FUSCOE ENGINEERING

WATER QUALITY MANAGEMENT PLAN (WQMP)

RITZ-CARLTON RESIDENCES, NEWPORT BEACH

City of Newport Beach, County of Orange

PREPARED FOR
NEWPORT CENTER HOTEL, LCC
4901 Birch Street
Newport Beach, CA 92660
949.252.9101

FUSCOE ENGINEERING, INC.
16795 Von Karman, Suite 100
Irvine, California 92606
949.474.1960
www.fuscoe.com

PROJECT MANAGER
Oriana Slasor, PE

DATE PREPARED: December 7, 2021

PROJECT NUMBER: 1112-008-03

full circle thinking®

PRELIMINARY
WATER QUALITY MANAGEMENT PLAN (WQMP)

RITZ-CARLTON RESIDENCES, NEWPORT BEACH

900 Newport Center Drive, Newport Beach, County of Orange

PARCEL 2, MAP 2004-225, BOOK 361, PAGES 1-3
APN 442-492-02

Prepared for:

NEWPORT CENTER HOTEL, LLC, a Delaware Limited Liability Company
4901 Birch Street
Newport Beach, CA 92660
949.252.9101

Prepared by:

FUSCOE ENGINEERING, INC.
16795 Von Karman, Suite 100
Irvine, CA 92618
949.474.1960
Oriana Slasor, PE

Date Prepared: December 7, 2021

PROJECT OWNER'S CERTIFICATION			
Permit/Application No.:	Pending	**Grading Permit No.:**	Pending
Tract/Parcel Map and Lot(s)No.:	Parcel 2, Map 2004-225, Book 361, Pg. 1-3	**Building Permit No.:**	Pending
Address of Project Site and APN:	900 Newport Center Drive, Newport Beach, CA 92660 APN: 442-491-02		

This Water Quality Management Plan (WQMP) has been prepared for Newport Center Hotel, LLC by FUSCOE ENGINEERING, INC. The WQMP is intended to comply with the requirements of the County of Orange NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan , including the ongoing operation and maintenance of all best management practices (BMPs), and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

OWNER:			
Name:	Nate Johnson		
Title:	Senior Vice President of Development		
Company:	Newport Center Hotel, LLC, a Delaware limited liability company		
Address:	4901 Birch Street, Newport Beach, CA 92660		
Email:	NateJohnson@lyonliving.com		
Telephone #:	949.463.0085		
I understand my responsibility to implement the provisions of this WQMP including the ongoing operation and maintenance of the best management practices (BMPs) described herein.			
Owner Signature:		**Date:**	

TABLE OF CONTENTS

APPENDICES

EXHIBITS & BMP DETAILS (INCLUDED IN SECTION VI)

- Vicinity Map
- WQMP Exhibit
- MWS Cross Section Details
- BIO-7 Proprietary Biotreatment BMP Fact Sheet
- Typical Full Capture System Details

EDUCATIONAL MATERIALS (INCLUDED IN APPENDIX C)

- The Ocean Begins at Your Front Door
- Tips for Pool Maintenance
- Tips for Protecting Your Watershed
- Proper Maintenance Practice for Your Business
- DF-1 Drainage System Operation & Maintenance
- SC-44 Drainage Maintenance
- SC-73 Landscape Maintenance
- SD-10 Site design & Landscape Planning
- SD-12 Efficient Irrigation
- SD-13 Storm Drain Signage

SECTION I DISCRETIONARY PERMITS AND WATER QUALITY CONDITIONS

PROJECT INFORMATION			
Permit/Application No.:	Pending	**Grading or Building Permit No.:**	Pending
Address of Project Site (or Tract Map and Lot Number if no address) and APN:	APN: 442-491-02		
WATER QUALITY CONDITIONS OF APPROVAL OR ISSUANCE			
Discretionary Permit(s):	N/A		
Water Quality Conditions of Approval or Issuance applied to this project: (Please list verbatim.)	<u>CITY OF NEWPORT BEACH CONDITIONS</u> • The City of Newport Beach requires all new development and significant redevelopment projects to prepare and submit a Water Quality Management Plan (WQMP) to the City for review and approval. Prior to issuance of grading or building permits, the project applicant shall have an approved final Project WQMP. • Prior to the issuance of the grading permit, the applicant shall prepare a Water Quality Management Plan (WQMP) specifically identifying the Best Management Practices (BMP's) that will be used on site to control predictable pollutant runoff. The plan shall identify the types of structural and non-structural measures to be used. The plan shall comply with the Orange County Drainage Area Management Plan (DAMP). Particular attention should be addressed to the appendix section "Best Management Practices for New Development." The WQMP shall clearly show the locations of structural BMP's, and assignment of long-term maintenance responsibilities (which shall also be included in the Maintenance Agreement). The plan shall be prepared to the format of the DAMP title "Water Quality Management Plan Outline" and be subject to the approval of the City.		

CONCEPTUAL WQMP	
Was a Conceptual Water Quality Management Plan previously approved for this project?	No – This report serves as the Preliminary Water Quality Management Plan (WQMP).
WATERSHED-BASED PLAN CONDITIONS	
Applicable conditions from watershed - based plans including WIHMPs and TMDLs:	Lower Newport Bay: Metals, Nutrients, Pathogens, Pesticides, Priority Organics, Siltation

SECTION II PROJECT DESCRIPTION

II.1 PROJECT DESCRIPTION

The proposed Ritz-Carlton Residences, Newport Beach project site encompasses approximately 3.95 acres in the City of Newport Beach. The total Marriott Hotel and Spa project encompasses a total area of approximately 9.5 acres. The project site is bounded by the Hotel and Spa along Santa Barbara Drive to the north, the Newport Beach Country Club to the west, residential and commercial buildings to the south, and Newport Center Drive to the east. A Vicinity Map is included in Section VI.

Under existing conditions, the project site consists of the hotel & spa, along with the associated parking structure. Adjacent land uses include other commercial development to the east, a golf course (Newport Beach Country Club) to the west, and residential property to the north and south.

The table below summarizes the proposed project.

DESCRIPTION OF PROPOSED PROJECT	
Development Category (Model WQMP, Table 7.11-2; or 7.11-3):	8. All significant redevelopment projects, where significant redevelopment is defined as the addition or replacement of 5,000 or more square feet of impervious surface on an already developed site. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility, or emergency redevelopment activity required to protect public health and safety. Since the proposed project includes the addition and replacement of more than 5,000 square feet of impervious surfaces on an already developed site, the project is considered a "Priority Project" in accordance with the Model WQMP and OC DAMP. If the redevelopment results in the addition or replacement of less than 50 percent of the impervious area on-site and the existing development was not subject to WQMP requirement, the numeric sizing criteria discussed in Section 7.II-2.0 only applies to the addition or replacement area. If the addition or replacement accounts for 50 percent or more of the impervious area, the Project WQMP requirements apply to the entire development.
Project Area (ft^2):	172,062 ft^2 (3.95 acres – Project Site) 121,315 ft^2 (5.57 acres – Drainage Management Area for Water Quality)
# of Dwelling Units:	159 Hotel Branded Residences
SIC Code:	7011

DESCRIPTION OF PROPOSED PROJECT				
Narrative Project Description:	The proposed Ritz-Carlton Residences, Newport Beach project at the Newport Beach Marriott Resort Hotel is the conversion of up to 30% of the existing 532 hotel rooms to hotel-branded residences. The project contemplates the demolition of the southernmost building, Harbor Landing, and construction of a new residential building. The project will result in the removal of 133 hotel units from the demolition of the Harbor Landing building and the reduction of 15 hotel units in the Pacific Landing building via interior reconfiguration. The Pacific Landing building will change from 63 hotel rooms to 48 hotel rooms, but the building itself will not be demolished and no exterior improvements are proposed. The new 21-story structure will accommodate up to 159 hotel-branded residences, representing 30% of the total units at the Newport Beach Marriott Resort Hotel. The total units at the Newport Beach Marriott Resort Hotel will remain unchanged at 532, with 373 traditional hotel rooms and up to 159 hotel-branded residences. Parking spaces required by City code will be maintained by an existing 6-level, 403-space parking structure proposed to be demolished and rebuilt in substantially the same location and a new 5-level, 439-space subterranean parking structure constructed below the new building. The new structure for the hotel-branded residences will be accessed via Newport Center Drive in two ways, including entrance into a porte cochere for valet parking, and through direct access into the below-grade parking structure. Operations for the hotel and the hotel branded residences will be managed by professionally trained Marriott staff. While dedication of staff for the hotel and hotel-branded residences will be separate, they will remain under the same Marriott umbrella. Marriott maintenance and groundskeeping staff will service both the hotel and the hotel-branded residences. A temporary sales office for the hotel-branded residences will be located within the hotel. In addition to existing hotel amenities such as a pool, gym, spa and restaurant that will remain onsite for hotel guest and resident use, the project proposes new pool facilities, fitness facilities, meeting rooms, and other food service amenities for exclusive use of the residents. Recreation opportunities provided by the hotel include bike rentals and an event lawn area where hotel guests and residents and guests of the hotel-branded residences may attend events.			
Project Area:	**Pervious Area**	**Pervious Area Percentage**	**Impervious Area**	**Impervious Area Percentage**
Pre-Project Conditions:	0.79 ac	20%	3.16 ac	80%
Post-Project Conditions:	0.39 ac	10%	3.56 ac	90%

DESCRIPTION OF PROPOSED PROJECT	
Drainage Patterns/ Connections:	The existing drainage pattern is generally from north to south, and toward the roadways to the west, and toward the golf course to the east. The intersection of Santa Barbara Drive and Newport Center Drive represent a high point in the adjacent roadways, with drainage on Santa Barbara Drive flowing northwesterly, and drainage on Newport Center Drive flowing southerly, following the easterly frontage from the property. There are existing City of Newport Beach Storm Drain facilities that accept drainage from site frontage and onsite area drain systems. Under proposed conditions, runoff will flow similar to existing conditions. An area drain system will collect runoff within the project area and direct low flows to one of three Modular Wetland Systems (MWS) for water quality treatment. High flows will bypass the biotreatment system and exit the site. Flows will comingle with offsite runoff from the Hotel and Spa. The biotreatment units will be sized for both offsite and onsite flows. Most flows will travel to the southeast corner of the site, connecting to an existing storm drain system that ties into an 18" storm drain that connects to the existing 42" storm drain pipe along Newport Center Drive. A small portion of runoff (approximately 0.08 acres) will exit the site to the west and drain to the adjacent golf course. Runoff from the proposed parking structure (approximately 0.74 acres) will drain easterly and outlet through a curb drain before entering a catch basin and joining the 42" storm drain along Newport Center Drive. After traveling along Newport Center Drive, flows eventually enter Lower Newport Bay and the Pacific Ocean.

PROJECT FEATURES	
Building Summary:	The new 21-story structure will accommodate up to 159 hotel-branded residences, representing 30% of the total units at the Newport Beach Marriott Resort Hotel. The total units at the Newport Beach Marriott Resort Hotel will remain unchanged at 532, with 373 traditional hotel rooms and up to 159 hotel-branded residences.
Amenities:	The project site will include common landscaping, guest-serving amenities including a pool, a fitness facility, meeting rooms, and open space areas for designated outdoor communal activities.
Landscaped Areas:	The project site will include landscaping in the form of common area landscaping surrounding the proposed building, as well as landscaping adjacent to sidewalks and adjacent to the pool and spa area.
Parking Facilities:	A new 5-level, 439-space subterranean parking structure constructed below the new building is proposed. The new structure for the hotel-branded residences will be accessed via Newport Center Drive in two ways, including entrance into a porte cochere for valet parking, and through direct access into the below-grade parking structure.

PROJECT FEATURES	
Other Project Features:	The site will not have any outdoor trash enclosures, loading docks, wash areas, outdoor storage areas, vehicle/community car wash racks, vehicle/equipment wash areas, or commercial kitchens/food preparation areas.
Outdoor Activities:	Outdoor areas throughout the site will be used for recreational and open space purposes. All other outdoor areas will be used for walkways, common areas and landscaping. No outdoor storage of materials is anticipated.
Materials Stored:	Materials anticipated to be stored on-site include those associated with a commercial hotel building (i.e. cleaning products, storage, etc.); however, no hazardous wastes will be stored on-site. No outdoor storage of materials is anticipated (materials will be stored indoors).
Wastes Generated:	The project is not anticipated to generate any wastes other than landscape clippings, typical trash, debris and refuse from the tenants. Outdoor trash receptacles will be provided throughout the common areas of the site for the tenants to dispose of their refuse in a proper manner, and property maintenance will provide trash and waste material removal to maintain a trash-free property. All wastes shall be collected and properly disposed of off-site.

II.2 POTENTIAL STORM WATER POLLUTANTS

The table below, derived from Table 2 of the Countywide Model WQMP Technical Guidance Document (December 2013), summarizes the categories of land use or project features of concern and the general pollutant categories associated with them.

ANTICIPATED & POTENTIAL POLLUTANTS GENERATED BY LAND USE TYPE								
Priority Project Categories and/or Project Features	**General Pollutant Categories**							
	Suspended Solid/ Sediments	**Nutrients**	**Heavy Metals**	**Pathogens (Bacteria/ Virus)**	**Pesticides**	**Oil & Grease**	**Toxic Organic Compounds**	**Trash & Debris**
Detached Residential Development	E	E	N	E	E	E	N	E
Attached Residential Development	E	E	N	E	E	E[(2)]	N	E
Commercial/Industrial Development	E[(1)]	E[(1)]	E[(5)]	E[(3)]	E[(1)]	E	E	E
Automotive Repair Shops	N	N	E	N	N	E	E	E
Restaurants	E[(1)(2)]	E[(1)]	E[(2)]	E	E[(1)]	E	N	E
Hillside Development >5,000 ft²	E	E	N	E	E	E	N	E

ANTICIPATED & POTENTIAL POLLUTANTS GENERATED BY LAND USE TYPE								
Priority Project Categories and/or Project Features	General Pollutant Categories							
	Suspended Solid/ Sediments	Nutrients	Heavy Metals	Pathogens (Bacteria/ Virus)	Pesticides	Oil & Grease	Toxic Organic Compounds	Trash & Debris
Parking Lots	E	E(1)	E	E(4)	E(1)	E	E	E
Streets, Highways, & Freeways	E	E(1)	E	E(4)	E(1)	E	E	E
Retail Gasoline Outlets	N	N	E	N	N	E	E	E

Notes:
E = expected to be of concern N = not expected to be of concern
(1) Expected pollutant if landscaping exists on-site, otherwise not expected.
(2) Expected pollutant if the project includes uncovered parking areas, otherwise not expected.
(3) Expected pollutant if land use involves food or animal waste products, otherwise not expected.
(4) Bacterial indicators are routinely detected in pavement runoff.
(5) Expected if outdoor storage or metal roofs, otherwise not expected.
Source: County of Orange. (2013, December 20). Technical Guidance Document for the Preparation of Conceptual/ Preliminary and/or Project Water Quality Management Plans (WQMPs). Table 2.1.

Priority Project Categories and/or Features: Commercial Development (hotel renovation)

POLLUTANTS OF CONCERN		
Pollutant	E = Expected to be of concern N =Not Expected to be of concern	Additional Information and Comments
Suspended Solid/ Sediment	E	303(d) listed impairment / TMDL
Nutrients	E	303(d) listed impairment / TMDL
Heavy Metals	E	303(d) listed impairment / TMDL
Pathogens (Bacteria/Virus)	E	303(d) listed impairment / TMDL
Pesticides	E	303(d) listed impairment / TMDL
Oil & Grease	E	
Toxic Organic Compounds	E	
Trash & Debris	E	

II.3 HYDROLOGIC CONDITIONS OF CONCERN

The purpose of this section is to identify any hydrologic conditions of concern (HCOC) with respect to downstream flooding, erosion potential of natural channels downstream, impacts of increased flows on natural habitat, etc. As specified in Section 2.3.3 of the 2011 Model WQMP, projects must identify and mitigate any HCOCs. A HCOC is a combination of upland hydrologic conditions and stream biological and physical conditions that presents a condition of concern for physical and/or biological degradation of streams.

In the North Orange County permit area, HCOCs are considered to exist if any streams located downstream from the project are determined to be potentially susceptible to hydromodification impacts and either of the following conditions exists:

- Post-development runoff volume for the 2-yr, 24-hr storm exceeds the pre-development runoff volume for the 2-yr, 24-hr storm by more than 5 percent

or

- Time of concentration (Tc) of post-development runoff for the 2-yr, 24-hr storm event exceeds the time of concentration of the pre-development condition for the 2-yr, 24-hr storm event by more than 5 percent.

If these conditions do not exist or streams are not potentially susceptible to hydromodification impacts, an HCOC does not exist and hydromodification does not need to be considered further. In the North Orange County permit area, downstream channels are considered not susceptible to hydromodification, and therefore do not have the potential for a HCOC, if all downstream conveyance channels that will receive runoff from the project are engineered, hardened, and regularly maintained to ensure design flow capacity, and no sensitive habitat areas will be affected.

Is the proposed project potentially susceptible to hydromodification impacts?

☐ **Yes** ☒ **No (show map)**

In accordance with updated Susceptibility Analysis, Newport Bay, Newport Coastal Streams exhibit within the 2011 TGD, the project lies in a location ***not*** subject to hydromodification impacts or HCOC's. Therefore, 2-year hydromodification controls are not required for post-construction runoff. A copy of Figure XVI-3a is included in Appendix A.

II.4 POST DEVELOPMENT DRAINAGE CHARACTERISTICS

Under proposed conditions, runoff will flow similar to existing conditions. An area drain system will collect runoff within the project area and direct low flows to one of three Modular Wetland Systems (MWS) for water quality treatment. High flows will bypass the biotreatment system and exit the site. Flows will comingle with offsite runoff from the Hotel and Spa. The biotreatment units will be sized for both offsite and onsite flows. Most flows will travel to the southeast corner of the site, connecting to an existing storm drain system that ties into an 18" storm drain that connects to the existing 42" storm

drain pipe along Newport Center Drive. A small portion of runoff (approximately 0.08 acres) will exit the site to the west and drain to the adjacent golf course. Runoff from the proposed parking structure (approximately 0.74 acres) will drain easterly and outlet through a curb drain before entering a catch basin and joining the 42" storm drain along Newport Center Drive. After traveling along Newport Center Drive, flows eventually enter Lower Newport Bay and the Pacific Ocean.

II.5 PROPERTY OWNERSHIP/MANAGEMENT

PROPERTY OWNERSHIP/MANAGEMENT	
Private Streets:	Newport Center Hotel, LLC
Landscaped Areas:	Newport Center Hotel, LLC
Open Space:	Newport Center Hotel, LLC
Easements:	Newport Center Hotel, LLC
Buildings:	Newport Center Hotel, LLC
Structural BMPs:	Newport Center Hotel, LLC

The Owner, Newport Center Hotel, LLC, shall assume all BMP maintenance and inspection responsibilities for the proposed project. Inspection and maintenance responsibilities are outlined in Section V of this report.

SECTION III SITE DESCRIPTION

III.1 PHYSICAL SETTING

Planning Area/ Community Name:	Ritz-Carlton Residences, Newport Beach
Address:	900 Newport Center Drive, Newport Beach, CA 92660
Project Area Description:	The project site is bounded by Santa Barbara Drive to the north, the Newport Beach Country Club to the west, residential and commercial buildings to the south, and Newport Center Drive to the east.
Land Use:	Commercial (CV)
Zoning:	Visitor Serving Commercial
Acreage:	3.95 ac
Predominant Soil Type:	Type D soils per Figure XVI-2a (see Appendix A)
Impervious Conditions:	Existing Impervious: 80% (20% Pervious) Proposed Impervious: 90% (10% Pervious)

III.2 SITE CHARACTERISTICS

Precipitation Zone:	0.65 inches per Figure XVI-1 (see Appendix A)
Topography:	The surface topography of the site generally slopes away from the buildings, with the westerly portion of the site generally draining toward the golf course, and the easterly portion of the site generally draining toward the roadways. The ground surface elevation near the northwesterly portion of the site is in the 179 to 180 feet range (NAVD88). The elevations in the vicinity of the main entrance to Santa Barbara Drive and Newport Center Drive at the northeasterly corner of the site are in the range of 180 to 183. The surface elevations at the mid-westerly area, adjacent to the golf course are in the 168 to 175 range. The elevations at the southerly portion of the site are in the 165 to172 range.
Existing Drainage Patterns/ Connections:	The existing drainage pattern is generally from north to south, and toward the roadways to the west, and toward the golf course to the east. The intersection of Santa Barbara Drive and Newport Center Drive represent a high point in the adjacent roadways, with drainage on Santa Barbara Drive flowing northwesterly, and drainage on Newport Center Drive flowing southerly, following the easterly frontage from the property. There are existing City of Newport Beach Storm Drain facilities that accept drainage from site frontage and onsite area drain systems.

Proposed Drainage Patterns/ Connections:	Under proposed conditions, runoff will flow similar to existing conditions. An area drain system will collect runoff within the project area and direct low flows to one of three Modular Wetland Systems (MWS) for water quality treatment. High flows will bypass the biotreatment system and exit the site. Flows will comingle with offsite runoff from the Hotel and Spa. The biotreatment units will be sized for both offsite and onsite flows. Most flows will travel to the southeast corner of the site, connecting to an existing storm drain system that ties into an 18" storm drain that connects to the existing 42" storm drain pipe along Newport Center Drive. A small portion of runoff (approximately 0.08 acres) will exit the site to the west and drain to the adjacent golf course. Runoff from the proposed parking structure (approximately 0.74 acres) will drain easterly and outlet through a curb drain before entering a catch basin and joining the 42" storm drain along Newport Center Drive. After traveling along Newport Center Drive, flows eventually enter Lower Newport Bay and the Pacific Ocean.
Soil Type, Geology, and Infiltration Properties:	According to Figure XVI-2a of the OC TGD, the site has Type D soils. The County's Watershed Infiltration & Hydromodification Management Plan (WIHMP) GIS interface describes the soils in this area as Myford sandy loam. During the geotechnical study performed by NMG Geotechnical, Inc., bedrock was found 5 feet below ground surface.
Hydrogeologic (Groundwater) Conditions:	Groundwater was not encountered to depths up to 31.5 feet below ground surface. Based on historic data from the State, the groundwater table was believed to be 10 feet deep in the alluvium below the adjacent golf course. Groundwater was not encountered in a 7.5 feet boring in the area. The groundwater table is believed to be very deep below the site.
Geotechnical Conditions (relevant to infiltration):	The existing hotel has subterranean levels with equipment that serves the hotel operation. In addition, the terrace bedrock contact extends to the ground surface in the adjacent golf course slope directly behind the hotel. During a recent geotechnical investigation performed by NMG Geotechnical Inc. in 2021, a boring was drilled on this slope and found bedrock at a depth of 5 feet below the surface. If surface waters were infiltrated around the hotel, the water would likely be collected in the subdrains around the building (if any) and/or result in nuisance seepage for this building or other down-gradient buildings that have subterranean levels. In addition, the infiltrated water that collects along the geologic contact can seep out where this contact is exposed at the ground surface in the golf course, which in turn, may cause instability of slopes, piping of the terrace sands, etc. Therefore, NMG Geotechnical, Inc. state that infiltration BMPs should not be used at the subject site. They recommend other types of filtration BMPs be utilized per the County of Orange WQMP Technical Guidelines. Refer to Appendix E for further details.

Off-Site Drainage:	The project site receives off-site storm water flows onto the property from the Hotel and Spa area (covered under a separate WQMP). Approximately 1.62 acres is expected to comingle with onsite project flows. The biotreatment BMP in the southeast corner of the site has been sized for both onsite and offsite flows.
Utility and Infrastructure Information:	Dry and wet utilities will be incorporated into the proposed project and will tie into existing facilities associated with the existing development. Utilities may also tie into larger existing facilities within Santa Barbara Drive and Newport Center Drive.

III.3 WATERSHED DESCRIPTION

Receiving Waters:	Lower Newport Bay
303(d) Listed Impairments:	Chlordane, Copper, DDT, Indicator Bacteria, Nutrients, PCBs, Sediment Toxicity
Applicable TMDLs:	Metals, Nutrients, Pathogens, Pesticides, Priority Organics, Siltation
Pollutants of Concern for the Project:	Per Section II.2: • Suspended Solids/Sediment • Nutrients • Heavy Metals • Pathogens (Bacteria/Virus) • Pesticides • Oil & Grease • Toxic Organic Compounds • Trash & Debris
Hydrologic Conditions of Concern (HCOCs):	None. Refer to Section II.3.
Environmentally Sensitive and Special Biological Significant Areas:	There are no Environmentally Sensitive Areas (ESAs) or Areas of Special Biological Significance (ASBS) within the project site or within the project's vicinity. The project is subject to CA Coastal Commission jurisdiction.

SECTION IV BEST MANAGEMENT PRACTICES (BMPs)

IV.1 PROJECT PERFORMANCE CRITERIA

Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?

☐ Yes ☒ No

PROJECT PERFORMANCE CRITERIA	
Hydromodification Control Performance Criteria: (Model WQMP Section 7.II-2.4.2.2)	If a hydrologic condition of concern (HCOC) exists, priority projects shall implement onsite or regional hydromodification controls such that: ▪ Post-development runoff volume for the two-year frequency storm does not exceed that of the predevelopment condition by more than five percent, and ▪ Time of concentration of post-development runoff for the two-year storm event is not less than that for the predevelopment condition by more than five percent. Where the Project WQMP documents that excess runoff volume from the two-year runoff event cannot feasibly be retained and where in-stream controls cannot be used to otherwise mitigate HCOCs, the project shall implement on-site or regional hydromodification controls to: ▪ Retain the excess volume from the two-year runoff event to the MEP, and ▪ Implement on-site or regional hydromodification controls such that the post-development runoff two-year peak flow rate is no greater than 110 percent of the predevelopment runoff two-year peak flow rate.
LID Performance Criteria: (Model WQMP Section 7.II-2.4.3)	Infiltrate, harvest and use, evapotranspire, or biotreat/biofilter, the 85th percentile, 24-hour storm event (Design Capture Volume). LID BMPs must be designed to retain, on-site, (infiltrate, harvest and use, or evapotranspire) storm water runoff up to 80 percent average annual capture efficiency.
Treatment Control BMP Performance Criteria: (Model WQMP Section 7.II-3.2.2)	If it is not feasible to meet LID performance criteria through retention and/or biotreatment provided on-site or at a sub-regional/regional scale, then treatment control BMPs shall be provided on-site or offsite prior to discharge to waters of the US. Sizing of treatment control BMP(s) shall be based on either the unmet volume after claiming applicable water quality credits, if appropriate.

PROJECT PERFORMANCE CRITERIA	
LID Design Storm Capture Volume:	DCV = C × d × A × 43560 sf/ac × 1/12 in/ft Where: DCV = design storm capture volume, cu-ft C = runoff coefficient = (0.75 × imp + 0.15) Imp = impervious fraction of drainage area (ranges from 0 to 1) d = storm depth (inches) A = tributary area (acres) Imp = 90 d = 0.65 inches A = 3.95 acres** *DCV = (0.75 x 0.90 +0.15) x 0.65 inches x 3.95 ac x 43560 sf/ac x 1/12 in/ft* *= 7,689 cu-ft* *Refer to Section IV.2.2 for specific Drainage Manage Area (DMA) breakdown and Appendix A for detailed calculations (Worksheet B).* ***The BMPs were sized for the project area and offsite run on.*

IV.2 SITE DESIGN AND DRAINAGE PLAN

The following section describes the site design BMPs used in this project and the methods used to incorporate them. Careful consideration of site design is a critical first step in storm water pollution prevention from new developments and redevelopments.

IV.2.1 Site Design BMPs

Minimize Impervious Area

The project will increase impervious surfaces as compared to existing conditions. However, landscaping will be provided throughout the site within the common areas as well as around the perimeter of the building.

Maximize Natural Infiltration Capacity

Infiltration is restricted for the project due to poor soils and the presence of shallow bedrock. Refer to Section IV.3.2 for details.

Preserve Existing Drainage Patterns and Time of Concentration

Runoff from the site will continue to flow similar to existing conditions. Low-flows and first-flush runoff from the disturbed project area as well as offsite run on will drain to one of three Modular Wetland System units for water quality treatment via biofiltration.

Disconnect Impervious Areas

The project site is part of an existing commercial building. New landscaping will be provided as islands at the grand entrance, along the perimeter and adjacent to the existing building to minimize impervious area.

Protect Existing Vegetation and Sensitive Areas, and Revegetate Disturbed Areas

There are no existing vegetated or sensitive areas to preserve on the project site. All disturbed areas will either be paved or landscaped.

Xeriscape Landscaping

Xeriscape landscaping is not proposed for the project. However, native and/or drought tolerant landscaping will be incorporated into the site design consistent with City guidelines.

IV.2.2 Drainage Management Areas

In accordance with the MS4 permit and the 2011 Model WQMP, the project site has been divided into Drainage Management Areas (DMAs) to be utilized for defining drainage areas and sizing LID and other treatment control BMPs. DMAs have been delineated based on the proposed site grading patterns, drainage patterns, storm drain and catch basin locations.

The design capture volumes (DCV) and treatment flow rates (Q_{Design}) for each DMA are summarized in the table below. These have been derived utilizing the "Simple Method" in accordance with the TGD Section III.1.1. Actual BMP sizing requirements, including 80 percent capture design volumes, flow rates, depths, and other design details for the specific BMPs proposed are provided in Sections IV.3.1 and IV.3.4 below. Locations of DMAs and associated LID and treatment BMPs are identified on the exhibits in Section VI. Additional calculations and TGD Worksheets are provided in Appendix A.

DRAINAGE MANAGEMENT AREAS (DMAs)								
DMA/ Drainage Area ID[1]	Tributary Drainage Area (ft^2)	Tributary Drainage Area (ac)	% Imp.	Design Storm Depth[2] (in)	Estimated Tc (min)	Rainfall Intensity[3] (in/hr)	Simple Method DCV[4] (ft^3)	Q_{Design} [5] (cfs)
DMA A3.1	52,272	1.2	90	0.65	5	0.26	2,336	0.257
DMA A3.2	3,485	0.08	14.5	0.65	5	0.26	49	0.005
DMA A4	84,071	1.93	90	0.65	5	0.26	3,757	0.414
DMA F1	32,234	0.74	100	0.65	5	0.26	1,571	0.173

Offsite	70,567	1.62	79	0.65	5	0.26	2,840	0.313

Notes:
1. Refer to exhibits in Section VI for locations of each DMA.
2. Per Figure XVI-1 of the Technical Guidance Document, dated December 20, 2013. See also Appendix A.
3. Per Figure III.4 of the Technical Guidance Document, dated December 20, 2013. See also Appendix A.
4. Per Section III.1.1 of the Technical Guidance Document.
5. Per Section III.3.3 and Worksheet D of the Technical Guidance Document.

IV.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS

Low Impact Development (LID) BMPs are required in addition to site design measures and source controls to reduce pollutants in storm water discharges. LID BMPs are engineered facilities that are designed to retain or biotreat runoff on the project site. The 4th Term MS4 Storm Water Permit (Order R8-2009-0030) requires the evaluation and use of LID features using the following hierarchy of treatment: infiltration, evapotranspiration, harvest/reuse, and biotreatment. The following sections summarize the LID BMPs proposed for the project in accordance with the permit hierarchy and performance criteria outlined in Section IV.1.

IV.3.1 Hydrologic Source Controls (HSCs)

Hydrologic source controls (HSCs) can be considered to be a hybrid between site design practices and LID BMPs. HSCs are distinguished from site design BMPs in that they do not reduce the tributary area or reduce the imperviousness of a drainage area; rather they reduce the runoff volume that would result from a drainage area with a given imperviousness compared to what would result if HSCs were not used.

HYDROLOGIC SOURCE CONTROLS		
ID	**Name**	**Included?**
HSC-1	Localized on-lot infiltration	☐
HSC-2	Impervious area dispersion (e.g. roof top disconnection)	☒
HSC-3	Street trees (canopy interception)	☐
HSC-4	Residential rain barrels (not actively managed)	☐
HSC-5	Green roofs/Brown roofs	☐
HSC-6	Blue roofs	☐
HSC-7	Impervious area reduction (e.g. permeable pavers, site design)	☐

The project will utilize hydrologic source controls (impervious area dispersion) within DMA A3.2 along the west perimeter of the project site adjacent to the golf course. Within this area, the walkway will drain to adjacent landscaping. Based on the capture efficiency calculations, the large amounts of landscaping in this area is sufficient to treat runoff from the adjacent impervious surfaces in accordance with the Model WQMP and TGD (meeting 80% minimum average annual capture efficiency). Calculations and worksheets are included in Appendix A.

HYDROLOGIC SOURCE CONTROL BMP SUMMARY						
Drainage Area ID	HSC Type	Drainage Area	Pervious to Impervious Ratio Tributary to HSC	$d_{HSC\ total}$ (1)	% Capture by HSC (2)	Sufficient?
DMA A3.2	HSC-2 Impervious Area Dispersion	0.08	5.9	1.0 inch	80%	Yes

Notes:
1. Per chart in Fact Sheet HSC-2 of the Technical Guidance Document, dated December 20, 2013.
2. Per Table III.1 of the Technical Guidance Document, dated December 20, 2013.

IV.3.2 Infiltration BMPs

Infiltration BMPs are LID BMPs that capture, store and infiltrate storm water runoff. These BMPs are engineered to store a specified volume of water and have no design surface discharge (underdrain or outlet structure) until this volume is exceeded. Examples of infiltration BMPs include infiltration trenches, bioretention without underdrains, drywells, permeable pavement, and underground infiltration galleries.

INFILTRATION		
ID	Name	Included?
INF-3 INF-4	Bioretention Without Underdrains	☐
	Rain Gardens	☐
	Porous Landscaping	☐
	Infiltration Planters	☐
	Retention Swales	☐
INF-2	Infiltration Trenches	☐
INF-1	Infiltration Basins	☐
INF-5	Drywells	☐
INF-7	Subsurface Infiltration Galleries	☐
--	French Drains	☐
INF-6	Permeable Asphalt	☐
	Permeable Concrete	☐
	Permeable Concrete Pavers	☐

INFILTRATION		
ID	**Name**	**Included?**
	Other:	☐

No infiltration BMPs are proposed within the redevelopment project. As discussed in Section III.2, poor infiltrating soils, shallow depth to bedrock, and potential slope instability make infiltration infeasible for the project. See also Appendices A and F for further details.

