

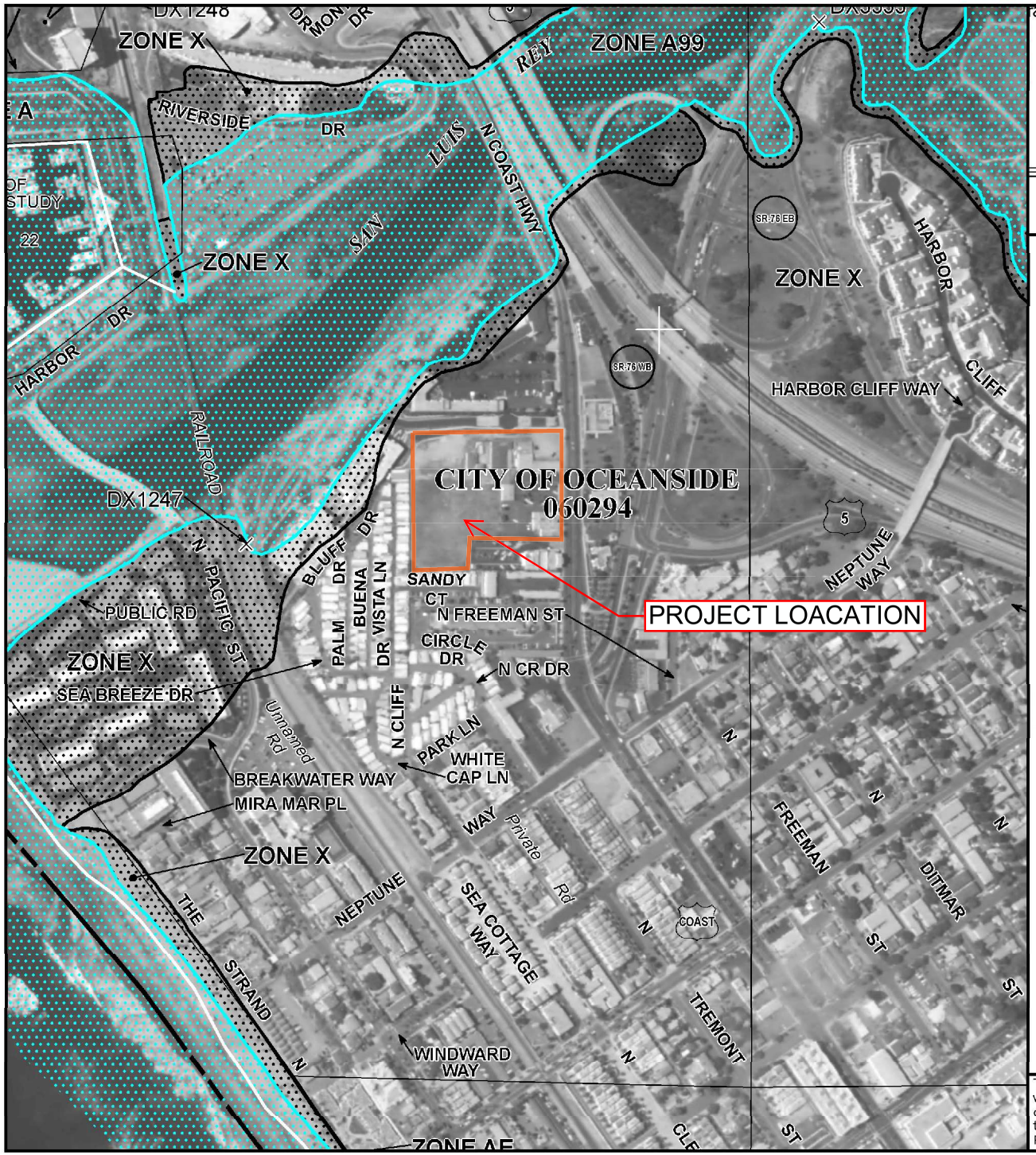
Geotechnical Update Report, Proposed ALTA OCEANSIDE Project South of Costa Pacific Way, West of North Coast Highway Oceanside, California, Dated January 18, 2019

Appendix 1 – Vicinity Map and FIRM Map



VICINITY MAP

NTS



ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0734H

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 734 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
OCEANSIDE, CITY OF	060294	0734	H
SAN DIEGO COUNTY	060284	0734	H

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

MAP NUMBER
06073C0734H

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix 2 - Soils Information

Hydrologic Soil Group—San Diego County Area, California

Alta Oceanside



Map Scale: 1:1,490 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

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

Alta Oceanside

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 13, Sep 12, 2018

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

Date(s) aerial images were photographed: Nov 3, 2014—Nov 22, 2014

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
TuB	Tujunga sand, 0 to 5 percent slopes	A	5.6	100.0%
Totals for Area of Interest			**5.6**	**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

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix 3 – Runoff Coefficient Determination

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

C factor for offsite areas was determined based on existing percent impervious-ness per table 3-1

Appendix 4 –Hydrology Calculations and Exhibits

EXISTING CONDITION

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2015 Advanced Engineering Software (aes)
             Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                           Analysis prepared by:




----------------------------------------------------------------------------
  FILE NAME: H:\AES2010\1535\FE\EX\10042019\EX-Q100.DAT
  TIME/DATE OF STUDY: 11:53 10/04/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  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   13.0      6.5    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0160
  2   15.0      7.5    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0130

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    195.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  USER SPECIFIED Tc(MIN.) =   15.190
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.345
  SUBAREA RUNOFF(CFS) =      1.28
  TOTAL AREA(ACRES) =      0.83   TOTAL RUNOFF(CFS) =      1.28

****************************************************************************
  FLOW PROCESS FROM NODE    195.00 TO NODE    200.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```



```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    48.00  DOWNSTREAM(FEET) =    27.60
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.31
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.28
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   15.23
  LONGEST FLOWPATH FROM NODE    185.00 TO NODE    200.00 =      36.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    200.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.340
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4541
  SUBAREA AREA(ACRES) =    0.11   SUBAREA RUNOFF(CFS) =    0.15
  TOTAL AREA(ACRES) =       0.9   TOTAL RUNOFF(CFS) =       1.43
  TC(MIN.) =   15.23

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 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) =    27.60  DOWNSTREAM(FEET) =    16.88
  FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.71
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.43
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   15.30
  LONGEST FLOWPATH FROM NODE    185.00 TO NODE    205.00 =      90.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 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.) =   15.30
  RAINFALL INTENSITY(INCH/HR) =   3.33
  TOTAL STREAM AREA(ACRES) =     0.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.43

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    220.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  LIMITED INDUSTRIAL RUNOFF COEFFICIENT = .8500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  96
  USER SPECIFIED Tc(MIN.) =    5.010
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.841
```

```
  SUBAREA RUNOFF(CFS) =      2.91
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      2.91

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 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) =    40.00  DOWNSTREAM(FEET) =    16.88
  FLOW LENGTH(FEET) =   181.75   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.91
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    5.26
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    205.00 =     235.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 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.) =    5.26
  RAINFALL INTENSITY(INCH/HR) =   6.63
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.91

****************************************************************************
  FLOW PROCESS FROM NODE    224.00 TO NODE    225.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  97
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  SUBAREA RUNOFF(CFS) =      0.77
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.77

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    225.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  97
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.11   SUBAREA RUNOFF(CFS) =    0.66
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       1.43
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    205.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```



```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     56.00  DOWNSTREAM(FEET) =     20.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   177.00   CHANNEL SLOPE =  0.2034
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.552
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.24
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.36
  Tc(MIN.) =    5.36
  SUBAREA AREA(ACRES) =     0.12       SUBAREA RUNOFF(CFS) =    0.32
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.717
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   8.75
  LONGEST FLOWPATH FROM NODE    224.00 TO NODE    205.00 =     358.75 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) =  6.552
  LIMITED INDUSTRIAL RUNOFF COEFFICIENT = .8500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7540
  SUBAREA AREA(ACRES) =    0.14   SUBAREA RUNOFF(CFS) =    0.78
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       2.47
  TC(MIN.) =    5.36

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 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.) =    5.36
  RAINFALL INTENSITY(INCH/HR) =   6.55
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.43    15.30        3.329          0.94
      2        2.91     5.26        6.634          0.50
      3        2.47     5.36        6.552          0.50

  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        5.82     5.26        6.634
      2        5.84     5.36        6.552
```

```
     3        4.14    15.30       3.329

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.84   Tc(MIN.) =    5.36
  TOTAL AREA(ACRES) =        1.9
  LONGEST FLOWPATH FROM NODE    224.00 TO NODE    205.00 =     358.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    235.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    16.88  DOWNSTREAM(FEET) =    14.50
  FLOW LENGTH(FEET) =   105.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.84
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    5.57
  LONGEST FLOWPATH FROM NODE    224.00 TO NODE    235.00 =     463.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    235.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.387
  OFFICE PROFESSIONAL/COMMERCIAL RUNOFF COEFFICIENT = .8500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  96
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6657
  SUBAREA AREA(ACRES) =    0.34   SUBAREA RUNOFF(CFS) =    1.85
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       9.69
  TC(MIN.) =    5.57

+--------------------------------------------------------------------------+
|                                                                          |
| CENTRAL DRAINAGE AREA                                                    |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
  UPSTREAM ELEVATION(FEET) =     58.70
  DOWNSTREAM ELEVATION(FEET) =     56.10
  ELEVATION DIFFERENCE(FEET) =      2.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.851
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.190
  SUBAREA RUNOFF(CFS) =      0.97
  TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      0.97

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  53
----------------------------------------------------------------------------
```



```
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     56.10  DOWNSTREAM(FEET) =     53.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   282.00   CHANNEL SLOPE =  0.0106
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0106 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.97
  FLOW VELOCITY(FEET/SEC) =   0.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.14   Tc(MIN.) =   13.99
  LONGEST FLOWPATH FROM NODE    145.00 TO NODE    155.00 =     347.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.528
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4600
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    0.81
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.36
  TC(MIN.) =   13.99

+--------------------------------------------------------------------------+
|                                                                          |
| SOUTHERLY DRAINAGE AREA                                                  |
|                                                                          |
+--------------------------------------------------------------------------+

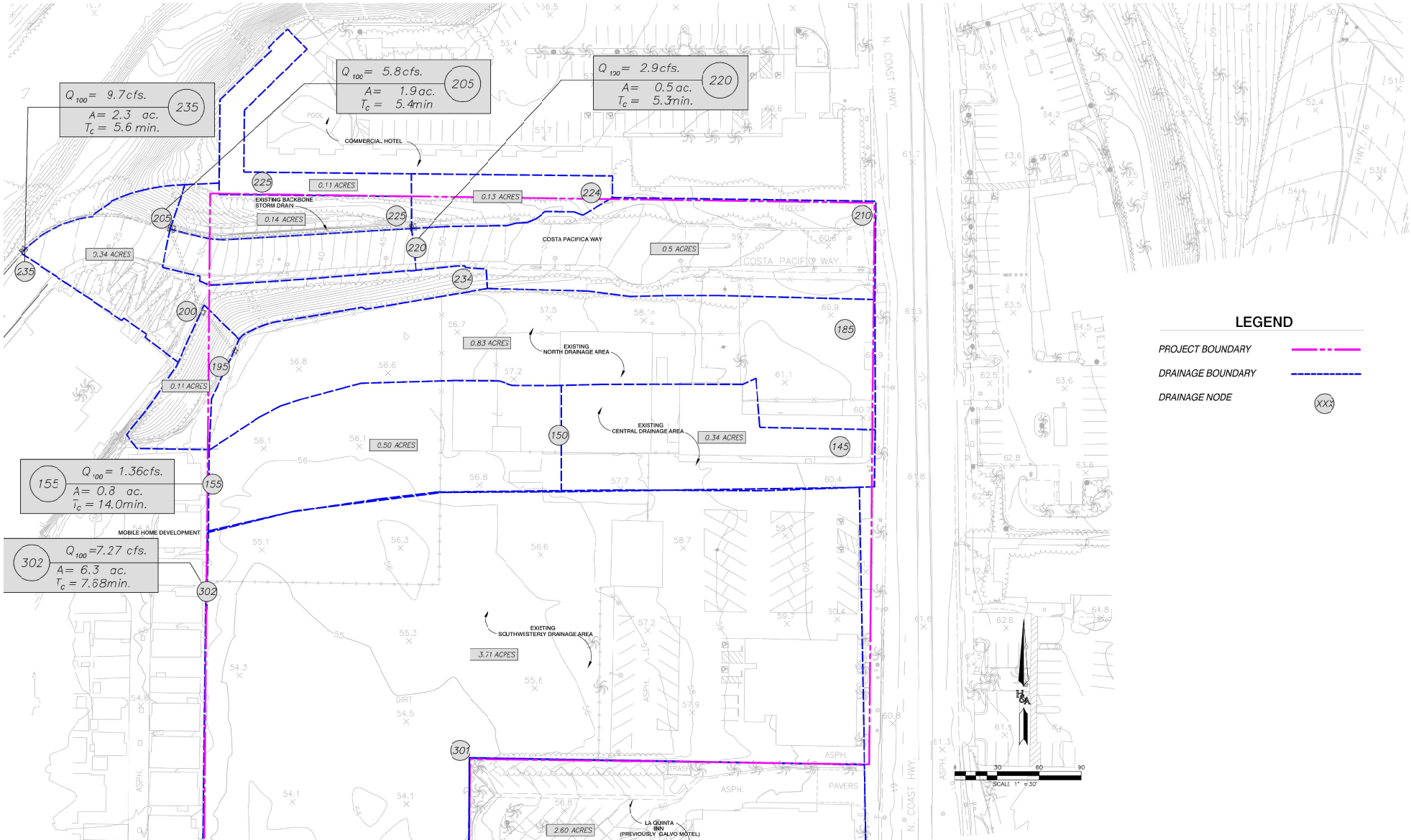
+--------------------------------------------------------------------------+
| THE FOLLOWING CODE 7 IS FLOW FROM THE GALVO MOTEL                        |
| SOUTHERLY DRAINAGE AREA                                                  |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    301.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.00   RAIN INTENSITY(INCH/HOUR) =  6.85
  TOTAL AREA(ACRES) =     2.60   TOTAL RUNOFF(CFS) =      0.69

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     54.00  DOWNSTREAM(FEET) =     53.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.0056
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.69
  FLOW VELOCITY(FEET/SEC) =   1.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.68   Tc(MIN.) =    7.68
  LONGEST FLOWPATH FROM NODE    145.00 TO NODE    302.00 =     527.00 FEET.

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

```
 FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.192
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  84
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2217
 SUBAREA AREA(ACRES) =    3.71   SUBAREA RUNOFF(CFS) =    6.74
 TOTAL AREA(ACRES) =        6.3   TOTAL RUNOFF(CFS) =       7.27
 TC(MIN.) =    7.68
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        6.3  TC(MIN.) =      7.68
 PEAK FLOW RATE(CFS)   =       7.27
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```



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EXISTING CONDITION HYDROLOGY MAP

ALTA OCEANSIDE

OCEANSIDE, CALIFORNIA

SHEET 1 OF 1

W.O. 2374-0016

OFFSITE EXISTING CONDITION

Per Reference Report
"Drainage Report, Renaissance Terrace", Prepared by Project Design Consultants, Dated March 2006

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 04/03/06

RENAISSANCE TERRACE 3129.00
SYSTEM 100 - PROPOSED CONDITIONS
100 YEAR STORM

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

Program License Serial Number 4049

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

Map data precipitation entered:
6 hour, precipitation(inches) = 2.600
24 hour precipitation(inches) = 4.000
P6/P24 = 65.0%
San Diego hydrology manual 'C' values used

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      145.000 to Point/Station      150.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[HIGH DENSITY RESIDENTIAL                    ]
(24.0 DU/A or Less      )
Impervious value, Ai = 0.650
Sub-Area C Value = 0.710
Initial subarea total flow distance  =  240.000(Ft.)
Highest elevation =   58.700(Ft.)
Lowest elevation =   56.100(Ft.)
Elevation difference =    2.600(Ft.) Slope =  1.083 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 65.00 (Ft)
for the top area slope value of   1.08 %, in a development type of
 24.0 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =   9.50 minutes
 (for slope value of   1.00 %)
The initial area total distance of  240.00 (Ft.) entered leaves a
remaining distance of  175.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.38 minutes
for a distance of 175.00 (Ft.) and a slope of  1.08 %
with an elevation difference of   1.90(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.379 Minutes
Tt=[(11.9*0.0331^3)/(  1.90)]^.385=  2.38
Total initial area Ti =   9.50 minutes from Table 3-2 plus
  2.38 minutes from the Figure 3-4 formula =  11.88 minutes
Rainfall intensity (I) =      3.920(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.710
Subarea runoff =      0.946(CFS)
Total initial stream area =        0.340(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      150.000 to Point/Station      155.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------------
Upstream point elevation =    56.100(Ft.)
Downstream point elevation =    53.100(Ft.)
Channel length thru subarea  =   282.000(Ft.)
```

```
Channel base width       =   10.000(Ft.)
Slope or 'Z' of left channel bank =  50.000
Slope or 'Z' of right channel bank =  50.000
Estimated mean flow rate at midpoint of channel =      1.229(CFS)
Manning's 'N'    = 0.030
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      1.229(CFS)
Depth of flow =   0.095(Ft.), Average velocity =   0.881(Ft/s)
Channel flow top width =   19.464(Ft.)
Flow Velocity =    0.88(Ft/s)
Travel time  =    5.33 min.
Time of concentration =   17.21 min.
Critical depth =      0.069(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL                    ]
(2.9 DU/A or Less       )
Impervious value, Ai = 0.250
Sub-Area C Value = 0.490
Rainfall intensity =      3.086(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.582  CA =      0.472
Subarea runoff =      0.509(CFS) for      0.470(Ac.)
Total runoff =      1.456(CFS)      Total area =       0.810(Ac.)
Depth of flow =   0.104(Ft.), Average velocity =   0.926(Ft/s)
Critical depth =      0.076(Ft.)
```

Existing Discharge to Mobile Home Park = 1.456 cfs

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      155.000 to Point/Station      160.000
**** IMPROVED CHANNEL TRAVEL TIME ****

------------------------------------------------------------------------
Upstream point elevation =    53.100(Ft.)
Downstream point elevation =    50.500(Ft.)
Channel length thru subarea  =   102.000(Ft.)
Channel base width       =   10.000(Ft.)
Slope or 'Z' of left channel bank =  10.000
Slope or 'Z' of right channel bank =  10.000
Estimated mean flow rate at midpoint of channel =      1.744(CFS)
Manning's 'N'    = 0.030
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      1.744(CFS)
Depth of flow =   0.099(Ft.), Average velocity =   1.599(Ft/s)
Channel flow top width =   11.985(Ft.)
Flow Velocity =    1.60(Ft/s)
Travel time  =    1.06 min.
Time of concentration =   18.28 min.
Critical depth =      0.095(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                       ]
```

```
(Office Professional     )
Impervious value, Ai = 0.900
Sub-Area C Value = 0.850
Rainfall intensity =      2.969(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.651  CA =      0.710
Subarea runoff =      0.651(CFS) for      0.280(Ac.)
Total runoff =      2.107(CFS)      Total area =       1.090(Ac.)
Depth of flow =   0.111(Ft.), Average velocity =   1.712(Ft/s)
Critical depth =      0.107(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      160.000 to Point/Station      135.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =    50.500(Ft.)
Downstream point elevation =    35.000(Ft.)
Channel length thru subarea  =   202.000(Ft.)
Channel base width       =    2.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      2.192(CFS)
Manning's 'N'     = 0.015
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      2.192(CFS)
Depth of flow =   0.142(Ft.), Average velocity =   6.779(Ft/s)
Channel flow top width =    2.566(Ft.)
Flow Velocity =    6.78(Ft/s)
Travel time  =    0.50 min.
Time of concentration =   18.77 min.
Critical depth =      0.301(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less        )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Rainfall intensity =      2.918(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.627  CA =      0.759
Subarea runoff =      0.107(CFS) for      0.120(Ac.)
Total runoff =      2.215(CFS)      Total area =       1.210(Ac.)
Depth of flow =   0.142(Ft.), Average velocity =   6.803(Ft/s)
Critical depth =      0.301(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      135.000 to Point/Station      135.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.210(Ac.)
Runoff from this stream =      2.215(CFS)
```

```
Time of concentration =   18.77 min.
Rainfall intensity =     2.918(In/Hr)
Summary of stream data:

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


1         7.864       6.81                 5.614
2         2.215      18.77                 2.918
Qmax(1) =
          1.000 *     1.000 *     7.864) +
          1.000 *     0.363 *     2.215) + =       8.667
Qmax(2) =
          0.520 *     1.000 *     7.864) +
          1.000 *     1.000 *     2.215) + =       6.303

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.864       2.215
Maximum flow rates at confluence using above data:
       8.667       6.303
Area of streams before confluence:
       1.580       1.210
Results of confluence:
Total flow rate =      8.667(CFS)
Time of concentration =     6.808 min.
Effective stream area after confluence =      2.790(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      135.000 to Point/Station      165.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    35.000(Ft.)
Downstream point/station elevation =    23.500(Ft.)
Pipe length  =    60.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.667(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     8.667(CFS)
Normal flow depth in pipe =    6.39(In.)
Flow top width inside pipe =   11.97(In.)
Critical depth could not be calculated.
Pipe flow velocity =     20.38(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     6.86 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      165.000 to Point/Station      165.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                    ]
```

```
(General Industrial        )
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Time of concentration =      6.86 min.
Rainfall intensity =       5.588(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.758  CA =       2.280
Subarea runoff =       4.073(CFS) for       0.220(Ac.)
Total runoff =      12.741(CFS)       Total area =        3.010(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      165.000 to Point/Station      165.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =       3.010(Ac.)
Runoff from this stream =      12.741(CFS)
Time of concentration =     6.86 min.
Rainfall intensity =      5.588(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      166.000 to Point/Station      167.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
(General Industrial        )
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =   60.000(Ft.)
Highest elevation =   32.650(Ft.)
Lowest elevation =   31.650(Ft.)
Elevation difference =    1.000(Ft.) Slope =  1.667 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.67 %, in a development type of
 General Industrial
In Accordance With Table 3-2
Initial Area Time of Concentration =   2.70 minutes
 (for slope value of   2.00 %)
Calculated TC of    2.700 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      0.954(CFS)
Total initial stream area =        0.160(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      167.000 to Point/Station      165.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
```

```
Upstream point/station elevation =    31.650(Ft.)
Downstream point/station elevation =    24.000(Ft.)
Pipe length  =   222.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.954(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.954(CFS)
Normal flow depth in pipe =    4.51(In.)
Flow top width inside pipe =    5.18(In.)
Critical Depth =    5.61(In.)
Pipe flow velocity =      6.01(Ft/s)
Travel time through pipe =    0.62 min.
Time of concentration (TC) =     3.32 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      165.000 to Point/Station      165.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.160(Ac.)
Runoff from this stream =      0.954(CFS)
Time of concentration =    3.32 min.
Rainfall intensity =     6.850(In/Hr)
Summary of stream data:

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


1        12.741       6.86                 5.588
2         0.954       3.32                 6.850
Qmax(1) =
          1.000 *     1.000 *     12.741) +
          0.816 *     1.000 *      0.954) + =       13.519
Qmax(2) =
          1.000 *     0.483 *     12.741) +
          1.000 *     1.000 *      0.954) + =        7.113

Total of 2 streams to confluence:
Flow rates before confluence point:
      12.741       0.954
Maximum flow rates at confluence using above data:
       13.519        7.113
Area of streams before confluence:
        3.010        0.160
Results of confluence:
Total flow rate =     13.519(CFS)
Time of concentration =     6.857 min.
Effective stream area after confluence =      3.170(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      165.000 to Point/Station      180.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    23.500(Ft.)
Downstream point/station elevation =    11.000(Ft.)
```

```
Pipe length  =   105.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.519(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    13.519(CFS)
Normal flow depth in pipe =    8.43(In.)
Flow top width inside pipe =   14.89(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.03(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     6.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      180.000 to Point/Station      180.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.170(Ac.)
Runoff from this stream =     13.519(CFS)
Time of concentration =    6.95 min.
Rainfall intensity =     5.540(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      185.000 to Point/Station      195.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL                    ]
(2.0 DU/A or Less       )
Impervious value, Ai = 0.200
Sub-Area C Value = 0.460
Initial subarea total flow distance  =  500.000(Ft.)
Highest elevation =   58.600(Ft.)
Lowest elevation =   53.000(Ft.)
Elevation difference =    5.600(Ft.) Slope =  1.120 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.12 %, in a development type of
 2.0 DU/A or Less
In Accordance With Table 3-2
Initial Area Time of Concentration =  10.50 minutes
 (for slope value of   1.00 %)
The initial area total distance of  500.00 (Ft.) entered leaves a
remaining distance of  430.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   4.69 minutes
for a distance of 430.00 (Ft.) and a slope of  1.12 %
with an elevation difference of   4.82(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    4.693 Minutes
Tt=[(11.9*0.0814^3)/(  4.82)]^.385=  4.69
Total initial area Ti =  10.50 minutes from Table 3-2 plus
```

```
  4.69 minutes from the Figure 3-4 formula =  15.19 minutes
Rainfall intensity (I) =      3.345(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.460
Subarea runoff =      1.277(CFS)
Total initial stream area =        0.830(Ac.)
```

NODE 195 -Discharge to Type F CB = 1.28 cfs

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      195.000 to Point/Station      200.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    48.000(Ft.)
Downstream point/station elevation =    27.600(Ft.)
Pipe length  =    36.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.277(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.277(CFS)
Normal flow depth in pipe =    2.26(In.)
Flow top width inside pipe =    5.82(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.85(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    15.22 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      200.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Time of concentration =    15.22 min.
Rainfall intensity =      3.340(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.454  CA =      0.427
Subarea runoff =      0.149(CFS) for      0.110(Ac.)
Total runoff =      1.426(CFS)      Total area =       0.940(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      205.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    27.600(Ft.)
Downstream point/station elevation =    16.880(Ft.)
Pipe length  =    54.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.426(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.426(CFS)
Normal flow depth in pipe =    3.25(In.)
Flow top width inside pipe =    5.98(In.)
```

```
Critical depth could not be calculated.
Pipe flow velocity =      13.15(Ft/s)
Travel time through pipe =     0.07 min.
Time of concentration (TC) =     15.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      205.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =       0.940(Ac.)
Runoff from this stream =       1.426(CFS)
Time of concentration =    15.29 min.
Rainfall intensity =      3.331(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      220.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(Office Professional     )
Impervious value, Ai = 0.900
Sub-Area C Value = 0.850
Initial subarea total flow distance  =  362.000(Ft.)
Highest elevation =    60.000(Ft.)
Lowest elevation =    46.000(Ft.)
Elevation difference =    14.000(Ft.) Slope =  3.867 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of    3.86 %, in a development type of
 Office Professional
In Accordance With Table 3-2
Initial Area Time of Concentration =    2.90 minutes
 (for slope value of    3.00 %)
The initial area total distance of  362.00 (Ft.) entered leaves a
remaining distance of  282.00 (Ft.)
Using Figure 3-4, the travel time for this distance is    2.11 minutes
for a distance of 282.00 (Ft.) and a slope of  3.86 %
with an elevation difference of  10.89(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.106 Minutes
Tt=[(11.9*0.0534^3)/( 10.89)]^.385=  2.11
Total initial area Ti =    2.90 minutes from Table 3-2 plus
  2.11 minutes from the Figure 3-4 formula =    5.01 minutes
Rainfall intensity (I) =      6.845(In/Hr) for a    100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850
Subarea runoff =      2.909(CFS)
Total initial stream area =        0.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

POINT OF PROPOSED CONNECTION BETWEEN NODE 220 AND NODE 205

```
Process from Point/Station      220.000 to Point/Station      205.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    40.000(Ft.)
Downstream point/station elevation =    16.880(Ft.)
Pipe length  =   181.75(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.909(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.909(CFS)
Normal flow depth in pipe =    4.46(In.)
Flow top width inside pipe =    9.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.31(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =     5.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      205.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.500(Ac.)
Runoff from this stream =      2.909(CFS)
Time of concentration =    5.23 min.
Rainfall intensity =     6.652(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      224.000 to Point/Station      225.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                          ]
(General Industrial       )
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =  170.000(Ft.)
Highest elevation =   58.000(Ft.)
Lowest elevation =   56.000(Ft.)
Elevation difference =    2.000(Ft.) Slope =  1.176 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.17 %, in a development type of
 General Industrial
In Accordance With Table 3-2
Initial Area Time of Concentration =   3.20 minutes
 (for slope value of   1.00 %)
The initial area total distance of  170.00 (Ft.) entered leaves a
remaining distance of  110.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.62 minutes
for a distance of 110.00 (Ft.) and a slope of  1.17 %
with an elevation difference of   1.29(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
```

```
 =    1.615 Minutes
Tt=[(11.9*0.0208^3)/(  1.29)]^.385=  1.62
Total initial area Ti =   3.20 minutes from Table 3-2 plus
  1.62 minutes from the Figure 3-4 formula =   4.82 minutes
Calculated TC of    4.815 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      6.850(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      0.775(CFS)
Total initial stream area =        0.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      225.000 to Point/Station      225.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                          ]
(General Industrial       )
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Time of concentration =     4.82 min.
Rainfall intensity =      6.850(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.870  CA =      0.209
Subarea runoff =      0.656(CFS) for      0.110(Ac.)
Total runoff =      1.430(CFS)      Total area =       0.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      225.000 to Point/Station      205.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =    56.000(Ft.)
Downstream point elevation =    20.000(Ft.)
Channel length thru subarea  =   177.000(Ft.)
Channel base width       =    2.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      1.607(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      1.607(CFS)
Depth of flow =   0.089(Ft.), Average velocity =   8.329(Ft/s)
Channel flow top width =    2.354(Ft.)
Flow Velocity =    8.33(Ft/s)
Travel time  =    0.35 min.
Time of concentration =    5.17 min.
Critical depth =      0.250(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
```

```
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Rainfall intensity =      6.705(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.717  CA =      0.258
Subarea runoff =      0.299(CFS) for      0.120(Ac.)
Total runoff =      1.730(CFS)      Total area =       0.360(Ac.)
Depth of flow =   0.093(Ft.), Average velocity =   8.554(Ft/s)
Critical depth =      0.262(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      205.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                       ]
(Office Professional    )
Impervious value, Ai = 0.900
Sub-Area C Value = 0.850
Time of concentration =     5.17 min.
Rainfall intensity =      6.705(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.754  CA =      0.377
Subarea runoff =      0.798(CFS) for      0.140(Ac.)
Total runoff =      2.528(CFS)      Total area =       0.500(Ac.)
```

CONFLUENCE AT NODE 205

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      205.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      0.500(Ac.)
Runoff from this stream =      2.528(CFS)
Time of concentration =    5.17 min.
Rainfall intensity =     6.705(In/Hr)
Summary of stream data:

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


1         1.426      15.29                3.331
2         2.909       5.23                6.652
3         2.528       5.17                6.705
Qmax(1) =
          1.000 *     1.000 *      1.426) +
          0.501 *     1.000 *      2.909) +
          0.497 *     1.000 *      2.528) + =       4.139
Qmax(2) =
          1.000 *     0.342 *      1.426) +
```

```
          1.000 *    1.000 *     2.909) +
          0.992 *    1.000 *     2.528) + =       5.905
Qmax(3) =
          1.000 *    0.338 *     1.426) +
          1.000 *    0.988 *     2.909) +
          1.000 *    1.000 *     2.528) + =       5.883

Total of 3 streams to confluence:
Flow rates before confluence point:
       1.426       2.909       2.528
Maximum flow rates at confluence using above data:
       4.139       5.905       5.883
Area of streams before confluence:
       0.940       0.500       0.500
Results of confluence:
Total flow rate =      5.905(CFS)
Time of concentration =     5.234 min.
Effective stream area after confluence =      1.940(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      235.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =    16.880(Ft.)
Downstream point/station elevation =    14.500(Ft.)
Pipe length  =   105.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.905(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.905(CFS)
Normal flow depth in pipe =    8.44(In.)
Flow top width inside pipe =   14.88(In.)
Critical Depth =   11.80(In.)
Pipe flow velocity =      8.31(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =     5.44 min.
```

TOTAL RUNOFF AT NODE 235

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      235.000 to Point/Station      235.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(Office Professional    )
Impervious value, Ai = 0.900
Sub-Area C Value = 0.850
Time of concentration =     5.44 min.
Rainfall intensity =      6.484(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.666  CA =      1.518
Subarea runoff =      3.938(CFS) for      0.340(Ac.)
Total runoff =      9.843(CFS)      Total area =       2.280(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      235.000 to Point/Station      240.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    14.500(Ft.)
Downstream point/station elevation =    12.500(Ft.)
Pipe length  =   152.68(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.843(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     9.843(CFS)
Normal flow depth in pipe =   12.39(In.)
Flow top width inside pipe =   16.68(In.)
Critical Depth =   14.53(In.)
Pipe flow velocity =      7.59(Ft/s)
Travel time through pipe =    0.34 min.
Time of concentration (TC) =     5.78 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      240.000 to Point/Station      240.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                          ]
(General Industrial       )
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Time of concentration =     5.78 min.
Rainfall intensity =     6.239(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.705  CA =      1.988
Subarea runoff =      2.559(CFS) for      0.540(Ac.)
Total runoff =     12.402(CFS)      Total area =      2.820(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      240.000 to Point/Station      245.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    12.500(Ft.)
Downstream point/station elevation =    11.500(Ft.)
Pipe length  =   108.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.402(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    12.402(CFS)
Normal flow depth in pipe =   14.39(In.)
Flow top width inside pipe =   19.51(In.)
Critical Depth =   15.75(In.)
Pipe flow velocity =      7.06(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =     6.03 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      245.000 to Point/Station      245.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(Office Professional     )
Impervious value, Ai = 0.900
Sub-Area C Value = 0.850
Time of concentration =      6.03 min.
Rainfall intensity =       6.068(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.711  CA =       2.098
Subarea runoff =       0.330(CFS) for       0.130(Ac.)
Total runoff =      12.732(CFS)       Total area =       2.950(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      245.000 to Point/Station      180.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =     11.500(Ft.)
Downstream point/station elevation =     11.000(Ft.)
Pipe length  =     35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     12.732(CFS)
Nearest computed pipe diameter  =      21.00(In.)
Calculated individual pipe flow  =     12.732(CFS)
Normal flow depth in pipe =    12.61(In.)
Flow top width inside pipe =    20.57(In.)
Critical Depth =    15.95(In.)
Pipe flow velocity =       8.45(Ft/s)
Travel time through pipe =     0.07 min.
Time of concentration (TC) =      6.10 min.
```

CONFLUENCE AT NODE 180

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      180.000 to Point/Station      180.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       2.950(Ac.)
Runoff from this stream =      12.732(CFS)
Time of concentration =     6.10 min.
Rainfall intensity =      6.024(In/Hr)
Summary of stream data:

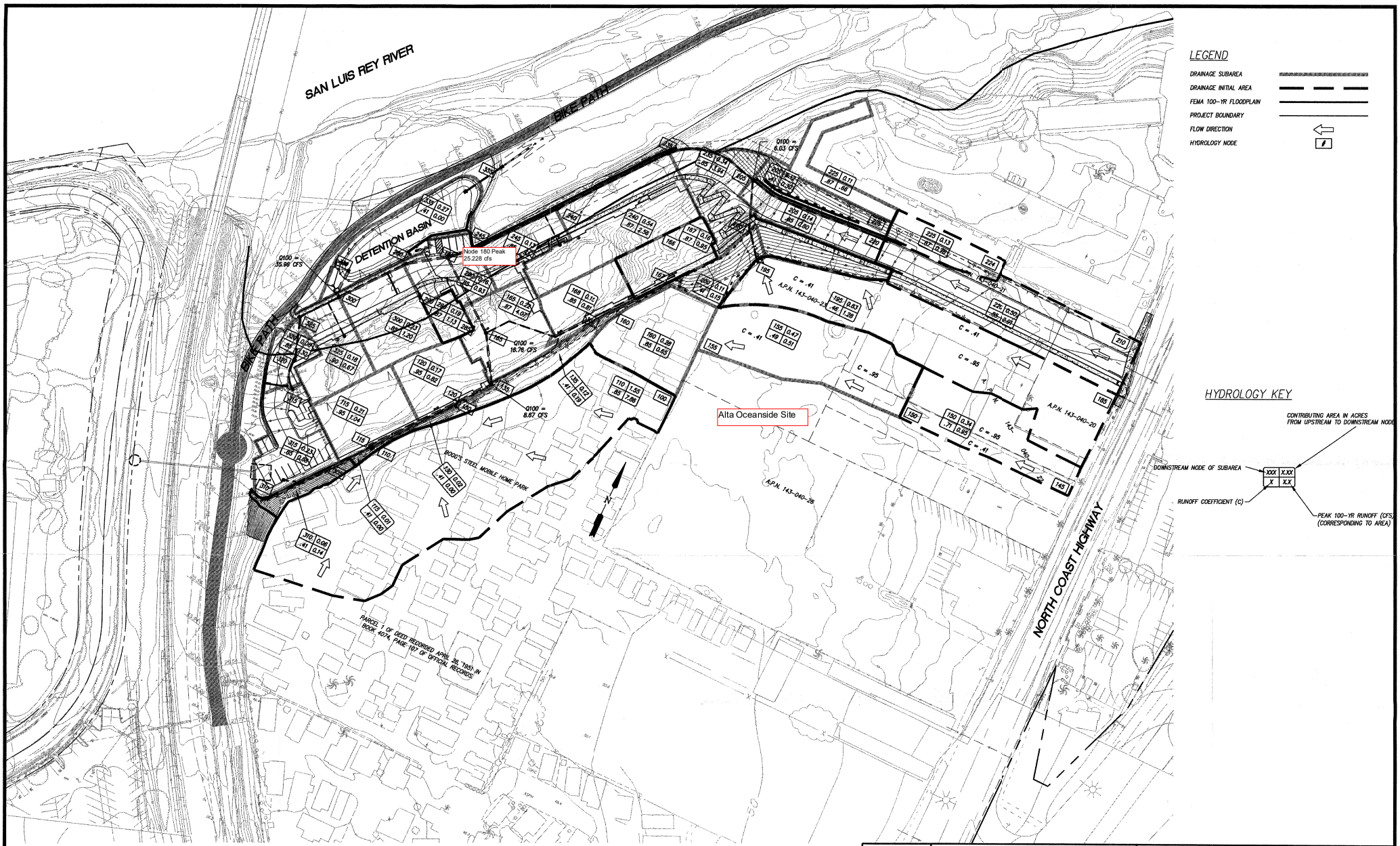
 Stream    Flow rate       TC              Rainfall Intensity
  No.        (CFS)        (min)                  (In/Hr)


 1        13.519       6.95                 5.540
 2        12.732       6.10                 6.024
 Qmax(1) =
```

```
          1.000 *     1.000 *     13.519) +
          0.920 *     1.000 *     12.732) + =       25.228
Qmax(2) =
          1.000 *     0.878 *     13.519) +
          1.000 *     1.000 *     12.732) + =       24.606

Total of 2 main streams to confluence:
Flow rates before confluence point:
      13.519       12.732
Maximum flow rates at confluence using above data:
       25.228       24.606
Area of streams before confluence:
        3.170        2.950


Results of confluence:
Total flow rate =      25.228(CFS)
Time of concentration =      6.949 min.
Effective stream area after confluence  =       6.120(Ac.)
```



LEGEND

- DRAINAGE SUBAREA
- DRAINAGE INITIAL AREA
- FEMA 100-YR FLOODPLAIN
- PROJECT BOUNDARY
- FLOW DIRECTION
- HYDROLOGY NODE

HYDROLOGY KEY

SCALE:	1"=50'
JOB #:	3129.00
CREATED:	9/13/05

PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Environmental | Engineering | Survey
701 B Street, Suite 800 San Diego, CA 92101
619.235.6471 Tel 619.234.0349 Fax

CITY OF OCEANSIDE

RENAISSANCE TERRACE

DRAINAGE MAP

PROPOSED CONDITIONS

EXHIBIT B

P:\3129\ENGR\REPORTS\DRAIN\EXH\PROPOSED.dwg 4/4/2008 @ 10:48 AM

PROPOSED CONDITION

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2015 Advanced Engineering Software (aes)
            Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                       Analysis prepared by:




----------------------------------------------------------------------------
  FILE NAME: H:\AES2010\1535\FE\PR\05\AT\PR-Q100.DAT
  TIME/DATE OF STUDY: 12:51 10/04/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  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   13.0      6.5    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0160
  2   15.0      7.5    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0130

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

+---------------------------------------------------------------------------+
| BEGIN FLOWS FROM COSTA PACIFICA WAY                                       |
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    220.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =  84
  USER SPECIFIED Tc(MIN.) =    5.010
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.841
  SUBAREA RUNOFF(CFS) =      2.77
  TOTAL AREA(ACRES) =      0.45   TOTAL RUNOFF(CFS) =      2.77

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 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) =    40.00  DOWNSTREAM(FEET) =    16.88
  FLOW LENGTH(FEET) =   181.75   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.18
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.77
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    5.26
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    205.00 =     181.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    250.00 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.) =    5.26
  RAINFALL INTENSITY(INCH/HR) =   6.63
  TOTAL STREAM AREA(ACRES) =     0.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.77

****************************************************************************
  FLOW PROCESS FROM NODE    224.00 TO NODE    225.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  84
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
```

```
  SUBAREA RUNOFF(CFS) =      0.77
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.77

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    225.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.11   SUBAREA RUNOFF(CFS) =    0.66
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       1.43
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    205.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     56.00  DOWNSTREAM(FEET) =     20.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   177.00   CHANNEL SLOPE =  0.2034
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.552
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.24
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.36
  Tc(MIN.) =    5.36
  SUBAREA AREA(ACRES) =     0.12       SUBAREA RUNOFF(CFS) =    0.32
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.717
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   8.75
  LONGEST FLOWPATH FROM NODE    224.00 TO NODE    205.00 =   18352.00 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) =  6.552
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
```



```
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7540
  SUBAREA AREA(ACRES) =    0.14   SUBAREA RUNOFF(CFS) =    0.78
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       2.47
  TC(MIN.) =    5.36

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 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.) =    5.36
  RAINFALL INTENSITY(INCH/HR) =   6.55
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.77     5.26        6.631          0.45
      2        2.47     5.36        6.552          0.50

  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        5.19     5.26       6.631
      2        5.21     5.36       6.552

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.21   Tc(MIN.) =    5.36
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE    224.00 TO NODE    205.00 =   18352.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| BEGIN 300 SERIES ONSITE FLOWS                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    307.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    35.00
  UPSTREAM ELEVATION(FEET) =     61.00
  DOWNSTREAM ELEVATION(FEET) =     60.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.327
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.27
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.27

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    308.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    54.40  DOWNSTREAM(FEET) =    51.90
  FLOW LENGTH(FEET) =   831.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.62
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.27
  PIPE TRAVEL TIME(MIN.) =   8.53    Tc(MIN.) =   10.85
  LONGEST FLOWPATH FROM NODE    305.00 TO NODE    308.00 =     866.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    308.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.155
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    2.69   SUBAREA RUNOFF(CFS) =    8.83
  TOTAL AREA(ACRES) =       2.7   TOTAL RUNOFF(CFS) =       8.99
  TC(MIN.) =   10.85

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 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.) =   10.85
  RAINFALL INTENSITY(INCH/HR) =   4.16
  TOTAL STREAM AREA(ACRES) =     2.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.99

+--------------------------------------------------------------------------+
| THE FOLLOWING CODE 7 IS FROM LA QUINTA INN                               |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    308.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.00   RAIN INTENSITY(INCH/HOUR) =  6.85
  TOTAL AREA(ACRES) =     0.69   TOTAL RUNOFF(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 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.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   6.85
  TOTAL STREAM AREA(ACRES) =     0.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.23

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        8.99    10.85        4.155          2.74
      2        0.23     5.00        6.850          0.69

  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        4.37     5.00        6.850
      2        9.13    10.85        4.155
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.13   Tc(MIN.) =   10.85
  TOTAL AREA(ACRES) =        3.4
  LONGEST FLOWPATH FROM NODE    224.00 TO NODE    308.00 =   18352.00 FEET.

+----------------------------------------------------------------------------+
| END HYDROLOGY FOR INFLOW TO UNDERGROUND STORM VAULT                        |
| FOLLOWING PEAK FLOW RATE TAKEN FROM FLOOD ATTENUATION CALCS                |
| IN APPENDIX 5 OF THIS REPORT                                               |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  43.85   RAIN INTENSITY(INCH/HOUR) =  1.69
  TOTAL AREA(ACRES) =     3.40   TOTAL RUNOFF(CFS) =      1.00

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    195.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.90  DOWNSTREAM(FEET) =    45.20
  FLOW LENGTH(FEET) =   335.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.70
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.00
  PIPE TRAVEL TIME(MIN.) =   1.19    Tc(MIN.) =   45.04
  LONGEST FLOWPATH FROM NODE    224.00 TO NODE    195.00 =   18687.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    195.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.660
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2433
  SUBAREA AREA(ACRES) =    0.43   SUBAREA RUNOFF(CFS) =    0.56
  TOTAL AREA(ACRES) =        3.8   TOTAL RUNOFF(CFS) =       1.55
  TC(MIN.) =   45.04
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    195.00 TO NODE    195.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

+----------------------------------------------------------------------------+
| BEGIN NORTH DRAINAGE AREA AND PARKING STRUCTURE                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    186.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =     61.00
  DOWNSTREAM ELEVATION(FEET) =     60.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.319
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    66.76
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    186.00 TO NODE    310.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    56.00  DOWNSTREAM(FEET) =    48.50
  FLOW LENGTH(FEET) =   375.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.36
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.32
  PIPE TRAVEL TIME(MIN.) =   1.86    Tc(MIN.) =    6.18
  LONGEST FLOWPATH FROM NODE    184.00 TO NODE    310.00 =     460.00 FEET.

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

```
 FLOW PROCESS FROM NODE    186.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.977
 RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
 SUBAREA AREA(ACRES) =    0.41   SUBAREA RUNOFF(CFS) =    1.94
 TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       2.22
 TC(MIN.) =    6.18

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.18
 RAINFALL INTENSITY(INCH/HR) =   5.98
 TOTAL STREAM AREA(ACRES) =     0.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.22

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    303.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
 UPSTREAM ELEVATION(FEET) =     62.50
 DOWNSTREAM ELEVATION(FEET) =     61.85
 ELEVATION DIFFERENCE(FEET) =      0.65
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.208
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.32
 TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    310.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   61.85  DOWNSTREAM ELEVATION(FEET) =   58.50
 STREET LENGTH(FEET) =   335.00   CURB HEIGHT(INCHES) =  6.0
```



```
 STREET HALFWIDTH(FEET) = 13.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.50
 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) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.10
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =    9.52
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.05
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
 STREET FLOW TRAVEL TIME(MIN.) =   2.73   Tc(MIN.) =    6.94
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.546
 RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
 SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    3.50
 TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       3.77

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.21
 FLOW VELOCITY(FEET/SEC.) =  2.34   DEPTH*VELOCITY(FT*FT/SEC.) =   0.87
 LONGEST FLOWPATH FROM NODE    301.00 TO NODE    310.00 =     395.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 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.) =    6.94
 RAINFALL INTENSITY(INCH/HR) =   5.55
 TOTAL STREAM AREA(ACRES) =     0.86
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.77

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1        2.22     6.18        5.977          0.47
    2        3.77     6.94        5.546          0.86

 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        5.57     6.18       5.977
     2        5.83     6.94       5.546

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.83   Tc(MIN.) =    6.94
 TOTAL AREA(ACRES) =        1.3
 LONGEST FLOWPATH FROM NODE    184.00 TO NODE    310.00 =     460.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    195.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    48.50  DOWNSTREAM(FEET) =    45.00
 FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.32
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.83
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    7.07
 LONGEST FLOWPATH FROM NODE    184.00 TO NODE    195.00 =     540.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    195.00 TO NODE    195.00 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.) =    7.07
 RAINFALL INTENSITY(INCH/HR) =   5.48
 TOTAL STREAM AREA(ACRES) =     1.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.83

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    195.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  82
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =     55.00
```



```
 DOWNSTREAM ELEVATION(FEET) =     40.00
 ELEVATION DIFFERENCE(FEET) =     15.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.993
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.22
 TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.22

****************************************************************************
 FLOW PROCESS FROM NODE    195.00 TO NODE    195.00 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.) =    4.99
 RAINFALL INTENSITY(INCH/HR) =   6.85
 TOTAL STREAM AREA(ACRES) =     0.08
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.22

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        5.83     7.07        5.480          1.33
     2        0.22     4.99        6.850          0.08

 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        4.89     4.99       6.850
     2        6.01     7.07       5.480

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.01   Tc(MIN.) =    7.07
 TOTAL AREA(ACRES) =        1.4
 LONGEST FLOWPATH FROM NODE    184.00 TO NODE    195.00 =     540.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    195.00 TO NODE    195.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
```

```
    1        6.01     7.07       5.480        1.41
LONGEST FLOWPATH FROM NODE    184.00 TO NODE    195.00 =     540.00 FEET.

** MEMORY BANK #  2 CONFLUENCE DATA **
STREAM     RUNOFF       Tc       INTENSITY     AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1        1.55    45.04       1.660        3.83
LONGEST FLOWPATH FROM NODE    224.00 TO NODE    195.00 =   18687.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM    RUNOFF       Tc       INTENSITY
NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1       6.25       7.07        5.480
    2       3.37      45.04        1.660

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       6.25   Tc(MIN.) =    7.07
TOTAL AREA(ACRES) =        5.2

****************************************************************************
FLOW PROCESS FROM NODE    195.00 TO NODE    195.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE    195.00 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) =    26.60  DOWNSTREAM(FEET) =    20.70
FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  12.58
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       6.25
PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.18
LONGEST FLOWPATH FROM NODE    224.00 TO NODE    205.00 =   18769.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  11
----------------------------------------------------------------------------
>>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

** MAIN STREAM CONFLUENCE DATA **
STREAM     RUNOFF       Tc       INTENSITY     AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1        6.25     7.18       5.427        5.24
```



```
LONGEST FLOWPATH FROM NODE    224.00 TO NODE    205.00 =   18769.00 FEET.

** MEMORY BANK #  1 CONFLUENCE DATA **
STREAM     RUNOFF       Tc       INTENSITY     AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1        5.21     5.36       6.552        0.95
LONGEST FLOWPATH FROM NODE    224.00 TO NODE    205.00 =   18352.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM    RUNOFF       Tc       INTENSITY
NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1       9.87       5.36        6.552
    2      10.56       7.18        5.427

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      10.56   Tc(MIN.) =    7.18
TOTAL AREA(ACRES) =        6.2

****************************************************************************
FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE    205.00 TO NODE    235.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    20.70  DOWNSTREAM(FEET) =    14.50
FLOW LENGTH(FEET) =   105.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  13.50
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      10.56
PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    7.31
LONGEST FLOWPATH FROM NODE    224.00 TO NODE    235.00 =   18874.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    235.00 TO NODE    235.00 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.) =    7.31
RAINFALL INTENSITY(INCH/HR) =   5.36
TOTAL STREAM AREA(ACRES) =     6.19
PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.56
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    234.00 TO NODE    235.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  95
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   220.00
  UPSTREAM ELEVATION(FEET) =     55.00
  DOWNSTREAM ELEVATION(FEET) =     14.50
  ELEVATION DIFFERENCE(FEET) =     40.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.340
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.80
  TOTAL AREA(ACRES) =      0.32   TOTAL RUNOFF(CFS) =      1.80

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    235.00 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.) =    2.34
  RAINFALL INTENSITY(INCH/HR) =   6.85
  TOTAL STREAM AREA(ACRES) =     0.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.80

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       10.56     7.31        5.364          6.19
      2        1.80     2.34        6.850          0.32

  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        5.18     2.34       6.850
      2       11.97     7.31       5.364
```



```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.97   Tc(MIN.) =    7.31
  TOTAL AREA(ACRES) =        6.5
  LONGEST FLOWPATH FROM NODE    224.00 TO NODE    235.00 =   18874.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        6.5  TC(MIN.) =      7.31
  PEAK FLOW RATE(CFS)   =      11.97
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

OFFSITE PROPOSED CONDITION

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2015 Advanced Engineering Software (aes)
            Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                        Analysis prepared by:




------------------------------------------------------------------------
  FILE NAME: H:\AES2010\1535\FE\PR\05-OFF\PR-Q100.DAT
  TIME/DATE OF STUDY: 14:16 10/09/2019
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  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   13.0      6.5    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160
  2   15.0      7.5    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0130

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    235.00 IS CODE =   7
------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
```



```
  TC(MIN) =   7.31   RAIN INTENSITY(INCH/HOUR) =  5.36
  TOTAL AREA(ACRES) =     6.50   TOTAL RUNOFF(CFS) =     11.97

************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    14.50  DOWNSTREAM(FEET) =    12.50
  FLOW LENGTH(FEET) =   152.68   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.90
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.97
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    7.63
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    240.00 =     152.68 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.215
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3838
  SUBAREA AREA(ACRES) =    0.54   SUBAREA RUNOFF(CFS) =    2.45
  TOTAL AREA(ACRES) =        7.0   TOTAL RUNOFF(CFS) =      14.09
  TC(MIN.) =    7.63

************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    245.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    12.50  DOWNSTREAM(FEET) =    11.50
  FLOW LENGTH(FEET) =   108.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.03
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.09
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    7.89
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    245.00 =     260.68 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    245.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.105
  *USER SPECIFIED(SUBAREA):
  OFFICE PROFESSIONAL/COMMERCIAL RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3923
  SUBAREA AREA(ACRES) =    0.13   SUBAREA RUNOFF(CFS) =    0.56
  TOTAL AREA(ACRES) =        7.2   TOTAL RUNOFF(CFS) =      14.36
  TC(MIN.) =    7.89

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    180.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    11.50  DOWNSTREAM(FEET) =    11.00
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.48
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.36
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    7.96
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    180.00 =     295.68 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  OFFICE PROFESSIONAL/COMMERCIAL RUNOFF COEFFICIENT = .8500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  96
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   110.00
  UPSTREAM ELEVATION(FEET) =     53.00
  DOWNSTREAM ELEVATION(FEET) =     52.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.543
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    58.18
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.63
```



```
  TOTAL AREA(ACRES) =      0.28   TOTAL RUNOFF(CFS) =      1.63

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    135.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     50.50  DOWNSTREAM(FEET) =     35.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   202.00   CHANNEL SLOPE =  0.0767
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  84
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.36
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   0.53
  Tc(MIN.) =    4.07
  SUBAREA AREA(ACRES) =     0.12       SUBAREA RUNOFF(CFS) =    0.38
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.733
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       2.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   6.58
  LONGEST FLOWPATH FROM NODE    155.00 TO NODE    135.00 =     312.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 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.) =    4.07
  RAINFALL INTENSITY(INCH/HR) =   6.85
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.01

****************************************************************************
  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) =   6.80   RAIN INTENSITY(INCH/HOUR) =  5.62
  TOTAL AREA(ACRES) =     1.58   TOTAL RUNOFF(CFS) =      7.86

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

```
 FLOW PROCESS FROM NODE    129.00 TO NODE    135.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    23.60  DOWNSTREAM(FEET) =    23.50
 FLOW LENGTH(FEET) =    10.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.39
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.86
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.83
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE    135.00 =      10.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 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.) =    6.83
 RAINFALL INTENSITY(INCH/HR) =   5.60
 TOTAL STREAM AREA(ACRES) =     1.58
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.86

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        2.01     4.07        6.850          0.40
     2        7.86     6.83        5.604          1.58

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
     1        6.70     4.07        6.850
     2        9.50     6.83        5.604

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       9.50   Tc(MIN.) =    6.83
 TOTAL AREA(ACRES) =        2.0
 LONGEST FLOWPATH FROM NODE    155.00 TO NODE    135.00 =     312.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    165.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```



```
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    35.00  DOWNSTREAM(FEET) =    23.50
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.13
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.50
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    6.88
 LONGEST FLOWPATH FROM NODE    155.00 TO NODE    165.00 =     372.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.578
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  97
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8562
 SUBAREA AREA(ACRES) =    0.22   SUBAREA RUNOFF(CFS) =    1.07
 TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =      10.51
 TC(MIN.) =    6.88

****************************************************************************
 FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.88
 RAINFALL INTENSITY(INCH/HR) =   5.58
 TOTAL STREAM AREA(ACRES) =     2.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.51

****************************************************************************
 FLOW PROCESS FROM NODE    166.00 TO NODE    167.00 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 LIMITED INDUSTRIAL RUNOFF COEFFICIENT = .8500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  96
 USER SPECIFIED Tc(MIN.) =    5.000
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
 SUBAREA RUNOFF(CFS) =      0.93
 TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.93
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    167.00 TO NODE    165.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    31.65  DOWNSTREAM(FEET) =    24.00
 FLOW LENGTH(FEET) =   222.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.59
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.93
 PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =    5.66
 LONGEST FLOWPATH FROM NODE    166.00 TO NODE    165.00 =  100222.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 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.) =    5.66
 RAINFALL INTENSITY(INCH/HR) =   6.32
 TOTAL STREAM AREA(ACRES) =     0.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.93

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       10.51     6.88        5.578          2.20
     2        0.93     5.66        6.323          0.16

 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       10.20     5.66       6.323
     2       11.33     6.88       5.578

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.33   Tc(MIN.) =    6.88
 TOTAL AREA(ACRES) =        2.4
 LONGEST FLOWPATH FROM NODE    166.00 TO NODE    165.00 =  100222.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    165.00 TO NODE    180.00 IS CODE =  31
```



```
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    23.50  DOWNSTREAM(FEET) =    11.00
 FLOW LENGTH(FEET) =   105.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.79
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.33
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.97
 LONGEST FLOWPATH FROM NODE    166.00 TO NODE    180.00 =  100327.00 FEET.

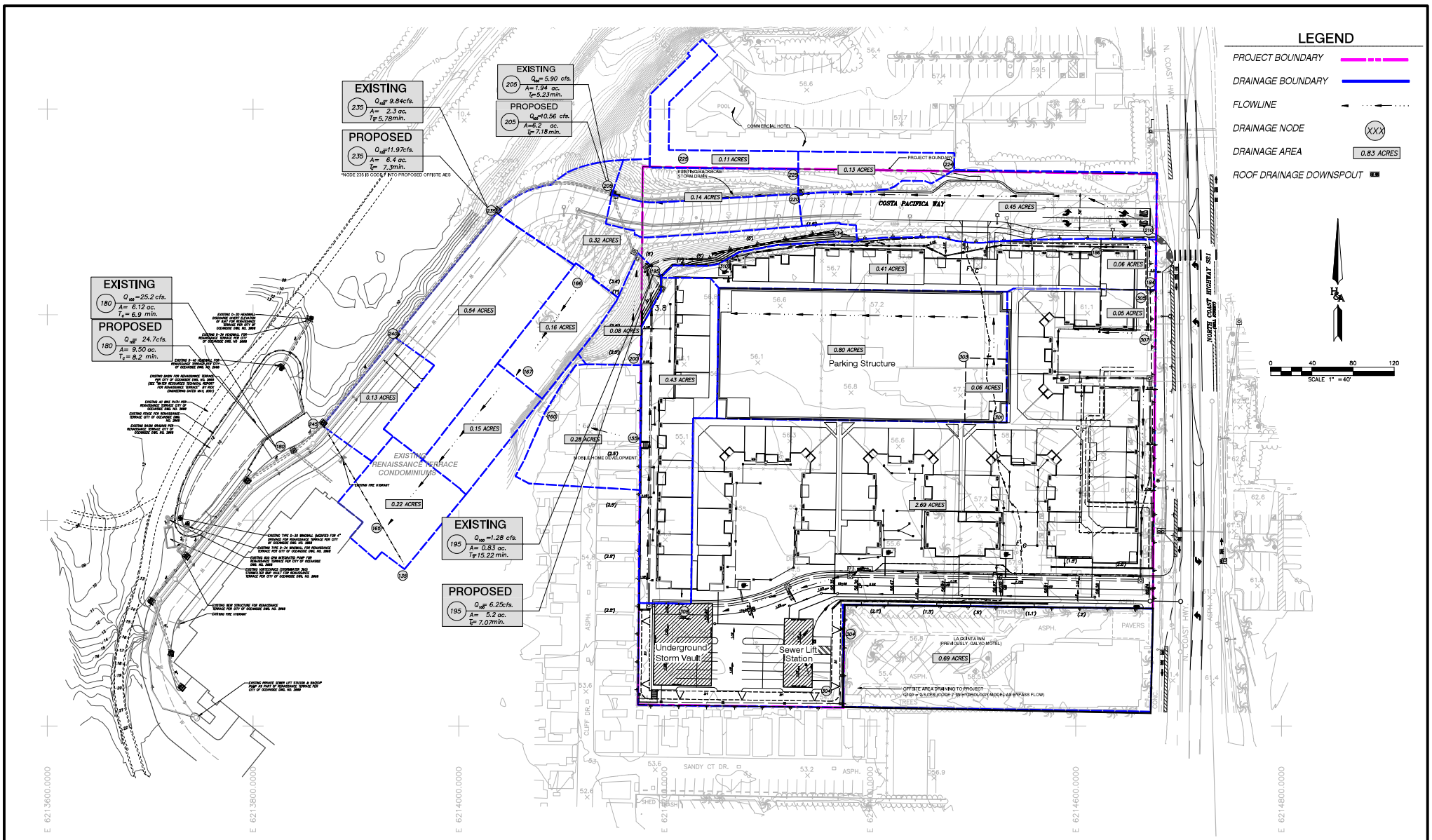
**************************************************************************
 FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 IS CODE =  11
--------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       11.33     6.97       5.527        2.36
 LONGEST FLOWPATH FROM NODE    166.00 TO NODE    180.00 =  100327.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       14.36     7.96       5.076        7.17
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE    180.00 =     295.68 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       23.91     6.97       5.527
     2       24.76     7.96       5.076

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      24.76   Tc(MIN.) =    7.96
 TOTAL AREA(ACRES) =        9.5
==========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        9.5  TC(MIN.) =      7.96
 PEAK FLOW RATE(CFS)   =      24.76
==========================================================================
==========================================================================
 END OF RATIONAL METHOD ANALYSIS
```



PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC

PLANNING
ENGINEERING
SURVEYING

PROPOSED CONDITION HYDROLOGY MAP

ALTA OCEANSIDE

OCEANSIDE, CALIFORNIA

SHEET 1 OF 1

W.O. 3321-02

Appendix 5 –Attenuation Simulation

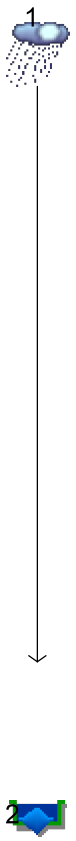
RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE 7/17/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 11 MIN.
6 HOUR RAINFALL 2.6 INCHES
BASIN AREA 3.4 ACRES
RUNOFF COEFFICIENT 0.79
PEAK DISCHARGE 9.13 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 11	DISCHARGE (CFS) = 0.4
TIME (MIN) = 22	DISCHARGE (CFS) = 0.4
TIME (MIN) = 33	DISCHARGE (CFS) = 0.4
TIME (MIN) = 44	DISCHARGE (CFS) = 0.5
TIME (MIN) = 55	DISCHARGE (CFS) = 0.5
TIME (MIN) = 66	DISCHARGE (CFS) = 0.5
TIME (MIN) = 77	DISCHARGE (CFS) = 0.5
TIME (MIN) = 88	DISCHARGE (CFS) = 0.5
TIME (MIN) = 99	DISCHARGE (CFS) = 0.6
TIME (MIN) = 110	DISCHARGE (CFS) = 0.6
TIME (MIN) = 121	DISCHARGE (CFS) = 0.6
TIME (MIN) = 132	DISCHARGE (CFS) = 0.6
TIME (MIN) = 143	DISCHARGE (CFS) = 0.7
TIME (MIN) = 154	DISCHARGE (CFS) = 0.7
TIME (MIN) = 165	DISCHARGE (CFS) = 0.8
TIME (MIN) = 176	DISCHARGE (CFS) = 0.9
TIME (MIN) = 187	DISCHARGE (CFS) = 1
TIME (MIN) = 198	DISCHARGE (CFS) = 1.1
TIME (MIN) = 209	DISCHARGE (CFS) = 1.3
TIME (MIN) = 220	DISCHARGE (CFS) = 1.5
TIME (MIN) = 231	DISCHARGE (CFS) = 2.2
TIME (MIN) = 242	DISCHARGE (CFS) = 5
TIME (MIN) = 253	DISCHARGE (CFS) = 9.13
TIME (MIN) = 264	DISCHARGE (CFS) = 1.8
TIME (MIN) = 275	DISCHARGE (CFS) = 1.2
TIME (MIN) = 286	DISCHARGE (CFS) = 0.9
TIME (MIN) = 297	DISCHARGE (CFS) = 0.8
TIME (MIN) = 308	DISCHARGE (CFS) = 0.7
TIME (MIN) = 319	DISCHARGE (CFS) = 0.6
TIME (MIN) = 330	DISCHARGE (CFS) = 0.5
TIME (MIN) = 341	DISCHARGE (CFS) = 0.5
TIME (MIN) = 352	DISCHARGE (CFS) = 0.5
TIME (MIN) = 363	DISCHARGE (CFS) = 0.4
TIME (MIN) = 374	DISCHARGE (CFS) = 0