IV.3.3 Evapotranspiration & Rainwater Harvesting BMPs

Evapotranspiration (ET) BMPs are a class of retention BMPs that discharges stored volume predominately to ET, though some infiltration may occur. ET includes both evaporation and transpiration, and ET BMPs may incorporate one or more of these processes. BMPs must be designed to achieve the maximum feasible ET, where required to demonstrate that the maximum amount of water has been retained on-site. Since ET is not the sole process in these BMPs, specific design and sizing criteria have not been developed for ET-based BMPs.

EVAPOTRANSPIRATION		
ID	**Name**	**Included?**
--	HSCs, *see Section IV.3.1*	☒
--	Surface-based infiltration BMPs	☐
--	Biotreatment BMPs, see *Section VI.3.4*	☒
	Other:	☐

Both HSC's and Bioretention BMPs are proposed which utilize evapotranspiration as physical process for runoff volume reduction. Bioretention BMPs are described further in Section IV.3.4.

Harvest and use (aka. Rainwater Harvesting) BMPs are LID BMPs that capture and store storm water runoff for later use. These BMPs are engineered to store a specified volume of water and have no design surface discharge until this volume is exceeded. Harvest and use BMPs include both above-ground and below-ground cisterns. Examples of uses for harvested water include irrigation, toilet and urinal flushing, vehicle washing, evaporative cooling, industrial processes and other non-potable uses.

HARVEST & REUSE / RAINWATER HARVESTING		
ID	**Name**	**Included?**
HU-1	Above-ground cisterns and basins	☐
HU-2	Underground detention	☐

HARVEST & REUSE / RAINWATER HARVESTING		
ID	Name	Included?
--	Other:	☐

In order to quantify harvested water demand for the common areas of the project, the Modified Estimated Applied Water Use (EAWU) method was used, consistent with Appendix X of the Model WQMP's Technical Guidance Document (TGD), dated December 20, 2013.

The Modified EAWU method is modified from the OC Irrigation Code (County Ordinance No. 09-010) to account for the wet season demand and storm events (assuming that no irrigation would be applied for approximately 30% of the days in the wet season).

The equation used to calculate the Modified EAWU is:

$$Modified\ EAWU = \frac{(ETo\text{wet} \times K\text{L} \times LA \times 0.015)}{IE}$$

Where:

$Modified\ EAWU$ = estimated daily average water use during wet season
ETo_{wet} = average reference ET from November through April (inches per month) per Table X.2 of the TGD
K_L = landscape coefficient (Table X.4 of the TGD)
LA = landscape area irrigated with harvested water (square feet)
IE = irrigation efficiency (assumed at 90%)

Note: In the equation, the coefficient (0.015) accounts for unit conversions and shut down of irrigation during and for three days following a significant precipitation event.

For a system to be considered "feasible", the system must be designed with a storage volume equal to the DCV from the tributary area and achieve more than 40% capture. The system must also be able to drawdown in 30 days to meet the 40% capture value. In addition, Table X.6 of the Technical Guidance Document sets forth the demand thresholds for minimum partial capture.

TABLE X.6: HARVESTED WATER DEMAND THRESHOLDS FOR MINIMUM PARTIAL CAPTURE	
Design Capture Storm Depth, inches	Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre
0.60	490
0.65	530
0.70	570
0.75	610

TABLE X.6: HARVESTED WATER DEMAND THRESHOLDS FOR MINIMUM PARTIAL CAPTURE	
Design Capture Storm Depth, inches	Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre
0.80	650
0.85	690
0.90	730
0.95	770
1.00	810

The following table summarizes the estimated applied water use for the common area landscaping of the project.

ESTIMATED APPLIED WATER USE (EAWU) FOR COMMON AREA LANDSCAPING									
Landscape Type	Total Area (ac)	% Impervious	Impervious Tributary (ac)	Irrigated LS Area (ac)(1)	ETo_{Wet} (2) (in/mo)	K_L (3)	Modified EAWU (gpd)	Modified EAWU per impervious acre (gpd/ac)	Minimum Capture Threshold (4) (gpd/ac)
Blend	3.95	90	3.56	0.4(1)	2.75	0.55	433.74	122.01	530
Design Capture Volume (gal)				57,514	Drawdown (days)				133

Notes:

1 Turf area has been subtracted from irrigated landscape area.
2 Per Table X.2 for Laguna Beach Region (similar climate type), Model WQMP Technical Guidance Document, dated December 20, 2013
3 Per Table X.4 of the Model WQMP Technical Guidance Document, dated December 20, 2013.
4 Per Table X.6 of Model WQMP Technical Guidance Document, dated December 20, 2013.

As shown above, the project site does not have sufficient water demand during the wet season to support harvest and reuse. The project does not meet the minimum capture threshold of 530 gallons per day/acre with its Modified EAWU or estimated daily average water usage during the wet season. Therefore the DCV will not be fully utilized and emptied for the next storm event. Drawdown of the DCV is anticipated to take approximately 133 days by the landscape's water demand usage, which is greater than the maximum drawdown time of 30 days.

IV.3.4 Biotreatment BMPs

Biotreatment BMPs are a broad class of LID BMPs that reduce storm water volume to the maximum extent practicable, treat storm water using a suite of treatment mechanisms characteristic of biologically active systems, and discharge water to the downstream storm drain system or directly to receiving waters. Treatment mechanisms include media filtration (though biologically-active media), vegetative filtration (straining, sedimentation, interception, and stabilization of particles resulting from

shallow flow through vegetation), general sorption processes (i.e., absorption, adsorption, ion-exchange, precipitation, surface complexation), biologically-mediated transformations, and other processes to address both suspended and dissolved constituents. Examples of biotreatment BMPs include bioretention with underdrains, vegetated swales, constructed wetlands, and proprietary biotreatment systems.

BIOTREATMENT		
ID	**Name**	**Included?**
BIO-1	Bioretention with underdrains	☐
	Storm Water planter boxes with underdrains	☐
	Rain gardens with underdrains	☐
BIO-5	Constructed wetlands	☐
BIO-2	Vegetated swales	☐
BIO-3	Vegetated filter strips	☐
BIO-7	Proprietary vegetated biotreatment systems	☒
BIO-4	Wet extended detention basin	☐
BIO-6	Dry extended detention basins	☐
--	Other:	☐

Since both infiltration and harvest and reuse are considered infeasible, biotreatment BMPs will be utilized on-site for water quality treatment. The project will utilize three MWS units sized to treat both onsite and offsite run on flows. The biotreatment system was selected based on its ability to treat the project's pollutants of concerns to a medium or high effectiveness, in accordance with the Model WQMP and TGD requirements. The table below summarizes the overall treatment effectiveness for bioretention planters and Modular Wetland Systems, derived from Table 4.2 of the Technical Guidance Document and testing data provided by the manufacturer. Additional details on the proposed BMPs are included in Section VI of this WQMP.

POLLUTANTS OF CONCERN AND PERFORMANCE RATINGS	
Pollutant of Concern [1]	**Treatment Effectiveness**
	Modular Wetlands Proprietary Bioretention Units [3]
Suspended Solids/Sediments	High
Nutrients	Medium-High
Metals	Medium
Pathogens/Bacteria	Medium-High
Pesticides	N/A

POLLUTANTS OF CONCERN AND PERFORMANCE RATINGS	
Pollutant of Concern (1)	Treatment Effectiveness
	Modular Wetlands Proprietary Bioretention Units (3)
Oil & Grease	High
Toxic Organic Compounds	N/A(4)
Trash & Debris	High

Notes:
1 See Section II.2 of this WQMP.
2 Per Table 4.2 of the Model WQMP's companion Technical Guidance Document dated May 19, 2011.
3 Based on Washington State University Technology Assessment Protocol – Ecology (TAPE) third-party independent field tests for a high-flow biotreatment system with raised under drain (Modular Wetland System-Linear). Refer to manufacturer documentation (attached) for specific removal efficiencies and source references.
4 Field and Lab Testing demonstrates 75-83% removal rates of Chemical Oxygen Demand (COD), a measure of the amount of organic pollutants commonly found in surface water. COD removals of this range would fall within the Medium-High effectiveness category.

Modular Wetlands by Modular Wetlands Systems, Inc. are proprietary biotreatment systems that utilize multi-stage treatment processes including screening media filtration, settling, and biofiltration. The pre-treatment chamber contains the first three stages of treatment, and includes a catch basin inlet filter to capture trash, debris, gross solids and sediments, a settling chamber for separating out larger solids, and a media filter cartridge for capturing fine TSS, metals, nutrients, and bacteria. Runoff then flows through the wetland chamber where treatment is achieved through a variety of physical, chemical, and biological processes. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants, functioning similar to bioretention systems. The discharge chamber at the end of the unit collects treated flows and discharges back into the storm drain system.

In accordance with the Model WQMP and TGD, the bioretention/biotreatment BMPs will be sized to treat runoff from the Design Capture Storm (85th percentile, 24-hour). Since Modular Wetlands are sized based on flow rate, the proposed units were sized utilizing the methodology for flow based BMPs (TGD Section III.1.2 and Worksheet D). As mentioned above, the MWS units were sized to treat both onsite and offsite run on flows. Locations and tributary drainage areas are shown on the WQMP Exhibit included in Section VI. BMP details are also included in Section VI. Detailed calculations and associated TGD Worksheets are included in Appendix A. Operation and maintenance details are included in Section V and Appendix D (O&M Plan).

MODULAR WETLAND SYSTEM DESIGN SUMMARY								
Drainage Area Name / DMA	BMP ID	Total Drainage Area (acres)	Tc (min)	Rainfall Intensity (in/hr)	Q_{Design} (cfs)	Model(4)	Treatment Capacity per Unit (cfs)	Total Treatment Capacity (cfs)
DMA A3.1, A4 & offsite	MWS #1 MWS #2	4.75	5	0.26	0.984	MWS-L-8-20 MWS-L-8-16	0.577 0.462	1.039
DMA F1	MWS #3	0.74	5	0.26	0.173	MWS-L-4-15	0.175	0.175

Notes:
(1) See also Section IV.2.2.
(2) Refer to WQMP Exhibit in Section VI for locations of each drainage area and BMP.
(3) Detailed calculations and worksheets are included in Appendix A.

(4) Unit details and specifications are included in Section VI.
(5) Treatment capacities of each unit are based on wetland media design loading rate (controlled by downstream orifice) and perimeter surface area of wetland media provided. Individual unit sizing calculations provided by the manufacturer are included on each cut sheet/detail included in Section VI.

IV.3.5 Hydromodification Control BMPs

Not applicable. Refer to Section II.3 for further information.

IV.3.6 Regional/Sub-Regional LID BMPs

Not applicable. LID BMPs (biofiltration) will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

IV.3.7 Treatment Control BMPs

Treatment control BMPs can only be considered if the project conformance analysis indicates that it is not feasible to retain the full design capture volume with LID BMPs.

TREATMENT CONTROL BMPs		
ID	Name	Included?
TRT-1	Sand Filters	☐
TRT-2	Cartridge Media Filter	☐
PRE-1	Hydrodynamic Separation Device	☐
PRE-2	Catch Basin Insert	☒
	Other:	☐

Full Trash Capture (FCS)

In order to treat the 1-year, 1-hour storm event in compliance with the CA State Trash Provisions, Connector Pipe Screens will be utilized on the outlet pipe within the internal bypass of the Modular Wetland System to treat the high flows. Refer to Section VI for details of the Bio Clean Connector Pipe Screen.

IV.3.8 Non-Structural Source Control BMPs

The table below indicates all BMPs to be incorporated in the project. For those designated as not applicable (N/A), a brief explanation why is provided.

NON-STRUCTURAL SOURCE CONTROL BMPs				
ID	**Name**	**Included?**	**Not Applicable?**	**If Not Applicable, Provide Brief Reason**
N1	Education for Property Owners, Tenants and Occupants	☐	☒	Improvements only include hardscape and landscape. Not residential development.
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	Hazardous materials will not be stored on-site.
N6	Local Water Quality Permit Compliance	☐	☒	The City of Newport Beach does not issue water quality permits.
N7	Spill Contingency Plan	☐	☒	Hazardous materials will not be stored on-site.
N8	Underground Storage Tank Compliance	☐	☒	No underground storage tanks are proposed as part of the project.
N9	Hazardous Materials Disclosure Compliance	☐	☒	Hazardous materials will not be stored on-site.
N10	Uniform Fire Code Implementation	☐	☒	Hazardous materials will not be stored on-site.
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	No loading docks are proposed.
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	No retail gasoline outlets are proposed.

N2, Activity Restrictions

The Owner shall develop ongoing activity restrictions that include those that have the potential to create adverse impacts on water quality. Activities include, but are not limited to: handling and disposal of contaminants, fertilizer and pesticide application restrictions, litter control and pick-up, and vehicle or equipment repair and maintenance in non-designated areas, as well as any other activities that may potentially contribute to water pollution.

N3, Common Area Landscape Management

Management programs will be designed and implemented by the Owner to maintain all the common areas within the project site. These programs will cover how to reduce the potential pollutant sources of fertilizer and pesticide uses, utilization of water-efficient landscaping practices and proper disposal of landscape wastes by the owner/developer and/or contractors.

N4, BMP Maintenance

The Owner will be responsible for the implementation and maintenance of each applicable non-structural BMP, as well as scheduling inspections and maintenance of all applicable structural BMP facilities through its staff, landscape contractor, and/or any other necessary maintenance contractors. Details on BMP maintenance are provided in Section V of this WQMP, and the O&M Plan is included in Appendix D.

N11, Common Area Litter Control

The Owner will be responsible for performing trash pickup and sweeping of littered common areas on a weekly basis or whenever necessary. Responsibilities will also include noting improper disposal materials by the public and reporting such violations for investigation.

N12, Employee Training

All employees of the Owner and any contractors will require training to ensure that employees are aware of maintenance activities that may result in pollutants reaching the storm drain. Training will include, but not be limited to, spill cleanup procedures, proper waste disposal, housekeeping practices, etc.

N14, Common Area Catch Basin Inspection

All on-site catch basin inlets and drainage facilities shall be inspected and maintained by the Owner at least once a year, prior to the rainy season, no later than October 1st of each year.

N15, Street Sweeping Private Streets and Parking Lots

The Owner shall be responsible for sweeping all on-site drive entrances and traffic circles within the project on a quarterly basis.

IV.3.9 Structural Source Control BMPs

The table below indicates all BMPs to be incorporated in the project. For those designated as not applicable (N/A), a brief explanation why is provided.

STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
S1 SD-13	Provide storm drain system stenciling and signage	☒	☐	
S2 SD-34	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	No outdoor hazardous material storage areas are proposed.
S3 SD-32	Design and construct trash and waste storage areas to reduce pollution introduction	☐	☒	No outdoor trash storage areas proposed.
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	
S5	Protect slopes and channels and provide energy dissipation	☐	☒	No slopes or channels on project site
S6 SD-31	Properly Design: Dock areas	☐	☒	No dock areas proposed
S7 SD-31	Properly Design: Maintenance bays	☐	☒	No maintenance bays proposed
S8 SD-33	Properly Design: Vehicle wash areas	☐	☒	No vehicle wash areas proposed
S9 SD-36	Properly Design: Outdoor processing areas	☐	☒	No outdoor processing areas proposed
S10	Properly Design: Equipment wash areas	☐	☒	No equipment wash areas proposed
S11 SD-30	Properly Design: Fueling areas	☐	☒	No fueling areas proposed
S12 SD-10	Properly Design: Hillside landscaping	☐	☒	No slopes on project site
S13	Properly Design: Wash water control for food preparation areas	☐	☒	No food prep areas proposed.
S14	Properly Design: Community car wash racks	☐	☒	No wash racks proposed

S1/SD-13, Provide storm drain system stenciling and signage

The phrase "NO DUMPING! DRAINS TO OCEAN", or an equally effective phrase approved by the City, will be stenciled on all major storm drain inlets within the project site to alert the public to the destination of pollutants discharged into storm water. Stencils shall be in place prior to release of certificate of occupancy. Stencils shall be inspected for legibility on an annual basis and re-stenciled as necessary.

S4/SD-12, Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control

The Owner will be responsible for the installation and maintenance of all common landscape areas utilizing similar planting materials with similar water requirements to reduce excess irrigation runoff. The Owner will be responsible for implementing all efficient irrigation systems for common area landscaping including, but not limited to, provisions for water sensors and programmable irrigation cycles. This includes smart timers, rain sensors, and moisture shut-off valves. The irrigation systems shall be in conformance with water efficiency guidelines. Systems shall be tested twice per year, and water used during testing/flushing shall not be discharged to the storm drain system.

IV.4 ALTERNATIVE COMPLIANCE PLAN

IV.4.1 Water Quality Credits

Local jurisdictions may develop a water quality credit program that applies to certain types of development projects after they first evaluate the feasibility of meeting LID requirements on-site. If it is not feasible to meet the requirements for on-site LID, project proponents for specific project types can apply credits that would reduce project obligations for selecting and sizing other treatment BMPs or participating in other alternative programs.

WATER QUALITY CREDITS	
Credit	**Applicable?**
Redevelopment projects that reduce the overall impervious footprint of the project site.	☐
Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface water quality if not redeveloped.	☐
Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance)	☐
Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).	☐

WATER QUALITY CREDITS	
Credit	**Applicable?**
Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned	☐
Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).	☐
Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.	☐
Developments in a city center area.	☐
Developments in historic districts or historic preservation areas.	☐
Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.	☐
In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.	☐

Not applicable. Water quality credits will not be applied for the project. LID BMPs will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy.

IV.4.2 Alternative Compliance Plan Information

Not applicable. LID BMPs (biofiltration) will be utilized for water quality treatment on-site in accordance with the MS4 Permit hierarchy identified at the beginning of this Section.

SECTION V INSPECTION/MAINTENANCE RESPONSIBILITY FOR BMPs

It has been determined that Newport Center Hotel, LLC shall assume all BMP inspection and maintenance responsibilities for the Hotel Branded Residences at Newport Beach project.

Contact Name:	Nate Johnson
Title:	Senior Vice President of Development
Company:	Newport Center Hotel, LLC
Address:	4901 Birch Street, Newport Beach, CA 92660
Phone:	949.463.0085
Email:	NateJohnson@lyonliving.com

Should the maintenance responsibility be transferred at any time during the operational life of Hotel Branded Residences at Newport Beach, such as when an HOA or POA is formed for a project, a formal notice of transfer shall be submitted to the City of Newport Beach at the time responsibility of the property subject to this WQMP is transferred. The transfer of responsibility shall be incorporated into this WQMP as an amendment.

The Owner shall verify BMP implementation and ongoing maintenance through inspection, self-certification, survey, or other equally effective measure. The certification shall verify that, at a minimum, the inspection and maintenance of all structural BMPs including inspection and performance of any required maintenance in the late summer / early fall, prior to the start of the rainy season. A form that may be used to record implementation, maintenance, and inspection of BMPs is included in Appendix D.

The City of Newport Beach may conduct verifications to assure that implementation and appropriate maintenance of structural and non-structural BMPs prescribed within this WQMP is taking place at the project site. The Owner shall retain operations, inspections and maintenance records of these BMPs and they will be made available to the City or County upon request. All records must be maintained for at least five (5) years after the recorded inspection date for the lifetime of the project.

Long-term funding for BMP maintenance will be provided by Newport Center Hotel, LLC.

The Operations and Maintenance (O&M) Plan can be found in Appendix D.

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	**Inspection/Maintenance Activities**	**Minimum Frequency**	**Responsible Party**
HYDROLOGIC SOURCE CONTROL (HSC) BMPs				
HSC-2	Impervious Area Dispersion	In conjunction with routine landscaping maintenance activities, maintain vegetative cover and/or mulch to eliminate exposed soils. Repair any eroded surfaces immediately. Inspections to be performed twice each year (spring and fall) and after major storm events to check for signs of erosion, gullies, and sloughing.	Monthly	Newport Center Hotel, LLC
BIOTREATMENT BMPs				
BIO-7	Proprietary Biotreatment: Modular Wetland Systems (MWS)	The Modular Wetland units shall be maintained in accordance with manufacturer's specifications. The system shall be inspected at a minimum of once every six months, prior to the start of the rainy season (October 1) each year, and after major storm events. Typical maintenance includes: ▪ Removing trash & debris from the catch basin screening filter (by hand). ▪ Removal of sediment and solids in the settlement chamber (vacuum truck). ▪ Replacement of the BioMediaGREEN™ filter cartridge and drain-down filter (if equipped) ▪ Trim plants within the wetland chamber as needed in conjunction with routine landscape maintenance activities. No fertilizer shall be used. Wetland chamber should be inspected during rain events to verify flow through the system. If little to no flow is observed from the lower valve or orifice plate, the wetland media may require replacement.	2x per year	Newport Center Hotel, LLC

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	**Inspection/Maintenance Activities**	**Minimum Frequency**	**Responsible Party**
TREATMENT CONTROL BMPs				
PRE-2	Full Capture Trash System Bio Clean (or similar) Connector Pipe Screen	During the rainy season (October 1 – April 30), the catch basins with connector pipe screens should be inspected monthly and cleaned out at least once per year at a minimum. Manufacturer recommends cleaning the insert four times per year.	Monthly Inspections Cleanout Annually and before major storm events (min.)	Newport Center Hotel, LLC
NON-STRUCTURAL SOURCE CONTROL BMPs				
N1	Education for Property Owners, Tenants and Occupants	Not Applicable		
N2	Activity Restrictions	The Owner will prescribe activity restrictions to protect surface water quality, through lease terms or other equally effective measure, for the property. Restrictions include, but are not limited to, prohibiting vehicle maintenance or vehicle washing.	Ongoing	Newport Center Hotel, LLC

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
N3	Common Area Landscape Management	Maintenance shall be consistent with City requirements. Fertilizer and/or pesticide usage shall be consistent with County Management Guidelines for Use of Fertilizers (OC DAMP Section 5.5). Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting, and replacement of mulch shall be performed on an as-needed basis to prevent exposure of erodible surfaces. Trimmings, clippings, and other landscape wastes shall be properly disposed of in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and storm drain inlets.	Monthly	Newport Center Hotel, LLC
N4	BMP Maintenance	Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP (Appendix D). Records of inspections and BMP maintenance shall be kept by the Owner and shall be available for review upon request.	Ongoing	Newport Center Hotel, LLC
N5	Title 22 CCR Compliance (How development will comply)	Not Applicable		
N6	Local Industrial Permit Compliance	Not Applicable		
N7	Spill Contingency Plan	Not Applicable		
N8	Underground Storage Tank Compliance	Not Applicable		

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
N9	Hazardous Materials Disclosure Compliance	Not Applicable		
N10	Uniform Fire Code Implementation	Not Applicable		
N11	Common Area Litter Control	Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities.	Weekly	Newport Center Hotel, LLC
N12	Employee Training	The Owner shall educate all new employees/ managers on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted as needed. Materials that may be utilized on BMP maintenance are included in Appendix D.	Annually	Newport Center Hotel, LLC
N13	Housekeeping of Loading Docks	Not Applicable		
N14	Common Area Catch Basin Inspection	On-site catch basin inlets and other drainage facilities shall be inspected at least once per year. Inlets and other facilities shall be cleaned when the sump is 40% full and annually at a minimum.	Annually	Newport Center Hotel, LLC
N15	Street Sweeping Private Streets and Parking Lots	Private parking areas and drive aisles within the project shall be swept at a minimum frequency quarterly as well as once per year prior to the storm season, no later than October 1 each year.	Quarterly	Newport Center Hotel, LLC
N16	Retail Gasoline Outlets	Not Applicable		

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
STRUCTURAL SOURCE CONTROL BMPs				
S1 SD-13	Provide storm drain system stenciling and signage	On-site storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1 each year. Those determined to be illegible will be re-stenciled as soon as possible.	Annually	Newport Center Hotel, LLC
S2 SD-34	Design and construct outdoor material storage areas to reduce pollution introduction	Not Applicable		
S3 SD-32	Design and construct trash and waste storage areas to reduce pollution introduction	Not Applicable		
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	In conjunction with routine maintenance, verify that landscape design continues to function properly by adjusting systems to eliminate overspray to hardscape areas and to verify that irrigation timing and cycle lengths are adjusted in accordance to water demands, given the time of year, weather, and day or nighttime temperatures. System testing shall occur twice per year. Water from testing/flushing shall be collected and properly disposed to the sewer system and shall not discharge to the storm drain system.	2x per year	Newport Center Hotel, LLC
S5	Protect slopes and channels and provide energy dissipation	Not Applicable		
S6 SD-31	Properly Design: Dock areas	Not Applicable		

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
S7 SD-31	Properly Design: Maintenance bays	Not Applicable		
S8 SD-33	Properly Design: Vehicle wash areas	Not Applicable		
S9 SD-36	Properly Design: Outdoor processing areas	Not Applicable		
S10	Properly Design: Equipment wash areas	Not Applicable		
S11 SD-30	Properly Design: Fueling areas	Not Applicable		
S12 SD-10	Properly Design: Hillside landscaping	Not Applicable		
S13	Properly Design: Wash water control for food preparation areas	Not Applicable		
S14	Properly Design: Community car wash racks	Not Applicable		

Any waste generated from maintenance activities will be disposed of properly. Wash water and other waste from maintenance activities is not to be discharged or disposed of into the storm drain system. Clippings from landscape maintenance (i.e. prunings) will be collected and disposed of properly off-site, and will not be washed into the streets, local area drains/conveyances, or catch basin inlets.

SECTION VI SITE PLAN AND DRAINAGE PLAN

The exhibits provided in this section are to illustrate the post construction BMPs prescribed within this WQMP. Drainage flow information of the proposed project, such as general surface flow lines, concrete or other surface drainage conveyances, and storm drain facilities are also depicted. All structural source control and treatment control BMPs are shown as well.

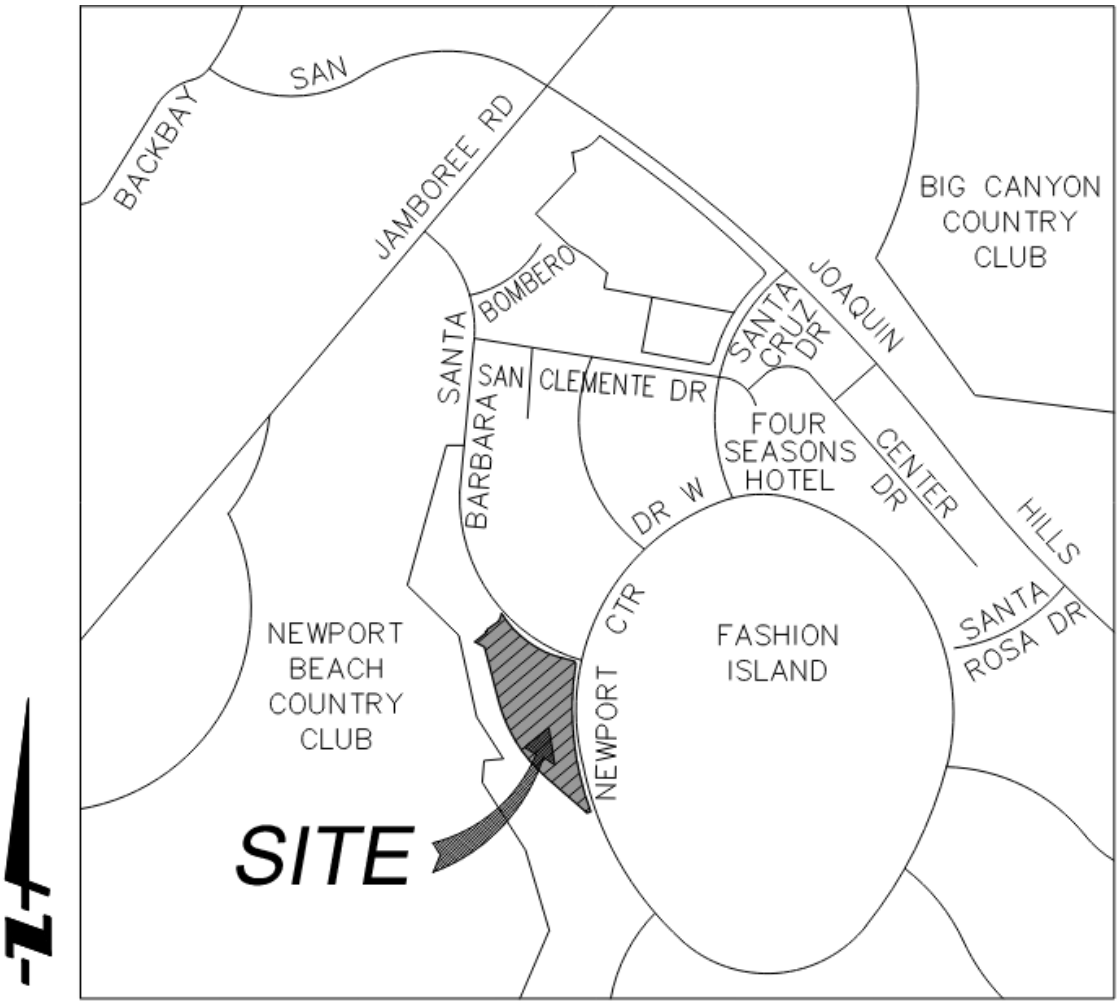
EXHIBITS

- Vicinity Map
- WQMP Exhibit

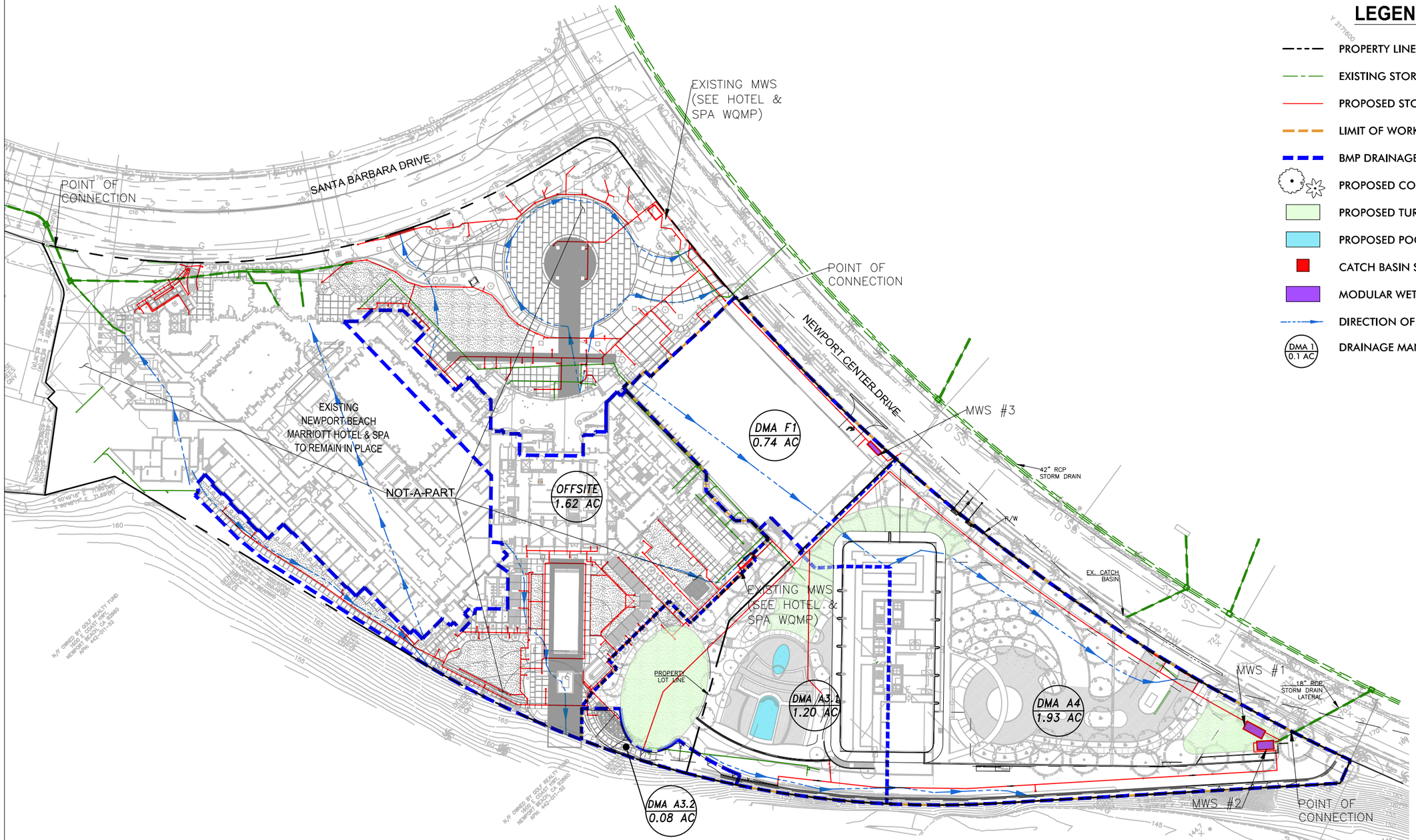
BMP DETAILS & FACT SHEETS

- MWS Cross Section Details
- BIO-7 Proprietary Biotreatment BMP Fact Sheet
- Typical Full Capture System Details

VICINITY MAP



LOCATION MAP
NTS



LEGEND

- PROPERTY LINE
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- LIMIT OF WORK (3.95 AC)
- BMP DRAINAGE AREA BOUNDARY
- PROPOSED COMMON AREA LANDSCAPING
- PROPOSED TURF
- PROPOSED POOL & SPA
- CATCH BASIN STENCILING & MAINTENANCE
- MODULAR WETLAND SYSTEM BMP
- DIRECTION OF SURFACE FLOW
- DMA 1 / 0.1 AC — DRAINAGE MANAGEMENT AREA AND ACREAGE

MODULAR WETLAND SYSTEM DESIGN SUMMARY

AREA ID	DRAINAGE AREA	IMP	Q DESIGN	SIZE / MODEL	TOTAL TREATMENT CAPACITY	GPS COORDINATES
DMA A1, A4 & OFFSITE	4.75 AC	86%	0.984 CFS	MWS-L-8-16 MWS-L-8-20	1.039 CFS	33.615027, -117.878717
DMA F1	0.74 AC	100%	0.173 CFS	MWS-L-4-15	0.175 CFS	33.616050, -117.878887

100' 0' 50' 100'