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	9.130	11	253	25,298	------	------	------	vault 2
2	Reservoir	1.045	11	286	25,290	1	103.48	15,632	vault 2

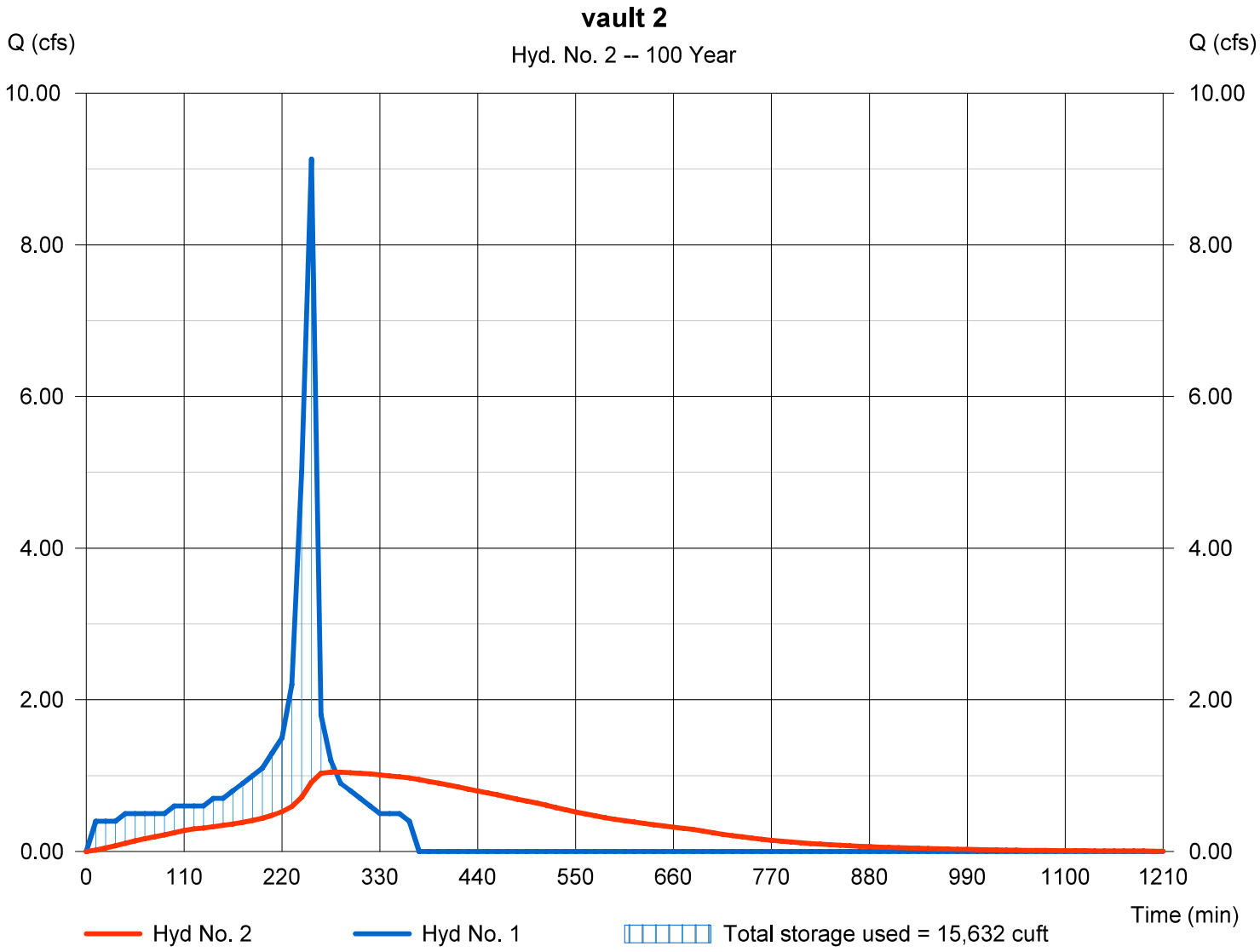
Hydrograph Report

Hyd. No. 2

vault 2

Hydrograph type	= Reservoir	Peak discharge	= 1.045 cfs
Storm frequency	= 100 yrs	Time to peak	= 286 min
Time interval	= 11 min	Hyd. volume	= 25,290 cuft
Inflow hyd. No.	= 1 - vault 2	Max. Elevation	= 103.48 ft
Reservoir name	= BASIN 1	Max. Storage	= 15,632 cuft

Storage Indication method used.



Pond No. 1 - BASIN 1

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 100.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	4,500	0	0
0.50	100.50	4,500	2,250	2,250
1.00	101.00	4,500	2,250	4,500
1.50	101.50	4,500	2,250	6,750
2.00	102.00	4,500	2,250	9,000
2.50	102.50	4,500	2,250	11,250
3.00	103.00	4,500	2,250	13,500
3.50	103.50	4,500	2,250	15,750
4.00	104.00	4,500	2,250	18,000

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	---	---	---	---	---	---	---	---	---	---	0.000
0.05	225	100.05	---	---	---	---	---	---	---	---	---	0.029	0.029
0.10	450	100.10	---	---	---	---	---	---	---	---	---	0.058	0.058
0.15	675	100.15	---	---	---	---	---	---	---	---	---	0.087	0.087
0.20	900	100.20	---	---	---	---	---	---	---	---	---	0.116	0.116
0.25	1,125	100.25	---	---	---	---	---	---	---	---	---	0.145	0.145
0.30	1,350	100.30	---	---	---	---	---	---	---	---	---	0.174	0.174
0.35	1,575	100.35	---	---	---	---	---	---	---	---	---	0.203	0.203
0.40	1,800	100.40	---	---	---	---	---	---	---	---	---	0.232	0.232
0.45	2,025	100.45	---	---	---	---	---	---	---	---	---	0.261	0.261
0.50	2,250	100.50	---	---	---	---	---	---	---	---	---	0.290	0.290
0.55	2,475	100.55	---	---	---	---	---	---	---	---	---	0.306	0.306
0.60	2,700	100.60	---	---	---	---	---	---	---	---	---	0.322	0.322
0.65	2,925	100.65	---	---	---	---	---	---	---	---	---	0.338	0.338
0.70	3,150	100.70	---	---	---	---	---	---	---	---	---	0.354	0.354
0.75	3,375	100.75	---	---	---	---	---	---	---	---	---	0.370	0.370
0.80	3,600	100.80	---	---	---	---	---	---	---	---	---	0.386	0.386
0.85	3,825	100.85	---	---	---	---	---	---	---	---	---	0.402	0.402
0.90	4,050	100.90	---	---	---	---	---	---	---	---	---	0.418	0.418
0.95	4,275	100.95	---	---	---	---	---	---	---	---	---	0.434	0.434
1.00	4,500	101.00	---	---	---	---	---	---	---	---	---	0.450	0.450
1.05	4,725	101.05	---	---	---	---	---	---	---	---	---	0.468	0.468
1.10	4,950	101.10	---	---	---	---	---	---	---	---	---	0.486	0.486
1.15	5,175	101.15	---	---	---	---	---	---	---	---	---	0.504	0.504
1.20	5,400	101.20	---	---	---	---	---	---	---	---	---	0.522	0.522
1.25	5,625	101.25	---	---	---	---	---	---	---	---	---	0.540	0.540
1.30	5,850	101.30	---	---	---	---	---	---	---	---	---	0.558	0.558
1.35	6,075	101.35	---	---	---	---	---	---	---	---	---	0.576	0.576
1.40	6,300	101.40	---	---	---	---	---	---	---	---	---	0.594	0.594
1.45	6,525	101.45	---	---	---	---	---	---	---	---	---	0.612	0.612
1.50	6,750	101.50	---	---	---	---	---	---	---	---	---	0.630	0.630
1.55	6,975	101.55	---	---	---	---	---	---	---	---	---	0.643	0.643
1.60	7,200	101.60	---	---	---	---	---	---	---	---	---	0.656	0.656
1.65	7,425	101.65	---	---	---	---	---	---	---	---	---	0.669	0.669

Continues on next page...

BASIN 1

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
1.70	7,650	101.70	---	---	---	---	---	---	---	---	---	0.682	0.682
1.75	7,875	101.75	---	---	---	---	---	---	---	---	---	0.695	0.695
1.80	8,100	101.80	---	---	---	---	---	---	---	---	---	0.708	0.708
1.85	8,325	101.85	---	---	---	---	---	---	---	---	---	0.721	0.721
1.90	8,550	101.90	---	---	---	---	---	---	---	---	---	0.734	0.734
1.95	8,775	101.95	---	---	---	---	---	---	---	---	---	0.747	0.747
2.00	9,000	102.00	---	---	---	---	---	---	---	---	---	0.760	0.760
2.05	9,225	102.05	---	---	---	---	---	---	---	---	---	0.771	0.771
2.10	9,450	102.10	---	---	---	---	---	---	---	---	---	0.782	0.782
2.15	9,675	102.15	---	---	---	---	---	---	---	---	---	0.793	0.793
2.20	9,900	102.20	---	---	---	---	---	---	---	---	---	0.804	0.804
2.25	10,125	102.25	---	---	---	---	---	---	---	---	---	0.815	0.815
2.30	10,350	102.30	---	---	---	---	---	---	---	---	---	0.826	0.826
2.35	10,575	102.35	---	---	---	---	---	---	---	---	---	0.837	0.837
2.40	10,800	102.40	---	---	---	---	---	---	---	---	---	0.848	0.848
2.45	11,025	102.45	---	---	---	---	---	---	---	---	---	0.859	0.859
2.50	11,250	102.50	---	---	---	---	---	---	---	---	---	0.870	0.870
2.55	11,475	102.55	---	---	---	---	---	---	---	---	---	0.879	0.879
2.60	11,700	102.60	---	---	---	---	---	---	---	---	---	0.888	0.888
2.65	11,925	102.65	---	---	---	---	---	---	---	---	---	0.897	0.897
2.70	12,150	102.70	---	---	---	---	---	---	---	---	---	0.906	0.906
2.75	12,375	102.75	---	---	---	---	---	---	---	---	---	0.915	0.915
2.80	12,600	102.80	---	---	---	---	---	---	---	---	---	0.924	0.924
2.85	12,825	102.85	---	---	---	---	---	---	---	---	---	0.933	0.933
2.90	13,050	102.90	---	---	---	---	---	---	---	---	---	0.942	0.942
2.95	13,275	102.95	---	---	---	---	---	---	---	---	---	0.951	0.951
3.00	13,500	103.00	---	---	---	---	---	---	---	---	---	0.960	0.960
3.05	13,725	103.05	---	---	---	---	---	---	---	---	---	0.969	0.969
3.10	13,950	103.10	---	---	---	---	---	---	---	---	---	0.978	0.978
3.15	14,175	103.15	---	---	---	---	---	---	---	---	---	0.987	0.987
3.20	14,400	103.20	---	---	---	---	---	---	---	---	---	0.996	0.996
3.25	14,625	103.25	---	---	---	---	---	---	---	---	---	1.005	1.005
3.30	14,850	103.30	---	---	---	---	---	---	---	---	---	1.014	1.014
3.35	15,075	103.35	---	---	---	---	---	---	---	---	---	1.023	1.023
3.40	15,300	103.40	---	---	---	---	---	---	---	---	---	1.032	1.032
3.45	15,525	103.45	---	---	---	---	---	---	---	---	---	1.041	1.041
3.50	15,750	103.50	---	---	---	---	---	---	---	---	---	1.050	1.050
3.55	15,975	103.55	---	---	---	---	---	---	---	---	---	2.235	2.235
3.60	16,200	103.60	---	---	---	---	---	---	---	---	---	3.420	3.420
3.65	16,425	103.65	---	---	---	---	---	---	---	---	---	4.605	4.605
3.70	16,650	103.70	---	---	---	---	---	---	---	---	---	5.790	5.790
3.75	16,875	103.75	---	---	---	---	---	---	---	---	---	6.975	6.975
3.80	17,100	103.80	---	---	---	---	---	---	---	---	---	8.160	8.160
3.85	17,325	103.85	---	---	---	---	---	---	---	---	---	9.345	9.345
3.90	17,550	103.90	---	---	---	---	---	---	---	---	---	10.53	10.53
3.95	17,775	103.95	---	---	---	---	---	---	---	---	---	11.72	11.72
4.00	18,000	104.00	---	---	---	---	---	---	---	---	---	12.90	12.90

...End

Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

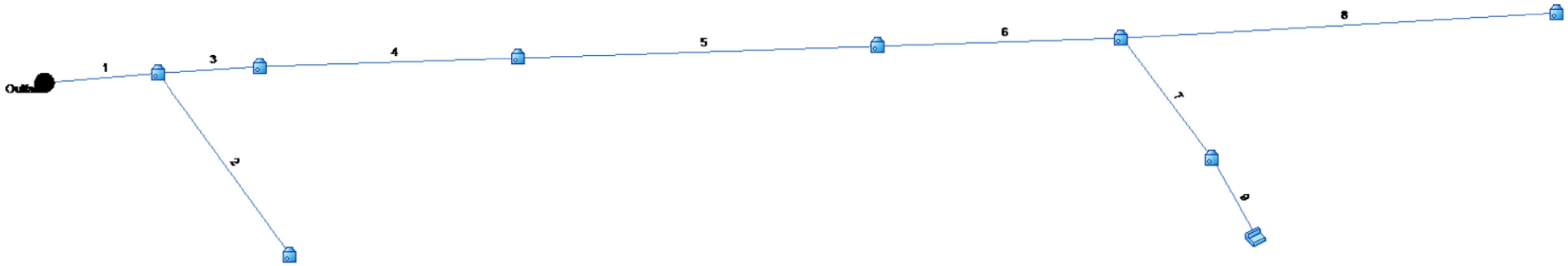
Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	2.20	0.00	3.30	4.25	5.77	6.80	7.95
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

Appendix 6 - Hydraulic Analysis of Existing Storm Drain System

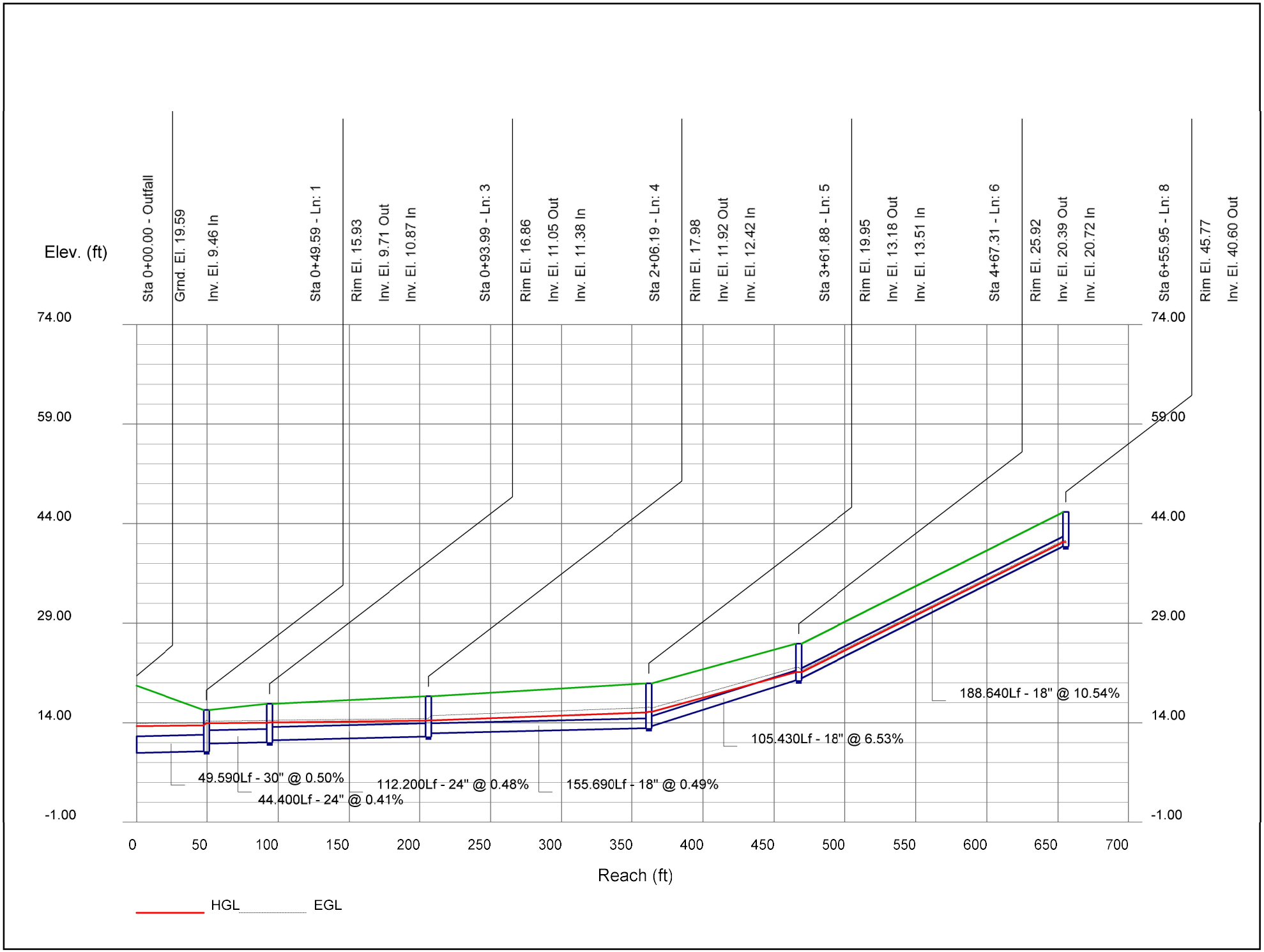
HYDRAULIC ANALYSIS

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: NorthCoast Apt-PR-Attenuated.stm	Number of lines: 8	Date: 1/27/2019

Storm Sewer Profile



Line No.	Line ID	Flow Rate	Line Size (Rise x Span)	Line Type	Line Length	Invert Elev. Down	Invert Elev. Up	Line Slope	HGL Down	HGL Up	Minor Loss	HGL Junct	Dn Str Line No.
		(cfs)	(in)		(ft)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	
1	8	24.76	30	Cir	49.590	9.46	9.71	0.50	13.50	13.61*	0.35	13.96	Outfall
2	Node 165 to 180	11.33	24	Cir	97.630	11.04	13.11	2.12	13.96	14.32	n/a	14.32 j	1
3	Node 245 to 180	14.11	24	Cir	44.400	10.87	11.05	0.41	13.91	14.01*	n/a	14.06	1
4	Node 240 to 245-24in	13.91	24	Cir	112.200	11.38	11.92	0.48	14.06	14.31*	n/a	14.36	3
5	Node 235 to 240-18in	11.97	18	Cir	155.690	12.42	13.18	0.49	14.36	15.56*	n/a	15.66	4
6	Node 205 to 235-18in	10.56	18	Cir	105.430	13.51	20.39	6.53	15.66	21.64	n/a	21.64	5
7	Node 200 to 205	6.25	18	Cir	65.520	20.72	25.20	6.84	21.64	26.17	n/a	26.17	6
8	Node 220 to 205	2.77	18	Cir	188.640	20.72	40.60	10.54	21.64	41.23	n/a	41.23	6
9	Node 195 to 200	6.25	18	Cir	38.490	26.65	44.40	46.12	26.95	45.37	n/a	45.37	7
	Notes: *Surcharged (HGL above crown).; j-Line contains hyd. jump.												

Line No.	Line ID	Dnstr Line No.	Line Length (ft)	Defl Angle (deg)	Junction Type	Known Q (cfs)
1	8	Outfall	49.590	-4.764	Manhole	24.76
2	Node 165 to 180	1	97.630	58.783	Manhole	11.33
3	Node 245 to 180	1	44.400	1.091	Manhole	14.11
4	Node 240 to 245-24in	3	112.200	1.781	Manhole	13.91
5	Node 235 to 240-18in	4	155.690	0.000	Manhole	11.97
6	Node 205 to 235-18in	5	105.430	0.000	Manhole	10.56
7	Node 200 to 205	6	65.520	55.020	Manhole	6.25
8	Node 220 to 205	6	188.640	-1.417	Manhole	2.77
9	Node 195 to 200	7	38.490	7.760	Grate Inlet	6.25

AS-BUILT DRAWINGS - EXISTING STORM DRAIN SYSTEM

PRELIMINARY GRADING PLAN FOR
RENAISSANCE TERRACE CONDOMINIUMS
OCEANSIDE, CALIFORNIA

GENERAL GRADING NOTES

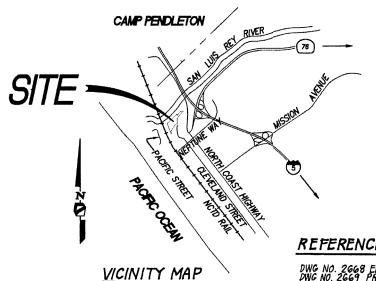
1. ALL GRADING AND DRAINAGE IMPROVEMENTS SHALL BE COMPLETED IN ACCORDANCE WITH THE CITY'S CURRENT GRADING ORDINANCE, THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION WITH SUPPLEMENTS (A.P.W.A. SPECIFICATIONS) AND THE "SAN DIEGO AREA REGIONAL STANDARD DRAWINGS", AS AMENDED BY THE CITY SUPPLEMENTS, AND THE EARTHWORK SPECIFICATIONS ATTACHED TO THE "PRELIMINARY SOILS REPORTS".
2. THE DEVELOPER SHALL BE RESPONSIBLE FOR LANDSCAPING, FOR SLOPE STABILIZATION OF ALL EMBANKMENTS OVER 3 FEET IN HEIGHT, WITHIN 45 DAYS OF COMPLETION OF PRELIMINARY GRADING. PERMANENT IRRIGATION SYSTEMS SHALL BE INSTALLED FOR ALL EMBANKMENTS OVER 5 FEET IN HEIGHT (AND FOR ALL SLOPES ALONG MAJOR STREETS). LANDSCAPING SPECIFICATIONS, AND PLANS AS REQUIRED, SHALL BE APPROVED BY THE TRANSPORTATION DIRECTOR PRIOR TO ISSUANCE OF THE GRADING PERMIT. THE DEVELOPER SHALL BE RESPONSIBLE FOR MAINTENANCE OF SLOPE STABILIZATION LANDSCAPING UNTIL RELEASE OF THE GRADING BOND OR UNTIL INDIVIDUAL LOTS (OR LIVING UNITS) CLOSE ESCROW, WHICHEVER OCCURS LATER.
3. ALL GRADING SHALL BE DONE UNDER THE OBSERVATION OF A QUALIFIED SOILS ENGINEER.
4. CUT AND FILL SLOPES SHALL BE TRIMMED TO THE FINISH GRADE TO PRODUCE A SMOOTH AND UNIFORM SURFACE OF CROSS SECTION. THE SLOPES OF EXCAVATIONS OR EMBANKMENTS SHALL BE SHAPED AND TRIMMED AS DIRECTED BY THE ENGINEER OF WORK AND AS APPROVED BY THE TRANSPORTATION DIRECTOR. FINISH SLOPES SHALL BE LEFT IN A NEAT AND ORDERLY CONDITION. ALL STONES, ROOTS OR OTHER WASTE MATERIAL SHALL BE PROPERLY DISPOSED OFF SITE.
5. COMPACTION TESTS SHALL BE SUPPLIED FOR TRENCHES.
6. ALL EXISTING, ABANDONED PIPELINES SHALL BE REMOVED AND REPLACED WITH PROPERLY COMPACTED SOILS UNLESS SPECIFICALLY APPROVED BY THE TRANSPORTATION DIRECTOR.
7. THE CONTRACTOR SHALL TAKE PRECAUTIONARY MEASURES TO PROTECT EXISTING UTILITIES.
8. NEITHER THE OWNER NOR THE ENGINEER OF WORK WILL ENFORCE SAFETY MEASURES OR REGULATIONS. THE CONTRACTOR SHALL DESIGN, CONSTRUCT AND MAINTAIN ALL SAFETY DEVICES, INCLUDING SHORING, AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE, AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS AND REGULATIONS.
9. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF WORK AND PUBLIC WORKS INSPECTOR PRIOR TO PERFORMING ROCK-REMOVAL OPERATION.
10. APPROVAL OF THESE PLANS BY THE TRANSPORTATION DIRECTOR DOES NOT AUTHORIZE ANY WORK OR GRADING TO BE PERFORMED UNTIL A VALID GRADING PERMIT HAS BEEN ISSUED, AND ALL AFFECTED PROPERTY OWNER'S PERMISSION HAS BEEN OBTAINED.
11. THESE PLANS ARE SUBJECT TO A SIGNED AND APPROVED SET OF IMPROVEMENT PLANS.
12. AN ENCROACHMENT PERMIT FROM THE TRANSPORTATION DIRECTOR SHALL BE REQUIRED BY THE CONTRACTOR FOR ANY WORK WITHIN THE EXISTING CITY RIGHT OF WAY.
13. ALL ROCK-SLOPE PROTECTION SHALL BE RIP RAP UNLESS OTHERWISE APPROVED BY THE TRANSPORTATION DIRECTOR.
14. ALL LOT PADS SHALL BE DESIGNED TO DRAIN TO AN ACCEPTABLE LOCATION AT A MINIMUM GRADIENT OF 1%
15. ALL CMU TYPE RETAINING WALLS GREATER THAN 3' IN HEIGHT SHALL HAVE A PERMIT FROM THE BUILDING DEPARTMENT PER THE UNIFORM BUILDING CODE.
16. MAXIMUM SLOPE RATIO SHALL BE 2:1.
17. A 12-INCH HIGH BY 4-FOOT WIDE BERM (90% COMPACTED) SHALL BE CONSTRUCTED ALONG THE TOP OF THE SLOPE. NO RUNOFF SHALL FLOW OVER THE TOP OF THE SLOPE. DOWNDRAINS SHALL BE USED PER D-75.
18. FOR THIS PLAN TO BECOME EFFECTIVE, AN APPROVED HAUL ROUTE PLAN THAT HAS BEEN APPROVED BY THE TRANSPORTATION DIRECTOR SHALL BE INCLUDED (FOR HAULING OF MATERIAL ON A PUBLIC STREET). HAULING OPERATIONS SHALL BE FROM 7:00 AM TO 4:00 PM UNLESS APPROVED BY THE CITY.
19. LOT GRADING IS TO BE IN ACCORDANCE WITH CITY SUPPLEMENT DRAWING M-12 ("TYPICAL LOT GRADING").
20. ALL OPERATIONS CONDUCTED ON THE PREMISES, INCLUDING THE WARMING UP, REPAIR, ARRIVAL, DEPARTURE, OR RUNNING OF TRUCKS, EARTHMOVING EQUIPMENT, CONSTRUCTION EQUIPMENT, AND ANY OTHER ASSOCIATED EQUIPMENT SHALL BE LIMITED TO THE PERIOD BETWEEN 7:00 A.M. AND 6:00 P.M. EACH DAY, MONDAY THROUGH FRIDAY, AND NO EARTHMOVING OR GRADING OPERATIONS SHALL BE CONDUCTED ON THE PREMISES ON SATURDAYS, SUNDAYS OR LEGAL HOLIDAYS, UNLESS WAIVED BY THE TRANSPORTATION DIRECTOR.
21. ALL DISTURBED AREAS MUST BE REVEGETATED, SUBSTANTIALLY GERMINATED, AND ESTABLISHED WITHIN 45 DAYS OF COMPLETION OF GRADING AND PRIOR TO REQUESTING FINAL INSPECTION.
22. IMPORT MATERIAL SHALL BE OBTAINED FROM, AND WASTE MATERIAL SHALL BE DEPOSITED AT A SITE APPROVED BY THE TRANSPORTATION DIRECTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DEBRIS OR DAMAGE OCCURRING ALONG THE HAUL ROUTES OR ADJACENT STREETS AS DIRECT RESULT OF THE OPERATION.
23. SMALL INCREMENTAL AMOUNTS OF DAILY GRADING ARE REQUIRED; THE SITE SHALL BE SECURED DAILY AFTER GRADING WITH GEOTEXTILES, MATS AND FIBER ROLLS. CONCRETE, SOLID WASTE, SANITARY WASTE AND HAZARDOUS WASTE MANAGEMENT BMP'S SHALL BE USED.
24. DEMONSTRATION THAT ALL ON SITE TEMPORARY AND PERMANENT RUNOFF AND EROSION CONTROL DEVICES ARE INSTALLED AND THE CITY OF OCEANSIDE ENGINEER HAS DETERMINED THAT ALL MEASURES ARE IN PLACE TO MINIMIZE SOIL LOSS FROM THE CONSTRUCTION SITE.
25. THE MONITORING PROGRAM SHALL INCLUDE, AT A MINIMUM, MONTHLY REPORTS BEGINNING ONE MONTH FROM THE DATE OF COMMISSION ACTION ON THIS PERMIT APPROVAL, CONTINUING TO APRIL 1. THE REPORTS SHALL BE COMPLETED BY A LICENSED ENGINEER AND SHALL DESCRIBE THE STATUS OF GRADING OPERATIONS AND THE CONDITION OF EROSION CONTROL DEVICES, INCLUDING TEMPORARY AND PERMANENT DESILTING BASINS. ANY POTENTIAL MODIFICATIONS TO THE APPROVED GRADING SCHEDULE SHALL BE INDICATED. MAINTENANCE OF TEMPORARY EROSION CONTROL MEASURES IS THE RESPONSIBILITY OF THE APPLICANT, INCLUDING REPLACEMENT OF ANY DEVICES ALTERED OR DISLODGED BY STORMS. DESILTING BASIN MAINTENANCE, INCLUDING REMOVAL OF ACCUMULATED SILT, SHALL OCCUR PRIOR TO THE ONSET OF THE RAINY SEASON AND ON AN AS-NEEDED BASIS THROUGHOUT THE WINTER.

SPECIAL NOTES

THE FOLLOWING NOTES ARE PROVIDED TO GIVE DIRECTIONS TO THE CONTRACTOR BY THE ENGINEER-OF- WORK (EOW). THE TRANSPORTATION DIRECTOR'S SIGNATURE ON THESE PLANS DOES NOT CONSTITUTE APPROVAL OF ANY OF THESE NOTES AND THE CITY WILL NOT BE RESPONSIBLE FOR THEIR ENFORCEMENT.

1. NEITHER THE OWNER NOR THE ENGINEER OF WORK WILL ENFORCE SAFETY MEASURES OR REGULATIONS. THE CONTRACTOR SHALL DESIGN, CONSTRUCT AND MAINTAIN ALL SAFETY DEVICES, INCLUDING SHORING, AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS AND REGULATIONS.
2. LOCATION AND ELEVATION OF IMPROVEMENTS TO BE MET BY WORK TO BE DONE SHALL BE CONFIRMED BY FIELD MEASUREMENTS PRIOR TO CONSTRUCTION OF NEW WORK.
3. BEFORE EXCAVATING FOR THIS CONTRACT, VERIFY LOCATION OF UNDERGROUND UTILITIES. THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS HAS BEEN OBTAINED FROM AVAILABLE RECORDS ONLY AND MAY NOT REFLECT ALL EXISTING UTILITIES. LOCATIONS OF ALL EXISTING UTILITIES SHALL BE CONFIRMED BY FIELD MEASUREMENTS BY CONTRACTOR PRIOR TO CONSTRUCTION OF WORK.
4. CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN HEREON AND ANY OTHER EXISTING LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.
5. CONTRACTOR SHALL COORDINATE HIS WORK WITH THAT OF OTHER CONTRACTORS WORKING ON THE SITE, INCLUDING GRADING, DRAINAGE, LANDSCAPING AND IRRIGATION.
6. THE STORM DRAIN IN THIS PLAN HAS BEEN DESIGNED FOR HIGH DENSITY POLYETHYLENE (HDPE) PIPE WITH WATERTIGHT JOINTS. USE OF ANY OTHER MATERIAL DURING CONSTRUCTION MUST ALSO BE WATERTIGHT.
7. SEE SHEET 9 FOR LIMITS OF OVER-EXCAVATION AREAS. REFER TO GEOTECHNICAL REPORT FOR SPECIFICATIONS ON OVER-EXCAVATION AND COMPACTION REQUIREMENTS.

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Environmental | Engineering | Survey
701 B Street, Suite 800
San Diego, CA 92101
619 235 6471 Tel
619 234 0349 Fax



VICINITY MAP
NOT TO SCALE

APPLICANT/ DEVELOPER

D.R. HORTON
5875 AVENIDA ENCINAS, SUITE B
CARLSBAD, CA 92008
PHONE: (760) 804-8490

IMPORTANT NOTICE

SECTION 4216 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID.
FOR DIG ALERT I.D. NUMBER, CALL UNDERGROUND SERVICE ALERT:
TOLL FREE 1-800-227-2600 TWO (2) WORKING DAYS BEFORE DIGGING.

CONTRACTOR'S NOTE

UNAUTHORIZED CHANGES & USES:
THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD CITY OF OCEANSIDE HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF CITY OF OCEANSIDE PROFESSIONAL.

GRADING PLAN DESIGN CERTIFICATE

1. ALL GRADING SHALL BE DONE UNDER THE OBSERVATION OF A QUALIFIED SOILS ENGINEER AND ENGINEERING GEOLOGIST AND IN ACCORDANCE WITH THE RECOMMENDATIONS AND SPECIFICATIONS SET FORTH IN THE APPROVED SOILS AND GEOLOGICAL REPORT PREPARED BY:

GEOCON INCORPORATED, 6960 FLANDERS DRIVE, SAN DIEGO, CA 92121 DATED: SEE BELOW

2. THESE GRADING PLANS HAVE BEEN REVIEWED BY THE UNDERSIGNED AND ARE FOUND TO BE IN CONFORMANCE WITH THE RECOMMENDATIONS AND SPECIFICATIONS OUTLINED IN THE SOILS AND GEOLOGICAL REPORT PREPARED FOR THIS DEVELOPMENT BY GEOCON INCORPORATED AS FOLLOWS:

GEOCON INCORPORATED, GEOTECHNICAL INVESTIGATION, RENAISSANCE TERRACE, OCEANSIDE, CALIFORNIA, DATED OCTOBER 13, 2005 (PROJECT NO. 07576-52-01); RESPONSE TO REVIEW COMMENTS, RENAISSANCE TERRACE, OCEANSIDE, CALIFORNIA, PREPARED BY GEOCON INCORPORATED, DATED DECEMBER 7, 2005 (PROJECT NO. 07576-52-01); ADDITIONAL TEMPORARY SHORING RECOMMENDATIONS, RENAISSANCE TERRACE, OCEANSIDE, CALIFORNIA, PREPARED BY GEOCON INCORPORATED, DATED DECEMBER 7, 2005 (PROJECT NO. 07576-52-01); ADDENDUM GEOTECHNICAL RECOMMENDATIONS, RENAISSANCE TERRACE, OCEANSIDE, CALIFORNIA, PREPARED BY GEOCON INCORPORATED, DATED APRIL 4, 2006 (PROJECT NO. 07576-52-01); RESPONSE TO REVIEW COMMENTS, RENAISSANCE, TERRACE, OCEANSIDE, CALIFORNIA, PREPARED BY GEOCON INCORPORATED, DATED APRIL 4, 2006 (PROJECT NO. 07576-52-01).

BY: _____ C.E. 2714 DATE: 4/4/06

BY: _____ C.E.G. 2288 DATE: 4/4/06

PLANS ARE CHECKED AND FOUND TO COMPLY WITH CITY OF OCEANSIDE REQUIREMENTS:

_____ 4/4/06
GEOTECHNICAL CONSULTANT DATE

DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

_____ 4.4.06
GREGORY M. SHIELDS, R.C.E. 42951 DATE
REGISTRATION EXPIRES 3/31/06

LEGAL DESCRIPTION

PORTIONS OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 22, 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 AND A PORTION OF LOT 4 IN SECTION 22, TOWNSHIP 11 SOUTH, RANGE 5 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA.

AS-BUILT K.P. 5-2-07

REFERENCE DRAWINGS

DWG NO. 2668 ERO
DWG NO. 2669 PRECISE GRADING
DWG NO. W229 (EXIST. WATER)
DWG NO. R13837 PUBLIC IMPROVEMENTS
DWG NO 20-5 (EXIST. SEWER)

TOPOGRAPHY

PROJECT DESIGN CONSULTANTS PHOTOGRAMMETRY TO 'B' STREET, SUITE 800
SAN DIEGO, CA 92101
PHONE: (619) 235-6471
DATE FLOWN: SEPTEMBER 9, 2005
FIELD SURVEYS DATED: SEPT. 14, 2005

SHEET INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	NOTES, KEY MAP & STREET SECTIONS
3	GRADING PLAN
4	GRADING PLAN
5	STORM DRAIN PLAN & PROFILE
6	STORM DRAIN PLAN & PROFILE
7	STORM DRAIN PLAN & PROFILE
8	SHORING DETAILS
9	RETAINING WALL PLAN
10	SHORING PLAN
11	SHORING PLAN
12	SHORING SECTIONS
13	SHORING SECTIONS
14	SHORING DETAILS
15	RETAINING WALL DETAILS
16	RETAINING WALL PROFILES
17	RETAINING WALL PROFILES
18	GRADING PLAN
19	DETAILS

ABBREVIATIONS

AC	= ASPHALT CONCRETE	CMP	= CORRUGATED METAL PIPE
PVMT	= PAVEMENT	DOC.	= DOCUMENT
PCC	= PORTLAND CEMENT CONCRETE	REC.	= RECORDED
LF	= LINEAR FEET	RT	= RIGHT
LIP	= GUTTER LIP	LT	= LEFT
BFP	= BACK-FLOW PREVENTOR	DWG.	= DRAWING
EOP	= EDGE OF PAVEMENT	NO.	= NUMBER
TC	= TOP OF CUB	FLG	= FLANGE
BC	= BOTTOM OF CUB	PJ	= PUSH-JOINT
FL	= FLOWLINE	GV	= GATE VALVE
IE	= INVERT ELEVATION	ARV	= AIR RELEASE VALVE
FH	= FIRE HYDRANT	NCTD	= NORTH COUNTY TRANSIT DISTRICT
R/W	= RIGHT OF WAY		
PVT	= PRIVATE	M.H.	= MANHOLE
PUB	= PUBLIC	TYP	= TYPICAL
(72.88)	= EXISTING ELEVATION	T.B	= THRUST BLOCK
PCR	= POINT OF REVERSED CURVE	F.G.	= FINISH GROUND
VERT.	= VERTICAL	SD	= STORM DRAIN
HORIZ.	= HORIZONTAL	WTR	= WATER
SDRSD	= SAN DIEGO REGIONAL STANDARD DRAWINGS	SWR	= SEWER
		ELEV	= ELEVATION
EXIST.	= EXISTING	STA	= STATION
STD	= STANDARD	TOP	= TOP OF PIPE
PVC	= POLYVINYL CHLORIDE PIPE	D.I.P.	= DUCTILE IRON PIPE
ACP	= ASBESTOS CEMENT PIPE	B.M.P.	= BEST-MANAGEMENT PRACTICE
VCP	= VITRIFIED CLAY PIPE		
PP	= POWER POLE		

SOILS ENGINEER CERTIFICATION

WE HEREBY CERTIFY THAT WE HAVE PROVIDED PROFESSIONAL TESTING AND APPROVAL CONCERNING THE PREPARATION OF GROUND TO RECEIVE FILLS, TESTING FOR REQUIRED COMPACTION, STABILITY OF ALL FINISH SLOPES, DESIGN OF BUTTRESS FILLS WHERE REQUIRED, THE ADEQUACY OF THE NATURAL GROUND FOR RECEIVING FILL, THE STABILITY OF CUT SLOPES WITH RESPECT TO GEOLOGICAL MATTERS AND THE NEED FOR SUBDRAINS AND OTHER GROUNDWATER DRAINAGE DEVICES AND THAT THESE GRADING PLANS ACCURATELY REFLECT ALL CONDITIONS AND CONSTRUCTION RECOMMENDATIONS PREPARED FOR THIS PROJECT AS DATED:

SOILS ENGINEER OF RECORD: _____ 6/18/09
NAME DATE

ENGINEERING GEOLOGIST OF RECORD: Troy K. Reist 6/18/09
NAME DATE

CIVIL ENGINEER CERTIFICATION

I HEREBY CERTIFY THAT AS THE ENGINEER IN RESPONSIBLE CHARGE OF WORK ON THIS PROJECT, I HAVE SUPERVISED THE ENGINEERING WORK AS SHOWN ON THESE PLANS, DETERMINE GENERAL COMPLIANCE WITH PLANS AND SPECIFICATIONS, AND THAT THE COMPLETED CONSTRUCTION IS IN CONFORMANCE WITH THESE PLANS.

I ALSO CERTIFY THAT ALL DESIGN CHANGES MADE DURING CONSTRUCTION, ALL INFORMATION AS REQUIRED BY THE CITY OF OCEANSIDE GRADING ORDINANCE, AND ALL RECOMMENDATIONS FROM THE SOILS ENGINEERING GEOLOGY REPORTS PREPARED FOR THIS PROJECT HAVE BEEN INCORPORATED IN THESE PLANS.

CIVIL ENGINEER OF RECORD: _____ 6-16-09
NAME DATE

CONSTRUCTION CHANGES:

NO.	DESCRIPTION	APPV'D.	DATE
1	RESIZED FILTER BOX, UPDATED BMP BOX DETAILS AND PIPE DIAMETERS	[illegible]	8-1-06
2	REVISED WALL SECTION 1 & 2	[illegible]	11-2-06
3	REDIRECTION OF STORM DRAIN	[illegible]	2/28/07
4	REVISED RETAINING WALLS	[illegible]	11/14/07
5	ADD NEW SHTS 18 & 19, KEY TOT SHTS	[illegible]	6-18-09

BENCHMARK:

Description: CITY OF OCEANSIDE BENCHMARK #F-52
Location: SET BRASS CAP STAMPED "COS BM-F-52" ON TOP OF CURB, WESTERLY P.C., NORTHWESTERLY CURB RETURN OF N. COAST HIGHWAY (HILL STREET) & NEPTUNE WAY (6TH STREET).
Record From: _____
Elev.: 58.172' (1984 ADJUSTED) Datum: M.S.L.

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THE PLANS AND THE SPECIFICATIONS AND STANDARD DRAWINGS OF THE CITY OF OCEANSIDE

STANDARD SPECIFICATIONS:
1. CITY OF OCEANSIDE "ENGINEERS & DESIGN PROCESSING MANUAL" ADOPTED FEBURARY 13, 1991 & REFORMATED JUNE, 2004.
2. CITY OF OCEANSIDE "WATER, SEWER, AND RECLAIMED WATER DESIGN [illegible] MANUAL" ADOPTED AUGUST 2005.
3. STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (2003 EDITION) INCLUDING THE REGIONAL AND CITY OF SAN DIEGO SUPPLEMENT AMENDMENTS NO 6-8 FILED JULY 21, 2000.
4. CALIFORNIA DEPARTMENT OF TRANSPORTATION, "MANUAL OF TRAFFIC CONTROLS CONSTRUCTION AND MAINTENANCE WORK ZONES," (2000 EDITION), INCLUDING NO 769843, FILED JANUARY 24, 2000.
5. STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATION. (JULY 1992), DOCUMENT NO. 769806, FILED JULY 9, 1992.

STANDARD DRAWINGS
1. CITY OF OCEANSIDE STANDARD DRAWINGS
2. SAN DIEGO REGIONAL STANDARD DRAWINGS, DOC. NO. 769846, FILED JULY 21, 2000.
3. CITY OF OCEANSIDE ENGINEER'S DESIGN AND PROCESSING MANUAL
4. STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION STANDARD PLANS (JULY 1992), DOCUMENT NO. 769805, FILED JULY 9, 1992.

LEGEND

DESCRIPTION	STD. DWG #	SYMBOL	QUANTITIES
PROJECT BOUNDARY			
SUBDIVISION LOT LINE PER FINAL MAP			
EXISTING CONTOUR			
PROPOSED CONTOUR		15	
100-YR FLOODPLAIN PER LOMA #01-09-061A & #01-09-700A			
EASEMENTS			
PROPOSED DAYLIGHT			
PROPOSED TOP/TOE OF SLOPE			
PROPOSED SHORING	SEE SHEETS 10 & 11		
BUILDING FOOTPRINT			
PROPOSED 8" WATER MAIN	SEE PUBLIC IMP PLAN, DWG. NO. R13837		
PROPOSED 6" SEWER MAIN (AS NOTED)	SEE PUBLIC IMP PLAN, DWG NO. R13837		
PROPOSED FIRE HYDRANT	SEE PUBLIC IMP PLAN, DWG NO. R13837		
PROPOSED CURB (TYPE G-1)	SEE PUBLIC IMP PLAN, DWG NO. R13837		
DETECTOR CHECK ASSEMBLY	SEE PUBLIC IMP PLAN, DWG NO. R13837		
PROPOSED PREDATION FENCE	SEE LANDSCAPE PLAN		
PROPOSED SECURITY FENCING	SEE LANDSCAPE PLAN		
PROPOSED 18" HDPE STORM DRAIN			866 LF
PROPOSED 24" HDPE STORM DRAIN			364 LF
PROPOSED 8" HDPE STORM DRAIN			104 LF
PROPOSED 12" HDPE STORM DRAIN			162 LF
PROPOSED TYPE 'G' CURB INLET	SDRSD: D-3		5 EA
PROPOSED MODIFIED TYPE 'G' CURB INLET (MOD. D-3)	SEE SHEET 2 FOR DETAIL		5 EA (AS NOTED)
TYPE F CATCH BASIN	SDRSD: D-7		5 EA
12" x 12" BROOKS BOX	SEE SHEET 2 FOR DETAIL		5 EA
4" PVC SUBDRAIN	PER KEYSTONE SPECIFICATIONS		1,190 LF
BLADED SWALE	SEE SHEET 2 FOR [illegible]		70 LF
PROPOSED BROW DITCH (TYPE AS-NOTED)	SDRSD: D-75		720 LF
PROPOSED KEYSTONE WALL	SEE SHEETS 15, 16, & 17 FOR DETAILS		2,816 SF
A-4 CLEANOUT	SDRSD: D-9		4 EA
WING HEADWALL	SDRSD: D-34		2 EA
STRAIGHT HEADWALL	SDRSD: D-30		2 EA
RIP RAP	SDRSD: D-40		45 CY
CONCRETE ANCHOR	SDRSD: S-9		1 EA

TOTAL GRADING QUANTITY

EXCAVATION = 35,000 CY
EXPORT = 33,000 CY

NOTE: QUANTITIES SHOWN ARE FOR ESTIMATION PURPOSES ONLY AND ARE NOT TO BE USED FOR FINAL PAY QUANTITY. QUANTITIES ARE GEOMETRIC ONLY AND DO NOT REFLECT SHRINKAGE OR BULKING FACTORS. QUANTITIES ALSO DO NOT INCLUDE OVER-EXCAVATION.

THIS PROJECT PROPOSES IMPORT/EXPORT OF 33,000 CUBIC YARDS OF MATERIAL ON THE PROJECT SITE. ALL EXPORT MATERIAL SHALL BE DISCHARGED INTO A LEGAL DISPOSAL SITE. THE APPROVAL OF THIS PROJECT DOES NOT ALLOW PROCESSING AND SALE OF THE MATERIAL. ALL SUCH ACTIVITIES REQUIRE A SEPARATE CONDITIONAL USE PERMIT.

PROPOSED UTILITIES PER PRECISE GRADING PLAN DWG 2668

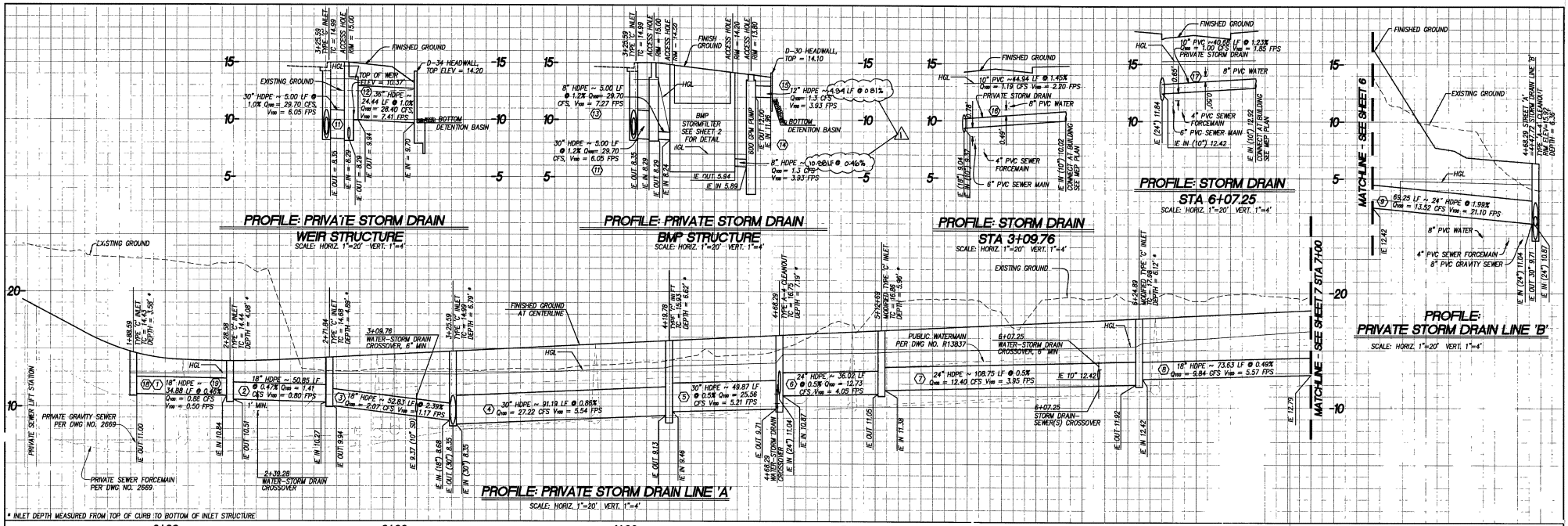
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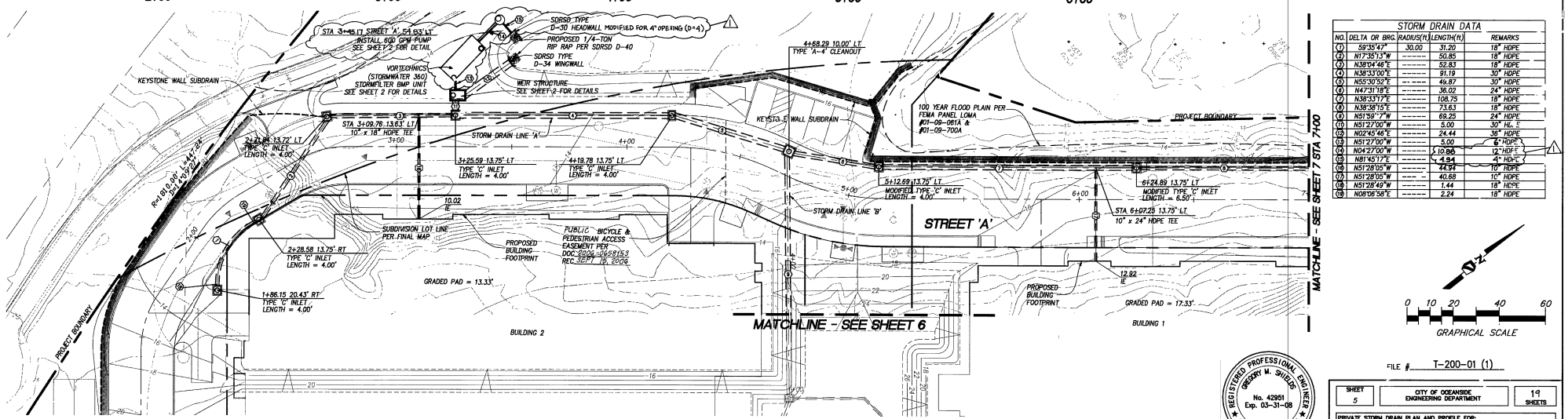
SHEET	CITY OF OCEANSIDE ENGINEERING DEPARTMENT	19 SHEETS

PRELIMINARY GRADING PLAN FOR:
RENAISSANCE TERRACE

ENGINEER OF WORK: GREGORY M. SHIELDS R.C.E. 42951	APPROVED: FRANK WATANABE R.C.E. 582-5 COMMUNITY DEV. & TRANS DIR.	4-6-06
	Checked By: ARC Approved Date: 4-4-06	PLAN NUMBER 2668

REGISTERED PROFESSIONAL ENGINEER — GREGORY M. SHIELDS — No. 42951 Exp. 03-31-08 — CIVIL — STATE OF CALIFORNIA





PLAN: PRIVATE: STORM DRAIN LINES 'A' AND 'B'

SCALE: 1"=20'

STORM DRAIN DATA

NO.	DELTA OR BRG.	RADIUS(ft)	LENGTH(ft)	REMARKS
①	59°35'47"	30.00	31.20	18" HDPE
②	N17°35'13"W	-------	50.85	18" HDPE
③	N38°04'46"E	-------	52.83	18" HDPE
④	N38°33'00"E	-------	91.19	30" HDPE
⑤	N55°30'52"E	-------	49.87	30" HDPE
⑥	N47°31'18"E	-------	36.02	24" HDPE
⑦	N38°33'17"E	-------	108.75	18" HDPE
⑧	N38°38'15"E	-------	73.63	18" HDPE
⑨	N51°59'17"W	-------	69.25	24" HDPE
⑩	N51°27'00"W	-------	5.00	30" HDPE
⑪	N02°45'46"E	-------	24.44	36" HDPE
⑫	N51°27'00"W	-------	5.00	6" HDPE
⑬	N04°27'00"W	-------	10.86	12" HDPE
⑭	N81°45'17"E	-------	4.94	12" HDPE
⑮	N51°28'05"W	-------	44.94	10" HDPE
⑯	N51°28'05"W	-------	40.68	10" HDPE
⑰	N51°28'49"W	-------	1.44	18" HDPE
⑱	N08°06'58"E	-------	2.24	18" HDPE

FILE # T-200-01 (1)

REGISTERED PROFESSIONAL ENGINEER
GREGORY M. SHIELDS
No. 42951
Exp. 03-31-08
CIVIL
STATE OF CALIFORNIA

SHEET	CITY OF OCEANSIDE ENGINEERING DEPARTMENT	SHEETS
5		19

PRIVATE STORM DRAIN PLAN AND PROFILE FOR:

RENAISSANCE TERRACE

APPROVED 4-6-06
FRANK WATANABE, R.C.E. 38255 COMMUNITY Dev. & TRANS. D.R.

ENGINEER OF WORK
GREGORY M. SHIELDS R.C.E. 42951 4-6-06

Checked By: ARC
Approval Date:

LAN NUMBER 2668

CONSTRUCTION CHANGES:

NO.	DESCRIPTION	APP'D	DATE
1	RESIZED FILTER Box	KDS	5-1-06
	AS-BUILT K.P	JC	7-3-07

BENCHMARK:

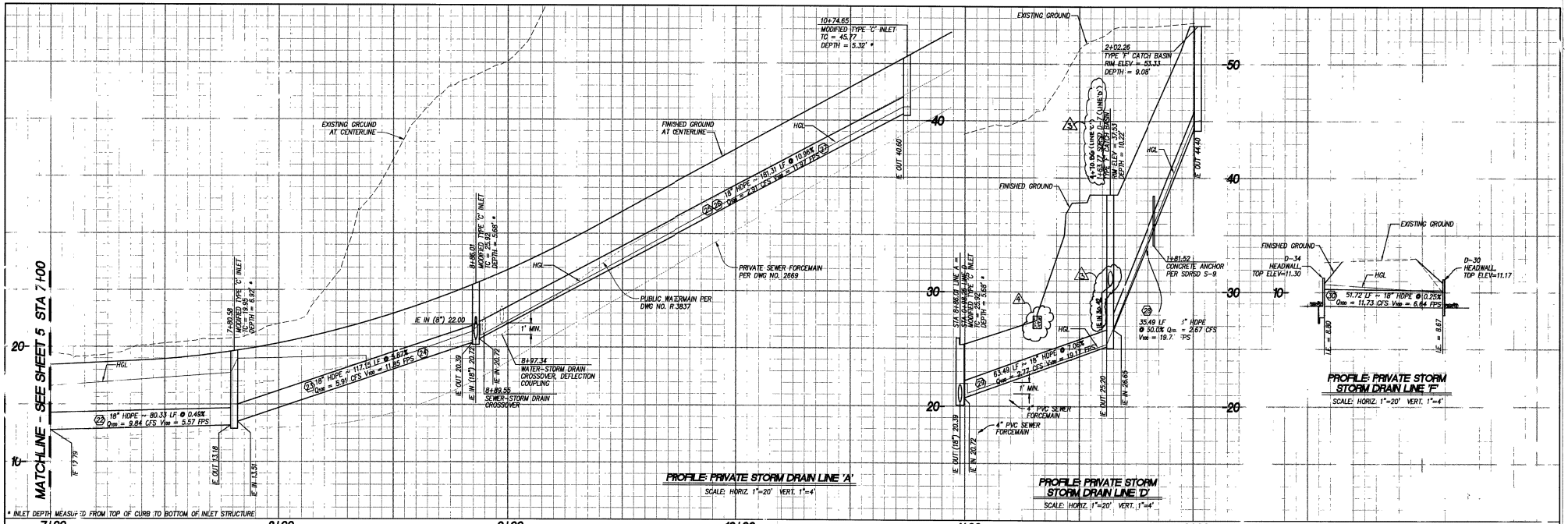
Description: CITY OF OCEANSIDE BENCHMARK #F-52

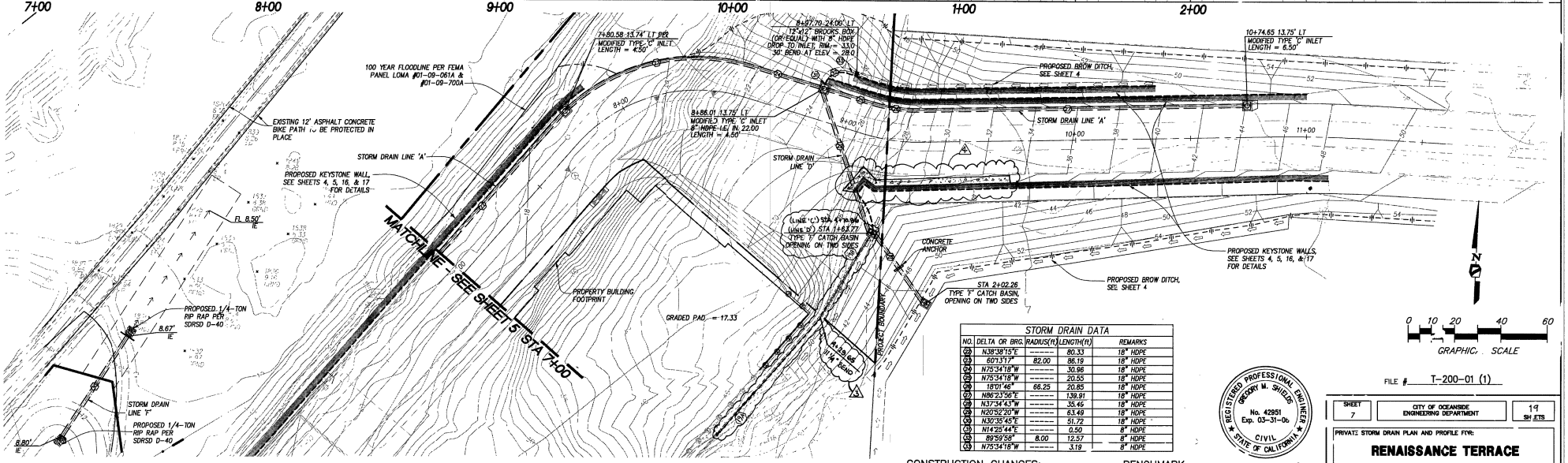
Location: SET BRASS CAP STAMPED "COS BM-F-52" ON TOP OF CURB, WESTERLY P.C., NORTHWESTERLY CURB RETURN, OF N. COAST HIGHWAY (HILL STREET) & NEPTUNE WAY (8TH STREET).

Record From:

Elev. 59.172' (1984 ADJUSTED) Datum: M.S.L.

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Environmental | Engineering | Survey
701 B Street, Suite 800
San Diego, CA 92101
619 236 6411 Tel
619 234 0349 Fax





PLAN: PRIVATE STORM DRAIN LINES A AND D

SCALE: 1"=20'

STORM DRAIN DATA

NO.	DELTA OR BRG.	RADIUS(ft)	LENGTH(ft)	REMARKS
(22)	N38°38'15"E	-------	80.33	18" HDPE
(23)	60°13'17"	82.00	86.19	18" HDPE
(24)	N75°34'18"W	-------	30.96	18" HDPE
(25)	N75°34'18"W	-------	20.55	18" HDPE
(26)	18°01'46"	66.25	20.85	18" HDPE
(27)	N86°23'56"E	-------	139.91	18" HDPE
(28)	N37°34'43"W	-------	35.45	18" HDPE
(29)	N20°52'20"W	-------	63.49	18" HDPE
(30)	N30°35'45"E	-------	51.72	18" HDPE
(31)	N14°25'44"E	-------	0.50	8" HDPE
(32)	89°59'58"	8.00	12.57	8" HDPE
(33)	N75°34'18"W	-------	3.19	8" HDPE

REGISTERED PROFESSIONAL ENGINEER GREGORY M. SHIELDS No. 42951 Exp. 03-31-06 CIVIL STATE OF CALIFORNIA

FILE # T-200-01 (1)

SHEET	CITY OF OCEANSIDE ENGINEERING DEPARTMENT	SHEETS
7		19

PRIVATE STORM DRAIN PLAN AND PROFILE FOR:

RENAISSANCE TERRACE

APPROVED 4-6-06
FRANK WATANABE R.C.E. 56255 COMMUNITY DEV. & TRANS. DIR.

ENGINEER OF WORK 2-2-06
GREGORY M. SHIELDS R.C.E. 42951

Checked By: ARC
Approval Date:

PLAN NUMBER 2668

CONSTRUCTION CHANGES:

NO.	DESCRIPTION	APP'D	DATE
3	REDIRECTION OF STORM DRAIN		2/20/07
4	REVISED RETAINING WALL		12/11/07
	AS-BUILT K-P	SK	2-10-08

BENCHMARK.

Description: CITY OF OCEANSIDE BENCHMARK #F-52

Location: SET BRASS CAP STAMPED "COS RM-F-__" ON TOP OF CURB, WESTERLY P.C., NORTHWESTERLY CURB RETURN OF N. COAST HIGHWAY (HILL STREET) & NEPTUNE WAY (8TH STREET).

Record From:

Elev. 59.172' (1984 ADJUSTED) Datum: M.S.L.