SCALE: 1" = 100'

Scale: 1" = 100'

Exhibit Date: 11/30/2021

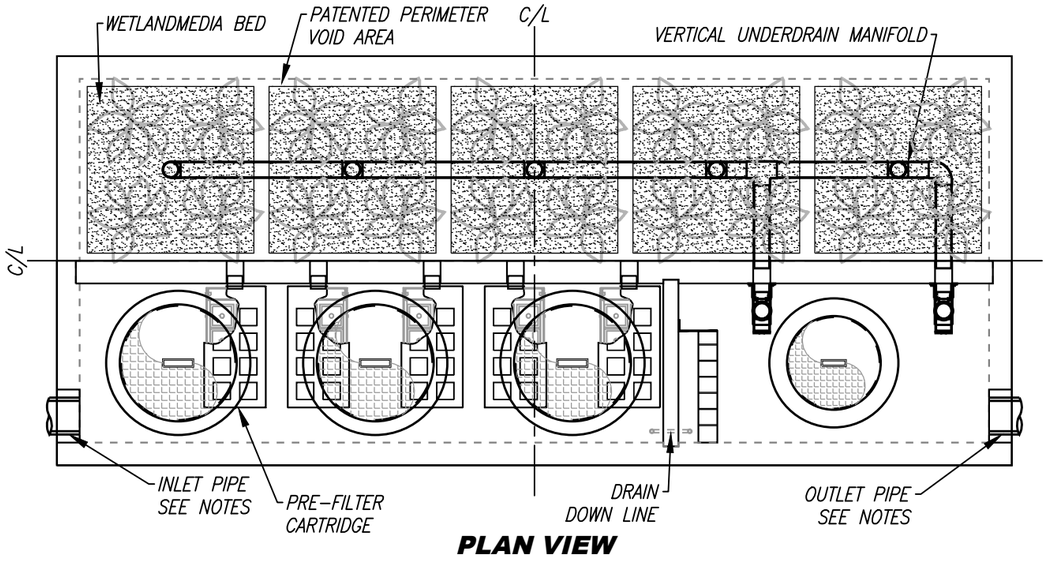
WATER QUALITY MANAGEMENT PLAN
RITZ-CARLTON RESIDENCES AT NEWPORT BEACH MARRIOTT
NEWPORT BEACH, CA

FUSCOE ENGINEERING
16795 Von Karman, Suite 100
Irvine, California 92606
tel 949.474.1960 • fax 949.474.5315
www.fuscoe.com

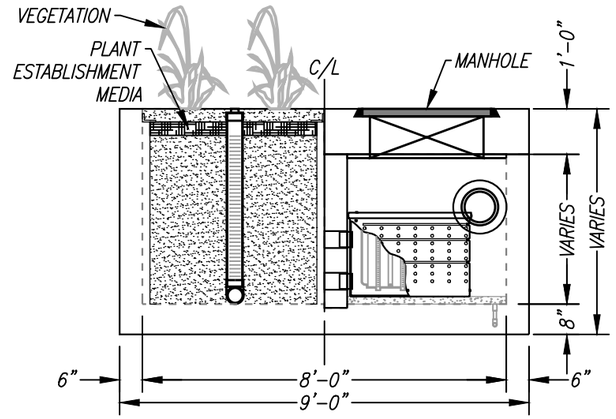
F:\PROJECTS\1112\008__SUPPORT FILES\REPORTS\WQMP\NEWPORT RESIDENTIAL – PRELIMINARY\SECTION 6 GRAPHICS\1112-08XH_MARRIOTTWQMP_2021-12-02.DWG (12-02-21 5:16:47PM) Plotted by: Sarah Johnson

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID		MWS #1	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.577	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
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	3EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



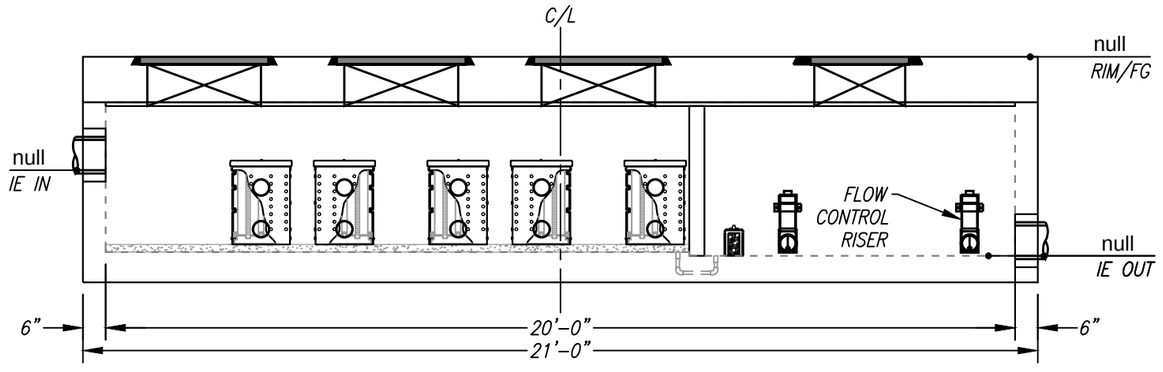
LEFT END VIEW

INSTALLATION NOTES

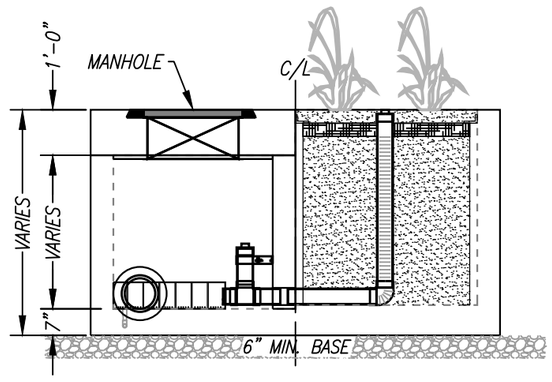
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
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.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
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.

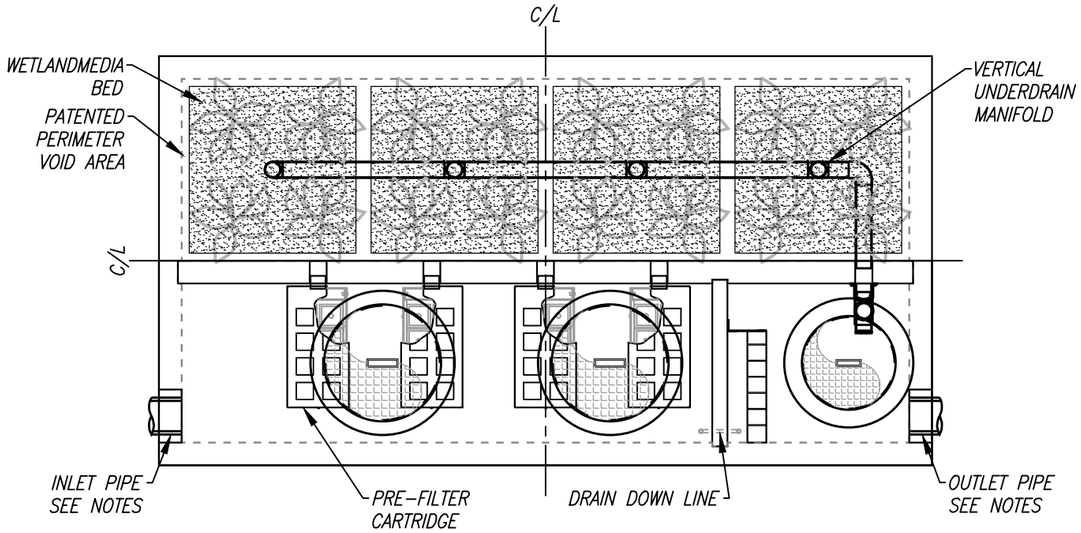
Bio Clean
A Forterra Company

MWS-L-8-20-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

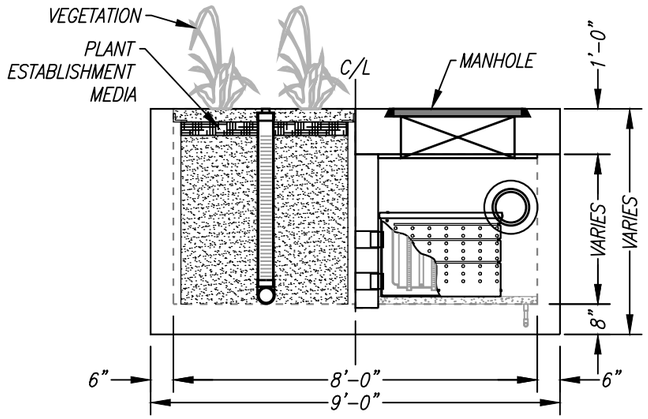
5/23/19 10:LEF

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID		MWS #2	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.462	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
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	2EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



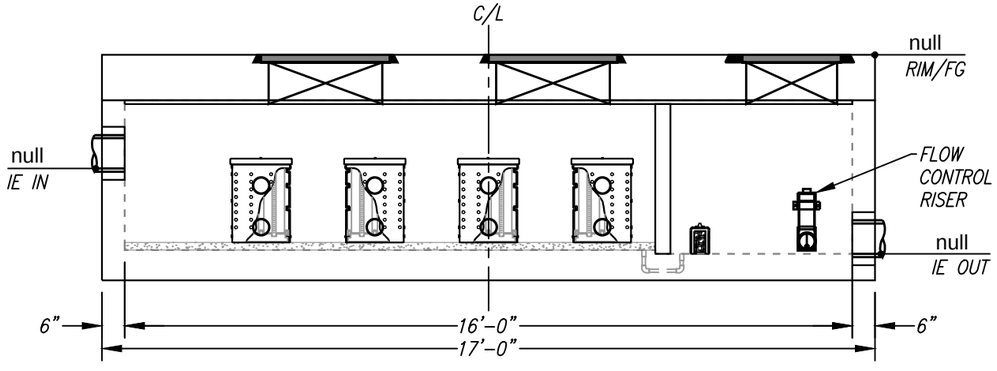
LEFT END VIEW

INSTALLATION NOTES

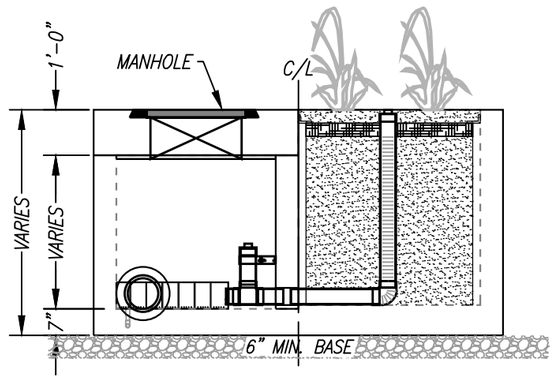
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
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.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.577
OPERATING HEAD (FT)	4.2
PRETREATMENT LOADING RATE (GPM/SF)	2.5
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.

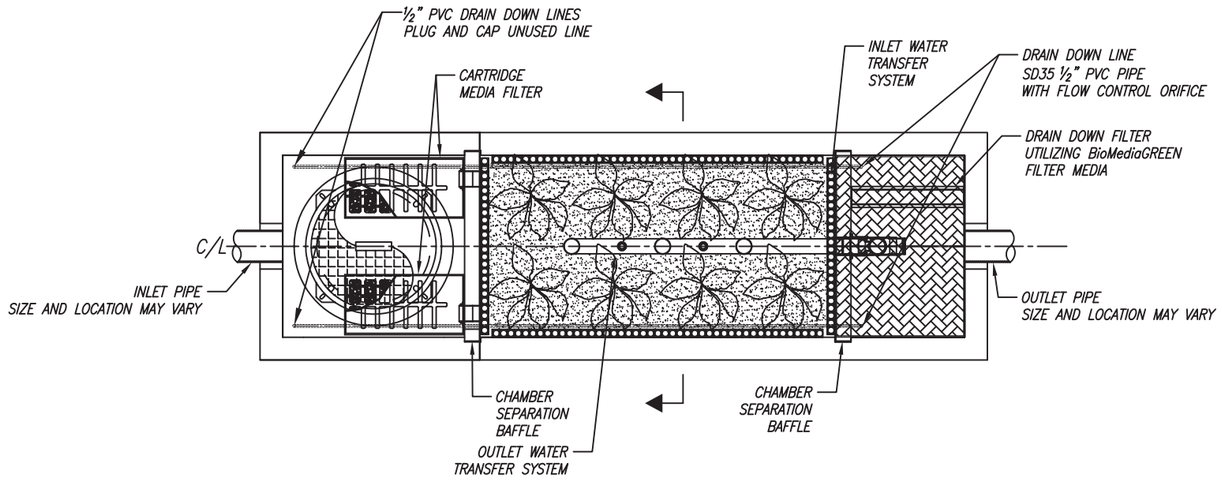
Bio Clean
A Forterra Company

MWS-L-8-16-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

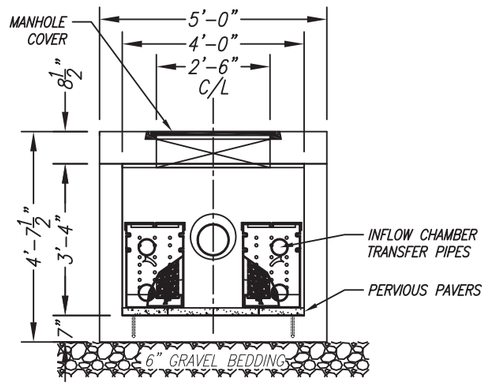
5/23/19 10:LEF

MODULAR WETLAND SYSTEMS - LINEAR 2.0
15' VAULT TYPE

FLOW RATES
PEAK TREATMENT FLOW RATE = .175 CFS OR 78.5 GPM
PEAK BYPASS FLOW RATE = N/A
SPECIFICATIONS
INSTALL AT SURFACE
O.D. DIMENSIONS = 16' X 5' X 4.7'
TOP OF VAULT TO INVERT OUT = 4.13'
SEDIMENT STORAGE CAPACITY = 1000 LBS OR 23.5 CF

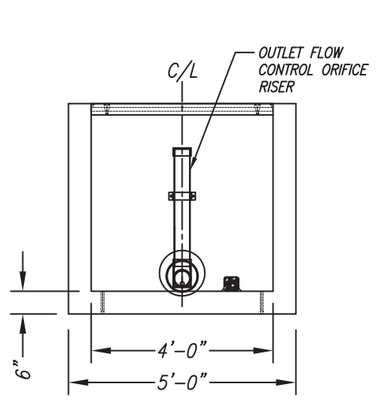


BIOFILTRATION CHAMBER SURFACE AREA CALCS
SIDES = 2
7.5' L x 3.4' H = 25.5 SF
SIDE SURFACE AREA = 51.0 SF
ENDS = 2
3.7' L x 3.4' H = 12.6 SF
END SURFACE AREA = 25.2 SF
TOTAL WETLAND MEDIA SURFACE AREA **= 76.2 SF**
WETLAND MEDIA LOADING RATE 78.5 GPM / 76.2 SF **= 1.0 GPM/SF**
PRETREATMENT FILTER SURFACE AREA CALCS
SIDES = 2
0.50' L x 1.67' H = 0.84 SF
SIDE SURFACE AREA = 1.68 SF
ENDS = 2
0.25' L x 1.67' H = 0.42 SF
END SURFACE AREA = 0.84 SF
TOTAL PRETREATMENT SURFACE AREA 2.52 SF x 28 FILTERS **= 70.56 SF**
PRETREATMENT FILTER LOADING RATE 78.5 GPM / 70.56 SF **= 1.11 GPM/SF**

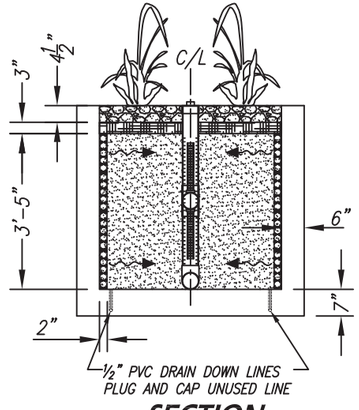


LEFT END VIEW
PRETREATMENT CHAMBER

ELEVATION VIEW



RIGHT END VIEW
DISCHARGE CHAMBER



SECTION
BIOFILTRATION CHAMBER

LEGEND

- 2" DRAIN CELL PERIMETER INLET WATER TRANSFER SYSTEM
- WETLAND MEDIA
- PLANT/ROOT MOISTURE RETENTION LAYER
- MANHOLE / ACCESS HATCH

INSTALLATION NOTES:

1. INSTALL UNIT ON LEVEL BED OF GRAVEL OF AT LEAST 6" IN DEPTH.
2. CONCRETE 28 DAY COMPRESSIVE STRENGTH fc=5,000 PSI.
3. REINFORCING: ASTM A-615, GRADE 60.
4. RATED FOR PARKWAY LOADING 300 PSF.
5. JOINT SEALANT: BUTYL RUBBER SS-S-00210

MODULAR WETLAND SYSTEMS INC.
P.O. BOX 869
OCEANSIDE, CA 92049
www.ModularWetlands.com

PROPRIETARY AND CONFIDENTIAL

THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MODULAR WETLAND SYSTEMS INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MODULAR WETLAND SYSTEMS INC. IS PROHIBITED.

MWS #3	NAME	DATE
DRAWN	Luis	1/25/13
EDITED		

COMMENTS:

TITLE: MWS LINEAR 2.0 VAULT TYPE

SIZE	DWG. NO.	REV
	MWS-L-4-15-V	

SCALE 1:40 | UNITS = INCHES | SHEET 1 OF 1

BIO-7: Proprietary Biotreatment

Proprietary biotreatment devices are devices that are manufactured to mimic natural systems such as bioretention areas by incorporating plants, soil, and microbes engineered to provide treatment at higher flow rates or volumes and with smaller footprints than their natural counterparts. Incoming flows are typically filtered through a planting media (mulch, compost, soil, plants, microbes, etc.) and either infiltrated or collected by an underdrain and delivered to the storm water conveyance system. Tree box filters are an increasingly common type of proprietary biotreatment device that are installed at curb level and filled with a bioretention type soil. For low to moderate flows they operate similarly to bioretention systems and are bypassed during high flows. Tree box filters are highly adaptable solutions that can be used in all types of development and in all types of soils but are especially applicable to dense urban parking lots, street, and roadways.

Also known as:

- *Catch basin planter box*
- *Bioretention vault*
- *Tree box filter*

Proprietary biotreatment
Source: http://www.americastusa.com /index.php/filterra/

Feasibility Screening Considerations

- Proprietary biotreatment devices that are unlined may cause incidental infiltration. Therefore, an evaluation of site conditions should be conducted to evaluate whether the BMP should include an impermeable liner to avoid infiltration into the subsurface.

Opportunity Criteria

- Drainage areas of 0.25 to 1.0 acres.
- Land use may include commercial, residential, mixed use, institutional, and subdivisions. Proprietary biotreatment facilities may also be applied in parking lot islands, traffic circles, road shoulders, and road medians.
- Must not adversely affect the level of flood protection provided by the drainage system.

OC-Specific Design Criteria and Considerations

☐ Frequent maintenance and the use of screens and grates to keep trash out may decrease the likelihood of clogging and prevent obstruction and bypass of incoming flows.

☐ Consult proprietors for specific criteria concerning the design and performance.

☐ Proprietary biotreatment may include specific media to address pollutants of concern. However, for proprietary device to be considered a biotreatment device the media must be capable of supporting rigorous growth of vegetation.

☐ Proprietary systems must be acceptable to the reviewing agency. Reviewing agencies shall have the discretion to request performance information. Reviewing agencies shall have the discretion to deny the use of a proprietary BMP on the grounds of performance, maintenance considerations, or other relevant factors.

☐ In right of way areas, plant selection should not impair traffic lines of site. Local jurisdictions may also limit plant selection in keeping with landscaping themes.

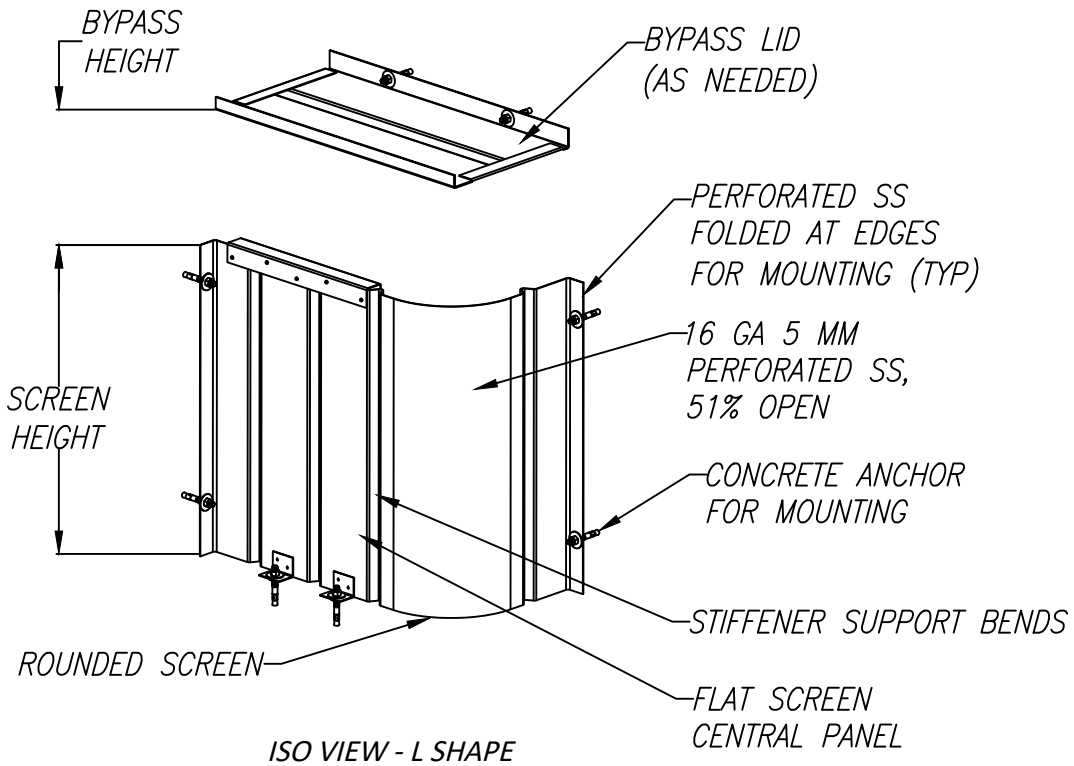
Computing Sizing Criteria for Proprietary Biotreatment Device

- Proprietary biotreatment devices can be volume based or flow-based BMPs.
- Volume-based proprietary devices should be sized using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** or the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs described in **Appendix III.3.2**.
- The required design flowrate for flow-based proprietary devices should be computed using the Capture Efficiency Method for Flow-based BMPs described in **Appendix III.3.3)**.

Additional References for Design Guidance

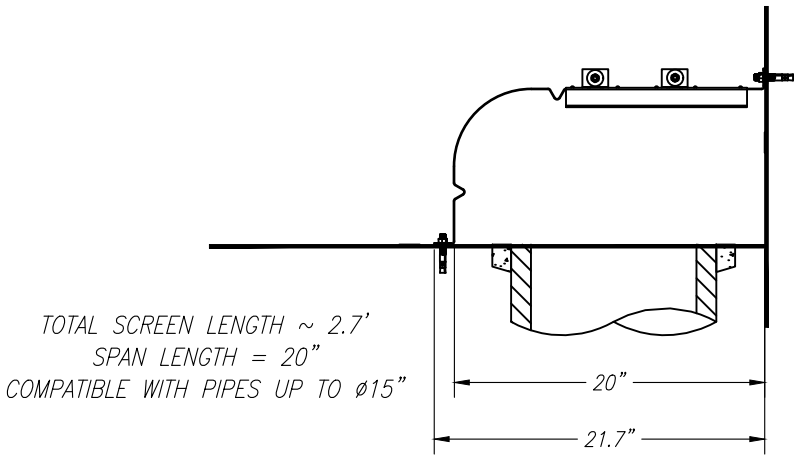
- Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4: **http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850**
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 9: **http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf**
- Santa Barbara BMP Guidance Manual, Chapter 6: **http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf**

CONNECTOR PIPE SCREEN (CPS)
L 2.7



ISO VIEW - L SHAPE

CPS L WITH 2.7 FT SCREEN LENGTH	
CPS HEIGHT (IN)	SCREEN FLOW (CFS)
12	3.84
18	7.06
24	10.88
30	15.20
36	19.99
NOTE: BYPASS FLOW RATES VARY WITH VAULT DEPTH AND BYPASS HEIGHT. CONTACT BIO CLEAN FOR ADDITIONAL INFORMATION.	



TOP SECTION VIEW - L SHAPE

GENERAL NOTES

1. BIO CLEAN TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS, AND CAPACITIES ARE SUBJECT TO CHANGE.
3. THIS CPS UNIT IS DESIGNED FOR TREATMENT FLOWS THROUGH THE SCREEN. FLOWS GREATER THAN THE TREATMENT FLOW RATE WILL BYPASS OVER THE SCREEN.
4. A BYPASS LID IS REQUIRED WHEN THE OUTLET PIPE IS DIRECTLY BELOW THE CURB OPENING.
5. CPS IS COMPRISED OF 304 STAINLESS STEEL. THICKNESS IS 16 GAUGE. SCREEN PERFORATIONS ARE 5 MILLIMETERS IN DIAMETER. THE SCREEN AREA IS 51% OPEN SPACE.

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS, AND INCIDENTALS REQUIRED TO INSTALL THE CPS UNIT AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. POSITION THE CPS SO IT IS EVENLY SPACED AROUND THE CONNECTOR PIPE, ENSURING A MIN. OF 4" SPACING AWAY FROM ANY CORNERS. SCREEN BOTTOM SHALL BE FLUSH WITH THE CATCH BASIN FLOOR, OR WITH GAPS NO GREATER THAN 5 MM.
3. IF A BYPASS LID IS REQUIRED, VERIFY THE BYPASS HEIGHT NEEDED AND MARK THAT LOCATION ON THE WALL DIRECTLY ABOVE THE BASE UPRIGHTS. LIFT THE LID IN PLACE AND MARK THE HOLE LOCATIONS FOR THE LID MOUNTING BRACKETS. SECURE THE LID WITH STAINLESS STEEL NUTS.

WARRANTY: 3 YEAR MANUFACTURER'S		MEETS FULL CAPTURE REQUIREMENTS	
BIO CLEAN ENVIRONMENTAL SERVICES, INC. 398 VIA EL CENTRO, OCEANSIDE CA 92058 PHONE: 760-433-7640		REVISIONS:	DATE:
		REVISIONS:	DATE:
DATE: 1/17/2020	SCALE: NTS	REVISIONS:	DATE:
DRAFTER: G.M.S.	UNITS = INCHES	REVISIONS:	DATE:

Bio Clean
A Forterra Company

SECTION VII EDUCATIONAL MATERIALS

The educational materials included in this WQMP are provided to inform people involved in future uses, activities, or ownership of the site about the potential pitfalls associated with careless storm water management. "The Ocean Begins at Your Front Door" provides users with information about storm water that is/will be generated on site, what happens when water enters a storm drain, and its ultimate fate, discharging into the ocean. Also included are activities guidelines to educate anyone who is or will be associated with activities that have a potential to impact storm water runoff quality, and provide a menu of BMPs to effectively reduce the generation of storm water runoff pollutants from a variety of activities. The educational materials that may be used for the proposed project are included in Appendix C of this WQMP and are listed below.

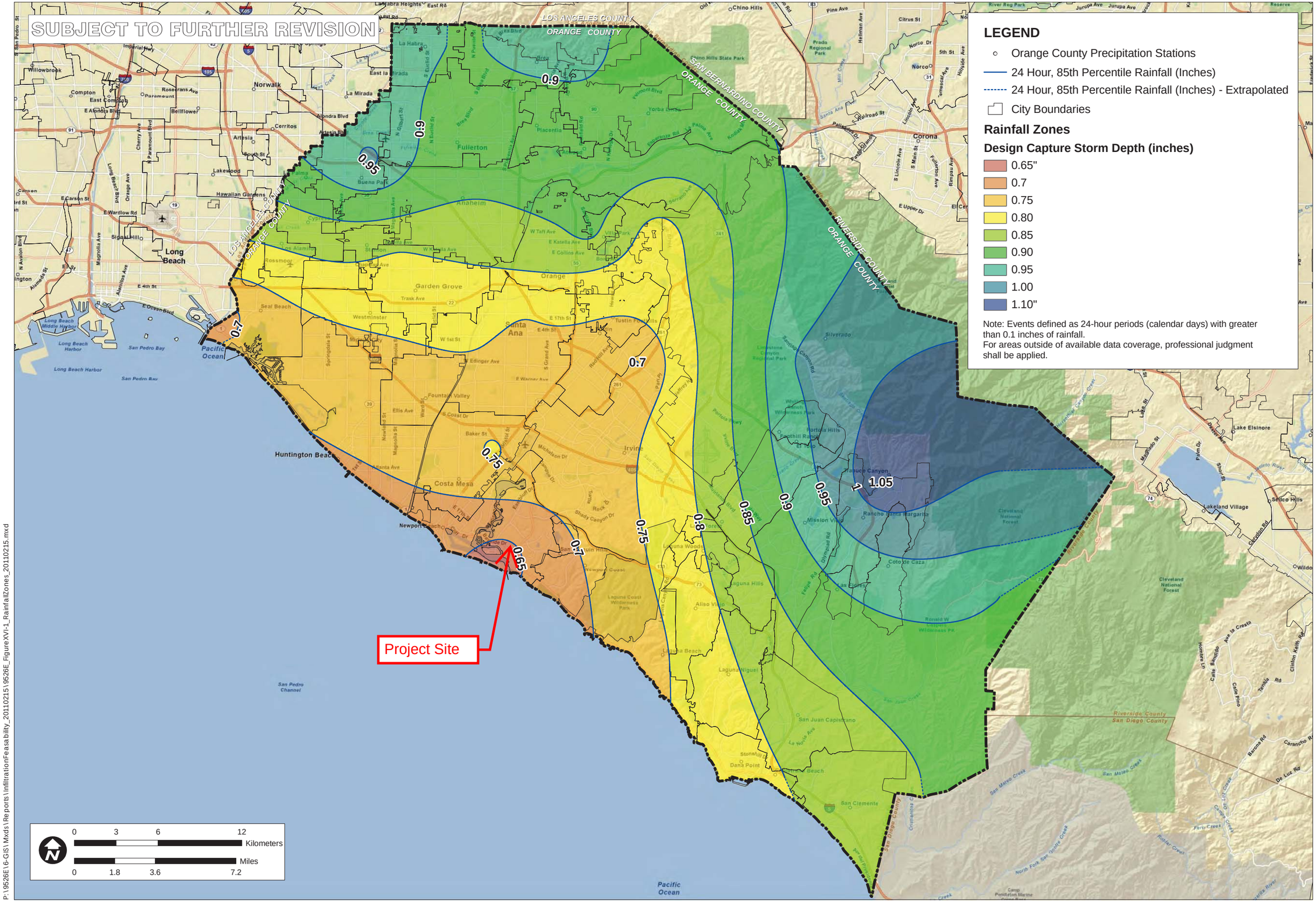
EDUCATION MATERIALS			
Residential Materials (http://www.ocwatersheds.com)	**Check If Attached**	**Business Materials (http://www.ocwatersheds.com)**	**Check If Attached**
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☐
Homeowners Guide for Sustainable Water Use	☐	Proper Maintenance Practices for Your Business	☒
Household Tips	☐	**Other Materials (http://www.ocwatersheds.com) (https://www.casqa.org/resources/bmp-handbooks)**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☐		
Recycle at Your Local Used Oil Collection Center (North County)	☐	DF-1 Drainage System Operation & Maintenance	☒
Recycle at Your Local Used Oil Collection Center (Central County)	☐	SC-10 Non Stormwater	☐
Recycle at Your Local Used Oil Collection Center (South County)	☐	SC-11 Spill Prevention	☐
Tips for Maintaining Septic Tank Systems	☐	SC-34 Waste Handling	☐
Responsible Pest Control	☐	SC-41 Building Maintenance	☐
Sewer Spill	☐	SC-43 Parking Maintenance	☐
Tips for the Home Improvement Projects	☐	SC-44 Drainage Maintenance	☒
Tips for Horse Care	☐	SC-70 Street Maintenance	☐
Tips for Landscaping and Gardening	☐	SC-73 Landscape Maintenance	☒
Tips for Pet Care	☐	SD-10 Site Design & Landscape Planning	☒
Tips for Pool Maintenance	☒	SD-11 Roof Runoff Controls	☐
Tips for Residential Pool, Landscape and Hardscape Drains	☐	SD-12 Efficient Irrigation	☒
Tips for Projects Using Paint	☐	SD-13 Storm Drain Signage	☒
Tips for Protecting Your Watershed	☒	SD-31 Maintenance Bays & Docs	☐
Other: Children's Brochure	☐	SD-32 Trash Storage Areas	☐

APPENDICES

APPENDIX A

SUPPORTING CALCULATIONS

SUBJECT TO FURTHER REVISION



LEGEND

- Orange County Precipitation Stations
- 24 Hour, 85th Percentile Rainfall (Inches)
- 24 Hour, 85th Percentile Rainfall (Inches) - Extrapolated
- City Boundaries

Rainfall Zones

Design Capture Storm Depth (inches)

- 0.65"
- 0.7
- 0.75
- 0.80
- 0.85
- 0.90
- 0.95
- 1.00
- 1.10"

Note: Events defined as 24-hour periods (calendar days) with greater than 0.1 inches of rainfall.
For areas outside of available data coverage, professional judgment shall be applied.

TITLE: RAINFALL ZONES

JOB: ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT — ORANGE CO., CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE XVI-1

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-1_RainfallZones_20110215.mxd

SUBJECT TO FURTHER REVISION

LEGEND

City Boundaries

Hydrologic Soil Groups

D Soils

Source:
D Soils: Natural Resources Conservation Service (NRCS)
Soil Survey - soil_ca678, Orange County & Western Riverside
Date of publication: 2006-02-08
http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Project Site

0 2.5 5 10 Kilometers

0 1.8 3.6 7.2 Miles

TITLE
HYDROLOGIC SOIL GROUP
TYPE D NRCS SOIL SURVEY

JOB
ORANGE CO.
ORANGE COUNTY
INFILTRATION STUDY
CA

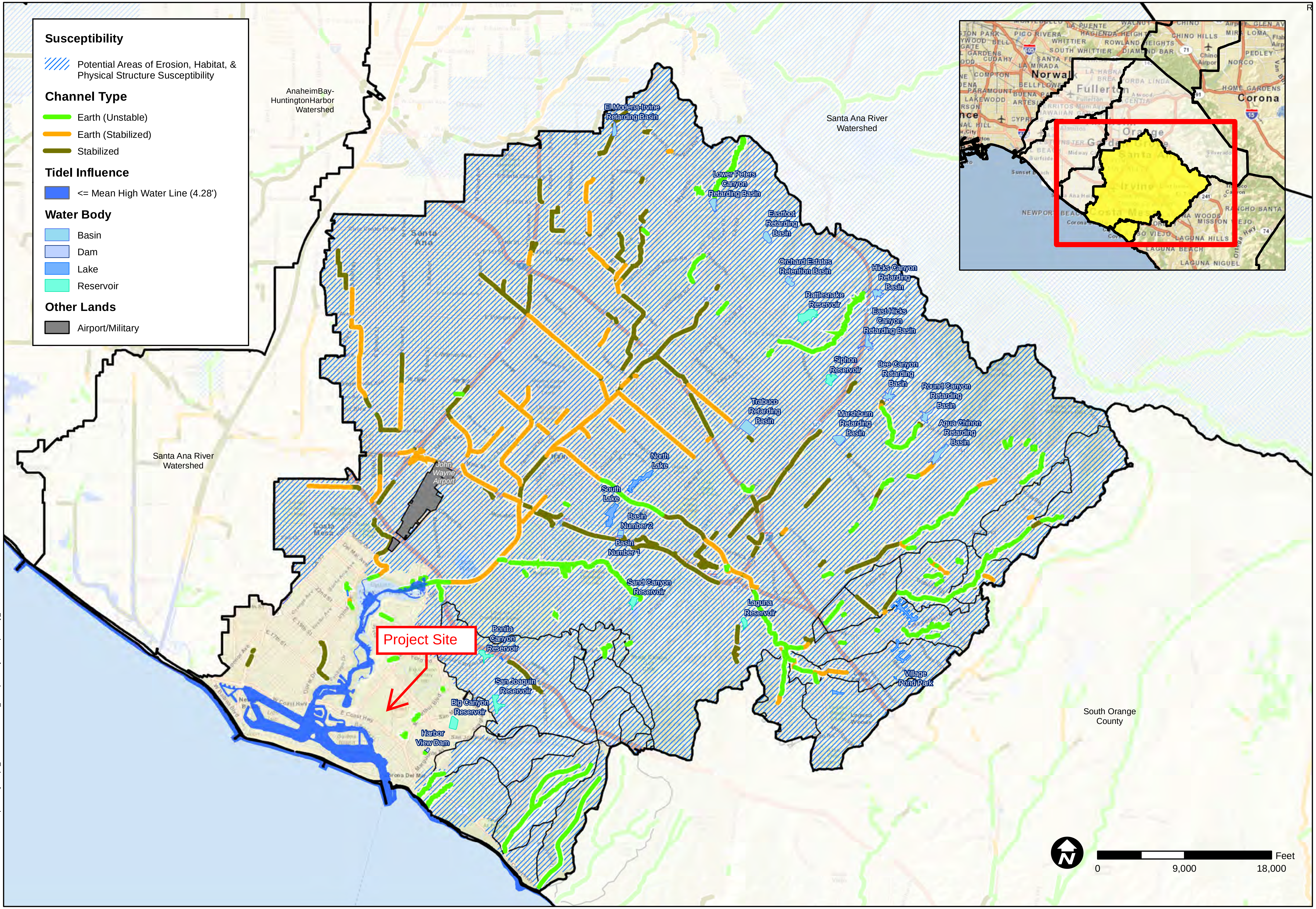
SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2b

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2b_D-Soils_20110215.mxd

SUSCEPTIBILITY MAP UPATE (FEB 2013)



Susceptibility
Potential Areas of Erosion, Habitat, & Physical Structure Susceptibility
Channel Type
Earth (Unstable)
Earth (Stabilized)
Stabilized
Tidel Influence
<= Mean High Water Line (4.28')
Water Body
Basin
Dam
Lake
Reservoir
Other Lands
Airport/Military
AnaheimBay-HuntingtonHarbor Watershed
Santa Ana River Watershed
Santa Ana River Watershed
South Orange County
El Modena-Irvine Retarding Basin
Lower Peters Canyon Retarding Basin
Eastfoot Retarding Basin
Orchard Estates Retention Basin
Hicks Canyon Retarding Basin
Rattlesnake Reservoir
East Hicks Canyon Retarding Basin
Siphon Reservoir
Bee Canyon Retarding Basin
Round Canyon Retarding Basin
Trabuco Retarding Basin
Marshburn Retarding Basin
Agua Chinon Retarding Basin
North Lake
South Lake
Basin Number 2
Basin Number 1
John Wayne Airport
Sand Canyon Reservoir
Laguna Reservoir
Bonita Canyon Reservoir
San Joaquin Reservoir
Big Canyon Reservoir
Harbor View Dam
Village Pond Park
Project Site
Feet
0
9,000
18,000

P:\9526E\6-GIS\Mxds\SusceptabilityMaps_20100505\9526E_NewportBaySusceptibility_20100430.mxd

TITLE
SUSCEPTIBILITY ANALYIS NEWPORT BAY-NEWPORT COASTAL STREAMS

JOB
ORANGE COUNTY WATERSHED MASTER PLANNING
ORANGE CO. CA

SCALE	1" = 12000'
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/30/10
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE
4

Table 2.7: Infiltration BMP Feasibility Worksheet

	Infeasibility Criteria	*Yes*	*No*
1	**Would Infiltration BMPs pose significant risk for groundwater related concerns?** Refer to Appendix VII (Worksheet I) for guidance on groundwater-related infiltration feasibility criteria.		X
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	Would Infiltration BMPs **pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level**? (Yes if the answer to any of the following questions is yes, as established by a geotechnical expert): The BMP can only be located less than 50 feet away from slopes steeper than 15 percent The BMP can only be located less than eight feet from building foundations or an alternative setback. A study prepared by a geotechnical professional or an available watershed study substantiates that stormwater infiltration would potentially result in significantly increased risks of geotechnical hazards that cannot be mitigated to an acceptable level.	X	
Provide basis: *If surface waters were infiltrated around the hotel, the water would likely be collected in the subdrains around the building (if any) and/or result in nuisance seepage for this building or other down-gradient buildings that have subterranean levels. In addition, the infiltrated water that collects along the geologic contact can seep out where this contact is exposed at the ground surface in the golf course, which in turn, may cause instability of slopes, piping of the terrace sands, etc. Therefore, NMG Geotechnical, Inc. state that infiltration BMPs should not be used at the subject site. They recommend other types of filtration BMPs be utilized per the County of Orange WQMP Technical Guidelines. Please see Appendix F for full Geotech Report.* Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
3	Would infiltration of the DCV from drainage area **violate downstream water rights**?		X

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

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

	Partial Infeasibility Criteria	***Yes***	***No***
4	Is proposed infiltration facility **located on HSG D soils** or the site geotechnical investigation identifies presence of soil characteristics which support categorization as D soils?	X	
Provide basis: *According to Figure XVI-2a from the OC TGD, the project site is located in area with Type D soils (see Appendix A for map).* Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
5	Is **measured infiltration rate below proposed facility less than 0.3 inches per hour**? This calculation shall be based on the methods described in Appendix VII.		N/A
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
6	Would **reduction of over predeveloped conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?**		X
Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

7	Would **an increase in infiltration over predeveloped conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?**		X
Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Infiltration Screening Results (check box corresponding to result):			
8	Is there substantial evidence that infiltration from the project would result in a significant increase in I&I to the sanitary sewer that cannot be sufficiently mitigated? (See Appendix XVII) Provide narrative discussion and supporting evidence: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.		
9	If any answer from row 1-3 is yes: infiltration of any volume is **not feasible** within the DMA or equivalent. Provide basis: *If surface waters were infiltrated around the hotel, the water would likely be collected in the subdrains around the building (if any) and/or result in nuisance seepage for this building or other down-gradient buildings that have subterranean levels. In addition, the infiltrated water that collects along the geologic contact can seep out where this contact is exposed at the ground surface in the golf course, which in turn, may cause instability of slopes, piping of the terrace sands, etc. Therefore, NMG Geotechnical, Inc. state that infiltration BMPs should not be used at the subject site. They recommend other types of filtration BMPs be utilized per the County of Orange WQMP Technical Guidelines. Please see Appendix F for full Geotech Report.* Summarize findings of infeasibility screening		X

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

10	If any answer from row 4-7 is yes, infiltration is **permissible but is not presumed to be feasible for the entire DCV.** Criteria for designing biotreatment BMPs to achieve the maximum feasible infiltration and ET shall apply. Provide basis: *According to Figure XVI-2a from the OC TGD, the project site is located in area with Type D soils (see Appendix A for map).* Summarize findings of infeasibility screening	X
11	If all answers to rows 1 through 11 are no, infiltration of the full DCV is potentially feasible, BMPs must be designed to infiltrate the full DCV to the maximum extent practicable.	

Harvest & Reuse Irrigation Demand Calculations

12/2/2021

Storm Water Design Caputre Volume (SQDV)

Drainage Area / Land Use Type	Impervious Area (ac)	Irrigated Area (ac)	% impervious	Runoff Coefficient	Design Storm Depth (in)	Drainage Area (acres)	DCV (ft^3)	DCV (gal)
Total Site	3.56	0.40	90%	0.825	0.65	3.950	**7,689.0**	**57,514**
				0.653			**0.0**	**0**
				0.668			**0.0**	**0**
				0.675			**0.0**	**0**
				0.900			**0.0**	**0**
				0.900			**0.0**	**0**

	Eto
Irvine	3.00
Laguna Beach	2.75
Santa Ana	2.93

Modified

$$EAWU = \frac{(Eto \times KL \times LA \times 0.015)}{IE}$$

$$EIATA = \frac{LA \times KL}{(IE \times \text{Tributary Imp. Area})}$$

Blend of High-Use and Low-Use Landscaping

Drainage Area / Land Use Type	Total Area (ac)	Total Area (sf)	% Impervious	Impervious (sf)	Pervious / LA (sf)	Eto	KL	Modified EAWU	EAWU/ Impervious Acre	Minimum EAWU/ Impervious Acre (Table X.6)	Feasible?	EIATA	Minimum EIATA (interpo-lated)	Drawdown (days)	Drawdown (hours)	% Capture (Fig. III.2)
Total Site	3.950	172,062	90%	154,856	17,206	2.75	0.55	433.74	122.01	530	No	0.07	0.00	132.6	3,182	
0	0.000	0	0%	0	0		0.55	0.00	#DIV/0!			#DIV/0!	0.00	#DIV/0!	#DIV/0!	

TABLE X.6: HARVESTED WATER DEMAND THRESHOLDS FOR MINIMUM PARTIAL CAPTURE

Design Capture Storm Depth, inches	Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre
0.60	490
0.65	530
0.70	570
0.75	610
0.80	650
0.85	690
0.90	730
0.95	770
1.00	810

TABLE X.8: MINIMUM IRRIGATED AREA FOR POTENTIAL PARTIAL CAPTURE FEASIBILITY

General Landscape Type	Conservation Design: KL = 0.35			Active Turf Areas: KL = 0.7		
Closest ET Station	Irvine	Santa Ana	Laguna	Irvine	Santa Ana	Laguna
Design Capture Storm Depth, inches	Minimum Required Irrigated Area per Tributary Impervious Acre for Potential Partial Capture, ac/ac					
0.60	0.66	0.68	0.72	0.33	0.34	0.36
0.65	0.72	0.73	0.78	0.36	0.37	0.39
0.70	0.77	0.79	0.84	0.39	0.39	0.42
0.75	0.83	0.84	0.9	0.41	0.42	0.45
0.80	0.88	0.9	0.96	0.44	0.45	0.48
0.85	0.93	0.95	1.02	0.47	0.48	0.51
0.90	0.99	1.01	1.08	0.49	0.51	0.54
0.95	1.04	1.07	1.14	0.52	0.53	0.57
1.00	1.1	1.12	1.2	0.55	0.56	0.6

Source: Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs). March 22, 2011. Appendix X.

Worksheet B: Simple Design Capture Volume Sizing Method

Project: Hotel Branded Residences at Newport Beach Marriott

Date: 12-08-2021

		DMA =	Total Offsite	A3.1	A4	F1	A3.2	
Step 1: Determine the design capture storm depth used for calculating volume								
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.65	0.65	0.65	0.65	0.65	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	0	0	0	0	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.65	0.65	0.65	0.65	0.65	inches
Step 2: Calculate the DCV								
1	Enter Project area tributary to BMP(s), *A* (acres)	A=	1.620	1.200	1.930	0.740	0.080	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	79.0%	90.0%	90.0%	100.0%	14.5%	%
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.743	0.825	0.825	0.900	0.259	
4	Calculate runoff volume, $V_{design} = (C \times d_{remainder} \times A \times 43560 \times (1/12))$	V_{design}=	2,840.0	2,335.9	3,756.9	1,571.4	48.9	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV								
Step 3a: Determine design infiltration rate								
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (Appendix VII)	$K_{measured}$=	N/A	N/A	N/A	N/A	N/A	in/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=						
3	Calculate design infiltration rate, $K_{design} = K_{measured} / S_{final}$	K_{design}=						in/hr
Step 3b: Determine minimum BMP footprint								
4	Enter drawdown time, *T* (max 48 hours)	T=	*See Worksheet D*				*See Worksheet A*	hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=						feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=						sq-ft

Worksheet A: Hydrologic Source Control Calculation Form

Project: Hotel Branded Residences at Newport Beach Marriott

Date: 12-08-2021

		Drainage area ID	**DMA A3.2**	
		Total drainage area	0.080	acres
		Total drainage area Impervious Area (IA_{total})	0.012	acres
HSC ID	HSC Type/ Description/ Reference BMP Fact Sheet	Effect of individual HSC_i per BMP Fact Sheets (XIV.1) (d_{HSCi})[1]	Impervious Area Tributary to HSC_i (IA_i)	$d_i \times IA_i$
A3.2	HSC-2: Impervious Area Dispersion, Ratio = 5.9	0.650"	0.0116	0.0076
		Box 1:	$\sum d_i \times Iai =$	0.0076
		Box 2:	$IA_{total} =$	0.012
		[Box 1]/[Box 2]:	$d_{HSC\ total} =$	0.650
			Percent Capture Provided by HSCs (Table III.1)	80%

1 - For HSCs meeting criteria to be considered self-retaining, enter the DCV for the project.

Area	***Impervious Area (SF)***	***Pervious Area (SF)***	***Total Area (SF)***	***Ratio***
A3.2	*506.4*	*2,978.4*	*3,484.8*	*5.9*

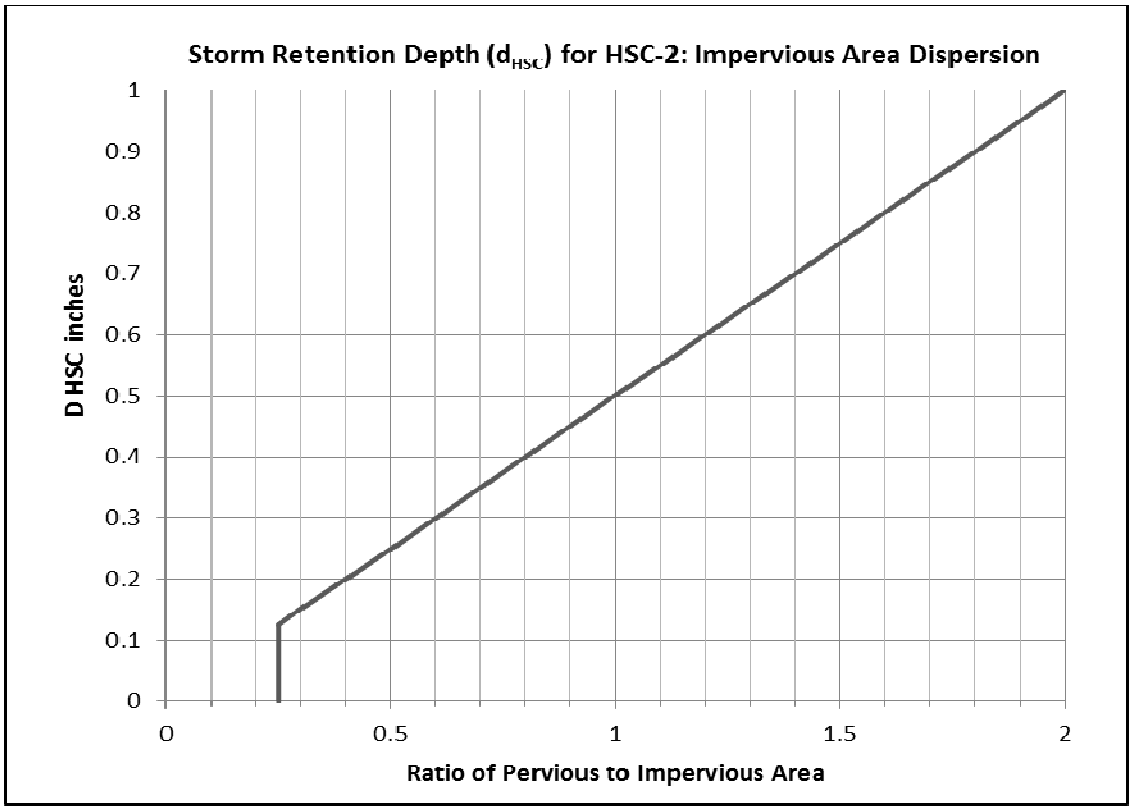


Table III.1: Fraction of Long Term Runoff Reduced (Capture Efficiency) by HSCs

Cumulative HSC Adjustment to Design Capture Storm Depth (d_{HSC})	Capture Efficiency Achieved Lowland Regions (<1,000 ft)	Capture Efficiency Achieved Mountainous Regions (>1,000 ft)
<0.05	0%	0%
0.05"	8%	7%
0.1"	20%	16%
0.2"	37%	31%
0.3"	48%	42%
0.4"	57%	50%
0.5"	64%	57%
0.6"	70%	63%
0.7"	75%	68%
0.8"	80%	72%
0.9"	80%	76%
1.0"	80%	80%

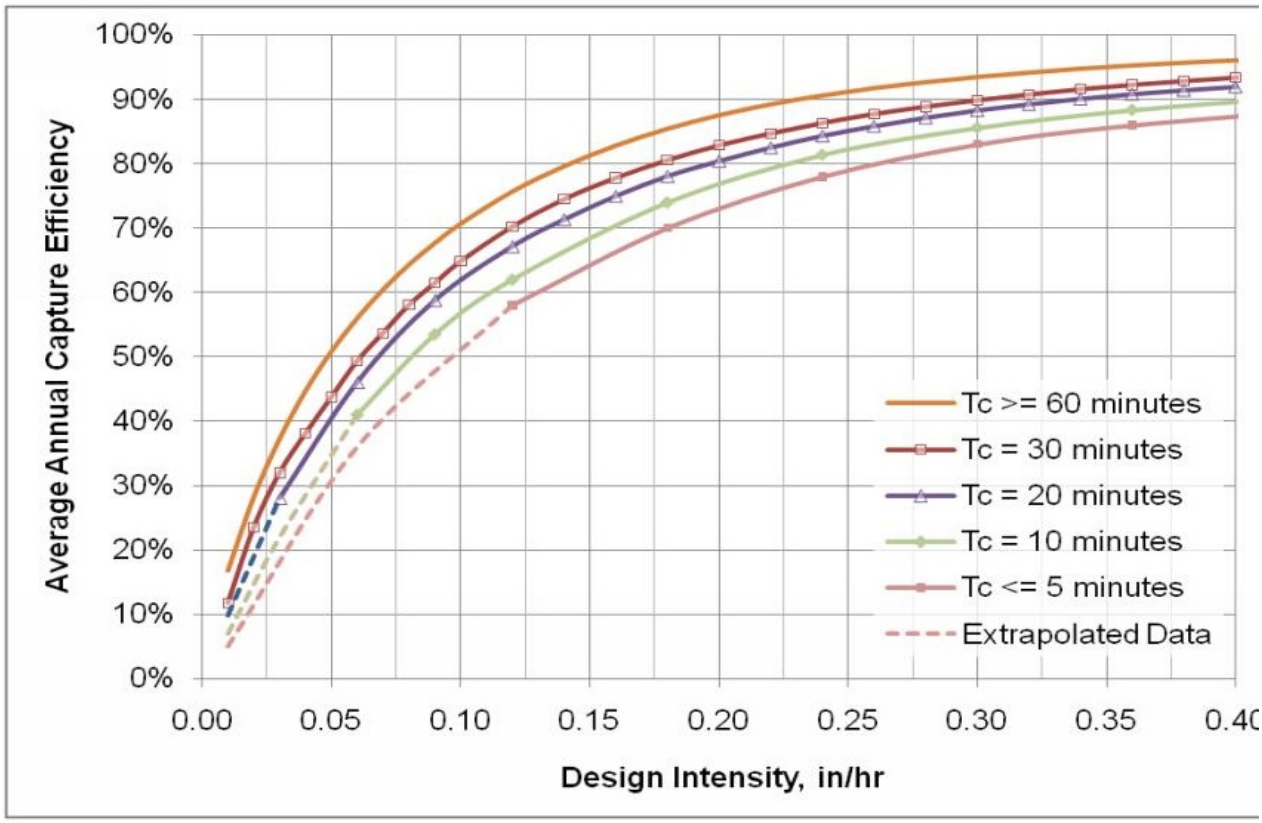
Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Project: Hotel Branded Residences at Newport Beach Marriott

Date: 12-08-2021

			A3+A4+Offsite	F1	
Step 1: Determine the design capture storm depth used for calculating volume					
1	Enter the time of concentration, T_c (min) (See Appendix IV.2)	T_c=	5.0	5.0	min
2	Using Figure III.4, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	I_1=	0.260	0.260	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	0	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (Worksheet A)	Y_2=	0%	0%	%
5	Using Figure III.4, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency (Y_2), I_2	I_2=	0	0	in/hr
6	Determine the design intensity that must be provided by BMP, $I_{design} = I_1 - I_2$	I_{design}=	0.260	0.260	in/hr
Step 2: Calculate the design flowrate					
1	Enter Project area tributary to BMP(s), *A* (acres)	A=	4.750	0.740	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	86.2%	100.0%	%
3	Calculate runoff coefficient, $C = (0.75 \times imp) + 0.15$	C=	0.797	0.900	
4	Calculate design flowrate, $Q_{design} = (C \times i_{design} \times A)$	Q_{design}=	0.984	0.173	cfs
Supporting Calculations					
Describe System:					
			Proprietary BioTreatment (BIO-7):		
			Unit Size / Model =	*MWS-L-8-16, MWS-L-8-20*	*MWS-L-4-15*
			Unit Size / Model Treatment Capacity =	*0.462, 0.577*	*0.175* cfs
			Number of Units Needed =	*2*	*1*
			Total Bio-treatment Provided =	*1.039*	*0.175* cfs
Provide time of concentration assumptions:					
				5.0	min

Figure III.4. Capture Efficiency Nomograph for Off-line Flow-based Systems in Orange County



Appendix B

Notice of Transfer of Responsibility

NOTICE OF TRANSFER OF RESPONSIBILITY

WATER QUALITY MANAGEMENT PLAN

Ritz-Carlton Residences, Newport Beach
Parcel 2, Map 2004-225, Book 361, Pages 1-3

Submission of this Notice Of Transfer of Responsibility constitutes notice to the City of Newport Beach that responsibility for the Water Quality Management Plan ("WQMP") for the subject property identified below, and implementation of that plan, is being transferred from the Previous Owner (and his/her agent) of the site (or a portion thereof) to the New Owner, as further described below.

I. Previous Owner/ Previous Responsible Party Information

Company/ Individual Name:		Contact Person:	
Street Address:		Title:	
City:	State:	ZIP:	Phone:

II. Information about Site Transferred

Name of Project (if applicable):	
Title of WQMP Applicable to site:	
Street Address of Site (if applicable):	
Planning Area (PA) and/ or Tract Number(s) for Site:	Lot Numbers (if Site is a portion of a tract):
Date WQMP Prepared (and revised if applicable):	

III. New Owner/ New Responsible Party Information

Company/ Individual Name:		Contact Person:	
Street Address:		Title:	
City:	State:	ZIP:	Phone:

IV. Ownership Transfer Information

General Description of Site Transferred to New Owner:	General Description of Portion of Project/ Parcel Subject to WQMP Retained by Owner (if any):

Lot/ Tract Numbers of Site Transferred to New Owner:
Remaining Lot/ Tract Numbers Subject to WQMP Still Held by Owner (if any):
Date of Ownership Transfer:

Note: When the Previous Owner is transferring a Site that is a portion of a larger project/ parcel addressed by the WQMP, as opposed to the entire project/parcel addressed by the WQMP, the General Description of the Site transferred and the remainder of the project/ parcel no transferred shall be set forth as maps attached to this notice. These maps shall show those portions of a project/ parcel addressed by the WQMP that are transferred to the New Owner (the Transferred Site), those portions retained by the Previous Owner, and those portions previously transferred by Previous Owner. Those portions retained by Previous Owner shall be labeled as "Previously Transferred".

V. Purpose of Notice of Transfer

The purposes of this Notice of Transfer of Responsibility are: 1) to track transfer of responsibility for implementation and amendment of the WQMP when property to which the WQMP is transferred from the Previous Owner to the New Owner, and 2) to facilitate notification to a transferee of property subject to a WQMP that such New Order is now the Responsible Party of record for the WQMP for those portions of the site that it owns.

VI. Certifications

A. Previous Owner

I certify under penalty of law that I am no longer the owner of the Transferred Site as described in Section II above. I have provided the New Owner with a copy of the WQMP applicable to the Transferred Site that the New Owner is acquiring from the Previous Owner.

Printed Name of Previous Owner Representative:	Title:
Signature of Previous Owner Representative:	Date:

B. New Owner

I certify under penalty of law that I am the owner of the Transferred Site, as described in Section II above, that I have been provided a copy of the WQMP, and that I have informed myself and understand the New Owner's responsibilities related to the WQMP, its implementation, and Best Management Practices associated with it. I understand that by signing this notice, the New Owner is accepting all ongoing responsibilities for implementation and amendment of the WQMP for the Transferred Site, which the New Owner has acquired from the Previous Owner.

Printed Name of New Owner Representative:	Title:
Signature:	Date:

APPENDIX C

EDUCATIONAL MATERIALS

The Ocean Begins at Your Front Door

Even if you live miles from the Pacific Ocean, you may be unknowingly polluting it.

Did You Know?

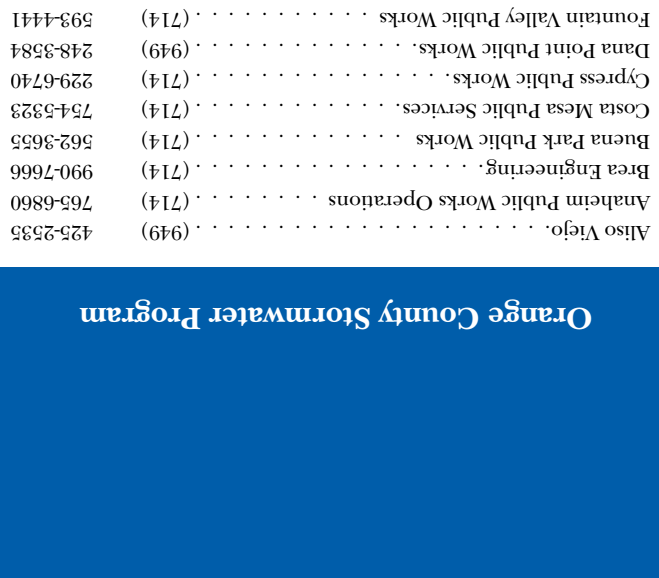
- Most people believe that the largest source of water pollution in urban areas comes from specific sources such as factories and sewage treatment plants. In fact, the largest source of water pollution comes from city streets, neighborhoods, construction sites and parking lots. This type of pollution is sometimes called “non-point source” pollution.
- There are two types of non-point source pollution: stormwater and urban runoff pollution.
- Stormwater runoff results from rainfall. When rainstorms cause large volumes of water to rinse the urban landscape, picking up pollutants along the way.
- Urban runoff can happen any time of the year when excessive water use from irrigation, vehicle washing and other sources carries trash, lawn clippings and other urban pollutants into storm drains.

Where Does It Go?

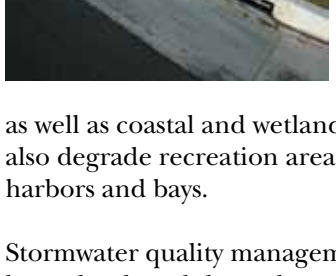
- Anything we use outside homes, vehicles and businesses – like motor oil, paint, pesticides, fertilizers and cleaners – can be blown or washed into storm drains.
- A little water from a garden hose or rain can also send materials into storm drains.
- Storm drains are separate from our sanitary sewer systems; unlike water in sanitary sewers (from sinks or toilets), water in storm drains is not treated before entering our waterways.

Sources of Non-Point Source Pollution

- Automotive leaks and spills.
- Improper disposal of used oil and other engine fluids.
- Metals found in vehicle exhaust, weathered paint, rust, metal plating and tires.
- Pesticides and fertilizers from lawns, gardens and farms.
- Improper disposal of cleaners, paint and paint removers.
- Soil erosion and dust debris from landscape and construction activities.
- Litter, lawn clippings, animal waste, and other organic matter.
- Oil stains on parking lots and paved surfaces.



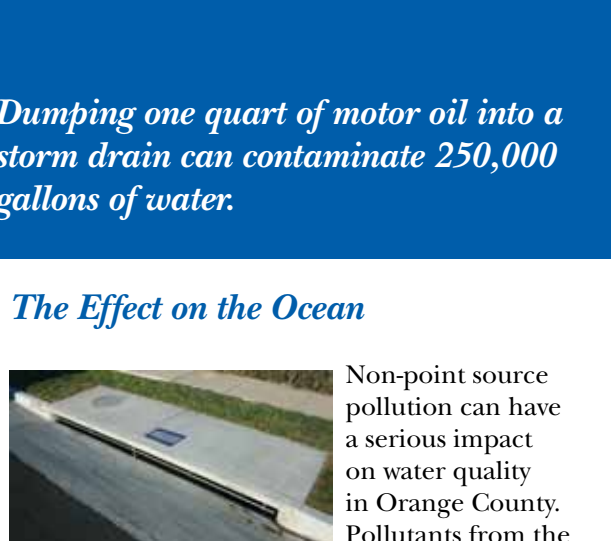
The Effect on the Ocean



Non-point source pollution can have a serious impact on water quality in Orange County. Pollutants from the storm drain system can harm marine life as well as coastal and wetland habitats. They can also degrade recreation areas such as beaches, harbors and bays.

Stormwater quality management programs have been developed throughout Orange County to educate and encourage the public to protect water quality, monitor runoff in the storm drain system, investigate illegal dumping and maintain storm drains.

Support from Orange County residents and businesses is needed to improve water quality and reduce urban runoff pollution. Proper use and disposal of materials will help stop pollution before it reaches the storm drain and the ocean.



Dumping one quart of motor oil into a storm drain can contaminate 250,000 gallons of water.