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Environmental | Engineering | Survey
701 B Street, Suite 800
San Diego, CA 92101
619 235 6471 Tel
619 234 0349 Fax

...\ENGR\3129 PLANS\GRADING-Mass\3129-MG07.dwg 4/4/2006 10:37:39 AM PDT

ATTACHMENT 6
Geotechnical and Groundwater Investigation Report

This is the cover sheet for Attachment 6.

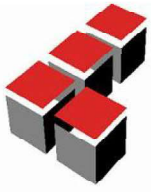
GEOTECHNICAL UPDATE REPORT
PROPOSED ALTA OCEANSIDE PROJECT
SOUTH OF COSTA PACIFIC WAY
WEST OF NORTH COAST HIGHWAY
OCEANSIDE, CALIFORNIA

Prepared for:

WP WEST ACQUISITIONS, LLC
c/o WOOD PARTNERS
7700 Irvine Center Drive, Suite 600
Irvine, California 92618

Project No. 12107.003

January 18, 2019



Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

January 18, 2019

Project No. 12107.003

WP West Acquisitions, LLC
c/o Wood Partners
7700 Irvine Center Drive, Suite 600
Irvine, California, 92618

Attention: Mr. Will Winkenhofer

Subject: Geotechnical Report, Proposed Alta Oceanside Project, South of Costa Pacific Way, West of North Coast Highway, Oceanside, California

In accordance with your request and authorization, we have prepared an updated geotechnical investigation report for the proposed Alta Oceanside project, located in Oceanside, California. Based on the results of our study, it is our professional opinion that the development of the site is geotechnically feasible provided the recommendations provided herein are incorporated into the design and construction of the proposed improvements. The accompanying report presents a summary of the existing conditions of the site, the results of our field investigation and laboratory testing, and provides geotechnical conclusions and recommendations relative to the proposed updated site development.

3934 Murphy Canyon Road, Suite B-205 ▪ San Diego, CA 92123-4425
858.292.8030 ▪ 858.292.0771 Fax

If you have any questions regarding our report, please do not hesitate to contact this office. We appreciate this opportunity to be of service.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.





William D. Olson, RCE 45289
Associate Engineer

Mike D. Jensen, CEG 2457
Senior Project Geologist



Bryan E. Voss, PG 8709
Senior Project Geologist

Distribution (1) Digital Copy

Leighton

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Appendix B - Boring, Test Pit Logs, and Field Percolation Test Results
Appendix C - Summary of Laboratory Testing
Appendix D - City of Oceanside Worksheet I-8
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1.0 INTRODUCTION

1.1 Purpose and Scope

This report presents the results of our preliminary geotechnical investigation for the proposed Alta Oceanside project is located in Oceanside, California (Figure 1). The purpose of our investigation was to evaluate the geotechnical conditions at the site and provide conclusions and recommendations relative to the proposed development. Our scope of services included the following:

- Review of published and unpublished geotechnical reports, maps and aerial photographs (Appendix A).
- Site reconnaissance.
- Excavation, logging and sampling of three exploratory borings and four field percolation tests. As background, four borings and two test pits had previously been performed on this site by Leighton (Leighton, 2001 and 2012). All boring and test pit logs are presented in Appendix B.
- Laboratory testing of representative soil samples obtained from the recent subsurface exploration. Results of these tests are presented in Appendix C.
- Development of seismic design parameters based on the 2016 California Building Code (CBC)
- Preparation of this report presenting our findings, conclusions, and geotechnical recommendations with respect to the proposed design, site grading and general construction considerations.

1.2 Site Location

The proposed site is located south of Costa Pacific Way and west of North Coast Highway in Oceanside, California. Currently, the western portion of the site is a vacant lot with sparse vegetation. The eastern portion of the site is occupied by commercial properties consisting of one-story buildings and paved parking lots. In general, the site is relatively flat; however, the northwestern corner of the site slopes down towards Costa Pacific Way. The existing surfaced elevations of the

site are roughly 52 to 60 feet above mean sea level (msl). The site is bounded by Costa Pacific Way to the north, mobile homes to the west, North Coast Highway to the east, and mixture of mobile homes and hotel property to the south.

Site Latitude and Longitude
33.20317° N
-117.3851° W

1.3 Proposed Development

Leighton's understands that the project proposes the construction of a mixed-use residential and commercial development, with demolition of the existing commercial uses on the site. The residential component would include 309-units comprised of one, two, and three-bedroom residences. The commercial component would include 5,615 square feet of restaurant, retail and/or visitor uses on the ground floor along North Coast Highway. There are two buildings proposed, a five-story (65-foot tall) apartment/commercial building that would wrap around a six-level parking garage, and a second smaller three-story building located in the southwest corner of the site, where the 10 units include individual garages. Additionally, based on our review of the ALTA Oceanside Civil Base Map by Hunsaker & Associates, San Diego, Inc., (Hunsaker & Associates, 2019), typical cut and fill grading techniques would be required to bring the site to design grades. Based on our review, cuts and fills are currently proposed up to about 2 and 3 feet in thickness, respectively (excluding remedial grading). Import soils are anticipated, as the site does not appear to currently balance.

Preliminary grading and foundation plans or structural loads were not available prior to the preparation of this report. Currently, we are assuming that the parking structure will be constructed of reinforced concrete. For the apartment structures, we are assuming it will be constructed of wood frame construction. Associated improvements including underground utilities, hardscaping, landscaping and retaining walls are also anticipated.

1.4 Previous Geotechnical Studies

In 1991, Leighton performed a geotechnical investigation for the proposed Sea Walk Village, which was never built. That study included the excavation of one boring (B-4) and two test pits (T-9 and T-11) on the subject property. In 2001, Leighton performed an additional investigation for the initial phase of the Renaissance Terrace project located immediately west of the subject site, which included two test pit explorations (T-7 and T-8) beneath Costa Pacific Way. Subsequently, in 2012, a site-specific investigation was performed for a proposed development in the northwest portion of the project site that consisted of three borings, B-1, B-2 and B-3 (Leighton, 2012). Information from these previous reports was utilized as appropriate in this report.

2.0 SUBSURFACE EXPLORATION AND LABORATORY TESTING

Our current subsurface exploration consisted of the excavation of three (3) additional exploratory borings (HSA-1 through HSA-3) with a truck mounted hollow-stem auger drill rig. The purpose of these excavations was to evaluate the physical characteristics of the onsite soils pertinent to the proposed improvements. The borings allowed evaluation of the soils encountered within project site beneath the proposed structure(s), and to provide representative samples for laboratory testing. Additionally, four field percolation tests were performed at the site as part of the subsurface exploration. The field percolation test holes were also advanced using a heavy-duty truck-mounted hollow-stem auger drill rig to a depth of approximately 5 feet bgs. It should also be noted that no indications (odors, staining, etc.) of hydrocarbon impacted soils were observed during drilling. The approximate locations of the recent borings and previous explorations are shown on the Geotechnical Map, Figure 2.

The exploratory excavations were logged by a representative from our firm. Representative bulk and undisturbed samples were obtained at frequent intervals for laboratory testing, and logs of the borings are presented in Appendix B. Subsequent to logging and sampling, the borings were backfilled with bentonite.

In-situ field percolation testing was performed on August 14, 2018 in general accordance with Appendix C and D of the City of Oceanside BMP Design Manual, For Permeant Site Design, Strom Water Treatment and Hydromodification Management, dated February 2016. The level of introduced water in each field percolation test location was measured at 30-minute intervals using a water level sounder until readings where generally steady

Laboratory testing was performed on representative samples to evaluate the moisture, density, expansion potential of the soils to be encountered near foundation elevations, shear strength, and geo-chemical (corrosion) characteristics of the subsurface soils. A discussion of the laboratory tests performed, and a summary of the laboratory test results are presented in Appendix C. In-situ moisture and density test results are provided on the boring logs (Appendix B).

3.0 SUMMARY OF GEOTECHNICAL CONDITIONS

3.1 Regional Geology

The site is located within the coastal subprovince of the Peninsular Ranges Geomorphic Province, near the western edge of the southern California batholith. Throughout the last 54 million years, the area known as the "San Diego Embayment" has gone through several episodes of marine inundation and subsequent marine regression, resulting in the deposition of a thick sequence of marine and nonmarine sedimentary rocks on the basement rock of the Southern California batholithic.

Gradual emergence of the region from the sea occurred in Pleistocene time, and numerous wave-cut platforms, most of which were covered by relatively thin marine and nonmarine terrace deposits, formed as the sea receded from the land. Accelerated fluvial erosion during periods of heavy rainfall, coupled with the lowering of the base sea level during Quaternary times, resulted in the rolling hills, mesas, and deeply incised canyons which characterize the landforms we see in the general site area today.

3.2 Site Geology

Based on subsurface exploration, aerial photographic analysis, and review of pertinent geologic literature and maps, the geologic units underlying the site consists of relatively thin veneers of undocumented fill over Quaternary-aged Old Paralic Deposits, which overlies the Tertiary-aged San Mateo Formation. A brief description of the geologic units encountered on the site is presented below.

3.2.1 Undocumented Fill Soils (Afu)

The undocumented fill soils generally consist of loose to medium dense silty sands that are generally less than 1 to 2 feet in depth and our generally associated with previous development of the site. However, deeper areas of undocumented fills associated with previously site development (i.e., utility trench backfill and other excavations) should be anticipated across the site. The fill soils typically consisted of silty sand, are dry, loose, and may settle appreciably under additional fill or foundation and improvement loadings. Therefore, all undocumented fills (soils) should be removed and

recompacted. These materials may be reused provided they are cleared of debris and/or oversized materials. All trash and debris should be removed, and properly disposed offsite, prior to fill placement and/or remedial grading.

3.2.2 Quaternary Old Paralic Deposits

Quaternary-aged Old Paralic (Terrace) Deposits were encountered at shallow depths during our investigation. As encountered, these soils were observed to generally consist of orange-brown to red brown, damp to moist, medium dense to very dense silty fine to medium grained sands with localized cobble lenses, and sandy silt. These units are massive and abundant iron oxide staining was visible throughout the exposures. The weathered near surface Old Paralic Deposits (upper 1 to 2 feet), where encountered, should be removed and recompacted, if not removed by planned excavation, should settlement sensitive improvements be proposed within its influence.

3.2.3 Tertiary-aged San Mateo Formation

The Tertiary-aged San Mateo Formation underlies the entire site at depth. As encountered in the recent boring and previous trench explorations to the west (Leighton, 2001), the San Mateo Formation generally consists of moderately well bedded to laminated, yellow-gray to orange-brown and light gray silty to very silty fine grained micaceous sandstone and massive, friable, gray silty fine- to medium-grained sandstone to sandy siltstone.

3.3 Geologic Structure

Based on the results of our current investigation, literature review, and our professional experience on nearby sites, the Old Paralic Deposits are generally massive with no well-defined bedding. The San Mateo Formation is massive to poorly-to moderately indurated sandstone with regional bedding of 5 degrees to the northwest.

3.4 Groundwater

Groundwater was not encountered within our recent explorations although localized perched water may seasonally be encountered along geologic contacts. In summary, groundwater is not expected to impact the proposed development

considering the estimated depth of the proposed improvements. However, groundwater may be encountered during deep excavations, such as, piles for shoring, if a basement or deep excavation is proposed. In addition, seepage conditions may locally be encountered after periods of heavy rainfall or irrigation. These conditions can be treated on an individual basis during construction, if they occur.

3.5 Engineering Characteristics of Onsite Soils

Based on the results of our current geotechnical investigation, laboratory testing of representative onsite soils and our professional experience on adjacent sites with similar soils, the engineering characteristics of the onsite soils are discussed below.

3.5.1 Compressible Soils

The site is underlain by weathered Old Paralic Deposits (i.e., upper near surface material) and undocumented fill materials which are considered compressible in their current state. Recommendations for remedial grading of these soils are provided in the following sections of this report.

3.5.2 Expansion Potential

The onsite undocumented fill and Old Paralic Deposits are anticipated to be in the very low to low expansion range. Geotechnical observations and/or laboratory testing of the finish grade soils are recommended during construction to determine the actual expansion potential of soils at grade.

3.5.3 Soil Corrosivity

The National Association of Corrosion Engineers (NACE) defines corrosion as “a deterioration of a substance or its properties because of a reaction with its environment”. From a geotechnical viewpoint, the “environment” is the prevailing foundation soils and the “substances” are reinforced concrete foundations or various types of metallic buried elements such as piles, pipes, etc. that are in contact with or within close vicinity of the soil. In general soil environments that are detrimental to concrete have high concentrations of soluble sulfates and/or pH values of less than 5.5. The 2016 CBC and ACI 318-08 provides specific guidelines

for the concrete mix-design when the soluble sulfate content of the soil exceeds 0.1 percent by weight or 1,000 parts per million (ppm).

The results of our laboratory tests on representative formational soils from the site indicated a soluble sulfate content of less than 0.015 percent and a pH of 6.83, and indicate chloride content of approximately 200 ppm. A minimum resistivity value of 3,075 ohm-cm indicating a moderate corrosion potential. The test results indicate that the sulfate contents of the subsurface soils are categorized as having a sulfate exposure class “S0” (formerly identified as negligible) ACI 318R-14 Table 19.3.2.1. Utilizing Caltrans criteria, the site is not considered to be corrosive to concrete. However, is considered corrosive to uncoated buried metal conduits.

3.5.4 Excavation Characteristics

It is anticipated the onsite surficial fill soils and Paralic (Terrace) Deposits can be excavated with conventional heavy-duty construction equipment. Excavations within the San Mateo Formation may encounter moderately cemented material that can locally be difficult to excavate. Heavy ripping or breaking may be needed during the excavation of moderately to well cemented material, if encountered. Oversize material (larger than 8 inches in maximum dimensions), if encountered, should be placed in non-structural areas or hauled off site.

3.6 Infiltration

In accordance with City of Oceanside BMP Design Manual, Section D.3.3.2, the Borehole Percolation Test Method was selected and performed between August 14, 2018. Specifically, four 8-inch diameter borings, PT-1 through PT-4, were advanced to a depth of approximately 5 feet below the existing ground surface (bgs). Approximate locations of the percolation test borings are shown on the attached Geotechnical Map (Figure 2). Given the test holes consisted of silty sand soils, the boreholes were filled with water and allowed to pre-soak for at least 15 hours prior to performing the in-situ percolation testing.

In summary, the in-situ percolation testing was performed in accordance with Oceanside BMP Design Manual, Section D.3.3.2. The water level in each test hole was measured at approximately 30-minute intervals using a water level sounder,

which is accurate to 0.01 feet. Refilling of the boreholes was done as needed. The total testing period lasted approximately 6 hours. Field testing data is presented in Appendix D. After the conclusion of in-situ percolation testing, the boreholes were backfilled.

3.6.1 Percolation and Infiltration Rates

Based on our field percolation testing, the in-situ percolation rates and calculated infiltration rates at tested locations and depths are summarized in Table 1 below. It is important to note that percolation rates are not equal to infiltration rates. As a result, we have made a distinction between percolation rates where water movement is considered laterally and vertically versus infiltration rates where only the vertical direction is considered. We have used the Porchet Method to convert measured percolation rates to calculated infiltration rates in accordance with County of San Diego Standards (2016). In addition, we have included a recommended infiltration rate with a minimum factor of safety of 2 for the preliminary design of potential infiltration systems.

Table 1
Percolation and Infiltration Rates

Perc. Test No.	Boring Depth (ft)	Soil Type	Measured Percolation Rate (mins/in)	Calculated Infiltration Rate (inches/hr)	Recommended Infiltration Rate w/ FS of 2 (inches/hr)
PT-1	5.0	Silty Sand	250	0.012	0.006
PT-2	4.89	Silty Sand	250	0.012	0.006
PT-3	4.59	Silty Sand	475	0.015	0.008
PT-4	4.78	Silty Sand	125	0.028	0.014

It should be emphasized that the percolation test results are only representative of the tested location and depth where they are performed.

Varying subsurface conditions may exist outside of the test locations, which could alter the calculated infiltration rates indicated above.

In addition, it is possible that long term infiltration rates within measured soil strata may be much lower than the values obtained by our current testing. Long term infiltration can be influenced by: variable vertical character and limited lateral extent of more permeable soil strata, reduction of permeability rates over time due to silting of the soil pore spaces, and other factors not discussed here. Accordingly, the possibility of future surface ponding of water as well as shallow groundwater impacts on subterranean structures such as basements, underground utilities, etc. should be anticipated as possible future conditions in all design aspects of the site.

3.6.2 Geotechnical Feasibility of Infiltration

From a geotechnical perspective, the following factors should also be considered for the feasibility of infiltration:

- Soil and Geologic Conditions

  Based on our review and our current investigation, the geologic units underlying the site consist of undocumented fill soils, Paralic Deposits and the San Mateo Formation at depth.

  Old Paralic Deposits were encountered within the percolation test locations and is anticipated to vary in depth. These soils generally consisted of medium to very dense silty sands, which have very low infiltration rates. The San Mateo Formation at depth was not encountered within percolation test boreholes.

- Settlement and Volume Change

  Based on our evaluation, the on-site soils remaining following construction are not considered susceptible to hydro-collapse or consolidation. Considering planned grading and foundation design measures, settlement potential is considered negligible due to infiltration. Our testing also did not indicate the presence of highly expansive soils. In addition, it is our professional opinion that site

soils are not liquefiable due to their dense condition and absence of a shallow ground water.

- Slope Stability

  The topography of the site is relatively flat with exception of the 2 to 1 cut slope at the northwest corner of the site. Infiltration near slopes should be mitigated during BMP design.

- Utility Considerations

  Currently, the locations of existing and proposed underground utilities are unknown relative to the tested sites.

- Groundwater Mounding

  Groundwater was not encountered during our site investigation. Based on the anticipated depth of groundwater across the site and the generally very low infiltration rates measured across the project site, groundwater mounding resulting from possible infiltration of storm water is not considered significant.

- Retaining Wall and Foundations

  There are currently existing retaining walls and subsurface basements located to the west down gradient of the sites which can be affected. However, mitigation can include subsurface vertical barriers and subdrains to limit subsurface water migration and preached groundwater conditions.

- Findings

  The measured percolation and calculated infiltration rates presented above may be used for the planning level screening phase of design. Once the locations of proposed infiltration facilities/systems are known, additional percolation testing may be needed to verify values provided in this letter for use in the design phase. During the design

phase, it should be noted that an elevated factor or safety may also be used by designers in lieu of additional field testing.

Based on the results of our current infiltration study, the site may be considered a “Non-Infiltration Site” based on City of Oceanside BMP Design Manual, For Permeant Site Design, Strom Water Treatment and Hydromodification Management (2016). Specifically, the recommended infiltration rate is between 0.006 and 0.014 inches per hour. Note that PT-4 infiltration test data indicated a partially infiltration rate, but this data is considered non-characteristic of soil conditions at the site. Therefore, this result was disregarded during feasibility elevation of the site for classification of site infiltration. We attribute this very low infiltration rate due to the dense nature of the underlying soils. The City of Oceanside Worksheet I-8 is presented in Appendix D.

Based on our professional experience, sites having such low infiltration rates are best suited for Low Impact Development (LID) BMPs that contain and filter surface waters by the use of flow-through planters and bioretention areas which are partially or fully lined with an impermeable liner and have subdrain systems that ties into an approved existing or proposed storm drain system. It should be noted that shallow bioswales, infiltration basins, and other unlined onsite detention and retention systems utilized in areas having less than 0.01 inches per hour infiltration rates can potentially create perched ground water conditions and surface seepage conditions off-site, if not mitigated by BMP design.

4.0 FAULTING AND SEISMICITY

4.1 Faulting

Our discussion of faults on the site is prefaced with a discussion of California legislation and state policies concerning the classification and land-use criteria associated with faults. By definition of the California Mining and Geology Board, an active fault is a fault which has had surface displacement within Holocene time (about the last 11,000 years). The state geologist has defined a pre-Holocene fault as any fault considered to have been active during Quaternary time (last 1,600,000 years). This definition is used in delineating Earthquake Fault Zones as mandated by the Alquist-Priolo Earthquake Faulting Zones Act of 1972 and as most recently revised in 2007 (Bryant and Hart, 2007). The intent of this act is to assure that unwise urban development and certain habitable structures do not occur across the traces of active faults. Based on our review, the site is not located within any Earthquake Fault Zone (EFZ) as created by the Alquist-Priolo Act.

Our review of available geologic literature (Appendix A) indicates that there are no known major or active faults on or in the immediate vicinity of the site. The nearest active regional fault is the Newport-Inglewood Fault Zone located offshore approximately 3.7 miles west of the site.

4.2 Seismicity

The site can be considered to lie within a seismically active region, as can all of Southern California. The effect of seismic shaking may be mitigated by adhering to California Building Code (CBC, 2016) for proposed subject lot. The following seismic design parameters have been determined in accordance with the 2016 CBC and the USGS Seismic Design Values tool (Version 5.1.0).

Table 2 2016 CBC Mapped Spectral Acceleration Parameters			
Site Class			D
Site Coefficients	F_a F_v	= =	1.029 1.547
Mapped MCE_R Spectral Accelerations	S_S S_1	= =	1.178 0.453
Site Modified MCE_R Spectral Accelerations	S_{MS} S_{M1}	= =	1.212 0.701
Design Spectral Accelerations	S_{DS} S_{D1}	= =	0.808 0.467

Utilizing ASCE Standard 7-10, in accordance with Section 11.4.1, the following additional parameters for the peak horizontal ground acceleration are associated with the Geometric Mean Maximum Considered Earthquake (MCEG). The mapped MCEG peak ground acceleration (PGA) is 0.468g for the site. For a Site Class D, the F_{PGA} is 1.032 and the mapped peak ground acceleration adjusted for Site Class effects (PGA_M) is 0.483g for the site.

4.2.1 Shallow Ground Rupture

Ground rupture because of active faulting is not likely to occur on site due to the absence of known active faults. Cracking due to shaking from distant seismic events is not considered a significant hazard, although it is a possibility at any site in Southern California.

4.2.2 Liquefaction and Dynamic Settlement

Liquefaction and dynamic settlement of soils can be caused by strong vibratory motion due to earthquakes. Both research and historical data indicate that loose, saturated, granular soils are susceptible to liquefaction and dynamic settlement. Liquefaction is typified by a loss of shear strength in the affected soil layer, thereby causing the soil to behave as a viscous liquid. This effect may be manifested by excessive settlements and sand boils at the ground surface.

Based on our evaluation, the on-site soils are not considered liquefiable due to their relatively dense condition. Considering planned excavation and foundation design measures, dynamic settlement potential is also considered negligible.

4.2.3 Tsunamis and Seiches

A tsunami is a sea wave generated by submarine earthquakes, landslides or volcanic activity that displaces a relatively large volume of water in a very short period. Several factors at the originating point such as; earthquake magnitude, type of fault, depth of earthquake, focus, water depth, and the ocean bottom profile all contribute to the size and momentum of a tsunami (Iida, 1969). Factors such as the distance away from the originating point, coastline profile (including width of the continental shelf), and angle at which the tsunami approaches also affect the size and severity of a tsunami.

The Southern California coastline is not only favorably oriented (i.e. not directly in line with any of the major originating tsunami zones), it has a relatively wide (about 140 miles) and rugged continental shelf or borderland, which acts as a diffuser and reflector of remotely, generated tsunami wave energy (Joy, 1968). In addition, the existing geologic and seismic conditions (such as the abundance of strike-slip faults, and the scarcity of large submarine earthquakes) along the coastline also tend to minimize the likelihood of a localized tsunami.

Based on our review of the San Diego County Tsunami Inundation Map for Emergency Planning, Oceanside/San Luis Rey Quadrangle, (CalEMA, 2009), the favorable geologic and seismic conditions along the coastline, and site elevation, there is little potential for catastrophic damage due to tsunamis.

5.0 CONCLUSIONS

Based on the results of our geotechnical investigation of the site, it is our professional opinion that the proposed development is feasible from a geotechnical standpoint, provided the following conclusions and recommendations are implemented during the design and construction of the project. The following is a summary of the significant geotechnical factors that may affect development of the site.

- Based on our subsurface exploration, the undocumented artificial fill and upper 1 to 2 feet of the weathered Old Paralic Deposits are considered unsuitable for supporting additional fill or structural loads and should be removed and recompacted, if not removed by planned excavation, should settlement sensitive improvements be proposed within its influence.

- Results of our exploration indicate that dense Old Paralic Deposits can be excavated with conventional heavy-duty earthwork equipment. However, excavation within the San Mateo Formation may require heavy ripping.

- All undocumented fill soil and weathered Old Paralic Deposits (upper 1 to 2 feet) should be removed to competent Old Paralic Deposits, if not removed by proposed excavation, within areas proposed for settlement-sensitive improvements. On a preliminary basis, remedial grading is estimated to consists of the removal of the upper 1 to 2 feet, or greater, of undocumented fill soils and/or weathered Old Paralic Deposits below exiting grades. Actual depths of removals will be evaluated in the field during grading by the geotechnical engineer.

- In order to reduce the potential for differential settlements between cut and fill materials, the entire cut portion of cut/fill transitions beneath the proposed building and/or structures should be overexcavated to a minimum depth of 3 feet below finish grade, or to a maximum ratio of fill thickness of 3:1 (maximum to minimum), and replaced with compacted fill.

- Ground water was not encountered within the recent borings, and ground water is not expected to impact the proposed development considering the estimated excavation depths being less than 10 feet bgs. However, seepage conditions may locally be encountered after periods of heavy rainfall or irrigation.

- The onsite undocumented fill and Old Paralic Deposits appear to be suitable material for reuse as compacted fill provided they are relatively free of organic material, debris, and rock fragments larger than 6 inches in maximum dimension.

- Based on laboratory testing, the onsite soils are expected to have a negligible potential for sulfate attack on concrete. These soils are also considered to have a potential for corrosion to buried uncoated metal conduits. Laboratory testing should be performed on the finish grade soils to verify the corrosivity characteristics.

- Active or potentially active faults are not known to exist on or in the immediate vicinity of the site. In addition, the on-site soils are not considered liquefiable due to their relatively dense condition.

6.0 RECOMMENDATIONS

6.1 Earthwork

We anticipate that earthwork at the site will consist of site preparation, excavation, and backfill. We recommend that earthwork on the site be performed in accordance with the current City of Oceanside grading ordinances and the following recommendations and the General Earthwork and Grading Specifications for Rough Grading included in Appendix D. In case of conflict, the following recommendations shall supersede those in Appendix D.

6.1.1 Site Preparation and Remedial Grading

Prior to grading, all areas to receive structural fill or engineered structures should be cleared of surface and subsurface obstructions, including any existing debris, old improvements, foundations, and undocumented or loose fill soils, and stripped of vegetation. Removed vegetation and debris should be properly disposed off site. All areas to receive fill and/or other surface improvements should be scarified to a minimum depth of 6 inches, brought to optimum moisture conditions, and recompacted to at least 90 percent relative compaction (based on American Standard of Testing and Materials [ASTM] Test Method D1557).

The undocumented artificial fill and upper ±1 to ±2 feet of the weathered Old Paralic Deposits are considered unsuitable for supporting additional fill or structural loads and should be removed and reprocessed within the proposed improvement areas. However, locally deeper removals cannot be precluded and should be anticipated. The actual depth and extent of the required removals should be evaluated during grading operations by the geotechnical consultant.

6.1.2 Transition and Overexcavation Areas

In order to reduce the potential for differential settlements between cut and fill materials, the entire cut portion of cut/fill transitions beneath the proposed building and/or structures should be overexcavated to a minimum depth of 3 feet below finish grade, or to a maximum ratio of fill thickness of 3:1 (maximum to minimum), and replaced with compacted fill. The

recommended overexcavation should extend at least 5 feet beyond the proposed footprint of the buildings and/or structures. The preliminary cut/fill daylight line is shown on the Geotechnical Map (Figure 2) and the recommended overexcavation depth is shown on Geologic Cross Section A-A' (Figure 3).

6.1.3 Excavations and Oversize Material

Excavations of the onsite materials may generally be accomplished with conventional heavy-duty earthwork equipment. Temporary shallow excavations less than 5 feet in depth with vertical sides should remain stable for the period required to construct the utility, provided the trenches are free of adverse geologic conditions (i.e., friable sands) and are not surcharged by static building loads or traffic loads. It should be noted that artificial fill soils, if encountered, are typically less dense than the Paralic Deposits and may cave during excavation. Friable layers within Paralic deposits may slough or cave during shoring construction especially if excavations are below the water table. In accordance with OSHA requirements, excavations deeper than 5 feet should be laid back or shored in accordance with Section 6.2, if workers are to enter such excavations.

6.1.4 Fill Placement and Compaction

The onsite soils are generally suitable for use as compacted fill provided they are free of organic material, debris, and rock fragments larger than 6 inches in maximum dimension. The onsite soils typically possesses a moisture content below optimum and may require moisture conditioning prior to reuse as compacted fill. All fill soils should be brought to 2 percent above-optimum moisture conditions and compacted in uniform lifts to at least 90 percent relative compaction based on laboratory standard ASTM Test Method D1557. Note that for retaining wall (if any) supporting settlement sensitive improvements, such as patio pavements, sidewalks and/or foundations, we recommend backfill soils be compacted to 95 percent relative compaction based on ASTM Test Method D1557. The optimum lift thickness required to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in lifts not exceeding 8 inches in thickness.

Placement and compaction of fill should be performed in general accordance with the current City of Oceanside grading ordinances, sound construction practice, and the General Earthwork and Grading Specifications for Rough Grading presented in Appendix D.

6.2 Shoring of Excavations

If deep excavations are needed, we recommend that excavations be retained either by a cantilever or braced shoring system with cast-in-place soldier piles and sheeting or lagging (i.e. shotcrete and/or wood), as needed. It should be noted that a tie-back restrained pile system may encounter a caving condition. Based on our experience with similar projects, if lateral movement of the shoring system on the order of 1 inch cannot be tolerated, we recommend the utilization of a braced pile system.

Shoring of excavations is typically performed by specialty contractors with knowledge of the San Diego County area soil conditions. Lateral earth pressures for design of shoring are presented below:

Cantilever Shoring System

Active pressure = 35H(psf), triangular distribution
Passive Pressure = 350h (psf)
H = wall height (active case) or h = embedment (passive case)

Multi-Braced Shoring System

Active Pressure = 29H (psf), rectangular distribution
Passive Pressure = 350h (psf)
H = wall height (active case) or h = embedment (passive case)

General

All pressures are based on dewatered conditions, with the water table at least 4 feet below the base of the excavation. All shoring systems should consider additional loading of adjacent surcharging loads.

If portions of the planned excavations are proposed with sloped temporary excavations, we recommend a maximum slope of 1 to 1 (horizontal to vertical).

Sloped excavations should be observed by the geotechnical consultant during excavation.

Settlement monitoring of adjacent building, sidewalks and adjacent settlement sensitive structures should be considered to evaluate the performance of the shoring. Shoring of the excavation is the responsibility of the contractor. Extreme caution should be used to minimize damage to existing pavement, utilities, and/or structures caused by settlement or reduction of lateral support.

6.3 Surface Drainage and Erosion

Surface drainage should be controlled at all times. The proposed structure should have an appropriate drainage system to collect roof runoff. Positive surface drainage should be provided to direct surface water away from the structure toward the street or suitable drainage facilities. Planters should be designed with provisions for drainage to the storm drain system. Ponding of water should be avoided adjacent to the structure.

Regarding Low Impact Development (LID) measures, we are of the opinion that infiltration basins, and other onsite storm water retention and infiltration systems can potentially create adverse perched ground water conditions. In addition, the existing onsite soils are anticipated to provide relatively low or minimal infiltration rates for the surface water. Therefore, given the site geologic conditions, relatively very low infiltration rate, and protect type, infiltration type LID measures are not considered to be appropriate for this site and project.

6.4 Foundation and Slab Considerations

Foundations and slabs should be designed in accordance with structural considerations and the following recommendations. These recommendations assume that the soils encountered within 5 feet of pad grade have a very low to medium potential (i.e. expansion index <70) for expansion. If highly expansive soils are encountered, additional foundation design may be necessary.