For More Information

California Environmental Protection Agency
www.calepa.ca.gov

- **Air Resources Board**
  www.arb.ca.gov
- **Department of Pesticide Regulation**
  www.cdpr.ca.gov
- **Department of Toxic Substances Control**
  www.dtsc.ca.gov
- **Integrated Waste Management Board**
  www.ciwmb.ca.gov
- **Office of Environmental Health Hazard Assessment**
  www.oehha.ca.gov
- **State Water Resources Control Board**
  www.waterboards.ca.gov

Earth 911 - Community-Specific Environmental Information 1-800-cleanup or visit www.1800cleanup.org

Health Care Agency’s Ocean and Bay Water Closure and Posting Hotline
(714) 433-6400 or visit www.ocbeachinfo.com

Integrated Waste Management Dept. of Orange County (714) 834-6752 or visit www.oclandfills.com for information on household hazardous waste collection centers, recycling centers and solid waste collection

O.C. Agriculture Commissioner
(714) 447-7100 or visit www.ocagcomm.com

Stormwater Best Management Practice Handbook
Visit www.cabmphandbooks.com

UC Master Gardener Hotline
(714) 708-1646 or visit www.uccemg.com

The Orange County Stormwater Program has created and moderates an electronic mailing list to facilitate communications, take questions and exchange ideas among its users about issues and topics related to stormwater and urban runoff and the implementation of program elements. To join the list, please send an email to ocstormwaterinfo-join@list.ocwatersheds.com

Aliso Viejo	(949)	425-2535
Anaheim Public Works Operations	(714)	765-6860
Brea Engineering	(714)	990-7666
Buena Park Public Works	(714)	562-3655
Costa Mesa Public Services	(714)	754-5323
Cypress Public Works	(714)	229-6740
Dana Point Public Works	(949)	248-3584
Fountain Valley Public Works	(714)	593-4441
Fullerton Engineering Dept.	(714)	738-6853
Garden Grove Public Works	(714)	741-5956
Huntington Beach Public Works	(714)	536-5431
Irvine Public Works	(949)	724-6315
La Habra Public Services	(562)	905-9792
La Palma Public Works	(714)	690-3310
Laguna Beach Water Quality	(949)	497-0378
Laguna Hills Public Services	(949)	707-2650
Laguna Niguel Public Works	(949)	362-4337
Laguna Woods Public Works	(949)	639-0500
Lake Forest Public Works	(949)	461-3480
Los Alamitos Community Dev.	(562)	431-3538
Mission Viejo Public Works	(949)	470-3056
Newport Beach, Code & Water Quality Enforcement	(949)	644-3215
Orange Public Works	(714)	532-6480
Placentia Public Works	(714)	993-8245
Rancho Santa Margarita	(949)	635-1800
San Clemente Environmental Programs	(949)	361-6143
San Juan Capistrano Engineering	(949)	234-4413
Santa Ana Public Works	(714)	647-3380
Seal Beach Engineering	(562)	431-2527 x317
Stanton Public Works	(714)	379-9222 x204
Tustin Public Works/Engineering	(714)	573-3150
Villa Park Engineering	(714)	998-1500
Westminster Public Works/Engineering	(714)	898-3311 x446
Yorba Linda Engineering	(714)	961-7138
Orange County Stormwater Program	(877)	897-7455

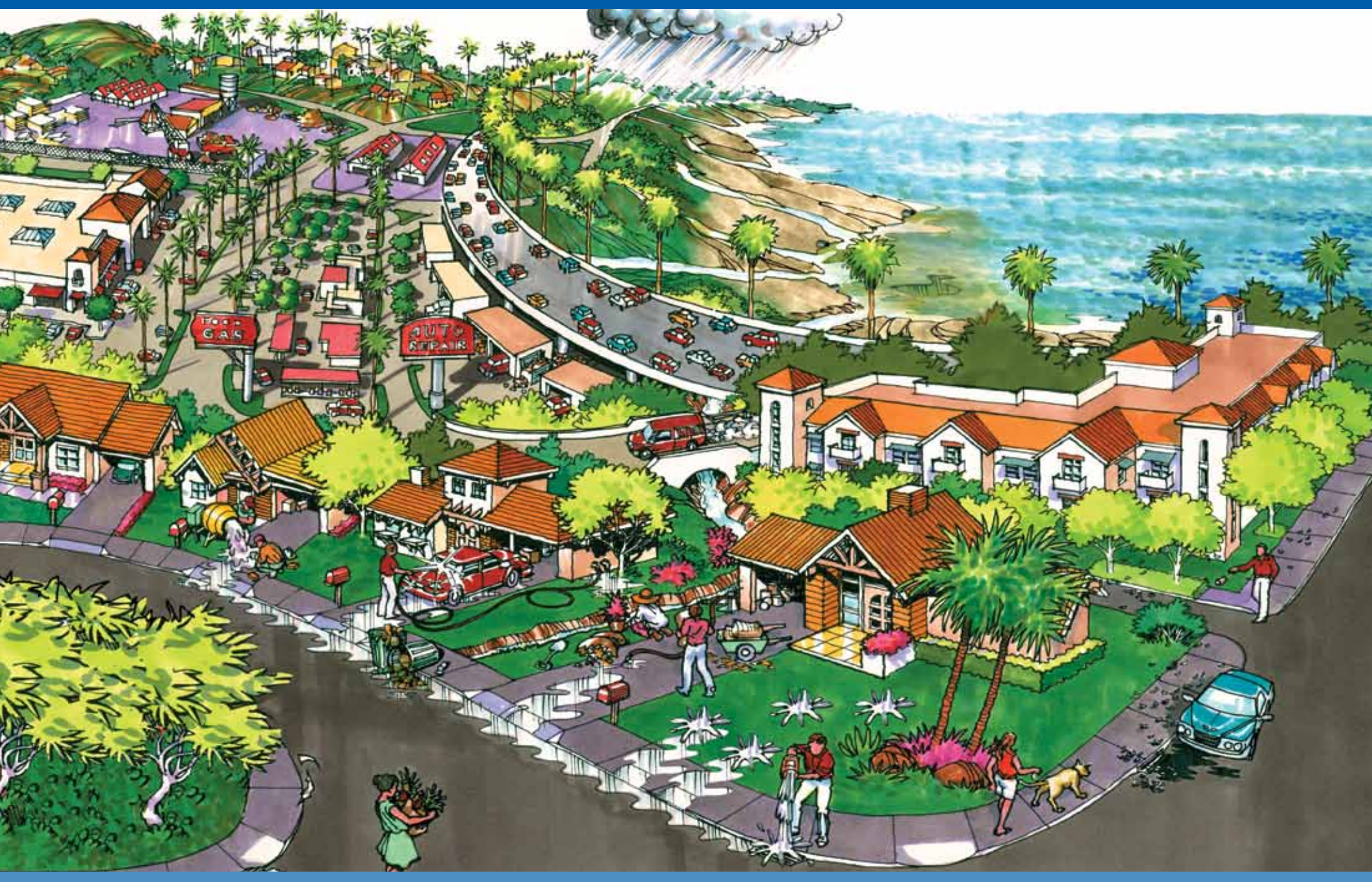
Orange County 24-Hour
Water Pollution Problem Reporting Hotline
1-877-89-SPILL (1-877-897-7455)

On-line Water Pollution Problem Reporting Form
www.ocwatersheds.com

Printed on Recycled Paper

Orange County Stormwater Program

The Ocean Begins at Your Front Door



Never allow pollutants to enter the street, gutter or storm drain!

Follow these simple steps to help reduce water pollution:

Household Activities

- Do not rinse spills with water. Use dry cleanup methods such as applying cat litter or another absorbent material, sweep and dispose of in the trash. Take items such as used or excess batteries, oven cleaners, automotive fluids, painting products and cathode ray tubes, like TVs and computer monitors, to a Household Hazardous Waste Collection Center (HHWCC).
- For a HHWCC near you call (714) 834-6752 or visit www.oclandfills.com.
- Do not hose down your driveway, sidewalk or patio to the street, gutter or storm drain. Sweep up debris and dispose of it in the trash.

Automotive

- Take your vehicle to a commercial car wash whenever possible. If you wash your vehicle at home, choose soaps, cleaners, or detergents labeled non-toxic, phosphate- free or biodegradable. Vegetable and citrus-based products are typically safest for the environment.
- Do not allow washwater from vehicle washing to drain into the street, gutter or storm drain. Excess washwater should be disposed of in the sanitary sewer (through a sink or toilet) or onto an absorbent surface like your lawn.
- Monitor your vehicles for leaks and place a pan under leaks. Keep your vehicles well maintained to stop and prevent leaks.
- Never pour oil or antifreeze in the street, gutter or storm drain. Recycle these substances at a service station, a waste oil collection center or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.1800cleanup.org.

Pool Maintenance

- Pool and spa water must be dechlorinated and free of excess acid, alkali or color to be allowed in the street, gutter or storm drain.
- When it is not raining, drain dechlorinated pool and spa water directly into the sanitary sewer.
- Some cities may have ordinances that do not allow pool water to be disposed of in the storm drain. Check with your city.

Landscape and Gardening

- Do not over-water. Water your lawn and garden by hand to control the amount of water you use or set irrigation systems to reflect seasonal water needs. If water flows off your yard onto your driveway or sidewalk, your system is over-watering. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of waste by composting, hauling it to a permitted landfill, or as green waste through your city's recycling program.
- Follow directions on pesticides and fertilizer, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Take unwanted pesticides to a HHWCC to be recycled. For locations and hours of HHWCC, call (714) 834-6752 or visit www.oclandfills.com.

Trash

- Place trash and litter that cannot be recycled in securely covered trash cans.
- Whenever possible, buy recycled products.
- Remember: Reduce, Reuse, Recycle.

Pet Care

- Always pick up after your pet. Flush waste down the toilet or dispose of it in the trash. Pet waste, if left outdoors, can wash into the street, gutter or storm drain.
- If possible, bathe your pets indoors. If you must bathe your pet outside, wash it on your lawn or another absorbent/permeable surface to keep the washwater from entering the street, gutter or storm drain.
- Follow directions for use of pet care products and dispose of any unused products at a HHWCC.

Common Pollutants

Home Maintenance

- Detergents, cleaners and solvents
- Oil and latex paint
- Swimming pool chemicals
- Outdoor trash and litter

Lawn and Garden

- Pet and animal waste
- Pesticides
- Clippings, leaves and soil
- Fertilizer

Automobile

- Oil and grease
- Radiator fluids and antifreeze
- Cleaning chemicals
- Brake pad dust

Clean beaches and healthy creeks, rivers, bays, and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Swimming pools and spas are common in Orange County, but they must be maintained properly to guarantee that chemicals aren't allowed to enter the street, where they can flow into the storm drains and then into the waterways. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never dump pool chemicals into the ocean, so don't let it enter the storm drains. Follow these easy tips to help prevent water pollution.

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

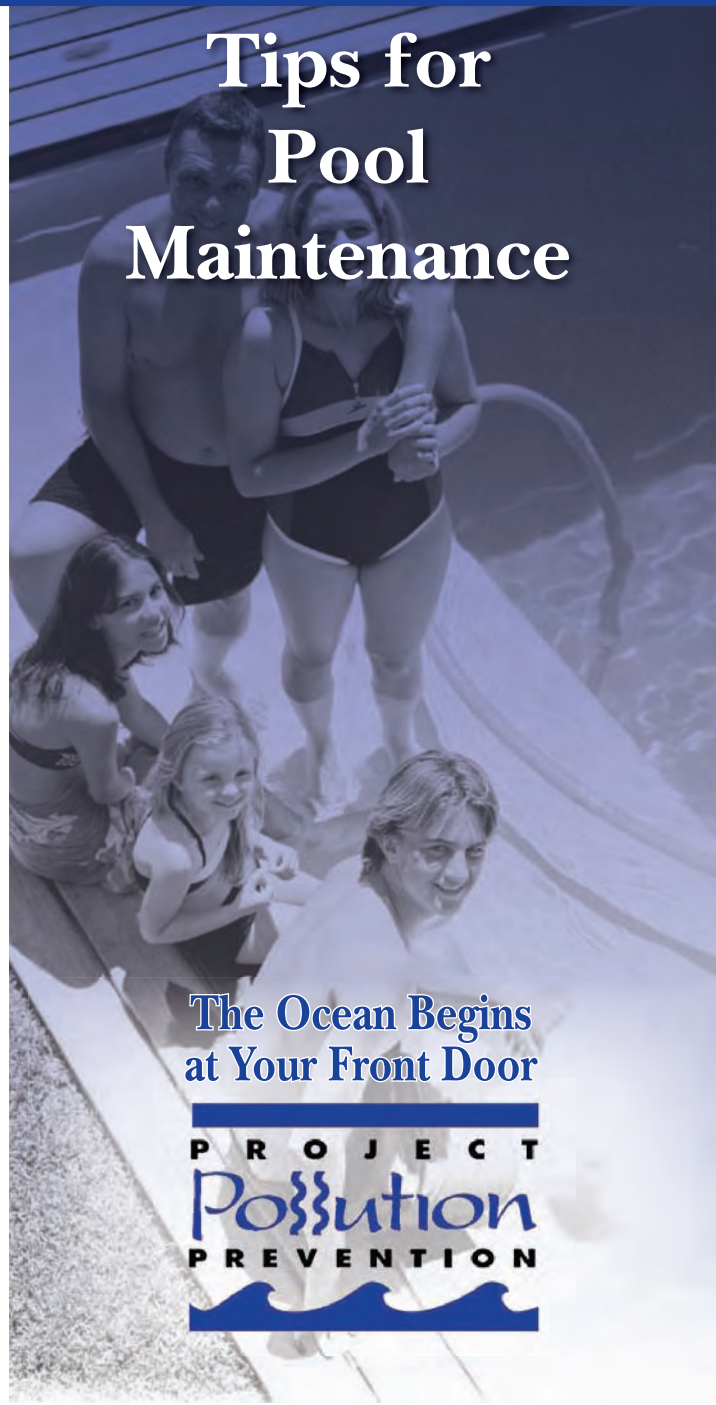
To report a spill,
call the
Orange County 24-Hour
Water Pollution Reporting Hotline
1-877-89-SPILL (1-877-897-7455).

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while maintaining your pool. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

Help Prevent Ocean Pollution:

Tips for Pool Maintenance



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Tips for Pool Maintenance

Many pools are plumbed to allow the pool to drain directly to the sanitary sewer. If yours is not, follow these instructions for disposing of pool and spa water.

Acceptable and Preferred Method of Disposal

When you cannot dispose of pool water in the sanitary sewer, the release of dechlorinated swimming pool water is allowed if all of these tips are followed:

- The residual chlorine does not exceed 0.1 mg/l (parts per million).
- The pH is between 6.5 and 8.5.
- The water is free of any unusual coloration, dirt or algae.
- There is no discharge of filter media.
- There is no discharge of acid cleaning wastes.
- Some cities may have ordinances that do not allow pool water to be disposed into a storm drain. Check with your city.

How to Know if You're Following the Standards

You can find out how much chlorine is in your water by using a pool testing kit. Excess chlorine can be removed by discontinuing the use of chlorine for a few days prior to discharge or by purchasing dechlorinating chemicals from a local pool supply company. Always make sure to follow the instructions that come with any products you use.

Doing Your Part

By complying with these guidelines, you will make a significant contribution toward keeping pollutants out of Orange County's creeks, streams, rivers, bays and the ocean. This helps to protect organisms that are sensitive to pool chemicals, and helps to maintain the health of our environment.

PROJECT Pollution PREVENTION

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, if we are not careful, our daily activities can lead directly to water pollution problems. Water that drains through your watershed can pick up pollutants which are then transported to our waterways and beautiful ocean.

You can prevent water pollution by taking personal action and by working with members of your watershed community to prevent urban runoff from entering your waterway.

For more information, please call the **Orange County Stormwater Program** at **1.877.89.SPILL** or visit **www.ocwatersheds.com**

To report a spill, call the **Orange County 24-Hour Water Pollution Problem Reporting Hotline** at **1.877.89.SPILL**.

For emergencies, dial 911.

The tips contained in this brochure provide useful information to help protect your watershed. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

Printed on Recycled Paper

Help Prevent Ocean Pollution: Tips For Protecting Your Watershed

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Tips for Protecting Your Watershed

My Watershed. Our Ocean.

Water + shed, *noun: A region of land within which water flows down into a specified water body, such as a river, lake, sea, or ocean; a drainage basin or catchment basin.*

Orange County is comprised of 11 major watersheds into which most of our water flows, connecting all of Orange County to the Pacific Ocean.

As water from rain (stormwater) or sprinklers and hoses (urban runoff) runs down your driveway and into your neighborhood streets, sidewalks and gutters, it flows into storm drains that lead to waterways within your watershed. The waterways from other cities merge as they make their way through our watersheds until all the runoff water in Orange County meets at the Pacific Ocean. The water that reaches our ocean is not pure. As it flows through the watershed, it picks up pollutants such as litter, cigarette butts, fertilizer, pesticides, pet waste, motor oil and lawn clippings. Unlike water that enters the sewer (from sinks and toilets), water that enters the storm drain is not treated before it flows, ultimately, to the ocean.

Water quality can be improved by "Adopting Your Watershed." Through this effort, we are challenging citizens and organizations to join the Orange County Stormwater Program and others who are working to protect and restore our creeks, rivers, bays and ocean.

There are many opportunities to get involved:

- Appreciate your watershed - explore the creeks, trails and ocean and make observations about its conditions. If you see anything abnormal (such as dead fish, oil spills, leaking barrels, and other pollution) contact the Orange County 24-hour water pollution problem reporting hotline at 1.877.89.SPILL to report the problem.
- Research your watershed. Learn about what watershed you live in by visiting www.ocwatersheds.com.
- Find a watershed organization in your community and volunteer to help. If there are no active groups, consider starting your own.
- Visit EPA's Adopt Your Watershed's Catalog of Watershed Groups at www.epa.gov/adopt to locate groups in your community.
- Organize or join in a creek, river, bay or ocean cleanup event such as Coastal & Inner Coastal Cleanup Day that takes place the 3rd Saturday of every September. For more information visit www.coast4u.org.

Follow these simple tips to protect the water quality of your watershed:

- **Sweep up debris and dispose of it in the trash. Do not hose down driveways or sidewalks into the street or gutter.**
- **Use dry cleanup methods such as cat litter to absorb spills and sweep up residue.**
- **Set your irrigation systems to reflect seasonal water needs or use weather-based controllers. Inspect for runoff regularly.**
- **Cover trashcans securely.**
- **Take hazardous waste to a household hazardous waste collection center. (For example, paint, batteries and petroleum products)**
- **Pick up after your pet.**
- **Follow application and disposal directions for pesticides and fertilizers.**
- **If you wash your car at home, wash it on your lawn or divert the runoff onto a landscaped area. Consider taking your car to a commercial car wash, where the water is reclaimed or recycled.**
- **Keep your car well maintained.**
- **Never pour oil or antifreeze in the street, gutter or storm drain.**

Preventing water pollution at your commercial/industrial site

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many landscape and building maintenance activities can lead to water pollution if you're not careful. Paint, chemicals, plant clippings and other materials can be blown or washed into storm drains that flow to the ocean. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never pour soap or fertilizers into the ocean, so why would you let them enter the storm drains? Follow these easy tips to help prevent water pollution.

Some types of industrial facilities are required to obtain coverage under the State General Industrial Permit. For more information visit: **www.swrcb.ca.gov/stormwater/industrial.html**

For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com**

To report a spill, call the **Orange County 24-Hour Water Pollution Problem Reporting Hotline** at **1-877-89-SPILL** (1-877-897-7455).

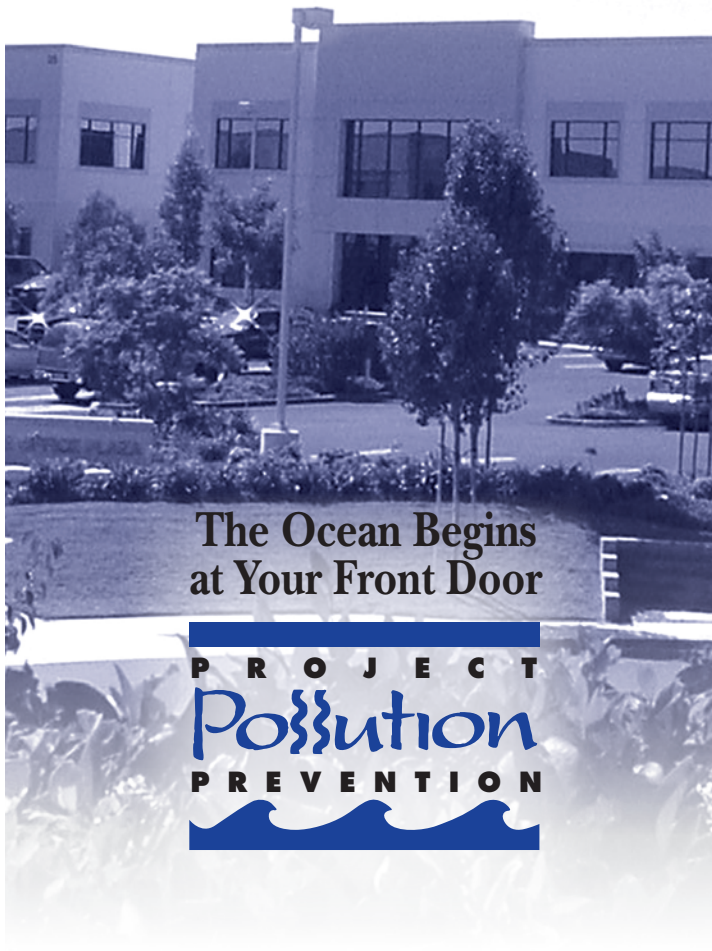
For emergencies, dial 911.

RECYCLE USED OIL

Printed on Recycled Paper

Help Prevent Ocean Pollution:

Proper Maintenance Practices for Your Business



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Proper Maintenance Practices for your Business

Landscape Maintenance

- Compost grass clippings, leaves, sticks and other vegetation, or dispose of it at a permitted landfill or in green waste containers. Do not dispose of these materials in the street, gutter or storm drain.
- Irrigate slowly and inspect the system for leaks, overspraying and runoff. Adjust automatic timers to avoid overwatering.
- Follow label directions for the use and disposal of fertilizers and pesticides.
- Do not apply pesticides or fertilizers if rain is expected within 48 hours or if wind speeds are above 5 mph.
- Do not spray pesticides within 100 feet of waterways.
- Fertilizers should be worked into the soil rather than dumped onto the surface.
- If fertilizer is spilled on the pavement or sidewalk, sweep it up immediately and place it back in the container.

Building Maintenance

- Never allow washwater, sweepings or sediment to enter the storm drain.
- Sweep up dry spills and use cat litter, towels or similar materials to absorb wet spills. Dispose of it in the trash.
- If you wash your building, sidewalk or parking lot, you **must** contain the water. Use a shop vac to collect the water and contact your city or sanitation agency for proper disposal information. Do not let water enter the street, gutter or storm drain.
- Use drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of materials in the trash.
- Use a ground cloth or oversized tub for mixing paint and cleaning tools.
- Use a damp mop or broom to clean floors.
- Cover dumpsters to keep insects, animals, rainwater and sand from entering. Keep the area around the dumpster clear of trash and debris. Do not overfill the dumpster.
- Call your trash hauler to replace leaking dumpsters.
- Do not dump any toxic substance or liquid waste on the pavement, the ground, or near a storm drain. Even materials that seem harmless such as latex paint or biodegradable cleaners can damage the environment.

Never Dispose of Anything in the Storm Drain.

- Recycle paints, solvents and other materials. For more information about recycling and collection centers, visit **www.oclandfills.com**.
- Store materials indoors or under cover and away from storm drains.
- Use a construction and demolition recycling company to recycle lumber, paper, cardboard, metals, masonry, carpet, plastic, pipes, drywall, rocks, dirt, and green waste. For a listing of construction and demolition recycling locations in your area, visit **www.ciwmb.ca.gov/recycle.**
- Properly label materials. Familiarize employees with Material Safety Data Sheets.

PROJECT Pollution PREVENTION

DF-1
DRAINAGE FACILITY OPERATION AND MAINTENANCE

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and storm water that may contain certain pollutants. Consequently these pollutants may accumulate in the system and must be removed periodically. In addition, the systems must also be maintained to function properly hydraulically to avoid flooding. Maintaining the system may involve the following activities:

1. Inspection and Cleaning of Stormwater Conveyance Structures
2. Controlling Illicit Connections and Discharges
3. Controlling Illegal Dumping

This list of Model Maintenance Procedures can be utilized as an inspection checklist to determine where better compliance with Designated Minimum Best Management Practices (notated with checkmarks and capital letters) is needed, and to recommend Additional Best Management Practices (notated with bullet points and lower case letters) that may be applicable under certain circumstances, especially where there are certain Pollutant Constituents of Concern. BMPs applicable to certain constituents are notated as:

Bacteria (BACT) *Sediment (SED)* *Nutrients (NUT)* *Oil and Grease (O&G)* *Pesticides (PEST)*
OtherToxic Compounds (TOX) *Trash (TRASH)* *Hydrological Impacts (HYD)* *Any/All or General (ANY)*

Program/Facility Being Inspected: _____

Date: _____ Inspector Name: _____

When completed, the checklist should be attached to the General Inspection Form Cover Sheet and copies should be provided to the Supervisor of the Facility/Program being inspected.

MAINTENANCE PROCEDURES:

1. Inspection and Cleaning of Drainage Facilities

Unsatisfactory	OK	General Guidelines
☐ _____	☐	T 1A. Annually inspect and clean drainage structures as needed.
☐ _____	☐	T 1B. Maintain appropriate records of cleaning and inspections.
☐ _____	☐	T 1C. Properly dispose of removed materials at a landfill or recycling facility.
☐ _____	☐	T 1D. Conduct intermittent supplemental visual inspections during the wet season to determine if there are problem inlets where sediment/trash or other pollutants accumulate, and provide for additional cleanouts as appropriate.
☐ _____	☐	T 1E. Prevent or clean up any discharges that may occur during the course of maintenance and cleaning procedures.
☐ _____	☐	T 1F. Verify that appropriate employees or subcontractors are trained in proper conductance of maintenance activities, including record keeping and disposal.
☐ _____	☐	T 1G. Annually inspect and clean v-ditches as needed, prior to the wet season. On shrub-covered slopes, vegetative debris may be placed on the downhill side of the ditch. Trash should be bagged and disposed at a landfill.

Unsatisfactory	OK
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐

General Guidelines (cont.)

- 1a. Remove trash or debris as needed from open channels. It should be noted that major vegetative debris removal may require other regulatory permits prior to completing the work. (TRASH)
- 1b. Consider retrofitting energy dissipaters (e.g. riprap) below culvert outfalls to minimize potential for erosion. (SED)
- 1c. Repair any v-ditches that have cracked or displaced in a manner that accelerates erosion. (SED)
- 1d. If suspicious conditions appear to exist, test selected samples of the removed wastes for compliance with hazardous waste regulations prior to disposal. (TOX)
- 1e. Consider more frequent regular cleaning of selected drainage structures to help address ongoing specific impairments. (SED, BACT, NUT, TRASH)
- 1f. Consider structural retrofits to the MS4 to help address ongoing specific impairments (SED, BACT, NUT, TRASH, O&G)
- 1g. Consider cleaning out pipes at gradient breaks or other in-pipe debris accumulation points as identified/needed. (ANY, BACT, NUT, TRASH)

Storm Drain Flushing

- 1h. Flushing of storm drains or storm drain inlets should only be done when critically necessary and no other solution is practical. (SED, BACT, TRASH).
- 1i. If flushed, to the extent practical the material should be collected (vacuumed), treated with an appropriate filtering device to remove sand and debris and disposed of properly. (SED)

Waste Management

T 1H. Store wastes collected from cleaning activities of the drainage facilities in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.

- 1j. Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device to remove the sand and debris prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not permitted, water should be pumped or vacuumed to a tank and properly disposed of. Do not dewater near a storm drain or stream. (SED, TRASH)
- 1k. Provide for laboratory analysis of at least one randomly collected sediment (less the debris) sample per year from the storm drain inlet leaning program to ensure that it does not meet the EPA criteria for hazardous waste. If the sample is determined to be hazardous, the sediment must be disposed of as hazardous waste and the source should be investigated. (TOX).

2. Controlling Illicit Connections and Discharges

Unsatisfactory	OK	General Guidelines
☐	☐	T 2A. Report prohibited discharges such as dumping, paint spills, abandoned oil containers, etc. observed during the course of normal daily activities so they can be investigated, contained, and cleaned up.
☐	☐	T 2B. Where field observations and/or monitoring data indicate significant problems, conduct field investigations to detect and eliminate existing illicit connections and improper disposal of pollutants into the storm drain (i.e. identify problem areas where discharges or illegal connections may occur and follow up stream to determine the source(s)). (Refer to Appendices A-10 and A-11.)
☐	☐	T 2C. Report all observed illicit connections and discharges to the 24-hour water pollution problem reporting hotline (714) 567-6363.
☐	☐	T 2D. Encourage public reporting of improper waste disposal by distributing public education materials and advertising the 24-hour water pollution problem reporting hotline.
		Storm Drain Stenciling ("No Dumping—Drains to Ocean")
☐	☐	T 2E. Implement and maintain a storm drain stenciling program.
☐	☐	• 2a. Consider adding the hotline number to the storm drain stencils (BACT, TOX, TRASH).

3. Controlling Illegal Dumping

		Field Investigation
☐	☐	T 3A. Report prohibited discharges such as dumpings observed during the course of normal daily activities so they can be investigated, contained and cleaned up.
☐	☐	T 3B. Conduct field investigations to detect and eliminate improper disposal of pollutants into the storm drain (i.e. identify problem areas where discharges or illegal connections may occur and follow up stream to determine the source(s)).
☐	☐	T 3C. Report all observed illegal dumping to the 24-hour water pollution problem reporting hotline (714) 567-6363.
☐	☐	T 3D. Encourage public reporting of improper waste disposal by distributing public education materials and advertising the 24-hour water pollution problem reporting hotline.
☐	☐	T 3E. If perpetrator can be identified, take appropriate enforcement action.
☐	☐	• 3a. Consider posting "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs could also indicate fines and penalties for illegal dumping. (ANY)

Unsatisfactory	OK	Training/Education/Outreach
☐ _____	☐	T 3F. Verify that appropriate employees and subcontractors are trained to recognize and report illegal dumping.
☐ _____	☐	T 3G. Encourage public reporting of illegal dumping by advertising the 24-hour water pollution problem reporting hotline (714) 567-6363.
☐ _____	☐	• 3b. Take extra steps to educate the public in neighborhoods where illegal dumping has occurred to inform them why illegal dumping is a problem, and that illegal dumping carries a significant financial penalty. (ANY)

LIMITATIONS:

Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.

Drainage System Maintenance SC-44

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

CASQA California Stormwater Quality Association

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:
  - Purchase and installation of signs.
  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.
  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.
  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Landscape Maintenance SC-73

Objectives

- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	
Oxygen Demanding	☑

Description

Landscape maintenance activities include vegetation removal; herbicide and insecticide application; fertilizer application; watering; and other gardening and lawn care practices. Vegetation control typically involves a combination of chemical (herbicide) application and mechanical methods. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. The major objectives of this BMP are to minimize the discharge of pesticides, herbicides and fertilizers to the storm drain system and receiving waters; prevent the disposal of landscape waste into the storm drain system by collecting and properly disposing of clippings and cuttings, and educating employees and the public.

Approach

Pollution Prevention

- Implement an integrated pest management (IPM) program. IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools.
- Choose low water using flowers, trees, shrubs, and groundcover.
- Consider alternative landscaping techniques such as naturescaping and xeriscaping.
- Conduct appropriate maintenance (i.e. properly timed fertilizing, weeding, pest control, and pruning) to help preserve the landscapes water efficiency.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Consider grass cycling (grass cycling is the natural recycling of grass by leaving the clippings on the lawn when mowing. Grass clippings decompose quickly and release valuable nutrients back into the lawn).

Suggested Protocols

Mowing, Trimming, and Weeding

- Whenever possible use mechanical methods of vegetation removal (e.g mowing with tractor-type or push mowers, hand cutting with gas or electric powered weed trimmers) rather than applying herbicides. Use hand weeding where practical.
- Avoid loosening the soil when conducting mechanical or manual weed control, this could lead to erosion. Use mulch or other erosion control measures when soils are exposed.
- Performing mowing at optimal times. Mowing should not be performed if significant rain events are predicted.
- Mulching mowers may be recommended for certain flat areas. Other techniques may be employed to minimize mowing such as selective vegetative planting using low maintenance grasses and shrubs.
- Collect lawn and garden clippings, pruning waste, tree trimmings, and weeds. Chip if necessary, and compost or dispose of at a landfill (see waste management section of this fact sheet).
- Place temporarily stockpiled material away from watercourses, and berm or cover stockpiles to prevent material releases to storm drains.

Planting

- Determine existing native vegetation features (location, species, size, function, importance) and consider the feasibility of protecting them. Consider elements such as their effect on drainage and erosion, hardiness, maintenance requirements, and possible conflicts between preserving vegetation and the resulting maintenance needs.
- Retain and/or plant selected native vegetation whose features are determined to be beneficial, where feasible. Native vegetation usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.
- Consider using low water use groundcovers when planting or replanting.

Waste Management

- Compost leaves, sticks, or other collected vegetation or dispose of at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Reduce the use of high nitrogen fertilizers that produce excess growth requiring more frequent mowing or trimming.

- Avoid landscape wastes in and around storm drain inlets by either using bagging equipment or by manually picking up the material.

Irrigation

- Where practical, use automatic timers to minimize runoff.
- Use popup sprinkler heads in areas with a lot of activity or where there is a chance the pipes may be broken. Consider the use of mechanisms that reduce water flow to sprinkler heads if broken.
- Ensure that there is no runoff from the landscaped area(s) if re-claimed water is used for irrigation.
- If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.
- Irrigate slowly or pulse irrigate to prevent runoff and then only irrigate as much as is needed.
- Apply water at rates that do not exceed the infiltration rate of the soil.

Fertilizer and Pesticide Management

- Utilize a comprehensive management system that incorporates integrated pest management (IPM) techniques. There are many methods and types of IPM, including the following:
  - Mulching can be used to prevent weeds where turf is absent, fencing installed to keep rodents out, and netting used to keep birds and insects away from leaves and fruit.
  - Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off the plant with water or in some cases vacuumed off of larger plants.
  - Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used.
  - Slugs can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
  - In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).
  - Small mammals and birds can be excluded using fences, netting, tree trunk guards.
  - Beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seed head weevils, and spiders that prey on detrimental pest species can be promoted.
- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

- Use pesticides only if there is an actual pest problem (not on a regular preventative schedule).
- Do not use pesticides if rain is expected. Apply pesticides only when wind speeds are low (less than 5 mph).
- Do not mix or prepare pesticides for application near storm drains.
- Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the pest.
- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Calibrate fertilizer and pesticide application equipment to avoid excessive application.
- Periodically test soils for determining proper fertilizer use.
- Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Purchase only the amount of pesticide that you can reasonably use in a given time period (month or year depending on the product).
- Triple rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Dispose of empty pesticide containers according to the instructions on the container label.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.
- Inspect pesticide/fertilizer equipment and transportation vehicles daily.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution. Pesticide application must be under the supervision of a California qualified pesticide applicator.
- Train/encourage municipal maintenance crews to use IPM techniques for managing public green areas.
- Annually train employees within departments responsible for pesticide application on the appropriate portions of the agency's IPM Policy, SOPs, and BMPs, and the latest IPM techniques.

- Employees who are not authorized and trained to apply pesticides should be periodically (at least annually) informed that they cannot use over-the-counter pesticides in or around the workplace.
- Use a training log or similar method to document training.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a know in location
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- The Federal Pesticide, Fungicide, and Rodenticide Act and California Title 3, Division 6, Pesticides and Pest Control Operations place strict controls over pesticide application and handling and specify training, annual refresher, and testing requirements. The regulations generally cover: a list of approved pesticides and selected uses, updated regularly; general application information; equipment use and maintenance procedures; and record keeping. The California Department of Pesticide Regulations and the County Agricultural Commission coordinate and maintain the licensing and certification programs. All public agency employees who apply pesticides and herbicides in "agricultural use" areas such as parks, golf courses, rights-of-way and recreation areas should be properly certified in accordance with state regulations. Contracts for landscape maintenance should include similar requirements.
- All employees who handle pesticides should be familiar with the most recent material safety data sheet (MSDS) files.
- Municipalities do not have the authority to regulate the use of pesticides by school districts, however the California Healthy Schools Act of 2000 (AB 2260) has imposed requirements on California school districts regarding pesticide use in schools. Posting of notification prior to the application of pesticides is now required, and IPM is stated as the preferred approach to pest management in schools.