6.4.1 Foundations

Based on the current site conditions, we recommend the proposed buildings and/or structures be supported by conventional footings on compacted fill soils. For conventional continuous or isolated spread

footings, a maximum allowable bearing pressure of 3,000 pounds per square foot (psf) is recommended. Footings should extend a minimum of 24 inches beneath the lowest adjacent soil grade. The allowable pressure may be increased by one-third when considering loads of short duration such as wind or seismic forces. The minimum recommended width of footings is 18 inches for continuous footings and 24 inches for square or round footings. Continuous footings should be designed in accordance with the structural engineer requirements and have a minimum reinforcement of four No. 5 reinforcing bars (two top and two bottom). Reinforcement of isolated footings should be per the structural engineer's design.

The recommended allowable bearing capacities are based on a maximum total and differential settlement of 1 inch and 3/4 of an inch, respectively, with all footings founded in competent artificial fill material. Since settlements are a function of footing size and contact bearing pressures, some differential settlement can be expected between adjacent columns or walls where a large differential loading condition exists.

6.4.2 Foundation Setback

We recommend a minimum horizontal setback distance from the face of slopes for all structural foundations, footings, and other settlement-sensitive structures as indicated on the table below. This distance is measured from the outside bottom edge of the footing, horizontally to the slope face, and is based on the slope height. However, the foundation setback distance may be revised by the geotechnical consultant on a case-by-case basis if the geotechnical conditions are different than anticipated.

Table 3 Minimum Foundation Setback from Slope Faces	
Slope Height	Setback
less than 5 feet	5 feet
5 to 15 feet	7 feet
15 to 30 feet	10 feet

Please note that the soils within the structural setback area possess poor lateral stability, and improvements (such as retaining walls, sidewalks, fences, pavements, etc.) constructed within this setback area may be subject to lateral movement and/or differential settlement. Potential distress to such improvements may be mitigated by providing a deepened footing or a grade beam foundation system to support the improvement. Depending on their proximity to the top of slopes, these buildings may require retaining walls and/or deepened foundations.

In addition, open or backfilled utility trenches that parallel or nearly parallel structure footings should not encroach within an imaginary 1:1 (horizontal to vertical) downward sloping line starting 9 inches above the bottom edge of the footing and should also not be located closer than 18 inches from the face of the footing. Deepened footings should meet the setbacks as described above. Also, over-excavation should be accomplished such that deepening of footings to accomplish the setback will not introduce a cut/fill transition bearing condition.

Where pipes may cross under footings, the footings should be specially designed. Pipe sleeves should be provided where pipes cross through footings or footing walls and sleeve clearances should provide for possible footing settlement, but not less than 1 inch around the pipe.

6.4.3 Slab Design

The building slab-on-grade floors should be at least 5 inches thick and be reinforced with No. 3 rebars 18 inches on center, each way. All reinforcing should be placed at mid-height in the slab. In addition, the parking

structure slab should also be designed for the anticipated traffic loading using a modulus of subgrade reaction of 250 pci. It is anticipated that actual slab thickness will be increased to accommodate design pressure. Slabs should have crack joints at spacings designed by the structural engineer. Columns should be structurally isolated from slabs.

Floor slabs with moisture-sensitive flooring should be underlain by 2 inches of sand, a 10-mil plastic sheeting moisture barrier and an addition 2 inches of sand (i.e., a total sand thickness of 4 inches). We recommend control joints be provided across the slab at appropriate intervals as designed by the project architect. In addition, we recommend using reinforcement and/or dowels between footings and floor slabs and sidewalks at doorways and openings to mitigate potential differential movements.

6.4.4 Moisture Conditioning

The slab subgrade soils underlying the foundation systems should be presoaked in accordance with the recommendations presented in Table 4 prior to placement of the moisture barrier and slab concrete. The subgrade soil moisture content should be checked by a representative of Leighton prior to slab construction.

Presoaking or moisture conditioning may be achieved in a number of ways. But based on our professional experience, we have found that minimizing the moisture loss on pads that have been completed (by periodic wetting to keep the upper portion of the pad from drying out) and/or berming the lot and flooding for a short period of time (days to a few weeks) are some of the more efficient ways to meet the presoaking recommendations. If flooding is performed, a couple of days to let the upper portion of the pad dry out and form a crust so equipment can be utilized should be anticipated.

Table 4 Presoaking Recommendations Based on Finish Grade Soil Expansion Potential	
Expansion Potential	Presoaking Recommendations
Very Low	Near-optimum moisture content to a minimum depth of 6 inches
Low	120 percent of the optimum moisture content to a minimum depth of 12 inches below slab subgrade
Medium	130 percent of the optimum moisture content to a minimum depth of 18 inches below slab subgrade

6.4.5 Lateral Earth Pressures and Retaining Wall Design

Should retaining walls be added to the project, Table 5 presents the lateral earth pressure values for level or sloping backfill for walls backfilled with and bearing against fully drained soils of very low to low expansion potential (less than 50 per ASTM D4829).

Table 5 Static Equivalent Fluid Weight (pcf)		
Conditions	Level	2:1 Slope
Active	35	55
At-Rest	55	65
Passive	350 (Maximum of 3 ksf)	150 (Sloping Down)

Walls up to 10 feet in height should be designed for the applicable equivalent fluid unit weight values provided above. If conditions other than those covered herein are anticipated, the equivalent fluid unit weight values should be provided on an individual case-by-case basis by the geotechnical engineer. A surcharge load for a restrained or unrestrained wall resulting from automobile traffic may be assumed to be equivalent to a uniform lateral pressure of 75 psf which is in addition to the equivalent fluid pressure given above. For other uniform surcharge loads, a uniform pressure equal to 0.35q should be applied to the wall. The wall pressures assume walls are backfilled with free draining materials and water is not

allowed to accumulate behind walls. A typical drainage design is contained in Appendix E. Wall backfill should be compacted by mechanical methods to at least 90 percent relative compaction (based on ASTM D1557). If foundations are planned over the backfill, the backfill should be compacted to 95 percent. Wall footings should be designed in accordance with the foundation design recommendations and reinforced in accordance with structural considerations. For all retaining walls, we recommend a minimum horizontal distance from the outside base of the footing to daylight as outlined in Section 6.4.2.

Lateral soil resistance developed against lateral structural movement can be obtained from the passive pressure value provided above. Further, for sliding resistance, the friction coefficient of 0.35 may be used at the concrete and soil interface. These values may be increased by one-third when considering loads of short duration including wind or seismic loads. The total resistance may be taken as the sum of the frictional and passive resistance provided that the passive portion does not exceed two-thirds of the total resistance.

To account for potential redistribution of forces during a seismic event, retaining walls providing lateral support where exterior grades on opposites sides differ by more than 6 feet fall under the requirements of 2016 CBC Section 1803.5.12 and/or ASCE 7-10 Section 15.6.1 and should also be analyzed for seismic loading. For that analysis, an additional uniform lateral seismic force of 9H should be considered for the design of the retaining walls with level backfill, where H is the height of the wall. This value should be increased by 150% for restrained walls.

6.5 Control of Surface Waters

Surface water should be transported off the site in approved drainage devices or unobstructed swales. We recommend a minimum flow gradient for unpaved drainage within 5 feet of structures of 2 percent sloping away. All area drain inlets should be maintained and kept clear of debris in order to function properly. In addition, landscaping should not cause any obstruction to site drainage. Rerouting of drainage patterns and/or installation of area drains should be performed, if necessary, by a qualified civil engineer or a landscape architect.

6.6 Concrete Flatwork

Concrete sidewalks and other flatwork (including construction joints) should be designed by the project civil engineer and should have a minimum thickness of 4 inches with No. 4 bars at 24 inches on center or No. 3 bars at 18 inches on center. For all concrete flatwork, the upper 12 inches of subgrade soils should be moisture conditioned to at least 2 percent above optimum moisture content depending on the soil type and compacted to at least 90 percent relative compaction based on ASTM Test Method D1557 prior to the concrete placement. Moisture testing should be confirmed 24 hours prior to concrete placement.

6.7 Preliminary Pavement Design

Flexible pavements for the project are not currently anticipated. However, should flexible pavements be constructed, they should be constructed in accordance with current Caltrans and the requirements outlined in the City of Oceanside Engineers Design and Processing Manual (2004). Based on a review of previous geotechnical report and this current study, for planning purposed flexible pavement with an assumed R-Value of 20 and a Traffic Index of 5 should be for 4 inches of Asphalt Concrete (AC) over 6 inches of Aggregate Base (AB).

For areas subject to regular truck loading (i.e., trash truck apron and Fire Lane), we recommend a full depth of Portland Cement Concrete (PCC) section of 7 inches and should be reinforced with No. 3 reinforcement bars spaced 24 inches on center each way, to reduce the potential for shrinkage cracking. Control joints should be spaced every 10 feet. Actual steel reinforcement and crack-control joints as designed by the project structural engineer. We recommend that sections be as nearly square as possible. A 3,500-psi mix that produces a 550-psi modulus of rupture should be utilized.

All pavement section materials should conform to and be placed in accordance with the latest revision of the California Department of Transportation Standard Specifications (Caltrans) and American Concrete Institute (ACI) codes. The upper 8 inches of subgrade soil and all aggregate base (if utilized) should be compacted to a relative compaction of at least 95 percent (based on ASTM Test Method D1557) and to a moisture content above optimum content.

If pavement areas are adjacent to heavily watered landscape areas, we recommend some measure of moisture control be taken to prevent the subgrade soils from becoming saturated. It is recommended that the concrete curbing separating the landscaping area from the pavement extend below the aggregate base to help seal the ends of the sections where heavy landscape watering may have access to the aggregate base. Concrete swales should be designed in roadway or parking areas subject to concentrated surface runoff.

6.8 Construction Observation and Plan Reviews

The recommendations provided in this report are based on preliminary design information and subsurface conditions disclosed by a series of widely spaced borings. The interpolated subsurface conditions should be checked in the field during construction. Construction observation of all onsite excavations and field density testing of all compacted fill should be performed by a representative of this office so that construction is in accordance with the recommendations of this report. We recommend that where possible excavation exposures be geologically mapped by the geotechnical consultant during grading for the presence of potentially adverse geologic conditions.

Final project civil, foundation, and shoring, drawings should be reviewed by Leighton before excavation to see that the recommendations provided in this report are incorporated in the project plans.

7.0 LIMITATIONS

The conclusions and recommendations in this report are based in part upon data that were obtained from a limited number of observations, site visits, excavations, samples, and tests. Such information is by necessity incomplete. The nature of many sites is such that differing geotechnical or geological conditions can occur within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, the findings, conclusions, and recommendations presented in this report can be relied upon only if Leighton has the opportunity to observe the subsurface conditions during grading and construction of the project, in order to confirm that our preliminary findings are representative for the site.

FIGURES



Project: 12107.003	Eng/Geol: BEV
Scale: 1 " = 2,000 '	Date: January 2019

Base Map: Bing Maps 2019
Thematic Information: Leighton
Author: Leighton Geomatics (mmurphy)

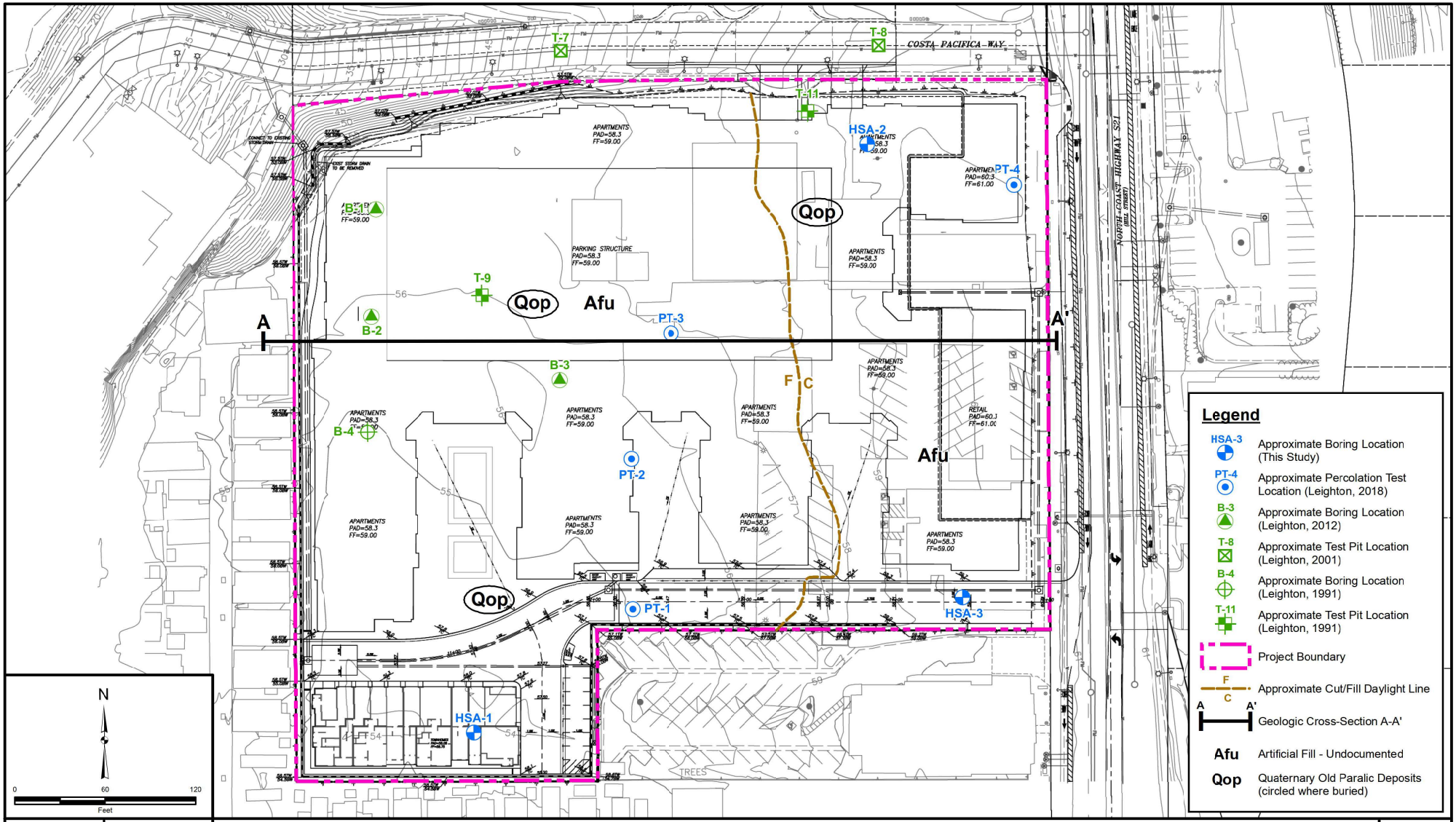
SITE LOCATION MAP

Alta Oceanside Project
Oceanside, California

Figure 1

Leighton

Map Saved as V:\Drafting\12107\003\Maps\12107-003_F01_SLM_2019-01-17.mxd on 1/17/2019 1:04:07 PM



GEOTECHNICAL MAP

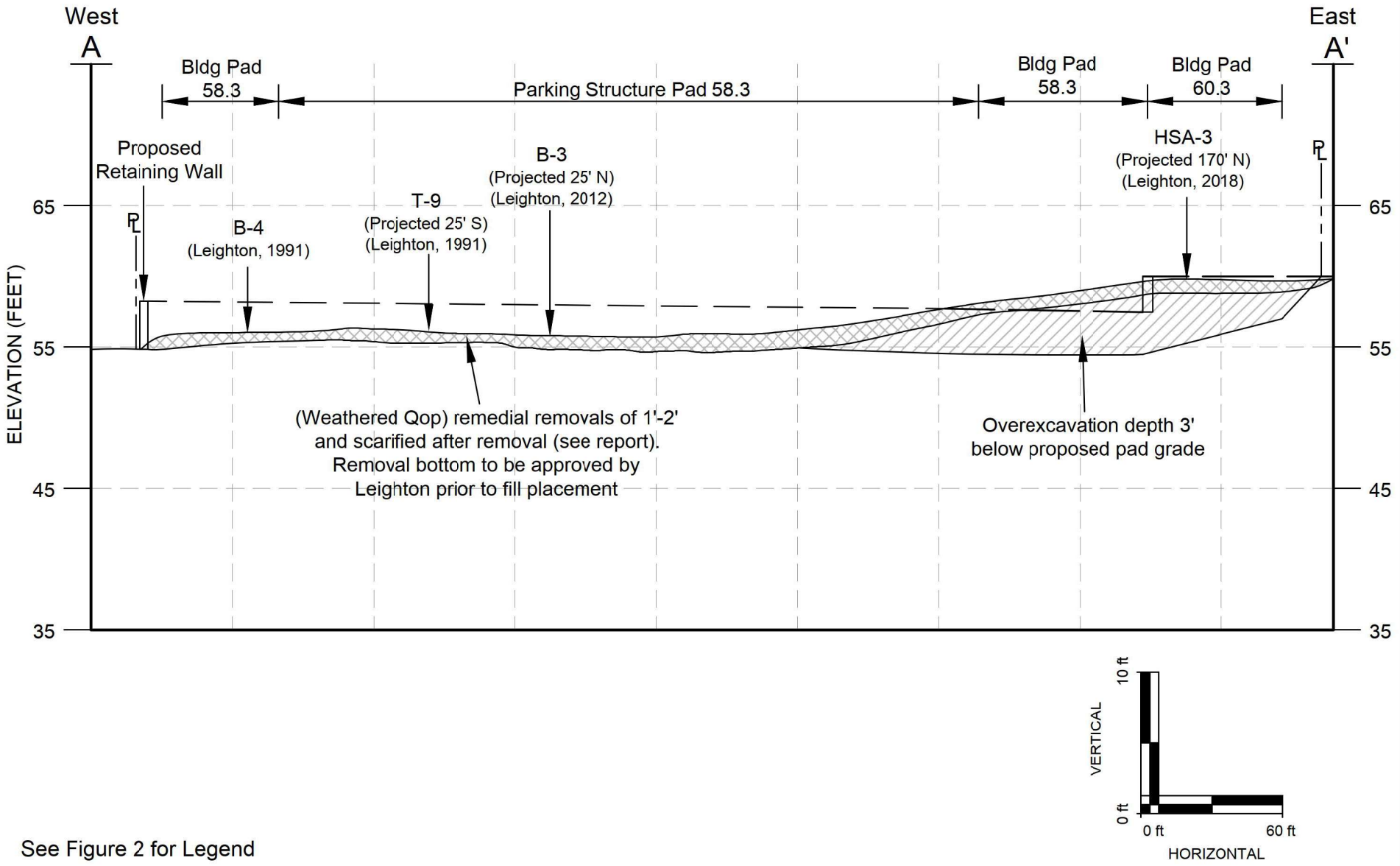
Alta Oceanside Project
Oceanside, California

Project: 12107.003	Eng/Geol: BEV
Scale: 1 " = 60 '	Date: January 2019
Base Map: Civil Base by Hunsaker & Associates, 1/3/2019.	
Author: Leighton Geomatics (mmurphy)	

Figure 2

Leighton

Map Saved as V:\Drafting\12107\003\Maps\12107-003_F02_ELM_2019-01-17.mxd on 1/17/2019 11:16:05 AM



See Figure 2 for Legend

Project: 12107.003	Eng/Geol: BEV
Scale: 1"=60'H 1"=10'V	Date: January 2019
Reference:	
Author: MAM	

GEOLOGIC CROSS-SECTION A-A'

Alta Oceanside Project
Oceanside, California

Figure 3

Leighton

APPENDIX A

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APPENDIX A

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APPENDIX B

BORING, TEST PIT LOGS

AND FIELD PERCOLATION TEST RESULTS

GEOTECHNICAL BORING LOG KEY

Date _____ **Sheet** 1 **of** 1

Project KEY TO BORING LOG GRAPHICS **Project No.** _____

Drilling Co. _____ **Type of Rig** _____

Hole Diameter _____ **Drive Weight** _____ **Drop** "

Elevation Top of Elevation ' **Location** _____

Logged By _____

Sampled By _____

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0								Asphaltic concrete.	
									Portland cement concrete.	
								CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay.	
								CII	Inorganic clay; high plasticity, fat clays.	
								OL	Organic clay; medium to plasticity, organic silts.	
	5							ML	Inorganic silt; clayey silt with low plasticity.	
								MH	Inorganic silt; diatomaceous fine sandy or silty soils; elastic silt.	
								ML-CL	Clayey silt to silty clay.	
								GW	Well-graded gravel; gravel-sand mixture, little or no fines.	
								GP	Poorly graded gravel; gravel-sand mixture, little or no fines.	
	10							GM	Silty gravel; gravel-sand-silt mixtures.	
								GC	Clayey gravel; gravel-sand-clay mixtures.	
								SW	Well-graded sand; gravelly sand, little or no fines.	
								SP	Poorly graded sand; gravelly sand, little or no fines.	
								SM	Silty sand; poorly graded sand-silt mixtures.	
	15							SC	Clayey sand; sand-clay mixtures.	
									Bedrock.	
									Ground water encountered at time of drilling.	
				B-1					Bulk Sample 1.	
	20			B-1					Bulk Sample 2.	
				C-1					Core Sample.	
				G-1					Grab Sample.	
				R-1					Modified California Sampler (3" O.D., 2.5 I.D.).	
				SH-1					Shelby Tube Sampler (3" O.D.).	
	25			S-1					Standard Penetration Test SPT (Sampler (2" O.D., 1.4" I.D.).	
				PUSH					Sampler Penetrates without Hammer Blow.	
									Bulk Sample 2.	
	30									

SAMPLE TYPES:

- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AT ATTERBURG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

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GEOTECHNICAL BORING LOG HSA-1

Project No.	12107.003	**Date Drilled**	8-9-18
Project	Wood Partners/North Coast Highway	**Logged By**	ERB
Drilling Co.	Baja Exploration	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	52'
Location	See Map	**Sampled By**	ERB

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1 0-5'					ARTIFICIAL FILL (Afu) @ 0-1': Silty SAND, light reddish-brown, dry, loose	EI, CR
50								SM	QUATERNARY OLD PARALIC DEPOSITS (Qop) @ 1': Silty SAND, light reddish-brown, dry, very dense, fine sand, partially indurated, trace manganese nodules, micaceous	
				R-1	40 50/2"	123.6	2.4			DS
	5			S-1	8 8 10				@ 5': Silty SAND, olive-gray to brown, dry, medium dense, fine sand, friable	
45									@ 7': Minor gravel layer	
	10			R-2	26 40 50/4"	120.0	7.0	SP	@ 10': Poorly-graded SAND, medium reddish-brown, dry, very dense, fine to coarse sand, partially indurated, micaceous	
40								GM	@ 12.5'-15': Dense gravel layer encountered	
	15			S-2	23 30 38	112.0	6.0	SM	@ 15': Silty SAND, medium brown, dry, very dense, fine to medium sand, friable, micaceous	
35										
				R-3	23 33 50/4"			SP	@ 18': Poorly-graded SAND, dark reddish-brown, damp, very dense, medium to coarse sand, partially indurated, horizontal oxidation lenses observed, micaceous	
	20								**Total Depth = 19.5 Feet (bgs)** **No groundwater encountered at time of drilling** **Backfilled with bentonite on 8/9/18**	
30										
	25									
25										
	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG HSA-2

Project No.	12107.003	**Date Drilled**	8-9-18
Project	Wood Partners/North Coast Highway	**Logged By**	ERB
Drilling Co.	Baja Exploration	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	60'
Location	See Map	**Sampled By**	ERB

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
60	0			B-1 0-5'				SM	ARTIFICIAL FILL (Af) @ 0-2': Silty SAND, light reddish-brown, dry, loose, trace asphalt debris	
				S-1	17 50/2"			SM	QUATERNARY OLD PARALIC DEPOSITS (Qop) @ 2': Silty SAND, light grayish-brown, dry, very dense, fine sand @4': Color changed to olive-gray	
55	5			R-1	40 50/4"	124.0	11.0	SP	@ 5': Poorly-graded SAND, medium olive-gray, damp, very dense, medium to coarse sand, manganese nodules throughout, indurated, horizontal oxidation, micaceous	
50	10			S-2	17 23 35			ML	@ 10': Sandy SILT, dark gray to dark brown, moist, very stiff, fine SAND, oxidation throughout, mottling throughout, infilled fracture surfaces observed throughout, micaceous	
45	15			R-2	25 26 36	105.0	15.0		@ 15': Continues at depth	
				S-3	12 17 19			SM	@ 18': SAND content increases, becomes silty sand	
40	20								**Total Depth = 19.5 Feet (bgs)** **No groundwater encountered at time of drilling** **Backfilled with bentonite on 8/9/18**	
35	25									
30	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH



*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG HSA-3

Project No.	12107.003	**Date Drilled**	8-9-18
Project	Wood Partners/North Coast Highway	**Logged By**	ERB
Drilling Co.	Baja Exploration	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	57'
Location	See Map	**Sampled By**	ERB

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
55	0			B-1 0-5'				SM	3" ASPHALT CONCRETE over 9" AGGREGATE BASE ARTIFICIAL FILL (Afu) @ 1': Silty SAND with GRAVEL, light yellowish-brown, damp, medium dense, fine to medium sand, subrounded to rounded gravel (1"-3") throughout, debris throughout @ 3': Dark brown silty SAND observed in cuttings	
50	5			R-1 B-2 5'-10'	40 50/3:	114.0	13.0	SM	QUATERNARY OLD PARALIC DEPOSITS (Qop) @ 5': Silty SAND, olive-brown, damp, very dense, fine sand, indurated, oxidation throughout, trace micas @ 8': Silty SAND, olive-brown observed in cuttings, noted increase in density	
45	10			R-2	30 45 50/5"	134.0	11.0	SP	SAN MATEO FORMATION (Tsm) @ 10': Poorly-graded SANDSTONE, light gray, damp, very dense, fine to coarse sand, partial induration, micaceous @ 12': plasticity observed to increase at depth	
40	15			R-3	22 40 50/2"	126.0	9.0		@ 15': Poorly-graded SANDSTONE continues at depth, medium orangish-brown, damp, very dense, fine to carse sand, partial induration, manganese nodules observed throughout, micaceous **Total Depth = 16.5 Feet (bgs)** **No groundwater encountered at time of drilling** **Backfilled with bentonite on 8/9/18**	
35	20									
30	25									
	30									

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICALBORING LOG B-1

Project No.	042593-001	**Date Drilled**	5-1-12
Project	CH Oceanside	**Logged By**	BCP
Drilling Co.	Baja Exploration	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	55'
Location	See Boring Location Map	**Sampled By**	BCP

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
55	0								OLD PARALIC (TERACE) DEPOSITS @Surface: Poorly graded SAND, reddish brown, minor silt	
50	5								@ 4': Poorly graded, fine to medium SAND, light brown, some gravel, trace silt	
45	10			R-1	8 17 24	104	1	SW	@ 10': well graded, fine-grained SAND, light brown, dry, hard, very dense	
									Refusal @ 12 Feet **Total Depth = 12 Feet** **Groundwater was not encountered during drilling** **Backfilled with bentonite on 5/1/12**	
40	15									
35	20									
30	25									
25	30									

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		



GEOTECHNICALBORING LOG B-2

Project No.	042593-001	**Date Drilled**	5-1-12
Project	CH Oceanside	**Logged By**	BCP
Drilling Co.	Baja Exploration	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	55'
Location	See Boring Location Map	**Sampled By**	BCP

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
55	0								OLD PARALIC (TERRACE) DEPOSITS SAND with silt (SP), Surface: Poorly graded fine-grained silty SAND, reddish brown	
50	5									
45	10								@10': well graded, fine-grained SAND, light brown	
									@ 12': Becomes poorly graded Gravelly SAND, fine to medium grained sand, well rounded gravels, trace silt.	
40	15								**Refusal @ 13.5 Feet** **Total Depth = 13.5 Feet** **Groundwater was not encountered during drilling** **Backfilled with bentonite on 5/1/12**	
35	20									
30	25									
25	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

GEOTECHNICAL BORING LOG B-3

Project No.	042593-001	**Date Drilled**	5-1-12
Project	CH Oceanside	**Logged By**	BCP
Drilling Co.	Baja Exploration	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	55'
Location	See Boring Location Map	**Sampled By**	BCP

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
55	0								OLD PARALIC (TERRACE) DEPOSITS @ Surface: poorly graded, fine-grained silty SAND, reddish brown	
50	5									
45	10			R-1	22 34 50+	112	5	SW	@ 10': well graded, fine-grained SAND, light brown to orange, dry, hard, very dense, trace silt	
40	15			S-1	18 50+			GP	@15': well graded, fine-grained SAND, light brown to orange, dry, hard, very dense, trace silt SAN ONOFRE BRECCIA(?) @ 15.5': Becomes poorly graded Gravelly SAND, light brown, fine to medium sand, angular gravels, dry, hard, very dense	
				B-1				SW		
35	20			R-2	18 37 44	101	3	SW	@ 20': well graded, fine to very fine SAND, light brown to tan, dry, hard, very dense	
30	25			S-2	14 18 24			SW	@ 25': well graded, very fine SAND, light brown to white, dry to moist, hard, very dense	
25	30									

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

GEOTECHNICALBORING LOG B-3

Project No.	042593-001	**Date Drilled**	5-1-12
Project	CH Oceanside	**Logged By**	BCP
Drilling Co.	Baja Exploration	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	55'
Location	See Boring Location Map	**Sampled By**	BCP

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
25	30			R-3	15 36 50/1	107	2	SW	@ 30': well graded, fine-grained SAND, light brown to orange, dry, hard, dense	
									Total Depth = 30 Feet **Groundwater was not encountered during drilling** **Backfilled with bentonite on 5/1/12**	
20	35									
15	40									
10	45									
5	50									
0	55									
-5	60									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

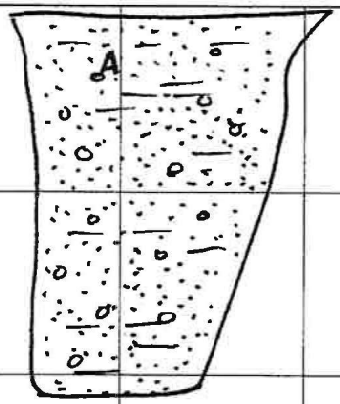
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

LOG OF TRENCH: T-7

Project Name: Concordia/Sea Walk
Logged by: MDJ
Project Number: 040259-001
Elevation: 55'
Equipment: 310 Backhoe
Location/Grid: See Geotechnical Map

GEOLOGIC ATTITUDES	DATE: 12/15/00 DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: USCS	Sample No.	Moisture (%)	Density (pcf)
	QUATERNARY TERRACE DEPOSITS	Qt				
	A @ 0'-10': Silty medium SAND: red-brown, damp, dense, becomes very dense at 9'; gravel rare		SM	1 @7'-8'		

GRAPHICAL REPRESENTATION: SCALE: 1"=5' SURFACE SLOPE: 0° TREND: N25W



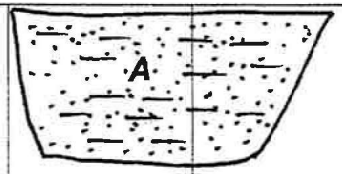
Total Depth = 10 Feet
No Ground Water Encountered
Backfilled: 12/15/2000

LOG OF TRENCH: T-8

Project Name: Concordia/Sea Walk	Logged by: MDJ	ENGINEERING PROPERTIES			
Project Number: 040259-001	Elevation: 57'				
Equipment: 310 Backhoe	Location/Grid: See Geotechnical Map				

GEOLOGIC ATTITUDES	DATE: 12/15/00 DESCRIPTION:	GEOLOGIC UNIT	USCS	Sample No.	Moisture (%)	Density (pcf)
	QUATERNARY TERRACE DEPOSITS	Qt				
	A @ 0'-4': Silty medium SAND: brown, damp, dense to very dense; massive, slightly porous 0'-1'; gravel rare		SM			
	Practical refusal at 4 feet on slightly cemented sand					

GRAPHICAL REPRESENTATION: SCALE: 1"=5' SURFACE SLOPE: 0° TREND: N-S



Total Depth = 4 Feet
No Ground Water Encountered
Backfilled: 12/15/2000

501-A - (3/77)

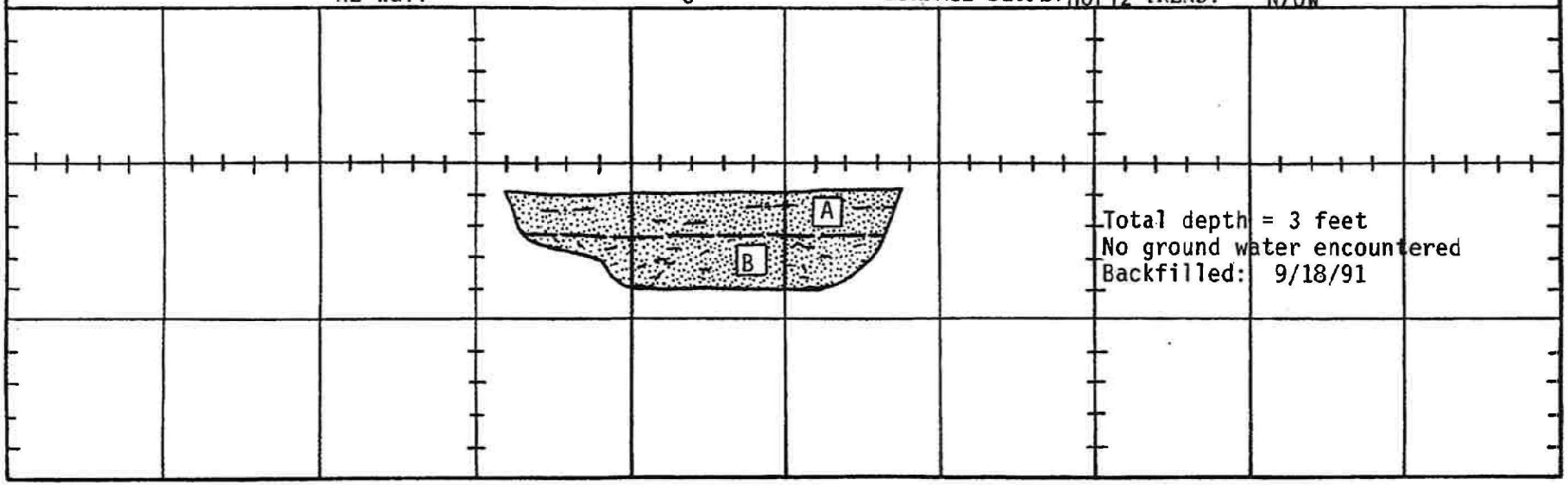
Project Name: Seawalk Village
Project Number: 4910693-01
Equipment: Case 580 Backhoe

Logged By: JB
Elevation: 55'±
Location: See Geotechnical Map

TRENCH NO. T-11

GEOLOGIC ATTITUDES	DATE: 9/18/91 DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	Sample No.	Moisture (%)	Density (% Compaction)
	PLEISTOCENE TERRACE DEPOSITS					
	[A] Light brown to red-brown, damp to moist, dense, silty fine- to medium-grained sand; slightly porous in upper .5 foot	Qt	SM			
	[B] Olive-brown to brown, moist, dense, slightly clayey fine- to medium-grained; abundant calcium carbonate flecks present		SC			

GRAPHIC REPRESENTATION NE Wall SCALE: 1" = 5' SURFACE SLOPE: Horiz TREND: N70W



LOG OF TRENCH NO: T-11

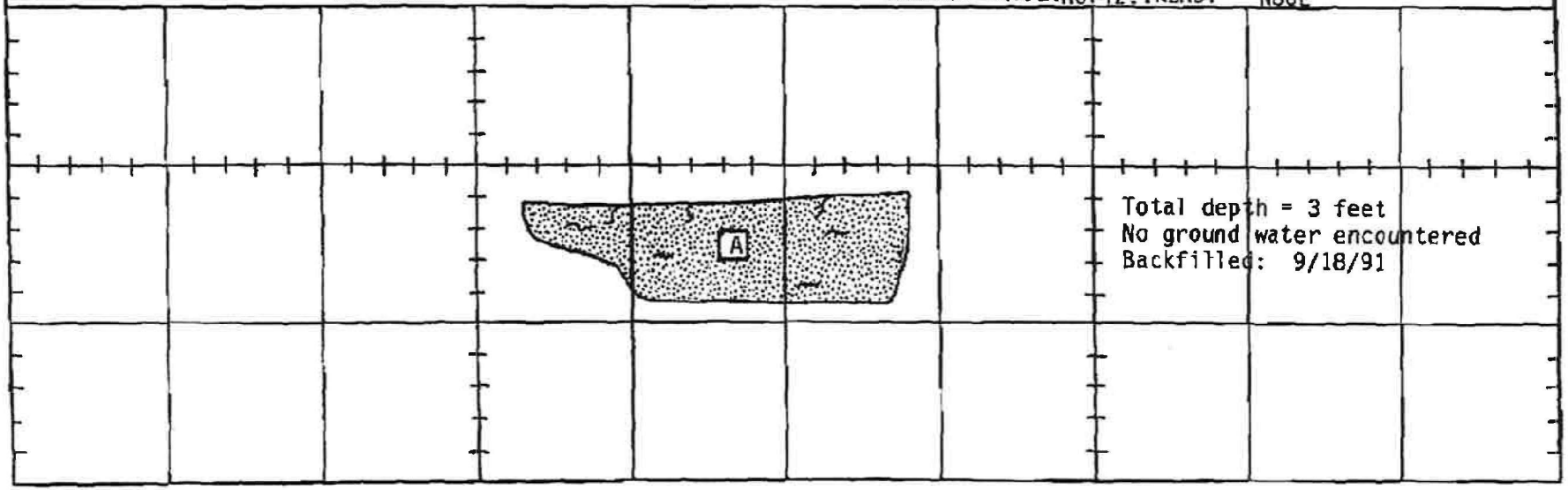
Leighton & Associates

501-A - (3/77)

Project Name: Seawalk Village
Project Number: 4910693-01
Equipment: Case 580 Backhoe
Logged By: JB
Elevation: 53'±
Location: See Geotechnical Map
TRENCH NO. T-9

GEOLOGIC ATTITUDES	DATE: 9/18/91 DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	Sample No.	Moisture (%)	Density (% Compaction)
	TERRACE DEPOSITS [A] Light brown to dark orange-brown, damp to moist, dense, slightly clayey, fine- to medium-grained sand; upper .5 foot slightly dessicated and porous; some scattered root hairs; massive	Qt	SC	(1) @0-3'		

GRAPHIC REPRESENTATION NW Wall SCALE: 1" = 5' SURFACE SLOPE:Horiz. TREND: N80E



LOG OF TRENCH NO. T-9

Leighton & Associates

GEOTECHNICAL BORING LOG

Date 9/24/91 Drill Hole No. B-4 Sheet 1 of 1

Project P-H/Sea Walk Village Job No. 4910693-01

Drilling Co. A&W Drill Rentals Type of Rig Rotary Wash

Hole Diameter 5" Drive Weight 340 lb. Drop 18 in.

Elevation Top of Hole ±53' Ref. or Datum mean sea level

Logged by JB

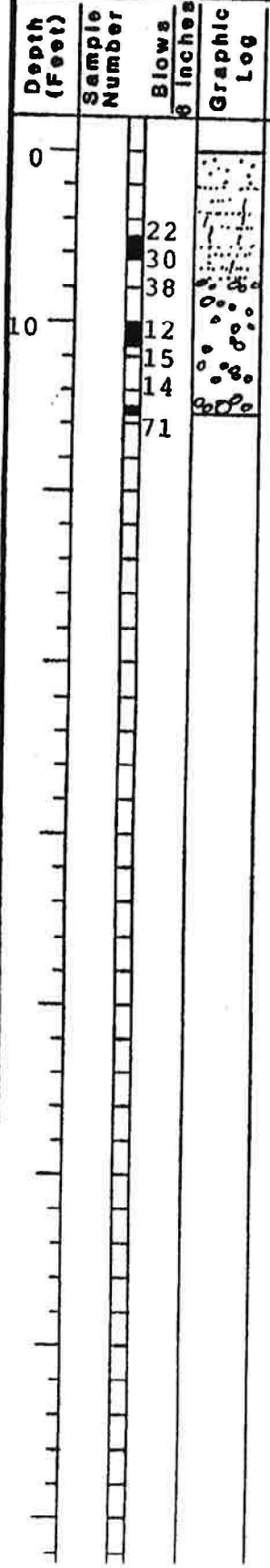
Sampled by JB

Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION
0								PLEISTOCENE TERRACE DEPOSITS Red-brown to brown, damp to moist, dense, silty, fine- to medium-grained sand
5								
10								
13								@13': Very gravelly, slow drilling
15								@15.5' to 17': Hole caving
20			No recovery	54(?)			SM	@20': No recovery of sample; based on cuttings appears to be yellow-brown to brown, generally silty, fine to medium sand
25			1	60+	106.5	9.9	GC	SAN ONOFRE BRECCIA (?) @25': Light brown-orange, moist to damp, dense, slightly clayey, sandy gravel; gravel is fine- to coarse-grained, sub-rounded to angular granitic and metamorphic rock clasts
30								Total depth = 25 feet No apparent ground water Refusal at 25 feet Backfilled: 9/24/91

Boring Log

Project Number: Lot C, Oceanside
Date: 2/19/90
Geologist: SF
Location of Boring: 225' west of curb, northeasterly portion of lot

Boring Number: 3
Diameter: 8"
Drive Weight: 140 lbs/ 30" drop
Surface Elevation:



Description

TERRACE DEPOSITS

0' reddish-brown, silty, very fine- to fine-grained sand; loose to medium dense, slightly moist.

2' light brown, very silty, very fine- to fine-grained sand; medium dense to dense, slightly moist.

5' very dense, partially cemented.

7.5' abundant subrounded to subangular gravels, scattered coarse-grained sand lenses.

14' light grayish-brown, poorly sorted sandy matrix containing abundant gravels.

15' cobbly.

TOTAL DEPTH = 15.5' (refusal)
NO GROUNDWATER

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FIELD PERCOLATION TEST DATA SHEET

Project Name:	WP West Acq./ North Coast HWY Update Report	Project No.:	12107.003
Proj. Address:	939 & 1009 N. Coast Highway, Oceanside California		

SOIL TYPE / TEST LOCATION / BOREHOLE

Soil Type: Brown Silty Sand — Hole #: P-1

Location: P-1

Hole Dia: 8"

Depth 5'

Tested by: Pre-Saturation Date: 8.13.18 — Test Date: 8.14.18

Notes: Measurements in 1/100ths of feet (ft)

Time of Day	Interval / Notes	Initial Depth to Water (ft)	Final Depth of Water (ft)	Δ in Water Level (ft)	Percolation Rate (min/inch)
9:09 AM	Start	1.74	-	-	-
9:37 AM	28	1.74	1.76	0.02	116.67
10:05 AM	28	1.76	1.78	0.02	116.67
10:35 AM	30	1.78	1.80	0.02	125.00
11:05 AM	30	1.80	1.83	0.03	83.33
11:35 AM	30	1.83	1.84	0.01	250.00
12:08 PM	33	1.84	1.85	0.01	275.00
12:35 PM	27	1.85	1.87	0.02	112.50
1:03 PM	28	1.87	1.89	0.02	116.67
1:41 PM	38	1.89	1.90	0.01	316.67
2:20 PM	39	1.90	1.91	0.01	325.00
2:50 PM	30	1.91	1.92	0.01	250.00
3:20 PM	30	1.92	1.93	0.01	250.00

Notes: Last reading used to determine percolation rate

Final Field Percolation Rate: 250 min/inch

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FIELD PERCOLATION TEST DATA SHEET

Project Name:	WP West Acq./ North Coast HWY Update Report	Project No.:	12107.003
Proj. Address:	939 & 1009 N. Coast Highway, Oceanside California		

SOIL TYPE / TEST LOCATION / BOREHOLE

Soil Type: Brown Silty Sand — Hole #: P-2

Location: P-2

Hole Dia: 8"

Depth 4.89

Tested by: Pre-Saturation Date: 8.13.18 — Test Date: 8.14.18

Notes: Measurements in 1/100ths of feet (ft)

Time of Day	Interval / Notes	Initial Depth to Water (ft)	Final Depth of Water (ft)	Δ in Water Level (ft)	Percolation Rate (min/inch)
9:25 AM	Start	1.48	-	-	-
9:46 AM	21	1.48	1.50	0.02	87.50
10:08 AM	22	1.50	1.53	0.03	61.11
10:38 AM	30	1.53	1.56	0.03	83.33
11:08 AM	30	1.56	1.59	0.03	83.33
11:39 AM	31	1.59	1.61	0.02	129.17
12:10 PM	31	1.61	1.62	0.01	258.33
12:39 PM	29	1.62	1.63	0.01	241.67
1:08 PM	29	1.63	1.65	0.02	120.83
1:43 AM	35	1.65	1.66	0.01	291.67
2:18 PM	35	1.66	1.67	0.01	291.67
2:50 AM	32	1.67	1.68	0.01	266.67
3:20 PM	30	1.68	1.69	0.01	250.00

Notes: Final reading used to determine percolation rate

Final Field Percolation Rate: 250 min/inch

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FIELD PERCOLATION TEST DATA SHEET

Project Name:	WP West Acq./ North Coast HWY Update Report	Project No.:	12107.003
Proj. Address:	939 & 1009 N. Coast Highway, Oceanside California		

SOIL TYPE / TEST LOCATION / BOREHOLE

Soil Type: Brown Silty Sand — Hole #: P-3

Location: P-3

Hole Dia: 8"

Depth 4.54

Tested by: Pre-Saturation Date: 8.13.18 — Test Date: 8.14.18

Notes: Measurements in 1/100ths of feet (ft)

Time of Day	Interval / Notes	Initial Depth to Water (ft)	Final Depth of Water (ft)	Δ in Water Level (ft)	Percolation Rate (min/inch)
9:16 AM	Start	2.09	-	-	-
9:41 AM	25	2.09	2.1	0.02	104.17
10:05 AM	24	2.1	2.11	0.01	200.00
10:35 AM	30	2.11	2.11	0	NP
11:06 AM	31	2.11	2.12	0.01	258.33
11:37 AM	31	2.12	2.12	0	NP
12:08 PM	31	2.12	2.12	0	NP
12:37 PM	29	2.12	2.12	0	NP
1:05 PM	28	2.12	2.13	0.01	233.33
1:43 PM	38	2.13	2.13	0	NP
2:18 PM	35	2.13	2.14	0.01	291.67
2:44 PM	26	2.14	2.14	0	NP
3:15 PM	31	2.14	2.15	0.01	258.33

Notes: Final reading used to determind percolation rate
Final Field Percolation Rate: 258 min/inch
NP = No Percolation Rate

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FIELD PERCOLATION TEST DATA SHEET

Project Name:	WP West Acq./ North Coast HWY Update Report	Project No.:	12107.003
Proj. Address:	939 & 1009 N. Coast Highway, Oceanside California		

SOIL TYPE / TEST LOCATION / BOREHOLE

Soil Type: Brown Silty Sand — Hole #: P-4

Location: P-4

Hole Dia: 8"

Depth 4.78

Tested by: Pre-Saturation Date: 8.13.18 — Test Date: 8.14.18

Notes: Measurements in 1/100ths of feet (ft)

Time of Day	Interval / Notes	Initial Depth to Water (ft)	Final Depth of Water (ft)	Δ in Water Level (ft)	Percolation Rate (min/inch)
8:56 AM	Start	1.81	-	-	-
9:28 AM	32	1.81	1.84	0.03	88.89
10:00 AM	32	1.84	1.87	0.03	88.89
10:30 AM	30	1.87	1.90	0.03	83.33
11:00 AM	30	1.90	1.94	0.04	62.50
11:32 AM	32	1.94	1.97	0.03	88.89
12:05 PM	33	1.97	2.00	0.03	91.67
12:27 PM	22	2.00	2.02	0.02	91.67
1:00 PM	33	2.02	2.05	0.03	91.67
1:37 PM	37	2.05	2.07	0.02	154.17
2:14 PM	37	2.07	2.10	0.03	102.78
2:44 PM	30	2.10	2.12	0.02	125.00
3:15 PM	31	2.12	2.14	0.02	129.17

Notes: Final reading used to determine percolation rate

Final Field Percolation Rate: 129 min/inch

APPENDIX C

SUMMARY OF LABORATORY TESTING

APPENDIX C

Laboratory Testing Procedures and Test Results

Moisture and Density Determination Tests: Moisture content and dry density determinations were performed on relatively undisturbed samples obtained from the test borings. The results of these tests are presented in the boring logs. Where applicable, only moisture content was determined from "undisturbed" or disturbed samples.

Direct Shear Test: One direct shear test was performed on selected relatively undisturbed sample which was soaked for a minimum of 24 hours under a surcharge equal to the applied normal force during testing. After transfer of the sample to the shear box and reloading of the sample, the pore pressures set up in the sample (due to the transfer) were allowed to dissipate for a period of approximately 1 hour prior to application of shearing force. The samples were tested under various normal loads utilizing a motor-driven, strain-controlled, direct-shear testing apparatus at a strain rate of 0.05 inches per minute. The test results are presented on the attached figure.

Expansion Index Test: The expansion potential of selected material was evaluated by the Expansion Index Text, ASTM Test Method 4829. The specimen was molded under a given compactive energy to approximately 50 percent saturation. The prepared 1-inch thick by 4-inch diameter specimen was loaded to an equivalent 144 psf surcharge and was inundated with water until volumetric equilibrium was reached. The result of this test is presented in the table below:

Sample Location	Sample Description	Expansion Index	Expansion Potential
HSA-1 @ 0 to 5 feet	Silty SAND (SM)	<1	Very Low

APPENDIX C (Continued)

Minimum Resistivity and pH Tests: Minimum resistivity and pH tests were performed in general accordance with Caltrans Test Method CT643 for Steel or CT532 for concrete and standard geochemical methods. The results are presented in the table below:

Sample Location	Sample Description	pH	Minimum Resistivity (ohms-cm)
HSA-1 @ 0-5'	Silty SAND (SM)	6.83	3,075

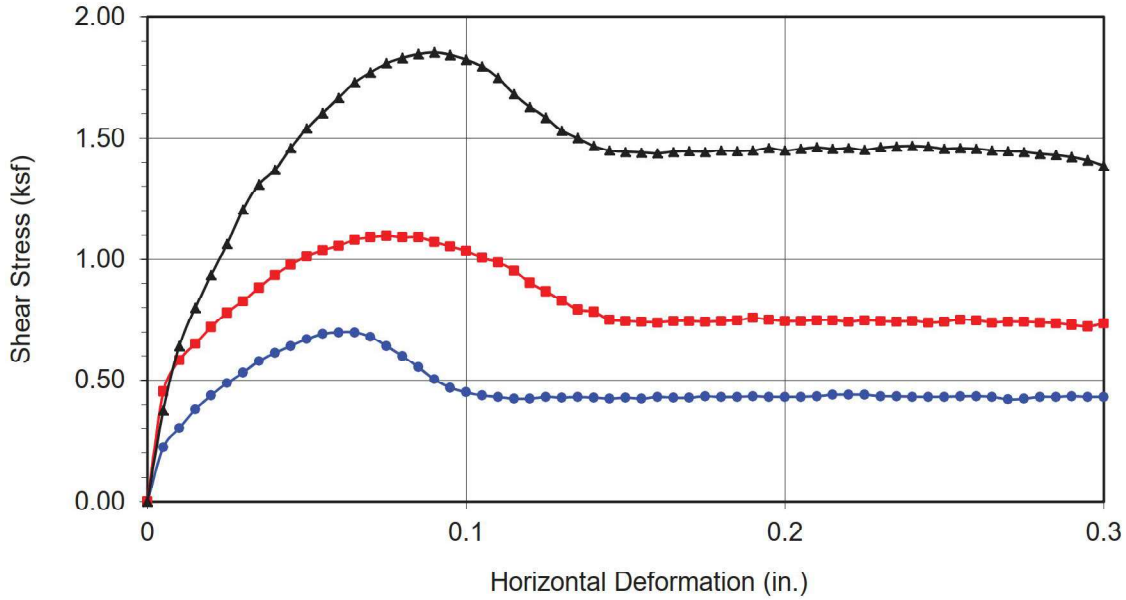
Chloride Content: Chloride content was tested in accordance with Caltrans Test Method CT422. The results are presented below:

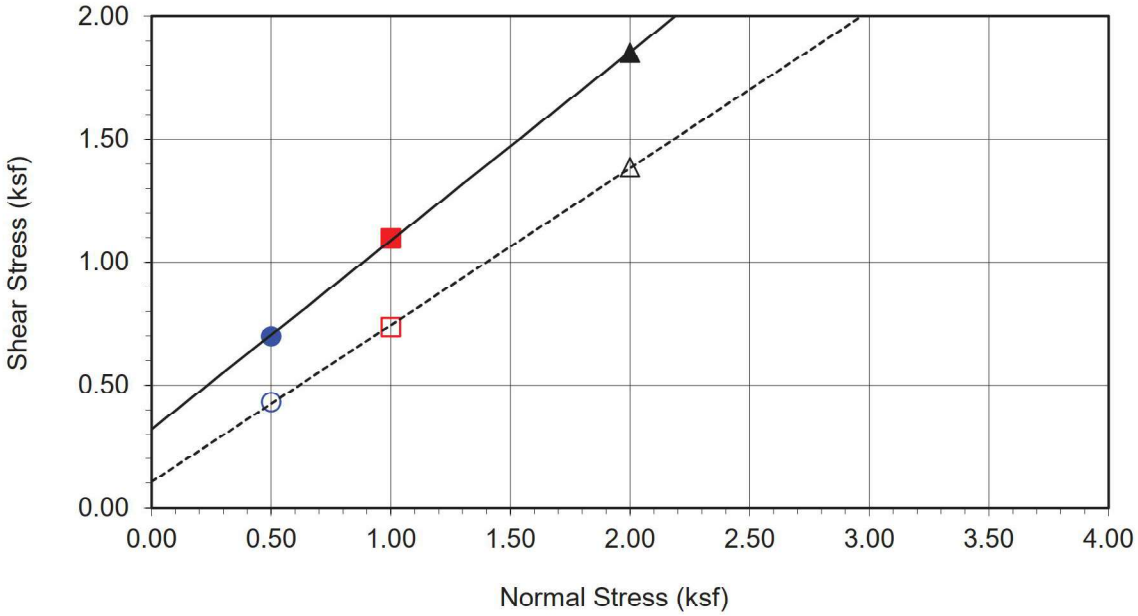
Sample Location	Sample Description	Chloride Content, ppm
HSA-1 @ 0-5'	Silty SAND (SM)	200

Soluble Sulfates: The soluble sulfate contents of selected samples were determined by standard geochemical methods (Caltrans Test Method CT417). The test results are presented in the table below:

Sample Location	Sample Description	Sulfate Content (%)	Potential Degree of Sulfate Attack*
HSA-1 @ 0-5'	Silty SAND (SM)	<0.015	Negligible

* Based on the 2011 edition of American Concrete Institute (ACI) Committee 318R, Table No. 4.2.1.





Boring No.	**HA-1**
Sample No.	**R-1**
Depth (ft)	**3-4**
Sample Type:	Ring
Soil Identification:	Yellowish brown silty sand (SM)

Strength Parameters

	C (psf)	ϕ (°)
Peak	321	37
Ultimate	106	33

Normal Stress (kip/ft²)	0.500	1.000	2.000
Peak Shear Stress (kip/ft²)	● 0.698	■ 1.097	▲ 1.852
Shear Stress @ End of Test (ksf)	○ 0.431	□ 0.736	△ 1.386
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	2.37	2.37	2.37
Dry Density (pcf)	122.9	123.6	124.5
Saturation (%)	17.2	17.6	18.1
Soil Height Before Shearing (in.)	0.9809	0.9901	0.9578
Final Moisture Content (%)	12.0	11.4	10.9

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DIRECT SHEAR TEST RESULTS

Consolidated Undrained

Project No.: 12107.003

939 & 1009 WP NC Hwy

08-18

APPENDIX D

CITY OF OCEANSIDE

WORKSHEET I-8

Categorization of Infiltration Feasibility Condition	Form I-8

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:

Based on our field percolation testing, the infiltration rates of the soils at the subject site are less than 0.5 inches per hour. The calculated infiltration rates via the Porchet Method with an applied safety factor of 2 range from 0.006 inches per hour to 0.008 inches per hour throughout the site.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

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:

If the infiltration rates were greater than 0.5 inches per hour, it may be possible that the risk of geotechnical hazards would not be increased provided mitigation is performed for any underground utilities/structures, slopes (i.e., setbacks) within the vicinity of the proposed infiltration site.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

Form I-8 Page 2 of 4			
Criteria	Screening Question	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: If the infiltration rates were greater than 0.5 inches per hour, it may be possible that the risk of groundwater contamination would not be increased provided there are no contaminated soil or groundwater sites within 250 feet of the proposed infiltration site. In addition, the previous explorations indicate the groundwater is greater than 50 feet bgs. 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.	X	
Provide basis: If the infiltration rates were greater than 0.5 inches per hour, it may be possible that potential water balance issues would not be affected provided there are no unlined site drainages/creeks/streams within 250 feet of the proposed infiltration site. 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		Go 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 the City to substantiate findings

Form I-8 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:

Based on our field percolation testing, the calculated infiltration rates of the soils at the subject site are between 0.006 to 0.008 inches per hour, which is currently assumed to be a "Non infiltration" condition. Note that the calculated infiltration rate via the Porchet Method has an applied safety factor of 2.

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:

For a "Non infiltration" condition (between 0.006 to 0.008 inches per hour), the risk of geotechnical hazards will not be increased by non infiltration provided mitigation is performed for any underground utilities/structures, slopes (i.e., setbacks) within the vicinity of the proposed infiltration site. Mitigation can include subsurface vertical barriers and subdrains to limit groundwater migration and perched groundwater conditions.

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.

Form I-8 Page 4 of 4			
Criteria	Screening Question	Yes	No
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	

Provide basis:

For a "Non infiltration" condition (between 0.006 to 0.008 inches per hour), the risk of groundwater contamination will not be increased by partial infiltration provided there are no contaminated soil or groundwater sites within 250 feet of the proposed infiltration site. In addition, the previous explorations indicate the groundwater is greater than 50 feet below ground surface.

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.	X	

Provide basis:

For a "Non infiltration" condition (between 0.006 to 0.008 inches per hour), violation of downstream water rights is not anticipated based on the site location and that there are no unlined site drainages/creeks/streams within 250 feet of the proposed infiltration site.

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.**	**Non 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 the City to substantiate findings

APPENDIX E

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

FOR ROUGH GRADING

1.0 General

1.1 Intent

These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 The Geotechnical Consultant of Record

Prior to commencement of work, the owner shall employ the Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultants shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 The Earthwork Contractor

The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified.

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

2.2 Processing

Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 Overexcavation

In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical

Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 General

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557).

4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557.

4.5 Compaction Testing

Field-tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to

inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing

Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations

The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 Safety

The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations.

7.2 Bedding and Backfill

All bedding and backfill of utility trenches shall be performed in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified. Backfill shall be placed and densified to a minimum of 90 percent of relative compaction from 1 foot above the top of the conduit to the surface.

The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

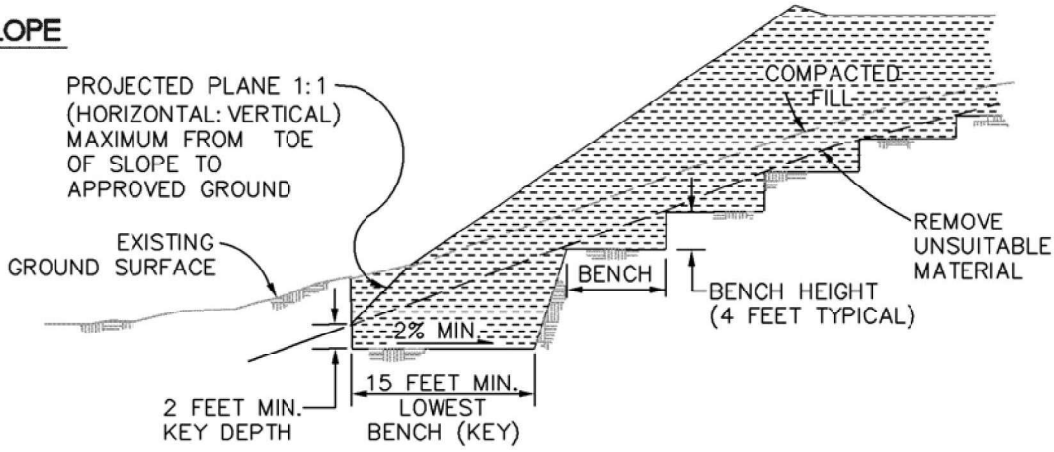
7.3 Lift Thickness

Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

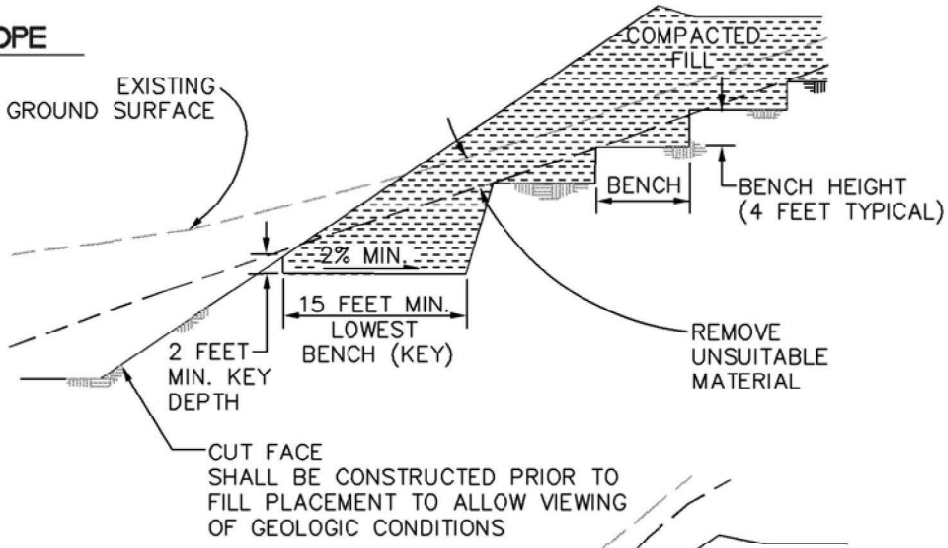
7.4 Observation and Testing

The densification of the bedding around the conduits shall be observed by the Geotechnical Consultant.