Requirements

Costs

Additional training of municipal employees will be required to address IPM techniques and BMPs. IPM methods will likely increase labor cost for pest control which may be offset by lower chemical costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Waste Management

Composting is one of the better disposal alternatives if locally available. Most municipalities either have or are planning yard waste composting facilities as a means of reducing the amount of waste going to the landfill. Lawn clippings from municipal maintenance programs as well as private sources would probably be compatible with most composting facilities

Contractors and Other Pesticide Users

Municipal agencies should develop and implement a process to ensure that any contractor employed to conduct pest control and pesticide application on municipal property engages in pest control methods consistent with the IPM Policy adopted by the agency. Specifically, municipalities should require contractors to follow the agency's IPM policy, SOPs, and BMPs; provide evidence to the agency of having received training on current IPM techniques when feasible; provide documentation of pesticide use on agency property to the agency in a timely manner.

References and Resources

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. 1995. King County Surface Water Management. July. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

Los Angeles County Stormwater Quality Model Programs. Public Agency Activities http://ladpw.org/wmd/npdes/model_links.cfm

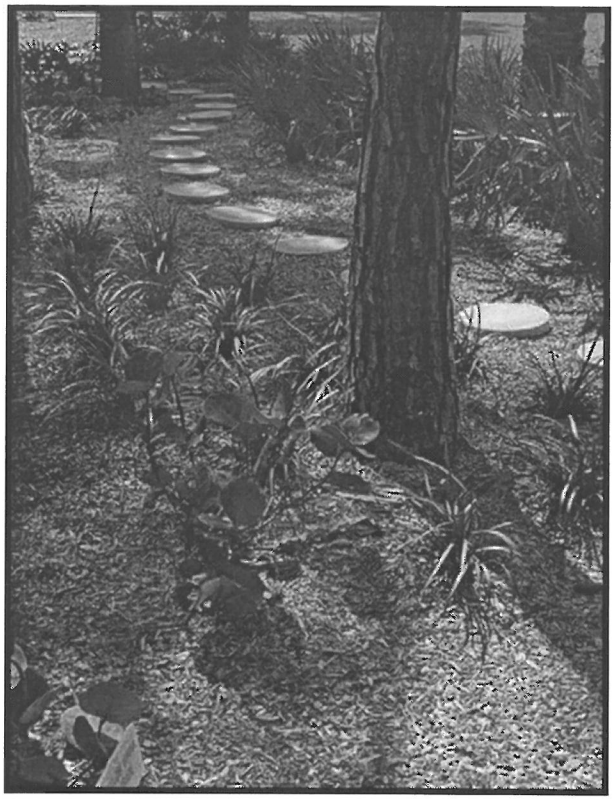
Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

Orange County Stormwater Program http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Landscaping and Lawn Care. Office of Water. Office of Wastewater Management. On-line: http://www.epa.gov/npdes/menuofbmps/poll_8.htm

Site Design & Landscape Planning SD-10



Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Roof Runoff Controls SD-11

Rain Garden

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say ¼ to ½ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Supplemental Information

Examples

- City of Ottawa's Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, "Low-Impact Development", January/February 2003. www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD. www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

APPENDIX D

BMP MAINTENANCE SUPPLEMENT / O&M PLAN

OPERATIONS AND MAINTENANCE (O&M) PLAN

Water Quality Management Plan

For

Ritz-Carlton Residences, Newport Beach

900 Newport Center Drive, Newport Beach, CA 92660

APN: 442-492-02

This page intentionally left blank

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	**BMP Name and BMP Implementation, Maintenance and Inspection Procedures**	**Implementation, Maintenance, and Inspection Frequency and Schedule**	**Person or Entity with Operation & Maintenance Responsibility**
NON-STRUCTURAL SOURCE CONTROL BMPs			
Yes	N2. Activity Restrictions	The Owner will prescribe activity restrictions to protect surface water quality, through lease terms or other equally effective measure, for the property. Restrictions include, but are not limited to, prohibiting vehicle maintenance or vehicle washing. Frequency: Ongoing	Newport Center Hotel, LLC
Yes	N3. Common Area Landscape Management	Maintenance shall be consistent with City requirements. Fertilizer and/or pesticide usage shall be consistent with County Management Guidelines for Use of Fertilizers (OC DAMP Section 5.5) as well as local requirements. Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting, and replacement of mulch shall be performed on an as-needed basis to prevent exposure of erodible surfaces. Trimmings, clippings, and other landscape wastes shall be properly disposed of in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and storm drain inlets. Frequency: Monthly	Newport Center Hotel, LLC

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	**BMP Name and BMP Implementation, Maintenance and Inspection Procedures**	**Implementation, Maintenance, and Inspection Frequency and Schedule**	**Person or Entity with Operation & Maintenance Responsibility**
Yes	N4. BMP Maintenance	Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP. Records of inspections and BMP maintenance shall be kept by the Owner and shall be available for review upon request. Frequency: Ongoing	Newport Center Hotel, LLC
Yes	N11. Common Area Litter Control	Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities. Frequency: Weekly	Newport Center Hotel, LLC
Yes	N12. Employee Training	The Owner shall educate all new employees/managers on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted on an as needed basis. Materials that may be utilized on BMP maintenance are included in Appendix D. Frequency: Annually	Newport Center Hotel, LLC
Yes	N14. Common Area Catch Basin Inspection	Catch basin inlets and other drainage facilities shall be inspected monthly. Inlets and other facilities shall be cleaned when the sump is 40% full and annually at a minimum. Frequency: Annually	Newport Center Hotel, LLC

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	**BMP Name and BMP Implementation, Maintenance and Inspection Procedures**	**Implementation, Maintenance, and Inspection Frequency and Schedule**	**Person or Entity with Operation & Maintenance Responsibility**
Yes	N15. Street Sweeping Private Streets and Parking Lots	On-site parking lots and drive aisles will be swept on a monthly basis, at minimum. Frequency: Quarterly	Newport Center Hotel, LLC
STRUCTURAL SOURCE CONTROL BMPs			
Yes	S1. Provide storm drain system stenciling and signage The phrase "NO DUMPING! DRAINS TO OCEAN", or an equally effective phrase approved by the City, will be stenciled on all major storm drain inlets within the project site to alert the public to the destination of pollutants discharged into storm water. Stencils shall be in place prior to release of certificate of occupancy.	Inspect stenciling for legibility no later than the beginning of the rainy season on October 1st of each year. Stenciling must be re-stenciled to maintain legibility as necessary and when deemed necessary by the local inspecting agency. Frequency: Annually	Newport Center Hotel, LLC

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX			
BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	S4. Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control The Owner will be responsible for the installation and maintenance of all common landscape areas utilizing similar planting materials with similar water requirements to reduce excess irrigation runoff. Includes implementation of efficient irrigation systems for common area landscaping including, but not limited to, provisions for water sensors and programmable irrigation cycles. This includes smart timers, rain sensors, and moisture shut-off valves.	In conjunction with routine maintenance, verify that landscape design continues to function properly by adjusting systems to eliminate overspray to hardscape areas and to verify that irrigation timing and cycle lengths are adjusted in accordance to water demands, given the time of year, weather, and day or nighttime temperatures. System testing shall occur twice per year. Water from testing/flushing shall be collected and properly disposed to the sewer system and shall not discharge to the storm drain system. Frequency: 2x per year	Newport Center Hotel, LLC

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX		
BMP Name and BMP Implementation, Maintenance and Inspection Procedures	**Implementation, Maintenance, and Inspection Frequency and Schedule**	**Person or Entity with Operation & Maintenance Responsibility**
LOW IMPACT DEVELOPMENT BMPs		
HSC-2: Impervious Area Dispersion	In conjunction with routine landscaping maintenance activities, maintain vegetative cover and/or mulch to eliminate exposed soils. Repair any eroded surfaces immediately. Inspections to be performed twice each year (spring and fall) and after major storm events to check for signs of erosion, gullies, and sloughing. Frequency: Monthly	Newport Center Hotel, LLC
BIO-7: Modular Wetland Systems (MWS) Modular Wetlands by Modular Wetlands Systems, Inc. are proprietary biotreatment systems that utilize multi-stage treatment processes. The pre-treatment chamber contains the first three stages of treatment, and includes a catch basin inlet filter to capture trash, debris, gross solids and sediments, a settling chamber for separating out larger solids, and a media filter cartridge for capturing fine TSS, metals, nutrients, and bacteria. Runoff then flows through the wetland chamber where treatment is achieved through a variety of physical, chemical, and biological processes. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants, functioning similar to bioretention systems. The discharge chamber at the end of the unit collects treated flows and discharges back into the storm drain system.	Inspect system at a minimum of once every six months, prior to the start of the rainy season (October 1), and after major storm events. Typical maintenance includes removing trash & debris from the catch basin screening filter (by hand), removal of sediment and solids in the settlement chamber (vacuum truck), replacement of the BioMediaGREENTM filter cartridge, and replacement of the BioMediaGREENTM drain down filter (if equipped). In addition, plants within the wetland chamber will require trimming in conjunction with landscape maintenance activities. See attached manufacturer's specifications for additional requirements. Frequency: 2x per year	Newport Center Hotel, LLC

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX		
BMP Name and BMP Implementation, Maintenance and Inspection Procedures	**Implementation, Maintenance, and Inspection Frequency and Schedule**	**Person or Entity with Operation & Maintenance Responsibility**
FULL CAPTURE SYSTEM (FCS) BMPs		
PRE-2: Full Capture Trash System (Bio Clean CPS or similar)	During the rainy season (October 1 – April 30), the catch basins with connector pipe screens should be inspected monthly and cleaned out at least once per year at a minimum. Manufacturer recommends cleaning the insert four times per year. Frequency: Monthly (inspections), Annual and before major storm events (cleanout)	Newport Center Hotel, LLC

Required Permits

Permits are not required for the implementation, operation, and maintenance of the BMPs.

Forms to Record BMP Implementation, Maintenance, and Inspection

The form that will be used to record implementation, maintenance, and inspection of BMPs is attached.

Recordkeeping

All records must be maintained for at least five (5) years and must be made available for review upon request.

Waste Management

Any waste generated from maintenance activities will be disposed of properly. Wash water and other waste from maintenance activities is not to be discharged or disposed of into the storm drain system. Clippings from landscape maintenance (i.e. prunings) will be collected and disposed of properly off-site, and will not be washed into the streets, local area drains/conveyances, or catch basin inlets.

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

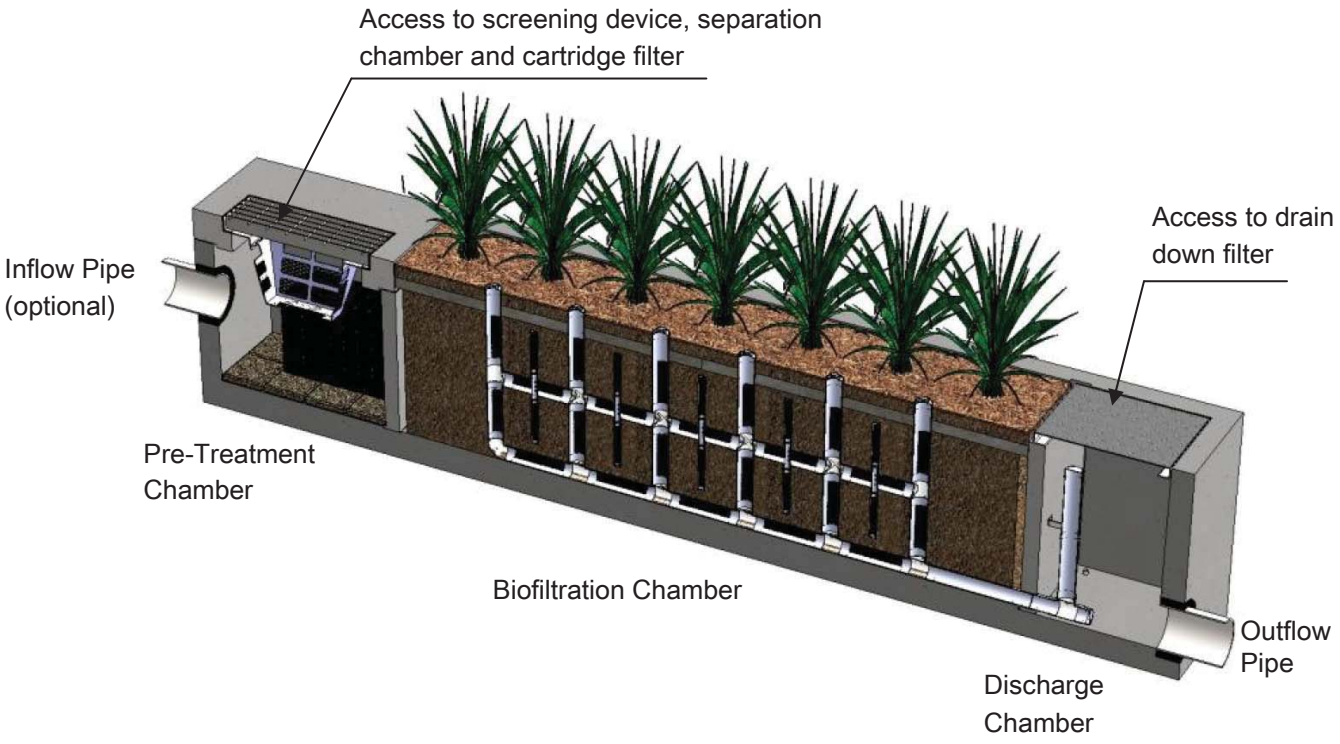
BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

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

System Diagram



Maintenance Procedures

Screening Device

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

Separation Chamber

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

Cartridge Filters

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

Drain Down Filter

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

Maintenance Notes

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

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

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

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

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

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

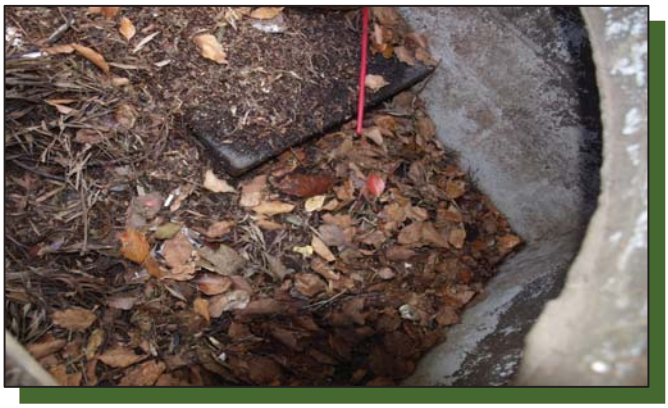
Maintenance Procedure Illustration

Screening Device

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

Separation Chamber

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



Cartridge Filters

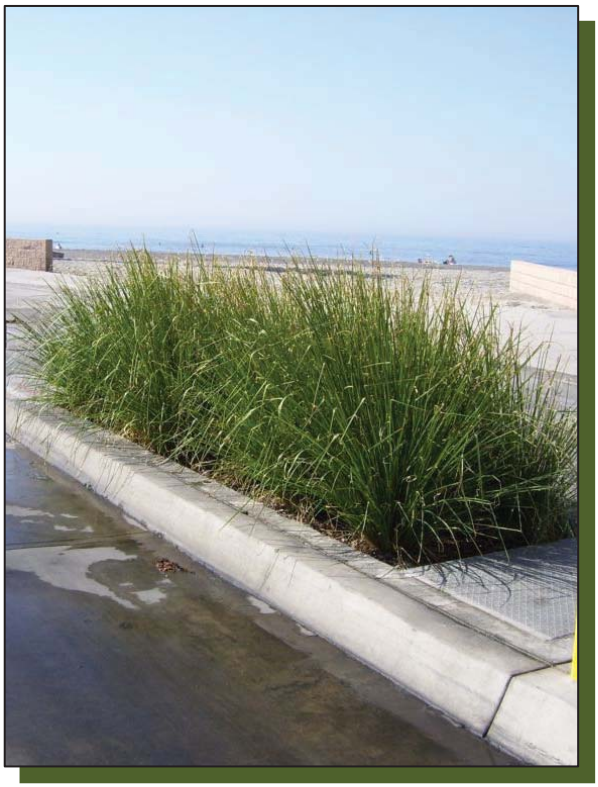
The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.

Drain Down Filter

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

Trim Vegetation

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



Inspection Form

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Inspection Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

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

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

Weather Condition _____ Additional Notes _____

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

Inspection Checklist

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

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

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

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

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: _____

2972 San Luis Rey Road, Oceanside, CA 92058 P (760) 433-7640 F (760) 433-3176

Maintenance Report

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

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

Weather Condition _____ Additional Notes _____

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

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

Comments:

2972 San Luis Rey Road, Oceanside, CA 92058 P. 760.433.7640 F. 760.433.3176

Bio Clean

A Forterra Company

Modular Connector Pipe Screen

A Stormwater Trash Capture Solution

OVERVIEW

The Bio Clean Modular Connector Pipe Screen (MCPS) is designed to utilize existing catch basins, allowing them to efficiently capture 100% of trash and debris. This device meets the Full Trash Capture requirements pioneered in California and is approved by the California state and regional boards.

MCPS technology can be retrofitted into any curb or drop inlet to help municipalities meet current stormwater regulations and comply with their NPDES or MS4 permit. MCPS devices can be used for new site developments as the first line of defense to prevent trash and debris from reaching downstream stormwater BMPs where they can cause clogging and unnecessary maintenance burdens.

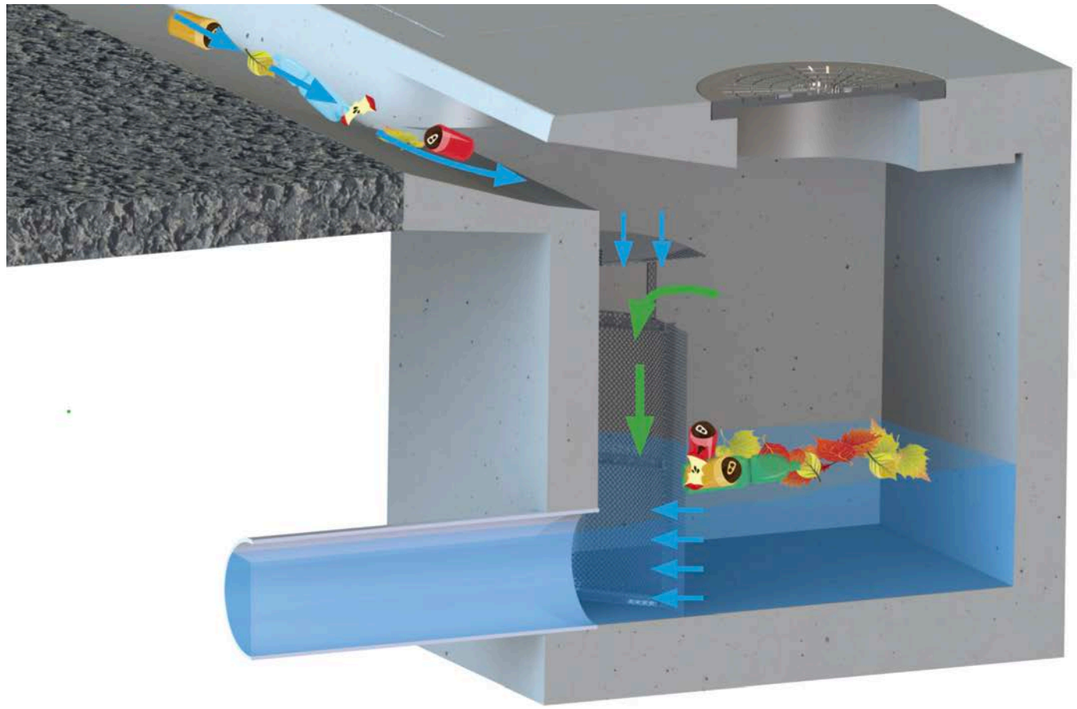
Constructed from 100% 304 perforated stainless steel, the system is feasible, effective, and built to last. An innovative curved design with multiple cross supports ensures the device can withstand several hundred pounds of pressure, far exceeding the 60-plus pound requirement by the County of Los Angeles. Its modular design makes it easy to insert through a 24-inch diameter manhole and assemble inside the basin within minutes.

The center piece comes in different lengths allowing it to be used with outlet pipe sizes up to 48 inches or greater. For catch basins with pipes exiting in the corner, the system can easily be adapted to an 'L' shape using a single corner piece and a single center piece.

ADVANTAGES

- MEETS 100% FULL TRASH CAPTURE REQUIREMENTS OF THE CALIFORNIA STATE AND REGIONAL WATER BOARDS
- 100% STAINLESS STEEL CONSTRUCTION UTILIZING ONLY PERFORATED METAL CONSTRUCTION
- MODULAR DESIGN ALLOWS IT TO BE ADAPTED TO ANY PIPE SIZE AND QUICKLY ASSEMBLED INSIDE THE CATCH BASIN
- ROUND DESIGN WITH CROSS SUPPORTS WITHSTANDS SEVERAL HUNDRED POUNDS OF WATER PRESSURE, FAR EXCEEDING ALL OTHER DEVICES.

OPERATION



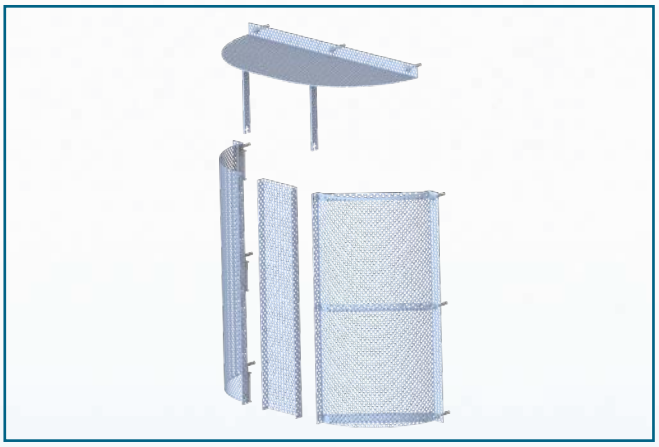
Treated flows enter the basin and are passed through the MCPS which retains all trash and debris down to 5 mms in size.

High flows are allowed to bypass over the top of the MCPS during intense storm events.

SPECIFICATIONS

PIPE SIZE (in.)	UNIT HEIGHT (in.)	LENGTH OF CENTER PIECE (in.)	ASSEMBLY WIDTH (in.)
18	18	n/a	24
24	24	6	30
30	30	12	36
36	36	18	42
42	42	24	48
48	48	30	60

INSTALLATION



The modular design of the system makes installation fast and easy. Rounded end pieces and center sections fit through any standard manhole. The system is assembled using self-tapping screws and concrete drive pins.

MAINTENANCE

The MCPS makes any catch basin a Full Trash Capture device. Maintenance of the catch basin can be performed using a standard vacuum truck or removed by hand. The center piece can be easily removed to allow access to the outlet pipe for jetting and other activities.

Bio Clean
A Forterra Company

5796 Armada Drive Suite 250
Carlsbad, CA 92008
855.566.3938
stormwater@forterrabp.com
biocleanenvironmental.com

122018R1A

APPENDIX E

GEOTECHNICAL REPORT

NMG Geotechnical, Inc.

April 8, 2021

Project No. 20108-01

To: Lyon Living
4901 Birch Street
Newport Beach, California 92660

Attention: Mr. Riley Paone

Subject: Geotechnical Exploration and Design Report for Proposed Improvements and Additions to the Existing Marriott Hotel, 900 Newport Center Drive, City of Newport Beach, California

In accordance with your authorization, NMG Geotechnical, Inc. (NMG) has performed a geotechnical exploration and prepared this design report for the proposed improvements and additions to the existing Marriott Hotel located at 900 Newport Center Drive in the city of Newport Beach, California. The proposed improvements include demolition of front entry cover, atrium area floor level and the main pool area. Improvements include a new entry drive/cover with various architectural and landscaping improvements, reconfiguration of the main pool and gazebo areas with addition of an outdoor bar, seating areas and a new pool, and patio/decking and landscape improvements to the secondary pool area. Construction is also planned in the existing hotel atrium area, where the floor will be lowered approximately 18 inches and two interior levels will be constructed. Proposed grading will also include regrading of the slope and path area below the western side of the northern portion of the building (Pacific Landing). The purpose of our study was to review the subject improvements in light of the geotechnical conditions at the site in order to provide recommendations for project design and grading.

NMG has worked in Newport Beach and specifically Fashion Island for the past 25 years and is very familiar with the geology and geotechnical issues within the area. We have also obtained and reviewed the prior reports for the hotel site and have included those boring logs and laboratory test results from these prior studies by others. Our supplemental geotechnical exploration for this study included seven hollow-stem borings in the entry, main pool and adjacent areas.

Based on our review, we conclude that the subject property is considered suitable for the proposed improvements from a geotechnical viewpoint provided the project is designed and constructed in accordance with the geotechnical recommendations provided herein.

If you have any questions regarding this report, please contact our office. We appreciate the opportunity to provide our services.

Respectfully submitted,

NMG GEOTECHNICAL, INC.

Shahrooz "Bob" Karimi, RCE 54250
Principal Engineer

Terri Wright, CEG 1342
Principal Geologist

TW/SBK/grd

Distribution: (1) Addressee (E-Mail)
(2) Ms. Oriana Slasor, Fuscoe (Wet-Signed and E-Mail)
(1) Ms. Claudia Walker, KPFF Structural Engineers (E-Mail)
(1) Mr. BJ Wickett, Houston Tyner Architects (E-Mail)

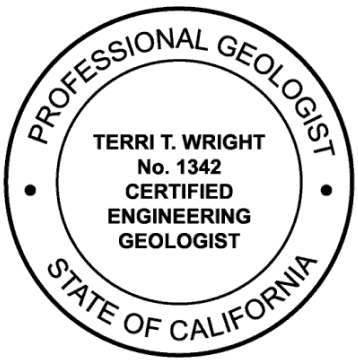


TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

ATTACHMENTS

To reduce the file size, a portion of Appendix B and Appendix C, D and E have been removed for this attachment. The full Geotechnical Report can be found under a separate submittal.

1.0 INTRODUCTION

1.1 Purpose and Scope of Work

In accordance with your request, NMG Geotechnical, Inc. (NMG) has prepared this geotechnical exploration and design report for the proposed improvements to the Marriott Hotel, located at 900 Newport Center Drive, in the city of Newport Beach, California (Figure 1). The purpose of our study was to evaluate the geotechnical site conditions in light of the proposed improvements in order to provide geotechnical recommendations for the project design and grading.

We have reviewed the preliminary grading plan prepared by Fuscoe and received by NMG on April 5, 2021. The recent topographic map of the site was used as the base map for the 30-scale Boring Location Map (Plate 1) to show the boring locations from this and prior studies.

Our scope of work was as follows:

- Review and compilation of available geotechnical reports and maps for the subject site and surrounding area. We also reviewed historic aerial photographs, historic topographic maps, and the prior design plans for the existing building, which were provided by you and/or obtained from the City. A list of references is included in Appendix A.
- Drilling of seven additional hollow-stem-auger borings near the entry to the hotel, pool area and near locations of proposed improvements. These borings were geotechnically logged and samples were collected for laboratory testing.
- Laboratory testing, including in-situ moisture and density, consolidation, shear strength, expansion index, and soluble sulfate content.
- Evaluation of faulting and seismicity in accordance with the 2019 California Building Code (CBC).
- Geotechnical review of the compiled data, including the geologic and soil conditions, settlement, retaining wall, and foundation considerations.
- Preparation of this report with our findings, conclusions, and recommendations for the proposed demolition and pad grading.

1.2 Site Location and Description

The Marriott Hotel is located at the southwest corner of Newport Center Drive loop road and Santa Barbara Road in Newport Beach, California (Figure 1). The hotel is situated on an approximate 9-acre property that is bounded by Santa Barbara Road on the north, Newport Center Drive on the east, and the Newport Beach Golf Course on the west. The existing hotel consists of a main tower with eight levels of guest rooms surrounded by 1- to 3-level structures for the lobby, conference rooms, other guest rooms and pool/spa facilities. There is also a 12-story tower for guest rooms and offices located to the north of the main hotel tower. An open-air atrium is located in the middle of the original tower, behind the main lobby area. There are three pool and amenity areas associated with the hotel, with the main pool area located directly behind the atrium. A lower gazebo area for special events is also located behind the main pool overlooking the golf course. A 3-level garage

structure, which is partially subterranean, is also located along the southeast portion of the site, parallel to Newport Center Drive.

1.3 Site History and Prior Investigations

Based on review of historic aerial photographs and topographic maps dating back to the late 1930s, prior use of the subject site was for agricultural (ranching) activities through the mid-1960s. The Fashion Island retail center was originally graded in the mid-1960s, which included construction of the Newport Center Drive loop road. The original hotel was constructed between 1972 and 1980, with at-grade parking in the area of the current day northern tower and parking structure areas. By 1995, both the northern tower and parking structures were added.

The original geotechnical investigation was performed by Dames and Moore (1973) and included 14 borings (DB-1 through DB-14). While the early study did not define the earth units, we were able to assign earth units based on the descriptions provided on the logs. The investigation performed for the main additions of the northern tower and garage were performed by Soils International, Inc. (1981 and 1983), and included another nine borings (SI-1 through SI-9). Please note that the study by Soils International, Inc. assigned a bench mark of 100-foot elevation at the hotel sign near the intersection of Newport Center Drive and Santa Barbara, which today is at 182-feet above mean sea level (msl) elevation. In 1981, there was a leaking water line under the northern tower area, and Irvine Soils, Inc. drilled 15 borings in the northern building area (IB-1 through IB-15), with only three of these borings extending into bedrock. In 2005, the entry drive and lobby area were renovated. As part of the renovations, the lobby area was expanded with a curved front facing, and the front welcome drives and valet parking areas were reconfigured. We were not able to locate the geotechnical report(s) for this renovation. However, the foundation plans provided by the structural engineer references a report. Two additional shallow borings were drilled in the planter areas within the existing atrium by Earth Systems Pacific (2020) for a planned addition that was not completed. The locations of these borings are shown on Plate 1 and the logs are included in Appendix B. The geotechnical laboratory test results from the prior studies are also presented in Appendix C.

1.4 Proposed Development

The proposed improvements at the site consist of demolition of the front entry/cover, the atrium area floor level and the main pool and gazebo areas, and construction of a new entry drive/cover with various architectural wall, port cochere and landscaping improvements, reconfiguration of the main pool and gazebo areas, and the addition of an outdoor bar, seating areas, and patio/decking and landscape improvements to the secondary pool area. In addition, the lower portion of the existing atrium area will be converted to a fitness and yoga area at the lower level and a Great room at the ground level. There will also be other structural improvements locally throughout the hotel.

Proposed grading for the improvements includes lowering the existing atrium level pad grade by 18 inches, removal of the main pool and excavation for a new pool, regrading of the slope and path area below the western portion of hotel structures, as well as regrading of the gazebo area and the main entry area. The planned grading consists of minor cuts and fills up to 4 feet. The back slope

behind the western portion of the hotel structures will be reshaped, the concrete path will be lowered, and there will be a cantilever seating area added over the top-of-slope in line with the new rectangular pool.

1.5 Field Exploration

Our field exploration included two phases of drilling. On January 28, 2021, three 11.5-inch-diameter, hollow-stem-auger borings (HS-1, -2, and -3) were drilled in the front entry area to depths of 26.3 to 31.5 feet below ground surface (bgs) with a truck-mounted drilling rig. On January 29, 2021, a tri-pod hollow-stem drilling rig was utilized to drill four borings (HS-4 through HS-7) in the back of the hotel where access was not possible with a truck-mounted rig. These borings were drilled to depths of 10 to 20 feet. All borings were hand-augered in the upper 5 feet and encountered bedrock in the bottom of the borings. The truck-mounted drilling rig was able to drill 15 feet into bedrock and take samples; however, the tri-pod rig typically had refusal at ½ to 2 feet into the bedrock. The borings were geotechnically logged and in-situ and bulk samples were collected.

We obtained relatively undisturbed soil ring samples in the exploratory boring with a 2.5-inch, inside-diameter, split-barrel sampler. The samplers were driven into the soil with a 140-pound automatic safety hammer, free-falling 30 inches on the truck-mounted rig, and with a cat-head and pulley on the tri-pod rig. The drive samples were also used to obtain a measure of resistance of the soil to penetration (recorded as blows-per-foot on our geotechnical boring log). Representative bulk samples of onsite soil were collected from the drill cuttings and used for additional laboratory testing. The borings were backfilled with cuttings and tamped for compaction, and the AC pavement was patched with black-dyed quickset concrete. Concrete areas were patched with quickset concrete. The approximate locations of these and prior borings are shown on the Geotechnical Map (Plate 1). The boring logs are included in Appendix B.

1.6 Laboratory Testing

Laboratory tests performed on selected bulk and relatively undisturbed soil samples include:

- Moisture content and dry density;
- Direct shear;
- Consolidation;
- Expansion index; and
- Soluble sulfate content.

Laboratory tests were conducted in general conformance with applicable ASTM standards. Laboratory test results for this study, as well as the tests performed for the prior studies, are presented in Appendix C. In-situ moisture and dry density results are included on the geotechnical boring logs (Appendix B).

2.0 GEOTECHNICAL FINDINGS

2.1 Geologic Setting

The site is located on the Newport Mesa, approximately 1.5-miles inland from the ocean. The mesa highland is covered with coastal terrace deposits and is located at the southwestern end of the San Joaquin Hills. Mapping by the State (CDMG, 1981) indicates the site is underlain by Quaternary-age marine terrace deposits which overlie Miocene-age sedimentary bedrock of the Monterey Formation.

The Fashion Island/Newport Center area exhibits a geologic configuration that is characteristic of a series of distinguishable elevated terraces and wave-cut platforms. The area has undergone regional uplift since deposition of the marine terrace deposits onto the ancient wave cut benches. These deposits were subsequently uplifted with the oldest deposits exposed along the higher, northern portion of the center and the lower/younger deposits located along the southern portion of the center. Based on mapping by the State, the terrace underlying the site is believed to be the second emergent terrace (Marine Isotopic Stage 7).

2.2 Earth Units

Our evaluation of the onsite data indicates that the site is underlain by compacted fill overlying native marine terrace deposits and bedrock of the Monterey Formation. These units are described below, in the order of youngest to oldest.

Artificial Fill (Af): Based on the prior and recent geotechnical borings, there is up to 5 feet of existing artificial fill under the proposed building and adjacent areas. The fill materials were found to consist of brown, gray brown to reddish-brown sandy clay and clayey sand that was generally damp to moist and medium dense, with local abundant roots near landscape areas. In HS-4, the fill consisted of fine to medium sand under the pool deck.

Marine Terrace Deposit (Qtm): Quaternary-age marine terrace deposits underlie the existing artificial fill and overlie the Monterey Formation bedrock. These deposits consist of a dark gray brown sandy clay layer (interpreted as the soil cover over the sandy terrace) that overlies yellowish-brown to reddish-brown clean fine to medium sands. The terrace material was found to be moist to locally wet and medium dense to very dense. These terrace sands were deposited on an ancient wave cut bench and unconformably overlie the bedrock.

Monterey Formation (Tm): Bedrock of the Miocene-age Monterey Formation underlies the marine terrace deposits and generally consists of olive gray to light gray interbedded fine sandstone, siltstone and claystone with local chert beds. Bedding thickness varies from thin to laminated, with localized thin beds of cemented siltstone (or shale, up to ½ inch thick). The marine terrace/bedrock contact at the site is variable, at elevations of 154 to 166 feet msl.

2.3 Geotechnical Conditions

The following includes a summary of the subsurface geotechnical conditions based on the laboratory test results performed on collected samples by NMG (Appendix C). The in-situ moisture contents and dry densities are included on the boring logs in Appendix B.

In-situ Moisture Content and Dry Density: Undisturbed samples of the terrace materials and bedrock were collected during this investigation. Since the upper 5 feet of the borings were hand-augered, no drive samples were collected of the fill. Blow counts in the terrace varied from 17 to 48 blows per foot with the automatic140-pound hammer dropping 30 inches per blow, and over 50 blows with the manual drop. In-situ dry densities for terrace deposits were generally in the range of 99.2 to 115.4 pounds-per-cubic-foot (pcf) with moisture contents ranging from 2.7 to 18.6 percent. Blow counts in the bedrock were over 50 blows per foot with both the automatic and manual sampling. In-situ dry densities for bedrock were generally in the range of 78.9 to 97.3 pounds-per-cubic-foot (pcf) with moisture contents ranging from 19.0 to 32.8 percent.

Shear Strength: Direct shear testing was performed on representative terrace deposits and the bedrock materials. The terrace deposits exhibit ultimate friction angles in the range of 19 to 27 degrees, with cohesions varying from 100 to 300 pounds per square foot (psf). Peak values for the friction angle and cohesion were in the range of 24.5 to 31 degrees and 350 to 550 psf, respectively. The test result on one sample of the bedrock indicated an ultimate friction angle of 29 degrees, with cohesion of 100 pounds per square foot (psf). Peak values for the friction angle and cohesion were 34 degrees and 250 psf, respectively.

Compressibility: Consolidation testing was performed on three relatively undisturbed ring samples collected at depths of 5 feet in three of the recent borings (HS-1, HS-4 and HS-7). Several samples were also tested previously as part of the prior investigations near the building. Based on the laboratory test results, the samples collected have relatively low compressibility with negligible hydro-collapse/swell potential upon addition of water at a load of 1.6 kilo-pounds per square foot (ksf).

Expansion Potential: The soil sample collected from the upper 5 feet in HS-1 has "Medium" expansion potential with an expansion index of 62.

Soluble Sulfate Content: The soluble sulfate exposure of the sample collected in the upper 5 feet was classified as "S0" per Table 19.3.1.1 of ACI-318-14.

2.4 Regional Faulting, Seismicity, and Seismic Hazards

Regional Faults: The site is not located within a fault-rupture hazard zone as defined by the Alquist-Priolo Special Studies Zones Act (CGS, 2018) and no evidence of active faulting was found during our background study. Also, based on mapping by the State (CGS, 2010), there are no active faults mapped at the site.

Using the USGS Deaggregation computer program (USGS, 2021) and the site coordinates of 33.6166 degrees north latitude and -117.8801 degrees west longitude, the closest major active

faults to the site are the Newport-Inglewood Fault located 2.7 miles (4.4km) to the south of the site, and the San Joaquin Hills Blind Thrust Fault located 3.3 miles (5.3 km) north of the site.

Seismicity: Properties in southern California are subject to seismic hazards of varying degrees depending upon the proximity, degree of activity, and capability of nearby faults. These hazards can be primary (i.e., directly related to the energy release of an earthquake, such as surface rupture and ground shaking) or secondary (i.e., related to the effect of earthquake energy on the physical world, which can cause phenomena such as liquefaction and ground lurching). Since there are no active faults at the site, the potential for primary ground rupture is considered very low. The primary seismic hazard for this site is ground shaking due to a future earthquake on one of the major regional active faults.

The maximum moment magnitude for the Controlling Fault is 7.15, which would be generated from the Newport-Inglewood Fault. The seismic design parameters are provided in Section 3.10.

Secondary Seismic Hazards: The site is not located in an area classified by the State as having soils that are potentially liquefiable, nor is it mapped as susceptible to seismically induced landslides, based on the Seismic Hazard Maps (CDMG, 1998).

The potential for secondary seismic hazards, such as tsunami and seiche, are considered very low to nil as the site is located away from the ocean at an elevation of over 170 feet above msl and outside of mapped tsunami inundation zones (CGS, 2009). The site is not located adjacent to a confined body of water; therefore, the potential for seismic hazard of a seiche (an oscillation of a body of water in an enclosed basin) is considered very low to nil.

2.5 Groundwater

Groundwater was not encountered in the borings drilled during this investigation to depths of up to 31.5 feet, nor was it encountered during drilling of prior borings to depths of up to 60 feet.

Based on historic data from the State, the groundwater table was believed to be 10 feet deep in the alluvium below the adjacent golf course. Our boring HS-6 was drilled to a depth of 7.5 feet on the golf course slope behind the existing gazebo, and groundwater was not encountered.

While perched groundwater is often in the terrace deposits above the bedrock contact in the Newport Beach area, it was not encountered in the borings drilled onsite. At this site, if irrigation water perches on the contact, it likely flows along the contact and outlets at the ground surface in the golf course. The groundwater table is believed to be very deep below the site.

2.6 Settlement and Foundation Considerations

The site is underlain by three earth units, including: 1) compacted fill which is approximately 4 feet thick; 2) marine terrace deposits which are primarily sandy; and 3) sandstone and siltstone of the Monterey Formation at depth. Based on the review of the original design foundation plans, the existing tower structures and the renovations to the lobby area (performed in 2005), are founded on

cast-in-place reinforced concrete caissons that vary in diameter from 16 to 24 inches and vary in length from 25 to 48 feet.

The proposed building foundations and slabs are anticipated to consist of shallow foundations that will be founded on existing fill materials, and/or dense native sandy terrace deposits.

The amount of settlement expected will depend upon the type of foundation(s) selected and the structural loads. Based on our settlement analyses for this study, the total consolidation (static) settlement can range from 0.4 to 1 inch for various bearing capacities. The anticipated settlement under various foundation loads is presented in Section 3.5.1.

3.0 CONCLUSION AND PRELIMINARY RECOMMENDATIONS

3.1 General Conclusion and Recommendation

Based on our findings, the site is considered geotechnically feasible for the proposed improvements provided the recommendations in this report are implemented during design, grading and construction. The recommendations in this report are considered minimum and may be superseded by more stringent requirements of others.

3.2 Demolition and Excavations

As discussed previously, the project includes demolition of the entry area, pool, and atrium floor areas, including removal of the existing pool, slab-on-grade and underground utilities. The removals for the foundations and underground utilities are generally anticipated to extend on the order 3 to 5 feet below the existing surface grade. The pool and spa demolition should include the plumbing lines and other appurtenances within the limits of demolition. The demolition materials should be disposed of offsite. The geotechnical consultant should observe the excavation bottoms in order to confirm the materials are suitable prior to backfill operations. The excavation should be backfilled with onsite materials and compacted to a minimum of 90 percent relative compaction. The backfill materials should be observed and tested during compaction.

Excavations should conform to applicable safety requirements for Cal OSHA (see Section 3.12). Trench excavations adjacent to buildings and walls should also be in conformance with the clearance requirements on the grading and foundation plans.

Excavations located adjacent to existing structures, roadways and utilities should be reviewed periodically by the geotechnical consultant to evaluate the conditions. If evidence of instability (such as ground cracks, etc.) is observed, then recommendations for additional shoring or other appropriate measures will be provided.

3.3 Protection of Existing Improvements and Utilities

Existing adjacent improvements and utilities that are to be protected in-place should be located and visually marked prior to demolition and grading operations.

Excavation adjacent to the existing foundations associated with the existing buildings should be performed in small, alternating sections so as not to undermine the existing foundations or destabilize the adjacent ground. After a section of the removal is performed, it should be backfilled prior to excavation of the next section. The width of the excavations next to the existing adjacent foundations should be kept small (on the order of 10 feet depending on the foundation type) to limit the footing exposure and to be able to place backfill in a timely manner. The excavations adjacent to the existing buildings should be observed by the geotechnical consultant. Consideration should be given to documenting and monitoring the conditions of the existing adjacent improvements prior to and during construction in order to have a record of any changes or movements of the improvements.

Excavations adjacent to improvements to be protected in-place or any utility easement should be performed with care so as not to destabilize the adjacent ground. Utility lines that are to be abandoned should be removed and the excavation should be backfilled and compacted in accordance with the recommendations provided herein.

Stockpiling of soils (more than 3 feet in height) at or near existing structures and over utility lines that are to remain in-place should not be allowed without review by the geotechnical consultant and the structure/utility line owners.

3.4 Earthwork and Remedial Grading

Grading and excavations should be performed in accordance with the City of Newport Beach Grading Code and NMG's General Earthwork and Grading Specifications included in Appendix F of this report. Miscellaneous trash and construction debris produced during removal of the existing improvements should be removed and disposed of offsite prior to remedial grading operations.

Remedial removals along the western portion of the site (along the adjacent golf course) may be required if cut portions of the site are less than 2 feet below the existing grades. In proposed fill areas, we recommend that the subgrade soils (after demolition operations) be removed to a depth of 2 feet to expose competent subgrade soils. The depth of removals may be deeper in areas where large trees have been removed or unsuitable soils are encountered. The subgrade soils should then be scarified to a depth of approximately 6 inches and recompacted in-place prior to fill placement or construction of improvements.

Onsite soils that are relatively free of organic materials and construction debris are considered suitable for fill placement (they do not need to be exported offsite).

Excavations associated with the removal of existing building structure utility lines, pool and spa should be backfilled and compacted in accordance with the recommendations provided in this section.

Fill and backfill materials should be compacted to at least 90 percent of maximum dry density, as determined by ASTM Test Method D1557. Fill materials should be placed in loose lifts, no thicker than 8 inches. Materials should be moisture-conditioned and processed as necessary to achieve uniform moisture content that is within moisture limits required to assure adequate bonding and compaction. We recommend that moisture contents of the fill be approximately 1 to 2 percentage points over the optimum moisture content.

3.5 Foundation Design and Settlement

New foundations for support of structures may consist of shallow foundations or deep/caisson foundations. In designing the new foundations adjacent to existing deep foundations, the structural integrity of the existing caissons should be evaluated for support of the additional surcharge loads from the new foundations. The stress distribution presented in Figure 2 may be used to estimate the additional surcharge loads from adjacent footings. Alternatively, the outside edge of the new shallow foundations may be kept a minimum of 7 feet away from the caisson caps.

3.5.1 Shallow Foundations

New shallow foundations may be designed with a net allowable bearing capacity of 1,800 psf for a 12-inch-wide footing embedded 12 inches below the lowest adjacent grade. The allowable bearing pressure may be increased by 300 psf for every additional foot of width and by 600 psf for every additional foot of embedment. The maximum allowable bearing pressures are presented below based on the anticipated total settlement for the new structure(s).

Shallow Foundation Type	***Maximum allowable Bearing Pressure (psf)***	***Total Settlement (in)***
Strip	3,000	0.4
Isolated/Column	4,000	0.5
Isolated/Column	5,500	1.0

The above-stated estimates are considered total settlement. The anticipated differential settlement between the structural elements of the new structures may be assumed to be ½ of the total settlement over a span of 30 feet. The allowable bearing pressure may be increased by one-third for wind and seismic loading. We recommend that strip and isolated footings have minimum embedment depths of 18 and 24 inches, respectively. For lateral resistance against sliding, a friction coefficient of 0.38 may be used at the soil-foundation interface. In addition, a subgrade modulus of reaction (K_s) of 100 pci may be used.

3.5.2 Deep Foundations

As previously noted, the existing tower structure and the main lobby entry area are supported on deep foundations. We understand that portions of the proposed improvements at the site are planned to utilize the existing caissons, where sufficient capacity is calculated.

Axial Capacity – Our review of original design foundation plans dated 1973, indicates that the existing caissons for the original tower structure have diameters ranging from 16 to 20 inches and lengths ranging from 35 to 42 feet. Review of the design foundation plans for the renovations along the lobby front/entry area plans dated 2005, indicates that the renovations are supported on caissons that are 24 inches in diameter and 25 feet long.

Based on review of the available prior geotechnical reports, our recent site investigation and experience in the Fashion Island area, the following axial capacities are estimated for the existing caissons.

Axial Capacity of Existing Caissons

Location	*Caisson size (diameter x length)*	*Caisson Cap Thickness (in)*	*Axial Capacity (kips)*
Main Structure and Atrium areas	16 in x 35 ft	30	125
	20 in x 42 ft	24	200
Lobby Front/ Entry Area	24 in x 25 ft	30	90*

*Includes Caisson Cap

The caisson capacity may be increased by one third for wind or seismic loading.

It should be noted that our estimated caisson capacities for the existing caissons are based on the assumption that they were designed and installed in accordance with the plans reviewed by us for this site. We recommend that one or two of the existing caissons be tested to verify the actual depth and structural integrity.

We have also evaluated parameters for design of new caissons, if necessary. The following axial capacities for new cast-in-place concrete caissons are presented below:

Axial Capacity of New Caissons

Location	*Caisson Size (Diameter x Length)*	*Minimum Caisson-Cap Thickness (in)*	*Capacity (kips)*
Atrium Area	24 in x 35 ft	24	200*
Entry Area	24 in x 25 ft	24	90*

*Includes Caisson Cap

Lateral Capacity - For lateral design analysis the following parameters were used:

- Concrete ultimate strength, f'_c, of 4,000 psi.
- Moment of inertia of 16,000 in^4 (concrete only).
- Caisson head deflection alternatives of 0.25 and 0.5 inches, as requested by KPFF, for the Atrium area.
- Shear and moment loads provided by KPFF for the entry area.

The calculated shear and moment loads for alternative caisson head deflection conditions for the Atrium area are tabulated below.

Lateral Caisson Capacity Summary

Boundary Condition (Top of Caisson)	*Fixed-Head*		*Free-Head*	
Caisson Diameter (in)	24	24	24	24
Caisson Length (ft)	35	35	35	35
Caisson Allowable Capacity (kip)	200	200	200	200
Deflection (in)	0.25	0.50	0.25	0.50
Maximum Shear Capacity (kips)	53	85	21	35
Maximum Moment (kip-ft)	280	490	92	174
Depth to Maximum Moment (ft)	0	0	7	8
Depth to Zero Moment (ft)	23	25	23	23
Depth to Zero Shear (ft)	26	27	25	25

The calculated deflections for the shear and moment loads provided by KPFF for the entry area caissons are presented below:

Caisson Deflection

Caisson Diameter (in)	*Caisson Length (ft)*	*Shear (kips)*	*Moment (kips)*	*Deflection (in)*
24	25	22	55	0.35

The computer printouts of our analysis of caisson design for the existing caissons and new caissons are presented in Appendix E. We have included only sample output results for presentation of parameters used in our analysis.

New caissons should have a minimum distance of five times their diameter, measured center to center, away from the existing caissons. The geotechnical aspects of the caisson design, presented above, are intended to assist and supplement the structural aspects of caisson design. Final design of the foundation is the purview of the structural engineer.

3.6 Lateral Earth Pressures for Permanent Retaining Structures

Recommendations for lateral earth pressures for retaining walls and structures (if any) with approved onsite drained soils are as follows:

Lateral Earth Pressures		
Equivalent Fluid Pressure (psf/ft.)		
Conditions	*Level*	*2:1 Slope*
Active	40	65
At Rest	60	85
Passive	360	180 (if sloping in front of wall)

These parameters are based on a soil internal friction angle of 30 degrees and soil unit weight of 120 pcf. The above parameters do not apply for backfill materials that is highly expansive.

To design an unrestrained retaining wall, such as a cantilever wall, the active earth pressure may be used. For a restrained retaining wall, the at-rest pressure should be used. Passive pressure is used to compute lateral soils resistance developed against lateral structural movement. The passive pressures provided above may be increased by one-third for wind and seismic loads. The passive resistance is taken into account only if it is ensured that the soil against embedded structure will remain intact with time. Future landscaping/planting and improvements adjacent to the retaining walls should also be taken into account in the design of the retaining walls. Excessive soil disturbance, trenches (excavation and backfill), future landscaping adjacent to footings and over-saturation can adversely impact retaining structures and result in reduced lateral resistance.

For sliding resistance, the friction coefficient of 0.38 may be used at the concrete and soil interface. The coefficient of friction may also be increased by one-third for wind and seismic loading. The retaining walls may also need to be designed for additional lateral loads if other structures or walls are planned within a 1H:1V projection.

The seismic lateral earth pressure for walls retaining more than 6 feet of soil and level backfill conditions may be estimated to be an additional 17 pcf for active and at-rest conditions. The earthquake soil pressure has a triangular distribution and is added to the static pressures. For the active and at-rest conditions, the additional earthquake loading is zero at the top and maximum at the base. The seismic lateral earth pressure does not apply to walls retaining less than, or equal to, 6 feet of soil (2019 CBC Section 1803.5.12).

Retaining structures should be waterproofed and provided with suitable back-drain systems to reduce the potential hydrostatic pressure on the walls and also to mitigate moisture seepage, efflorescence, and associated impacts to wall finishes. Figure 3 presents alternatives for wall-backdrain systems. Walls that retain less than 30 inches of soil do not require a drainage system from a geotechnical standpoint; however, waterproofing and drainage may still be desirable to help mitigate nuisance water and/or moisture impacts on wall finishes.

3.7 Slab on Grade

The subgrade for the new slabs on grade should be evaluated by the project geotechnical engineer to verify that the subgrade soils are compacted to a minimum of 90 percent relative compaction with adequate moisture content. The slabs should be designed by the structural engineer based on the anticipated use of the floor space and structural loadings. We recommend that, at minimum, the interior slabs be a minimum of 5 inches thick and reinforced with No. 4 rebar at 24 inches on-center. The slab subgrade soils should be pre-saturated to a minimum of 1.3 times the optimum moisture content to a depth of 18 inches below pad grade for soils with medium expansion potential. The subgrade soils may be tested following completion of the demolition operations to verify the expansion potential of the onsite soils.

3.8 Moisture Mitigation for Concrete Slabs

In addition to geotechnical and structural considerations, the project owner should also consider interior moisture mitigation when designing and constructing slabs-on-grade.

The intended use of the interior space, type of flooring, and the type of goods in contact with the floor may dictate the need for, and design of, measures to mitigate potential effects of moisture emission from and/or moisture vapor transmission through the slab. Typically, for human occupied structures, a vapor retarder or barrier has been recommended under the slab to help mitigate moisture transmission through slabs. The most recent guidelines by the American Concrete Institute (ACI 302.1R-04) recommend that the vapor retarder be placed directly under the slab (no sand layer). However, the location of the vapor retarder may also be subject to the builder's past successful practice. Placement of 1 or 2 inches of sand over the moisture retardant has been common practice by builders in southern California. Specifying the strength of the retarder to resist puncture and its permeance rating is important. These qualities are not necessarily a function of the retarder thickness. A minimum of 10-mil is typical but some materials, such as 10-mil polyethylene ("Visqueen"), may not meet the desired standards for toughness and permeance.

The vapor retarder, when used, should be installed in accordance with standards such as ASTM E 1643 and/or those specified by the manufacturer.
Concrete mix design and curing are also significant factors in mitigating slab moisture problems. Concrete with lower water/cement ratios results in denser, less permeable slabs. They also "dry" faster with regard to when flooring can be installed (reduced moisture emissions quantities and rates). Rewetting of the slab following curing should be avoided since this can result in additional drying time required prior to flooring installation. Proper concrete slab testing prior to flooring installation is also important.

Concrete mix design, the type and location of the vapor retarder should be determined in coordination with all parties involved in the finished product, including the project owner, architect, structural engineer, geotechnical consultant, concrete subcontractors, and flooring subcontractors.

3.9 Infiltration

The existing hotel has subterranean levels housing equipment that serves the hotel's operations. In addition, the terrace bedrock contact extends to the ground surface in the adjacent golf course slope directly behind the hotel. One of our recent borings was drilled on this slope and found bedrock at a depth of 5 feet below the surface.

If surface waters were infiltrated around the hotel, the water would likely be collected in the subdrains around the building (if any) and/or result in nuisance seepage for this building or other down-gradient buildings that have subterranean levels. In addition, the infiltrated water that collects along the geologic contact can seep out where this contact is exposed at the ground surface in the golf course, which in turn, may cause instability of slopes, piping of the terrace sands, etc. Thus, it is our opinion that infiltration BMPs should not be used at the subject site from a

geotechnical viewpoint. We recommend other types of filtration BMPs be utilized per the County of Orange WQMP Technical Guidelines.

3.10 Seismic Design Guidelines

The following table summarizes the seismic design criteria for the subject site. These seismic design parameters are developed in accordance with ASCE 7-16 and 2019 CBC, with the assumption that the fundamental period of the structure is within the "exceptions" included in Section 11.4.8 of ASCE 7-16. The seismic response coefficient, C_s, should be determined per the parameters provided below and using equation 12.8-2 of ASCE 7-16.

Selected Seismic Design Parameters from 2019 CBC/ASCE 7-16	***Seismic Design Values***	***Reference***
Latitude	33.6166 North	
Longitude	117.8801 West	
Controlling Seismic Source	Newport-Inglewood Fault (Offshore)	USGS, 2021
Distance to Controlling Seismic Source	2.8 mi (4.5 km)	USGS, 2021
Site Class per Table 20.3-1 of ASCE 7-16	D	SEA/OSHPD, 2021
Spectral Acceleration for Short Periods (Ss)	1.35 g	SEA/OSHPD, 2021
Spectral Accelerations for 1-Second Periods (S_1)	0.48 g	SEA/OSHPD, 2021
Site Coefficient F_a, Table 11.4-1 of ASCE 7-16	1	SEA/OSHPD, 2021
Site Coefficient F_v, Table 11.4-2 of ASCE 7-16	1.8	
Design Spectral Response Acceleration at Short Periods (S_{DS}) from Equation 11.4-3 of ASCE 7-16	0.90 g	SEA/OSHPD, 2021
Design Spectral Response Acceleration at 1-Second Period (S_{D1}) from Equation 11.4-4 of ASCE 7-16	0.57 g	
T_S, S_{D1}/ S_{DS}, Section 11.4.6 of ASCE 7-16	0.63 sec	
T_L, Long-Period Transition Period	8 sec	SEA/OSHPD, 2021
Peak Ground Acceleration Corrected for Site Class Effects (PGA_M) from Equation 11.8-1 of ASCE 7-16	0.65 g	SEA/OSHPD, 2021
Seismic Design Category, Section 11.6 of ASCE 7-16	D	

Please note that the fundamental period of the proposed building is unknown at this time (site-specific ground-motion hazard analysis was not performed for the site). During the design phase and upon conversation with the project structural engineer, we will perform ground motion hazard analysis as needed.

3.11 Foundation Setbacks

Footings of structures (including retaining walls and free-standing walls) located above a slope having a total height of 10 feet or less should have a minimum setback of 5 feet, as measured from the outside edge of the footing bottom along a horizontal line to the face of the slope. For footings above slopes having a total height greater than 10 feet but less than 30 feet, the setback should be,

at minimum, equal to half the total height of the slope but need not exceed 10 feet. For slopes greater than 30 feet high, the setback should be 1/3 the height of the slope, but not to exceed 40 feet.

3.12 Utility Installation and Trench Backfill

Trench excavations are not anticipated to encounter groundwater at this site. Depending upon the time of year that construction is performed, there could be wet zones in the soil from the surface waters percolating down through the fill and terrace deposits. These times could be during the rainy season and also when there is heavier irrigation being performed.

Excavations should be performed in accordance with the requirements set forth by Cal/OSHA Excavation Safety Regulations (Construction Safety Orders, Section 1504, 1539 through 1547, Title 8, California Code of Regulations). The fill materials may be classified as Type B for trench excavation requirements, except for the terrace deposits have clean friable sands and the bedrock could have adverse bedding that would be classified as Type C. Cal/OSHA regulations indicate that, for workmen in confined conditions, the steepest allowable slopes in Type B soil are 1H:1V and in Type C soil are 1.5H:1V for excavations less than 20 feet deep. Where there is no room for these layback slopes, we anticipate that shoring will be necessary. Excavations should be reviewed periodically by the contractor's qualified person to confirm compliance with Cal OSHA requirements.

Onsite soils should be suitable for use as trench backfill. Native backfill materials should be compacted to a minimum of 90 percent relative compaction. Select granular backfill may be used in lieu of native soils, but should also be compacted.

Trenches should be either backfilled with native soil and compacted to 90 percent relative compaction, or backfilled with clean sand (SE 30 or better), which can be densified with water jetting and flooding.

Trenches excavated next to structures and foundations should be properly backfilled and compacted under the observation and testing of the geotechnical consultant to provide full lateral support and reduce settlement potential.

3.13 Expansion Potential

Based on laboratory testing and prior experience, the expansion potential of onsite soils is anticipated to generally range from "Very Low" to "Medium" within the existing fill and terrace sands. It is possible that the bedrock and the clayey terrace soils may have locally "High" expansion potential. Additional laboratory testing may be performed upon completion of pad grading in order to confirm the expansion potential of pad grade materials.

3.14 Cement Type and Corrosivity

Based on our experience with onsite soils, we anticipate that soluble sulfates exposure in the onsite soils may be classified as "S0" per Table 19.3.1.1 of ACI-318-14. Structural concrete elements in

contact with soil include footings. The flatwork and sidewalk concrete are typically not considered structural elements. Concrete mix for these elements should be based on the "S0" soluble sulfate exposure class of Table 19.3.2.1 in ACI-318-14. Other ACI guidelines for structural concrete are recommended. Also, onsite soils are anticipated to be corrosive to metals.

3.15 Pool and Spa

The typical design parameters and recommendations for construction of pools and pool decks are provided on Figures 4 and 5 at the rear of text. For design, the subgrade soils for the pool and spa decks should be considered as having "Medium" expansion potential. The depth of the cutoff wall adjacent to the pool deck should be a minimum of 18 inches below the top of the pool deck. Presaturation of the pool and spa deck subgrade soils should be performed. A subdrain system consisting of a 4-inch perforated pipe inserted into a minimum of 1 cubic ft/ft of 3/8- 3/4-inch gravel, and wrapped with a filter fabric (Mirafi 140N or equivalent) should be placed behind the cut-off walls adjacent to the planters. A subdrain should also be provided for the deck area in accordance with Figure 5. If large trees are planned for the planter areas, we recommend that a root barrier be placed adjacent to the cutoff wall to extend a minimum of 4 feet below the adjacent landscaped surface.

3.16 Exterior Concrete (Non-Structural)

Exterior concrete elements, such as curbs and sidewalks, are susceptible to lifting and cracking when constructed over expansive soils. When this occurs with highly expansive soils, the impacts to flatwork/hardscape can be significant and may require removal and replacement of the affected improvements. Please also note that reduction of slab cracking is often a function of proper slab design, concrete mix design, placement, and curing/finishing practices. Adherence to guidelines of the American Concrete Institute (ACI) is recommended. Also, the amount of post-construction watering, or lack thereof, can have a significant impact on the adjacent concrete flatwork.

For reducing the potential adverse effects of expansive soils, we suggest a combination of presaturation of subgrade soils; reinforcement and restraint; moisture barriers/drains; and a sub-layer of granular material. Although these types of measures may not completely eliminate distress to concrete improvements, application of these measures can significantly reduce the impacts of post-construction heave of expansive soils. The degrees and combinations of these measures will depend upon:

- The expansion potential of the subgrade soils;
- The potential for moisture migration to the subgrade;
- The feasibility of the measures (especially presaturation); and
- The economics of these measures versus the benefits.

These factors should be weighed by the project owner determining the measures to be applied on a project-by-project basis, subject to the requirements of the local building/grading department.

The following table provides our guidelines. Additional considerations are also provided after the table. For this project, the soils are classified as having **"Medium"** expansion potential.

TYPICAL RECOMMENDATIONS FOR CONCRETE FLATWORK/HARDSCAPE

	Expansion Potential (Index)				
Recommendations	***Very Low (< 20)***	***Low (20 – 50)***	***Medium (51 – 90)***	***High (91 – 130)***	***Very High (> 130)***
Slab Thickness (Min.): Nominal thickness except where noted.	4"	4"	**4"**	4"	4" Full
Sub base: thickness of sand or gravel layer below concrete	N/A	N/A	**Optional**	2" – 4"	2" – 4"
Presaturation: degree of optimum moisture content (opt.) and depth of saturation	Pre-wet Only	1.1 x opt. to 6"	**1.2 x opt. to 12"**	1.3 x opt. to 18"	1.4 x opt. to 24"
Joints: maximum spacing of control joints. Joint should be ¼ of total thickness	10'	10'	**8'**	6'	6'
Reinforcement: rebar or equivalent welded wire mesh placed near mid-height of slab	N/A	N/A	**Optional (WWF 6 x 6 – W1.4/W1.4)**	No. 3 rebar, 24" O.C. both ways or equivalent wire mesh	No. 3 rebar, 24" O.C. both ways
Restraint: Slip dowels across cold joints; between sidewalk and curb	N/A	N/A	**Optional**	Across cold joints	Across cold joints (and into curb)

The subgrade soil for concrete sidewalk and curbs should be compacted to a minimum relative compaction of 90 percent per ASTM D1557 test method.

The more expansive soils, because of relatively high clay content, can take significantly longer to achieve recommended presaturation levels. Therefore, the procedure and timing should be carefully planned in advance of construction. For exterior slabs, the use of a granular sublayer is primarily intended to facilitate presaturation and subsequent construction by providing a better working surface over the saturated soil. It also helps retain the added moisture in the native soil in the event that the slab is not placed immediately. Where these factors are not significant, the subbase layer may be omitted. Design and maintenance of proper surface drainage is also very important.

3.17 Groundwater

Based on the recent and prior site investigations, groundwater is not expected to be encountered during grading and construction for the proposed improvements, including the remedial removals and excavations for utility lines. However, wet soils may be encountered locally during drilling of caissons to depths of less than 50 feet. We anticipate the groundwater table will remain deeper than 50 feet bgs.

3.18 Surface Drainage

Maintaining adequate surface drainage, proper disposal of run-off water, and control of irrigation will help reduce the potential for future moisture-related problems and differential movements from soil heave/settlement.

Surface drainage should be carefully taken into consideration during grading, landscaping, and pavement construction. Positive surface drainage, adequate drainage devices, gradients, and curbing should be provided to prevent run-off flowing from paved areas onto adjacent unpaved areas. Ponding of water adjacent to structures should be avoided.

3.19 Geotechnical Review of Future Plans

The final grading plan should be reviewed by the geotechnical consultant. A geotechnical grading plan review report should be submitted to the City for their review and approval prior to issuance of a grading and construction permit. NMG should also review the structural, shoring and foundation plans and issue a report documenting our review and confirming that the parameters used for design are in accordance with our recommendations provided herein and in the future grading plan review report.

3.20 Geotechnical Observation and Testing During Grading and Construction

Geotechnical observation and testing should be performed by the geotechnical consultant during the following phases of grading and construction:

- During site preparation, demolition, clearing and backfilling;
- During earthwork operations, including remedial removals and fill placement;
- During installation and testing of the tieback anchors;
- Upon completion of any excavation for building or retaining walls prior to concrete placement;
- During pavement subgrade preparation (including presoaking), prior to concrete placement;
- During and after installation of subdrains for retaining walls;
- During placement of backfill for utility trenches and retaining walls; and
- When any unusual soil conditions are encountered.

4.0 LIMITATIONS

This report has been prepared for the exclusive use of our client, Lyon Living, within the specific scope of services requested by them for the subject project at Fashion Island in the city of Newport Beach, California. This report or its contents should not be used or relied upon for other projects or purposes or by other parties without the written consent of NMG and the involvement of a geotechnical professional. The means and methods used by NMG for this study are based on local geotechnical standards of practice, care, and requirements of governing agencies. No warranty or guarantee, express or implied is given.

The findings, conclusions, and recommendations herein are professional opinions based on interpretations and inferences made from geologic and engineering data from specific locations and depths, observed or collected at a given time. By nature, geologic conditions can vary from point to point, can be very different in between points, and can also change over time. Our conclusions and recommendations are subject to verification and/or modification during excavation and construction when more subsurface conditions are exposed.

NMG's expertise and scope of services did not include assessment of potential subsurface environmental contaminants or environmental health hazards.