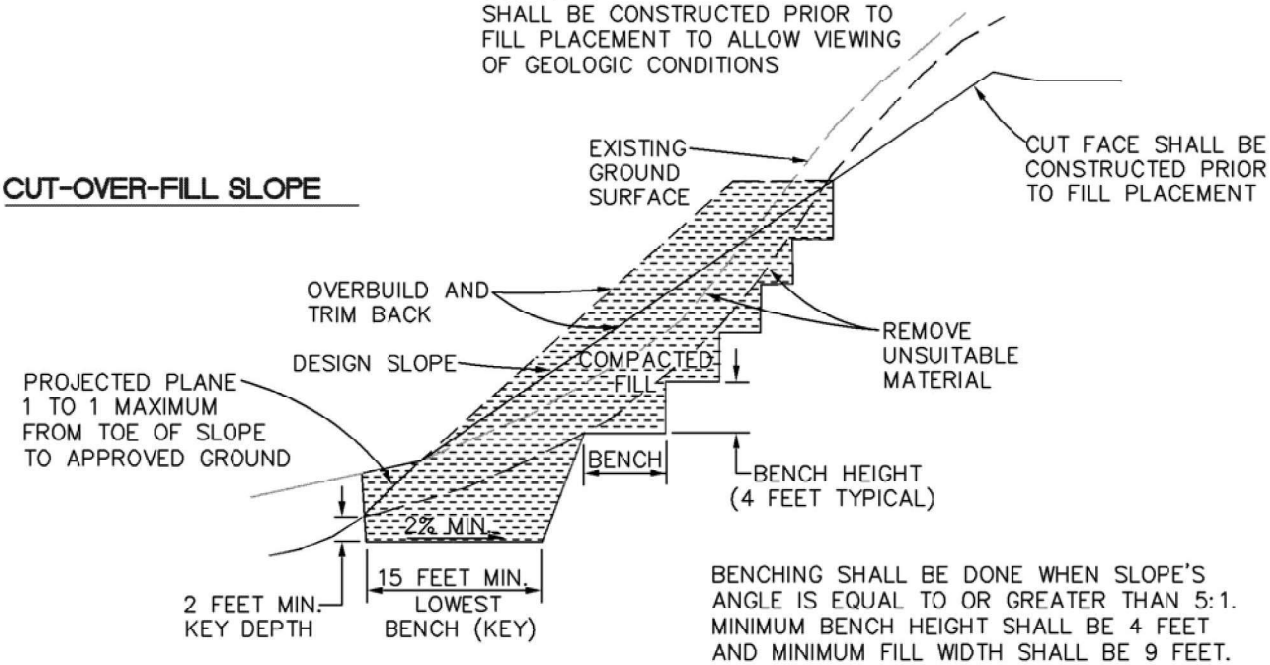
FILL SLOPE



FILL-OVER-CUT SLOPE



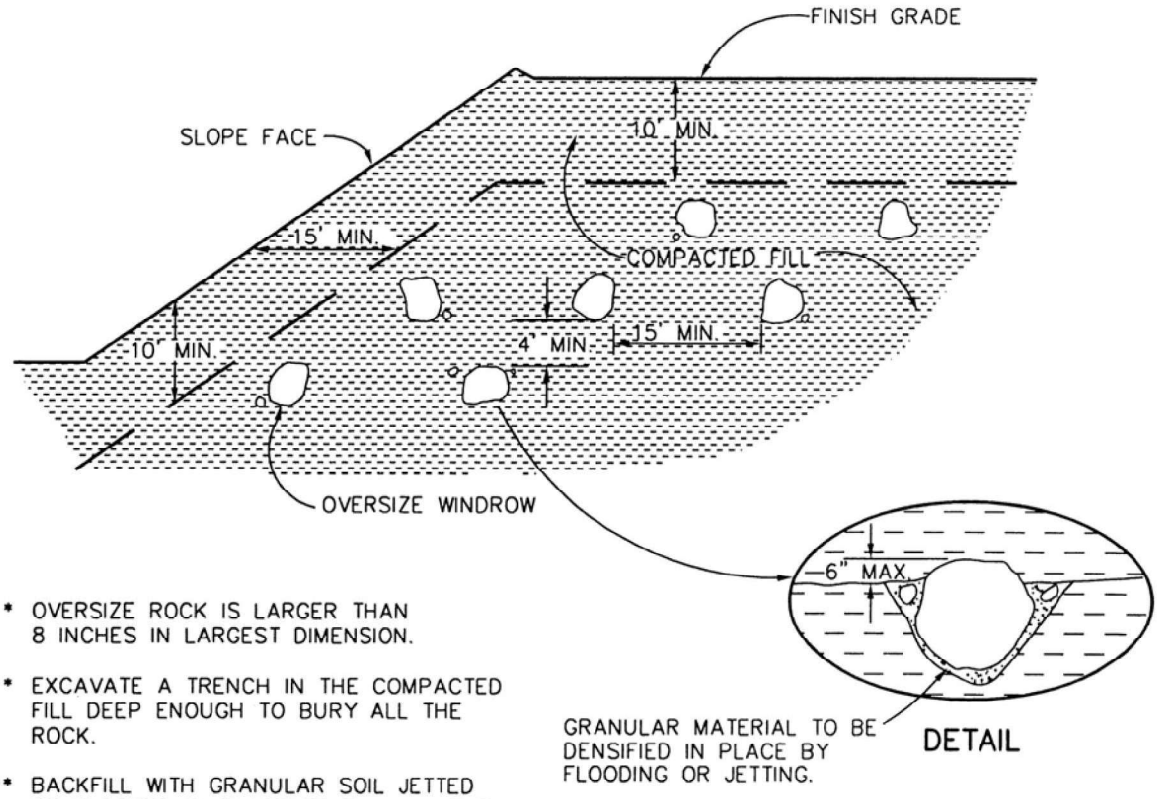
CUT-OVER-FILL SLOPE



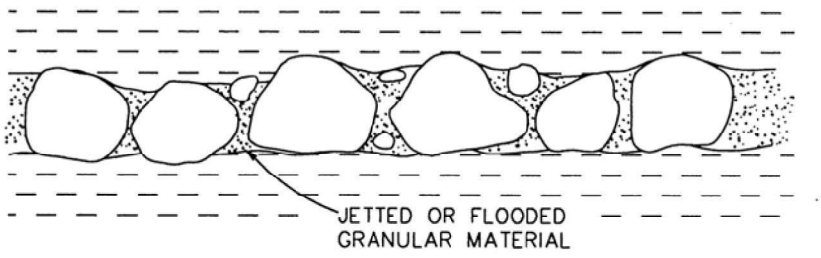
BENCHING SHALL BE DONE WHEN SLOPE'S ANGLE IS EQUAL TO OR GREATER THAN 5:1. MINIMUM BENCH HEIGHT SHALL BE 4 FEET AND MINIMUM FILL WIDTH SHALL BE 9 FEET.

KEYING AND BENCHING

GENERAL EARTHWORK AND
GRADING SPECIFICATIONS
STANDARD DETAIL A



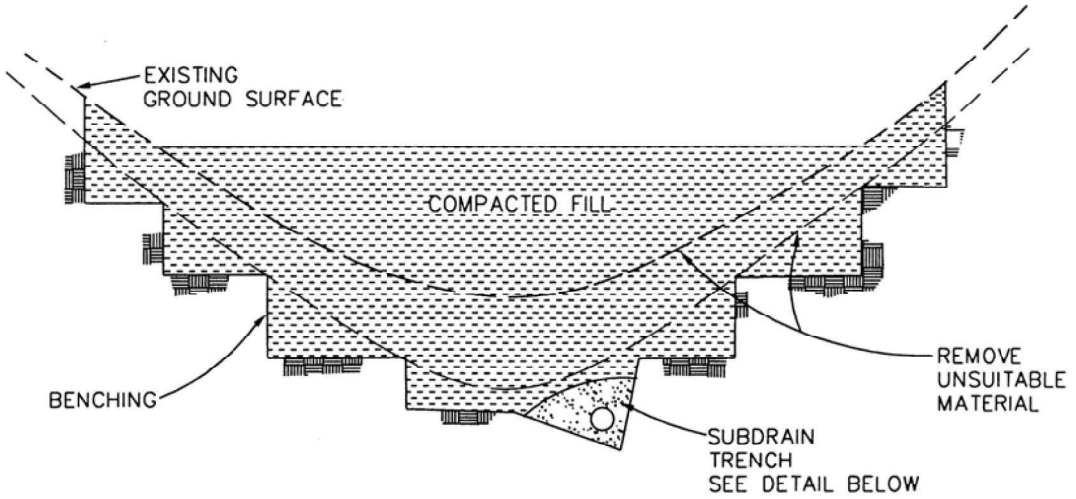
* OVERSIZE ROCK IS LARGER THAN 8 INCHES IN LARGEST DIMENSION.
* EXCAVATE A TRENCH IN THE COMPACTED FILL DEEP ENOUGH TO BURY ALL THE ROCK.
* BACKFILL WITH GRANULAR SOIL JETTED OR FLOODED IN PLACE TO FILL ALL THE VOIDS.
* DO NOT BURY ROCK WITHIN 10 FEET OF FINISH GRADE.
* WINDROW OF BURIED ROCK SHALL BE PARALLEL TO THE FINISHED SLOPE.

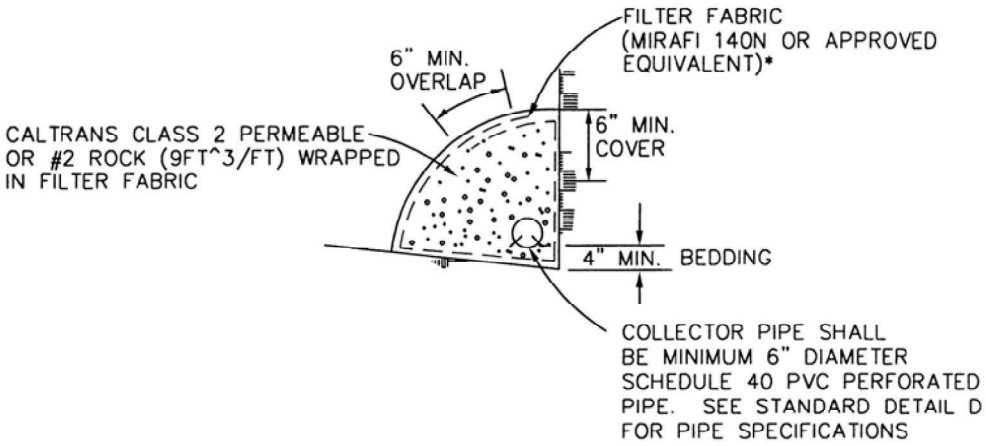


TYPICAL PROFILE ALONG WINDROW

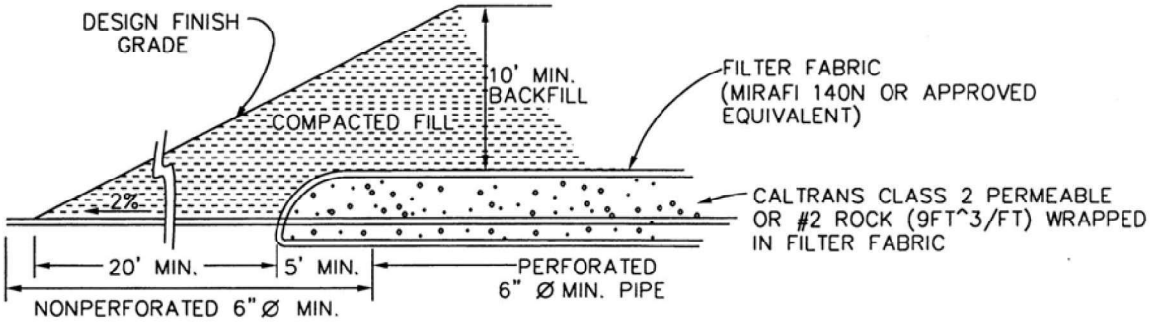
OVERSIZE ROCK DISPOSAL

GENERAL EARTHWORK AND GRADING SPECIFICATIONS
STANDARD DETAIL B





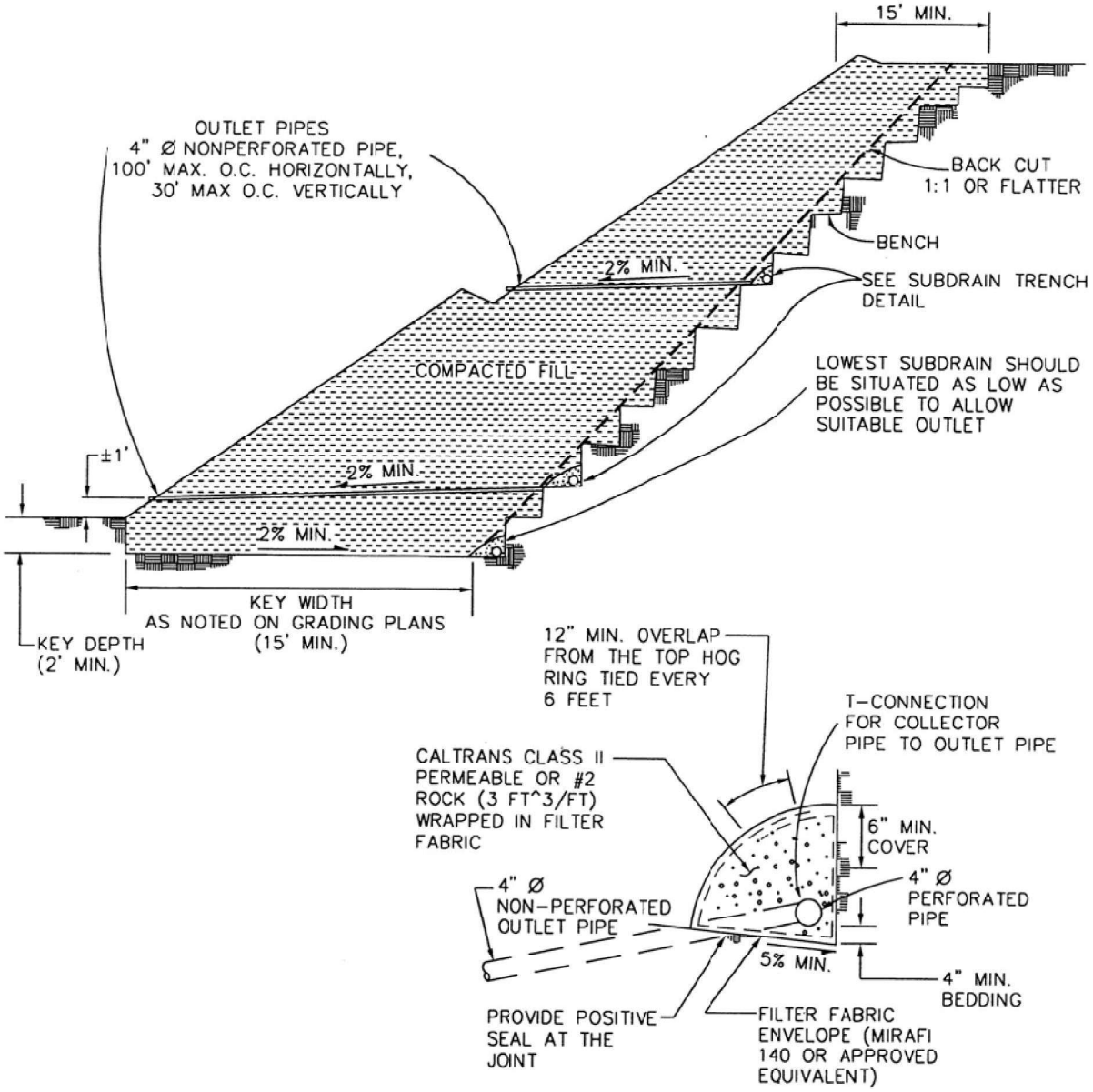
SUBDRAIN DETAIL



DETAIL OF CANYON SUBDRAIN OUTLET

CANYON SUBDRAINS

GENERAL EARTHWORK AND
GRADING SPECIFICATIONS
STANDARD DETAIL C



SUBDRAIN TRENCH DETAIL

SUBDRAIN INSTALLATION – subdrain collector pipe shall be installed with perforation down or, unless otherwise designated by the geotechnical consultant. Outlet pipes shall be non-perforated pipe. The subdrain pipe shall have at least 8 perforations uniformly spaced per foot. Perforation shall be 1/4" to 1/2" if drill holes are used. All subdrain pipes shall have a gradient of at least 2% towards the outlet.

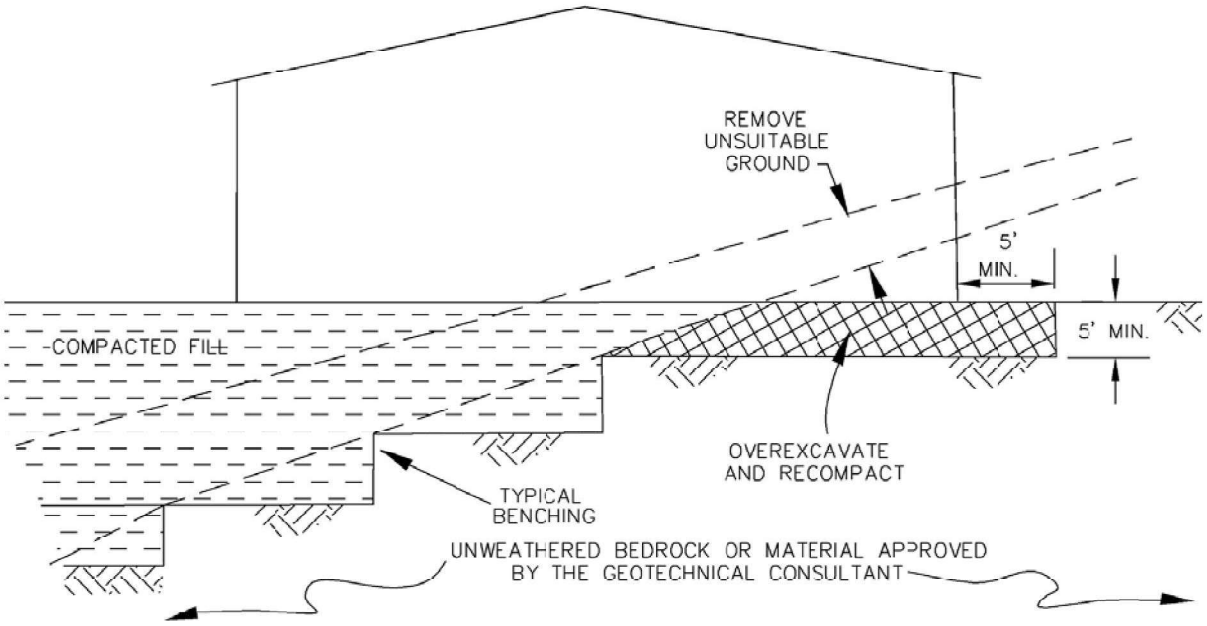
SUBDRAIN PIPE – Subdrain pipe shall be ASTM D2751, SDR 23.5 or ASTM D1527, Schedule 40, or ASTM D3034, SDR 23.5, Schedule 40 Polyvinyl Chloride Plastic (PVC) pipe.

All outlet pipe shall be placed in a trench no wider than twice the subdrain pipe.

BUTTRESS OR REPLACEMENT FILL SUBDRAINS

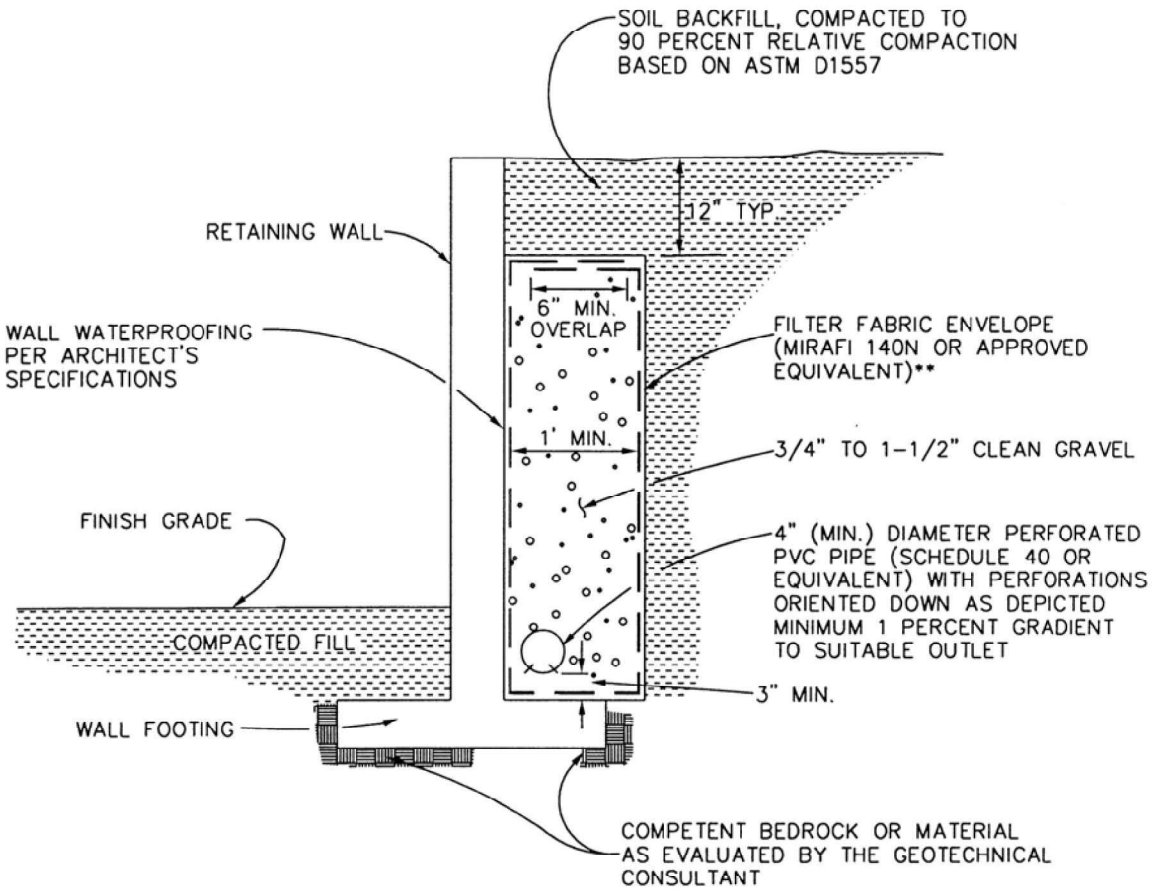
GENERAL EARTHWORK AND GRADING SPECIFICATIONS
STANDARD DETAIL D

CUT–FILL TRANSITION LOT OVEREXCAVATION



TRANSITION LOT FILLS

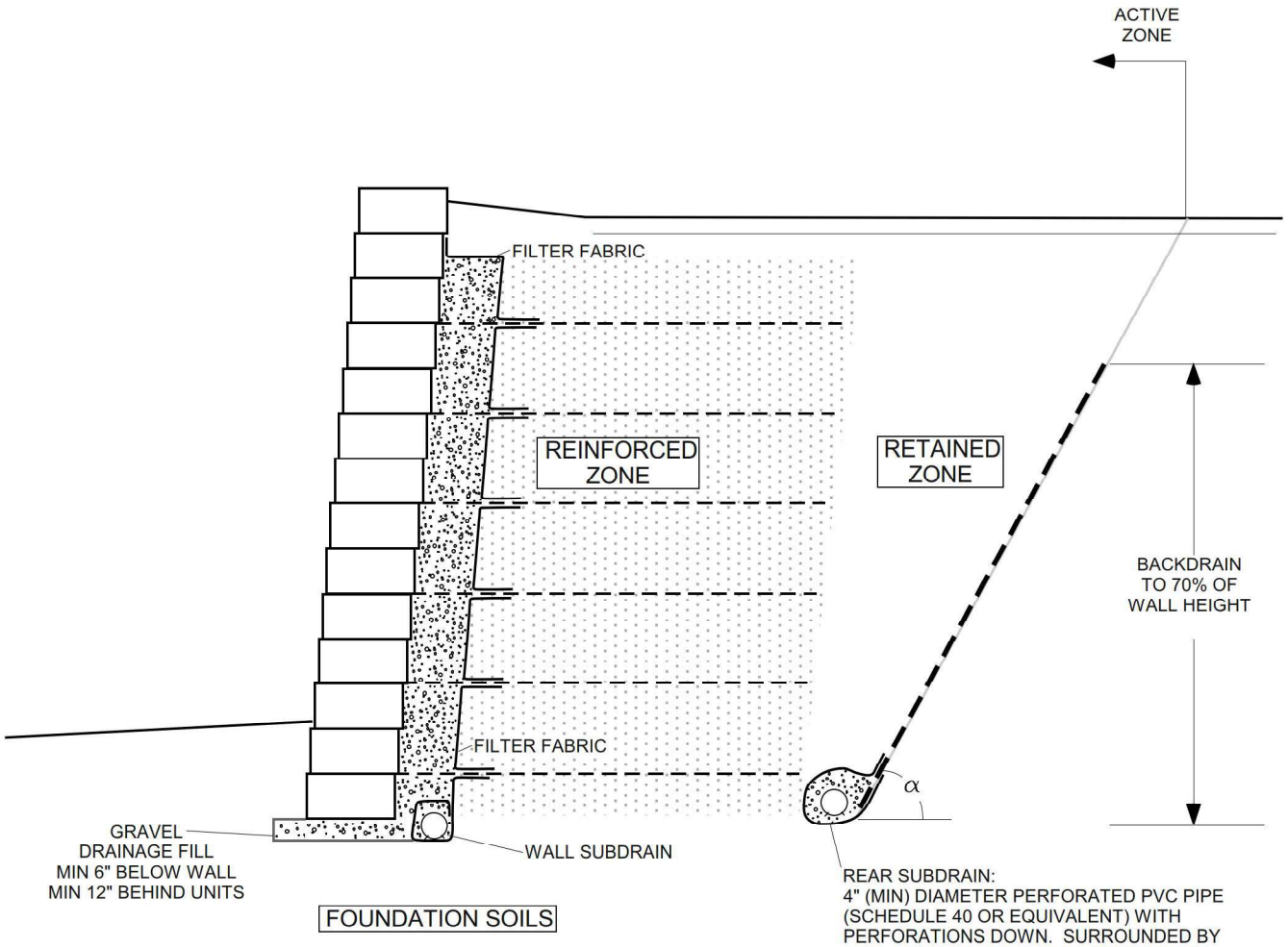
GENERAL EARTHWORK AND
GRADING SPECIFICATIONS
STANDARD DETAIL E



NOTE: UPON REVIEW BY THE GEOTECHNICAL CONSULTANT, COMPOSITE DRAINAGE PRODUCTS SUCH AS MIRADRAIN OR J-DRAIN MAY BE USED AS AN ALTERNATIVE TO GRAVEL OR CLASS 2 PERMEABLE MATERIAL. INSTALLATION SHOULD BE PERFORMED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

RETAINING WALL DRAINAGE

GENERAL EARTHWORK AND GRADING SPECIFICATIONS
STANDARD DETAIL F



NOTES:

1) MATERIAL GRADATION AND PLASTICITY

REINFORCED ZONE:

SIEVE SIZE	% PASSING
1 INCH	100
NO. 4	20-100
NO. 40	0-60
NO. 200	0-35

GRAVEL DRAINAGE FILL:

SIEVE SIZE	% PASSING
1 INCH	100
3/4 INCH	75-100
NO. 4	0-60
NO. 40	0-50
NO. 200	0-5

FOR WALL HEIGHT < 10 FEET, PLASTICITY INDEX < 20
FOR WALL HEIGHT 10 TO 20 FEET, PLASTICITY INDEX < 10
FOR TIERED WALLS, USE COMBINED WALL HEIGHTS
WALL DESIGNER TO REQUEST SITE-SPECIFIC CRITERIA FOR WALL HEIGHT > 20 FEET

2) CONTRACTOR TO USE SOILS WITHIN THE RETAINED AND REINFORCED ZONES THAT MEET THE STRENGTH REQUIREMENTS OF WALL DESIGN.

3) GEOGRID REINFORCEMENT TO BE DESIGNED BY WALL DESIGNER CONSIDERING INTERNAL, EXTERNAL, AND COMPOUND STABILITY.

3) GEOGRID TO BE PRETENSIONED DURING INSTALLATION.

4) IMPROVEMENTS WITHIN THE ACTIVE ZONE ARE SUSCEPTIBLE TO POST-CONSTRUCTION SETTLEMENT. ANGLE $\alpha = 45+\phi/2$, WHERE ϕ IS THE FRICTION ANGLE OF THE MATERIAL IN THE RETAINED ZONE.

5) BACKDRAIN SHOULD CONSIST OF J-DRAIN 302 (OR EQUIVALENT) OR 6-INCH THICK DRAINAGE FILL WRAPPED IN FILTER FABRIC. PERCENT COVERAGE OF BACKDRAIN TO BE PER GEOTECHNICAL REVIEW.

SEGMENTAL RETAINING WALLS

GENERAL EARTHWORK AND GRADING SPECIFICATIONS
STANDARD DETAIL G

APPENDIX F

GBA

GEOTECHNICAL REPORT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering 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 given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- 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;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the 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. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include 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 personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

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ATTACHMENT 7
Storm Water Quality Assessment Form

This is the cover sheet for Attachment 7.

City of Oceanside – Clean Water Program – Engineering Division

STORM WATER QUALITY ASSESSMENT FOR PLANNING, ENGINEERING, AND BUILDING PERMIT APPLICATIONS

Projects applying 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 and supporting documents to determine the applicability of State and City storm water requirements. Please note a storm water determination cannot be provided without a complete permit application package.

Section 1 – Project Information	
Applicant Name: Wood Partners	Phone Number:
Project Name: ALTA Oceanside	Email Address (Optional):
Project Site Address: Costa Pacifica Way, Oceanside, CA	Street Intersection: Costa Pacifica and N Coast Hwy
Assessor Parcel Number(s): 143-04-23, 143-04-54 (portion)	Total Parcel Area (acres or square feet): 4.4 acres
Project Description: Apartments/ Retail	Proposed Project Impervious Area (acres or square feet): 4.07 acres

Section 2 – Identify Project Type	
☐	New Development Project – go to Section 3
☒	Redevelopment Project go to Section 3
☐	None of the above – Skip Section 3 and go to Section 4

Section 3 – Identify Applicable Priority Development Project Categories	
☒	**Housing Development of 10 or more dwelling units –** Examples: single family homes, multifamily homes, condominiums, and apartments.
☐	**Commercial Development greater than one acre –** Any development other than Heavy Industry or Residential. Examples include, but are not limited to, hospitals, laboratories, and other medical facilities; educational institutions and facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; airfields; and other light industrial facilities.
☐	**Heavy Industry greater than one acre –** Examples: manufacturing plants, food processing plants, metalworking facilities, printing plants, and fleet storage areas (bus, truck, etc.).
☐	**Automotive Repair Shop –** A facility in any one of the Standard Industrial Classifications (SIC) 5013, 5014, 5541, 7532,-7534, or 7536-7539 (including sub-classifications).
☒	**Restaurants –** Any facility that sells prepared foods and drinks for consumption, including lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption or carry out (SIC code 5812), where the land area for development is 5,000 square feet or greater. Restaurants where land development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric-sizing criteria requirements and hydromodification requirements.
☐	**Hillside Development greater than 5,000 square feet –** Projects subject to the City of Oceanside Hillside Development Ordinance and/or any Hillside development that creates 5,000 square feet of impervious surface and is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.
☐	**Water Quality Environmentally Sensitive Areas (WQESAs) –** All development located within or directly adjacent to or discharging directly to a WQESA, where discharges from the development or redevelopment will enter receiving waters within the WQESA and which creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the WQESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and is not comingled with flows from adjacent lands (contact City Storm Water Staff for assistance in determining proximity to a WQESA).
☐	**Parking Lots –** of 5,000 square feet or more (new pavement or removal and replacement of existing pavement) or with 15 or more parking spaces and potentially exposed to urban runoff.
☐	**Streets, Roads, Highways, and Freeways –** Any paved surface that is 5,000 square feet of greater used for the transportation of automobiles, trucks, motorcycles and other vehicles.
☐	**Retail Gasoline Outlets (RGOs) –** that are (a) 5,000 square feet or (b) reflect a projected Average Daily Trip (ADT) of 100 or more vehicles per day.
☐	**Development Projects that result in the disturbance of one acre or more of land –** that generate pollutants at levels greater than background levels.
☐	**None of the Above**

STORM WATER QUALITY ASSESSMENT FOR PLANNING, ENGINEERING, AND BUILDING PERMIT APPLICATIONS

Section 4 – Identify Permit Application Type	
☒	**Discretionary Permit Application**: Specific Plan (S), General Plan Amendment (GPA), Zone Amendment (ZA), Tentative Map (T), Tentative Parcel Map (P), Development Plan (D), Conditional Use Permit (CUP), Variance (V), Regular Coastal Permit (RC), Historic Permit (H), Reclamation Plan, Planned Development Permit, Planned Unit Development Permit, Planning Commission Approval of Plans, Site Plan Review, Tentative Map Amendments to Conditions of Approval or Time Extension, Variance.
☐	**Administrative Permit Application**: Administrative Clearing Permit, Lot Line Adjustment, Final Map Modification, Grading Plan (including modification or renewal), Improvement Plan (including modification), Landscape Plan, Building Permit, Construction Right-of-Way Permit, Encroachment Permit, Excavation Permit, On-site Wastewater System Permit, Underground Tank Permit, Well Permit, or etc.

Section 5 – Applicant Certification	
Name of Responsible Party:	Phone Number:
Email Address (optional)	FAX Number (optional):
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. R9-2007-0001, 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 Standard Urban Storm Water Mitigation Plan, 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:

[Insert other supporting documentation here]