0 500 1,000 Feet

1 inch = 1,000 feet

N

SITE LOCATION MAP

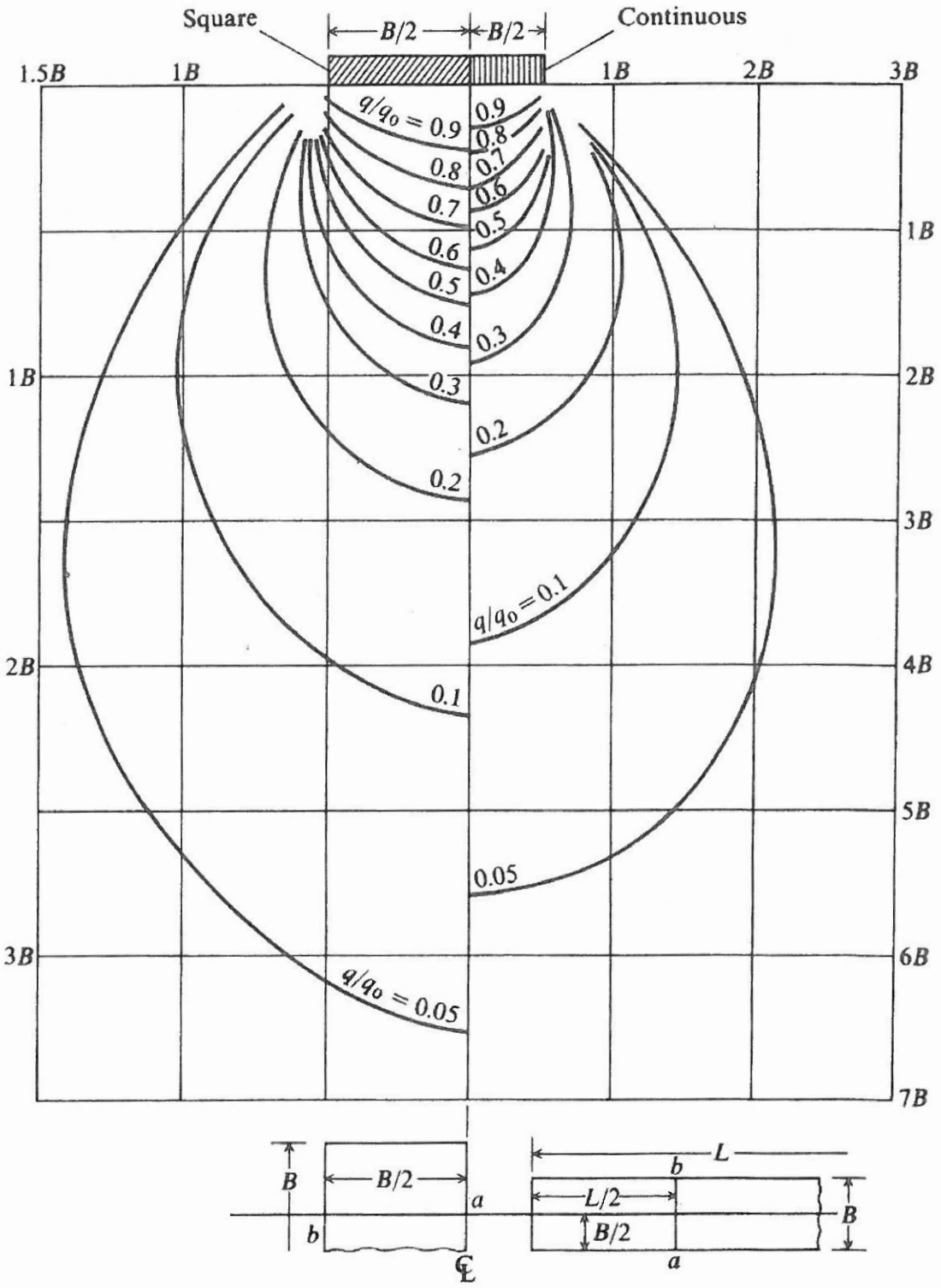
NEWPORT MARRIOTT
900 NEWPORT CENTER DRIVE
NEWPORT BEACH, CALIFORNIA

Project Number: 20108-01 By: SBK/TW
Project Name: Lyon Living/900 NCD
Date: 4/8/2021

Figure 1

NMG

P:\2020\20108-01 Lyon Liv - 900 NCD\Drafting\GIS\20108-01 SiteLocation.mxd



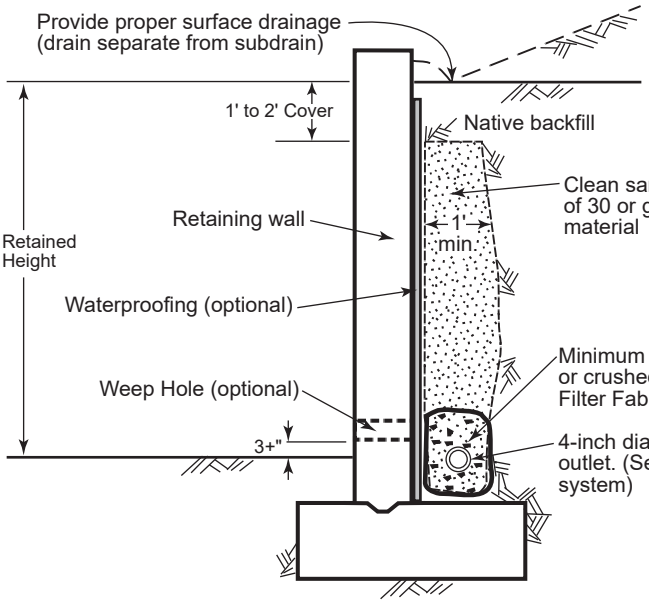
Pressure isobars based on the Boussinesq equation for square and long footings. Applicable only along line *ab* from center to edge of base.

From: Foundation Analysis and Design, 4th Edition, Joseph E. Bowles, McGraw-Hill Publishing Company, 1988
Page 248

FIGURE 2

OPTION 1:

AGGREGATE SYSTEM DRAIN

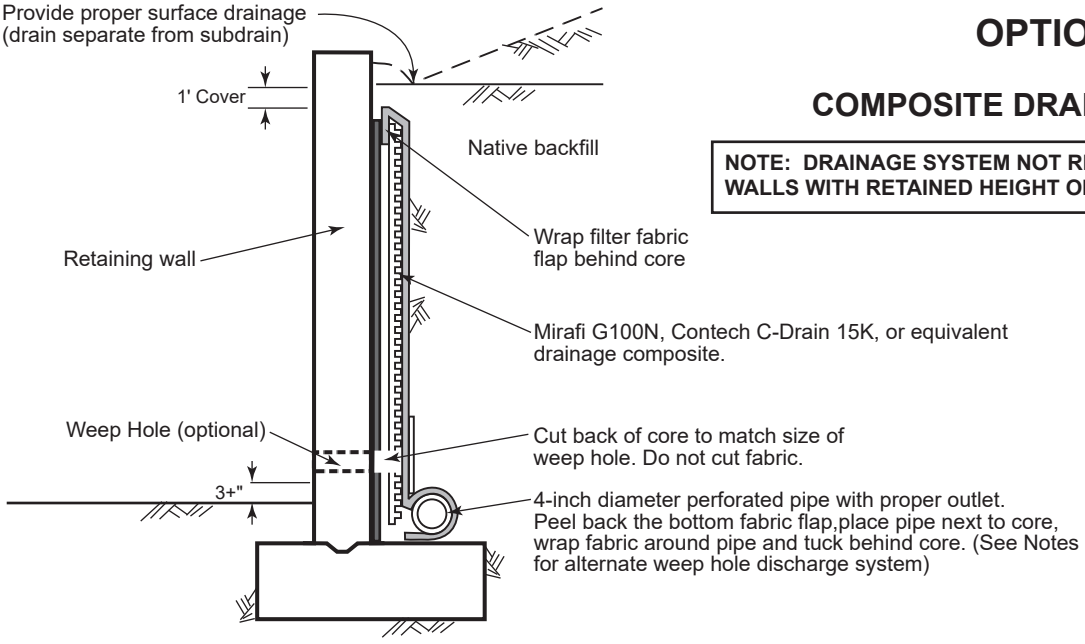


Alternative: Class 2 permeable filter material (Per Caltrans specifications) may be used for vertical drain and around perforated pipe (without filter fabric)

NOTE: DRAINAGE SYSTEM NOT REQUIRED FOR WALLS WITH RETAINED HEIGHT OF 30 INCHES OR LESS

OPTION 2:

COMPOSITE DRAINAGE SYSTEM



NOTE: DRAINAGE SYSTEM NOT REQUIRED FOR WALLS WITH RETAINED HEIGHT OF 30 INCHES OR LESS

NOTES:

1. **PIPE TYPE SHOULD BE PVC OR ABS, SCHEDULE 40 OR SDR35 SATISFYING THE REQUIREMENTS OF ASTM TEST STANDARD D1527, D1785, D2751 , OR D3034.**
2. **FILTER FABRIC SHALL BE APPROVED PERMEABLE NON-WOVEN POLYESTER, NYLON, OR POLYPROPYLENE MATERIAL.**
3. **DRAIN PIPE SHOULD HAVE A GRADIENT OF 1 PERCENT MINIMUM.**
4. **WATERPROOFING MEMBRANE MAY BE REQUIRED FOR A SPECIFIC RETAINING WALL (SUCH AS A STUCCO OR BASEMENT WALL).**
5. **WEEP HOLES MAY BE PROVIDED FOR LOW RETAINING WALLS (LESS THAN 3 FEET IN HEIGHT) IN LIEU OF A VERTICAL DRAIN AND PIPE AND WHERE POTENTIAL WATER FROM BEHIND THE RETAINING WALL WILL NOT CREATE A NUISANCE WATER CONDITION. IF EXPOSURE IS NOT PERMITTED, A PROPER SUBDRAIN OUTLET SYSTEM SHOULD BE PROVIDED.**
6. **IF EXPOSURE IS PERMITTED, WEEP HOLES SHOULD BE 2-INCH MINIMUM DIAMETER AND PROVIDED AT 25-FOOT MAXIMUM SPACING ALONG WALL. WEEP HOLES SHOULD BE LOCATED 3+ INCHES ABOVE FINISHED GRADE.**
7. **SCREENING SUCH AS WITH A FILTER FABRIC SHOULD BE PROVIDED FOR WEEP HOLES/OPEN JOINTS TO PREVENT EARTH MATERIALS FROM ENTERING THE HOLES/JOINTS.**
8. **OPEN VERTICAL MASONRY JOINTS (I.E., OMIT MORTAR FROM JOINTS OF FIRST COURSE ABOVE FINISHED GRADE) AT 32-INCH MAXIMUM INTERVALS MAY BE SUBSTITUTED FOR WEEP HOLES.**
9. **THE GEOTECHNICAL CONSULTANT MAY PROVIDE ADDITIONAL RECOMMENDATIONS FOR RETAINING WALLS DESIGNED FOR SELECT SAND BACKFILL.**

RETAINING WALL DRAINAGE DETAIL

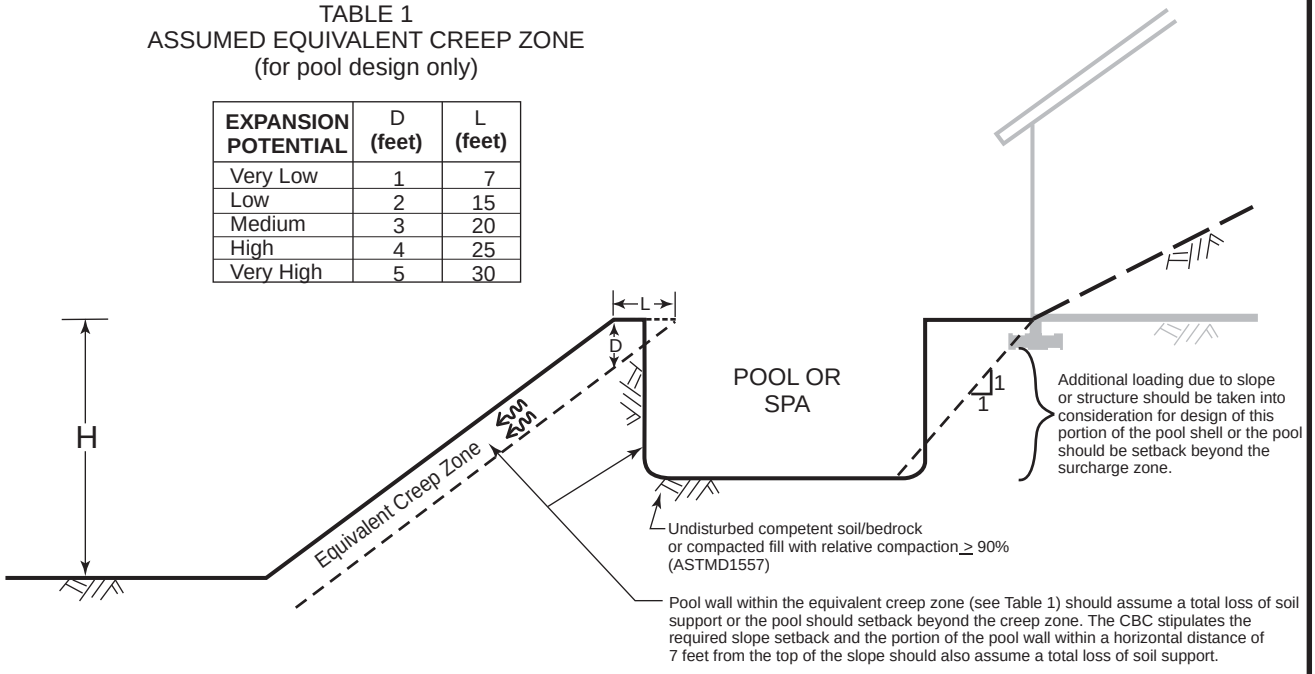
NMG Geotechnical, Inc.

3/21 RETAINING WALL DRAINAGE.ai

FIGURE 3

TABLE 1
ASSUMED EQUIVALENT CREEP ZONE
(for pool design only)

EXPANSION POTENTIAL	D (feet)	L (feet)
Very Low	1	7
Low	2	15
Medium	3	20
High	4	25
Very High	5	30



NOTE: • **THIS DETAIL IS TYPICAL AND SUBJECT TO CHANGE BY THE GEOTECHNICAL CONSULTANT.**

• **IN ACCORDANCE WITH THE 2019 CBC SECTION 1808.7.3**

1) The pool walls should be designed to account for soil expansion forces. Where constructed in soils possessing "medium" expansion potential, the pool walls should be designed for an equivalent lateral fluid pressure of 100 lbs./cu. ft. For soils possessing "high" or "very high" expansion potential, the pool walls should be designed for and equivalent lateral fluid pressure of 125 lbs./cu. ft. The actual expansiveness of soils exposed in pool excavations should be evaluated upon completion of the excavation as pool subgrade soils are exposed.

2) Pools and spas should conform to setback criteria pertaining to slopes as established in the California Building Code. The CBC indicates that the pool should be setback from descending slopes a minimum distance of one-sixth of the descending slope height (20 feet maximum). In addition, that portion of the pool wall within a horizontal distance of 7 feet from the top of the slope shall be capable of supporting the water in the pool without soil support. In addition, we recommend that the portion of the pool wall within the equivalent soil creep zone (Table 1) should also assume a total loss of soil support. Where pools are planned near toes-of-slopes and/or structures, appropriate surcharge loads should be incorporated into design and construction.

3) Pool/spa excavations exposing bedrock should be evaluated by a qualified geotechnical consultant to determine the need for special design to account for bedding plane surcharges. If encountered, the pool walls should be designed to support any daylight bedding. The bedding plane surcharge value will vary depending upon bedding angle, rock type, and strength.

4) In order to provide uniform conditions, the pool excavation may need to be overexcavated a depth of 3 feet below bottom of pool and replaced to pool subgrade with compacted fill. As an alternative, the reinforcing steel in the area of a transition area may be increased to account for the differences in engineering properties and the potential differential behavior.

5) Consideration should be given to incorporating provisions for mitigating subsurface water. Whereas pool excavations may be free of water at the time of construction, future irrigation could result in the development of perched water zones which could affect subsurface improvements. Heavy-duty pipes and couplings should be used for the pool plumbing system to minimize leaking which may produce additional pressures on the pool shell. In addition, installation of a pressure valve in the pool bottom may be considered to mitigate potential build-up of pressure.

6) In general, all below grade improvements must be constructed by qualified professionals utilizing appropriate designs which account for the on-site (lot) geotechnical and geologic conditions. Observation/testing should be performed by a geotechnical consultant during pool/spa excavation to verify exposed soil conditions are consistent with the assumed design conditions.

FIGURE 4

SWIMMING POOL AND SPA DESIGN CRITERIA DETAIL

NMG Geotechnical, Inc.

NOTE: RECOMMENDATIONS DEPICTED ON THIS DETAIL ARE TYPICAL AND SUBJECT TO CHANGE BY THE GEOTECHNICAL CONSULTANT OR ARCHITECT/DESIGNER

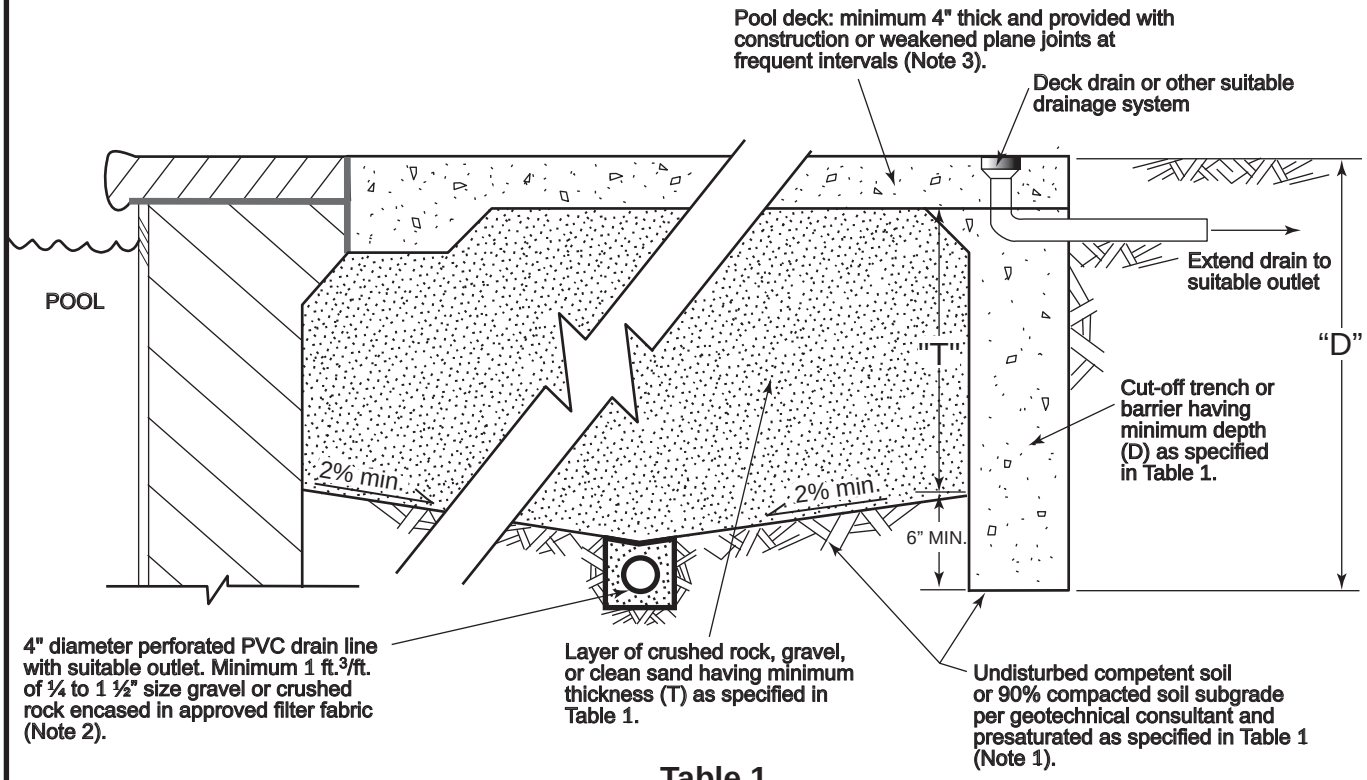


Table 1

Expansion Potential	Min. Depth of Cut-off "D"	Min. Thickness of Sand Back-fill "T"	Min. Depth of Presaturation	Min. Presaturation Moisture Content
Low	12"	4"	6"	120% of Optimum
Medium	18"	6"	12"	130% of Optimum
High	24"	12"	18"	140% of Optimum
Very High	30"	18"	24"	140% of Optimum

Notes:

1) To reduce the potential for excessive cracking due to expansive soil forces, pool deck concrete slabs should be a minimum of 4 inches thick and provided with construction or weakened plane joints at frequent intervals (e.g., every 6 feet or less). Slabs should be underlain by a layer of crushed rock, gravel, or clean sand having a minimum thickness as indicated in Table 1. This layer is not required for very low expansion potential subgrades. For very low expansion potential subgrade, water spraying the subgrade prior to pouring concrete is considered adequate otherwise, the subgrade should be presaturated to the minimum depth and minimum moisture content (as a percentage of optimum moisture content) indicated in Table 1. Presoaking should be observed, tested, and accepted by a geotechnical consultant prior to placement of concrete.

2) The Subgrade below pool decks should have a drain line consisting of 4-inch diameter perforated pipe (PVC Schedule 40, SDR 35, Armco A2000 PVC, or approved equivalent), surrounded by approved gravel which is wrapped with filter fabric (Mirafi 140N, or approved equivalent) provided below the sand layer. One line of subdrain around the swimming pool area is generally sufficient. The drain pipe should have a gradient of 1 percent minimum.

3) All concrete has a tendency to crack and cracks in concrete can be caused by many different factors. When constructing concrete decks, it is important that the ground on which these improvements are to rest be properly prepared, including moisture conditioning. Slab thickness, location of joints, reinforcement, and concrete mixture must also be appropriate for the intended use. Proper placement, finishing, and curing of concrete are also very important factors in minimizing cracking. Reinforcement of slabs may also be considered to further reduce unsightly cracking especially for high or very high expansion potential areas. Adjacent landscaping should provide appropriate surface and subdrainage to minimize overwetting the soils.

POOL AND SPA DECK SUBGRADE DETAIL

NMG Geotechnical, Inc.

6/14 POOL DECK.ai

FIGURE 5

APPENDIX A

APPENDIX A
REFERENCES

California Division of Mines and Geology, 1997a, Seismic Hazard Zone Evaluation Report for the Anaheim and Newport Beach 7.5-Minute Quadrangles, California, Seismic Hazard Zone Report 03.

California Division of Mines and Geology, 1997b, Seismic Hazard Zone Evaluation Report for the Laguna Beach 7.5-Minute Quadrangle, California, Seismic Hazard Zone Report 013.

California Division of Mines and Geology, 1981, Geologic Map of Orange County, California, Showing Mines and Mineral Deposits, Bulletin 204, Plate 1.

California Division of Mines and Geology, 1998, Seismic Hazard Zones, Newport Beach Quadrangle, Official Map dated April 15, 1998.

California Geological Survey (CGS), 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117, Originally Adopted March 13, 1997, Revised and Re-adopted September 11, 2008.

California Geologic Survey (CGS), 2009, Tsunami Inundation Map for Emergency Planning, Newport Beach Quadrangle, Official Map dated March 15, 2009.

California Geological Survey (CGS), 2010, Fault Activity Map of California and Adjacent Areas (Scale 1: 750,000), Geologic Data Map No. 6, Compiled and Interpreted by Charles W. Jennings and William A. Bryant.

California Geological Survey (CGS), 2018, Earthquake Fault Zones, A Guide for Government Agencies, Property Owners / Developers, and Geoscience Practitioners 2018. for Assessing Fault Rupture Hazards in California, Special Publication 42, Revised

Dames and Moore, 1973, Foundation Investigation, Proposed Hotel, Corner of Newport Center Drive and Santa Barbara Drive, Newport Beach, California, dated January 4, 1973.

Earth Systems Pacific, 2020, Preliminary Geotechnical Engineering Report, Proposed Newport Beach Marriott Hotel & Spa -M-Club Addition, Project No. 304031-001, dated September 15, 2020.

Irvine Soils Engineering, 1986, Summary of Geotechnical Field Observations, Newport Beach Marriott Hotel Ballroom and Tower, Newport Beach, California, Job No: V535, Job No.: 2651-06, dated February 7, 1986.

Morton, P.K., et. al., 1979, Environmental Geology of Orange County, California, California Department of Conservation, Division of Mines and Geology, OFR 79-08.

APPENDIX A
REFERENCES (Continued)

Soils International, 1981, Geotechnical and Seismicity Investigation, Proposed Marriott Hotel Additions, Newport Center, Newport Beach, California, Project No. S-0693-FG, dated December 23, 1981.

Soils International, 1983, Proposed Parking Structure Addition, Newport Center Marriott Hotel, Newport Beach, California, Project No. S-0693-FG, dated November 7, 1983.

Southern California Soil and Testing, Inc., 1985, Report of Field Observation, Compaction Testing, and Paving Inspection, Site of proposed Parking Structure located at Newport Center Drive, Newport Beach, California, Project No. SCST 8441005, dated January 9, 1985.

Structural Engineers Association/Office of Statewide Health Planning and Development, 2021, U.S. Seismic Design Maps, web site address: https://seismicmaps.org/2021.

Soils International, Inc., 1988, Geotechnical Investigation Report, Edwards Theatre, Newport Center Drive, Newport Beach, California, Project S-1093-F, dated April 18, 1988.

Tan, S.S., and Edgington, W.J., 1976, Geology and Engineering Geologic Aspects of the Laguna Beach Quadrangle, Orange County, California, California Division of Mines and Geology Special Report 127.

U.S. Geological Survey, 1951, Newport Beach Quadrangle, Orange County, California, 7.5 Minute Series (Topographic).

U.S. Geological Survey, 2021, Unified Hazard Tool, NSHM 2014 Dynamic Deaggregation Program; web site address: https://earthquake.usgs.gov/hazards/interactive/; Date Accessed: 2021

APPENDIX B

Date(s) Drilled	1/28/21	Logged By	BF
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs. @ 30-inch drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

HS-1

Sheet 1 of 2

Total Depth Drilled (ft)	31.5
Approximate Ground Surface Elevation (ft)	180.7 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
180	0					CL	Surface: Parking Lot, 5" of AC over 6" of AB. **Artificial Fill (Af)** @ 1': Medium brown to reddish brown silty sandy CLAY, moist, abundant roots, pinhole pores.			
			B-1							B-1 @ 1-5' ; EI, CC
	5		D-1	17		CL	**Marine Terrace (Qtm)** @ 4': Dark gray sandy silty CLAY, moist, rootlets, slightly micaceous. @ 5': Yellow brown sandy silty CLAY, moist to wet, stiff, slightly micaceous, FeO staining. Upper rings have darker brown CLAY.	18.7	110.9	CN
			D-2	12			@ 7.5': Upper: Yellowish brown/ reddish brown sandy CLAY, moist, medium stiff to stiff, slightly micaceous, FeO staining.	15.6	110.8	
						SM	Lower: Yellowish brown/ reddish brown clayey silty fine SAND, moist, loose, slightly micaceous, FeO staining.			
170	10		D-3	24		SP-SM	@ 10': Yellowish reddish brown fine to medium SAND with some silt, moist, medium dense, micaceous, friable, some FeO staining.	10.5	98.3	
	15		D-4	32		SP	@ 15': Upper: Yellow fine to medium SAND, moist, medium dense, micaceous, clean, friable. Lower: Reddish brown silty fine to medium SAND, moist, medium dense, small nodules of black material. Chert cobble in tip. **Monterey Formation (Tm)**	4.9	101.9	
160	20		D-5	73		ML SP	@ 20': Upper: Mottled grayish brown/ reddish brown SILTSTONE, damp, dense, interbedded siltstone and chert, less fractured, less weathered, thin bedded to laminated. Upper rings filled with fractured bedrock. Lower: Light gray to white silty very fine SANDSTONE, moist, dense, trace FeO staining, friable. Clay seam in tip.	22.2	97.1	DS
	25									

LOG OF BORING

Lyon Living/ 900 Newport Center Drive
Newport Beach, CA
PROJECT NO. 20108-01

NMG

Report: HOLLOW STEM; Project: 20108-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 3/19/21

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25	D	D-6	97/11"		ML	@ 25': Upper: Light gray SILTSTONE, moist, hard, well-bedded, FeO staining along bedding and joints, abundant FeO staining in upper rings in sandstone.	31.3	85.7	
						SP	Lower: Light gray to white very fine SANDSTONE, moist, very dense, abundant FeO staining, highly friable.			
		B	B-2							B-2 @ 25-30'
	30	D	D-7	65		ML	@ 30': Upper: Light grayish brown sandy SILTSTONE, moist, hard, abundant FeO staining along bedding, clayey siltstone in upper rings.	28.8	94.6	
150						SP	Lower: Light gray fine SANDSTONE, moist, dense, slightly micaceous, abundant FeO staining, friable.			
							Notes: Total Depth is 31.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped. Patched with Cold Patch AC.			
	35									
	40									
140										
	45									
	50									
130										
	55									

LOG OF BORING

Lyon Living/ 900 Newport Center Drive
Newport Beach, CA

PROJECT NO. 20108-01

NMG

Date(s) Drilled	1/28/21	Logged By	BF
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs. @ 30-inch drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

HS-2

Sheet 1 of 2

Total Depth Drilled (ft)	31.5
Approximate Ground Surface Elevation (ft)	183.3 msl

Elevation (ft)	Depth (ft)	Sample Type	Sample Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SC-CL	Surface: Parking Lot, 4" of AC over 5" of AB. **Artificial Fill (Af)** @ ~1': Reddish brown sandy silty CLAY/ clayey fine to medium SAND, moist. Some rock/concrete fragments in first location. Moved boring to avoid possible fire line utility.			
180			B-1							B-1 @ 1-5' (mix of first hole and second hole)
	5		D-1	27		CL	**Marine Terrace (Qtm)** @ 5': Upper: Light olive brown silty CLAY, moist, very stiff, slightly plastic to plastic. Upper rings have silty fine to medium SAND, FeO staining. Lower: Olive brown silty CLAY, moist, very stiff, FeO staining, plastic to highly plastic.	15.9	104.7	
			D-2	25			@ 7.5': Reddish olive brown silty CLAY, moist, very stiff, pinhole pores, trace root hairs, FeO staining, trace root staining, plastic to highly plastic.	30.4	92.7	DS
	10		D-3	48			@ 10': Upper: Reddish olive brown silty CLAY with some fine to medium sand, moist, hard, trace pinhole pores, FeO staining, slightly plastic.	16.7	106.0	
170						SP	Lower: Yellow fine to medium SAND, moist, dense, some FeO staining, highly friable.			
	15		D-4	38			@ 15': Light yellowish/ reddish brown fine to medium SAND, moist, medium dense, FeO staining, mafic minerals, micaceous, highly friable.	4.4	95.6	
	20		D-5	42			@ 20': Reddish brown fine to coarse SAND with trace clay, moist, medium dense, slightly micaceous, possible FeO staining, highly friable.	18.9	105.7	DS
160						ML	**Monterey Formation (Tm)**			
	25									

LOG OF BORING

Lyon Living/ 900 Newport Center Drive
Newport Beach, CA
PROJECT NO. 20108-01

NMG

Report: HOLLOW STEM; Project: 20108-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 3/19/21

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-6	86/8"		ML	@ 25': Olive brown SILTSTONE, moist, hard, well-bedded, FeO staining along bedding.	23.4	78.9	
	30		D-7	60		SP	@ 30': Upper: Light gray clayey SILTSTONE, moist, hard, well-bedded. Upper rings contain red sandstone, highly friable. Lower: White silty SANDSTONE, moist, dense, FeO staining on top and bottom of sandstone, highly friable.	32.8	83.5	
150							Notes: Total Depth is 31.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped. Patched with Cold Patch AC.			
	35									
	40									
140										
	45									
	50									
130										
	55									

LOG OF BORING

Lyon Living/ 900 Newport Center Drive
Newport Beach, CA

PROJECT NO. 20108-01

NMG

Report: HOLLOW STEM; Project: 20108-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 3/19/21

Date(s) Drilled	1/28/21	Logged By	BF
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs. @ 30-inch drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

HS-3

Sheet 1 of 2

Total Depth Drilled (ft)	26.3
Approximate Ground Surface Elevation (ft)	183.3 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0						Surface: Parking Lot, 4" of AC over 13" of AB, fabric at the bottom of the AB. Observed dripping from fabric.			
						SC	**Artificial Fill (Af)** @ 1-5': Reddish brown clayey SAND, moist.			
180			B-1							B-1 @ 1-5'
	5		D-1	24		CL	**Marine Terrace (Qtm)** @ 5': Upper: Light olive brown silty CLAY with some sand, moist, very stiff, FeO staining, plastic, trace pinhole pores, becomes more sandy at bottom of sample.	17.7	110.2	
			D-2	21		SC	@ 7.5': Reddish brown clayey fine to medium SAND, moist, medium dense, pinhole pores, trace pencil-tip pores, trace root staining, abundant FeO staining, slightly micaceous.	12.2	109.0	
	10		D-3	32		SP	@ 10': Reddish brown/ Red fine to medium SAND with trace silt, moist, medium dense, FeO staining, mafic minerals, micaceous, highly friable.	7.7	108.3	
170										
	15		D-4	36			@ 15': Light yellowish brown/ yellowish red fine to medium SAND, moist, medium dense, mafic minerals, micaceous, highly friable.	7.6	103.9	
	20		D-5	86		ML	**Monterey Formation (Tm)**	10.3	110.2	DS
						SP	@ 20': Light yellowish brown/ reddish brown fine SANDSTONE, moist, very dense, FeO staining, friable. Upper rings contained siltstone bedrock.			
160										
	25									

LOG OF BORING

Lyon Living/ 900 Newport Center Drive
Newport Beach, CA
PROJECT NO. 20108-01

NMG

Report: HOLLOW STEM; Project: 20108-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 3/19/21

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-6	83/9"		ML	@ 25': Light olive gray SILTSTONE, moist, hard, well-bedded, chert bed within upper rings, FeO staining along bedding.	32.4	81.4	
							Notes: Total Depth is 26.25 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped. Patched with Cold Patch AC.			
	30									
150										
	35									
	40									
140										
	45									
	50									
130										
	55									

LOG OF BORING

Lyon Living/ 900 Newport Center Drive
Newport Beach, CA

PROJECT NO. 20108-01

NMG

Report: HOLLOW STEM; Project: 20108-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 3/19/21

Report: HOLLOW STEM; Project: 20108-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 3/19/21

Date(s) Drilled	2/16/21	Logged By	BF
Drilling Company	Pacific Drilling Company	Drill Bit Size/Type	6"
Drill Rig Type	Tripod Hollow Stem	Hammer Data	Cat-head, 140 lbs. @ 30-inch drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

HS-4

Sheet 1 of 1

Total Depth Drilled (ft)	19.5
Approximate Ground Surface Elevation (ft)	173.4 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
170	0					SP	Surface: Pool Deck, concrete, clean sand under concrete. **Artifical Fill (Af)** @ 0.5': Light yellowish brown, very fine SAND, dry to damp.			
	5		D-1	55		SP	**Marine Terrace (Qtm)** @ 5': Reddish yellow very fine to fine SAND, damp, dense, very clean, highly friable, possibly sand from pool deck shading.	3.1	99.2	CN
			D-2	50/6"			@ 7.5': Light yellowish/ reddish brown very fine to fine SAND, damp, very dense, very clean, highly friable, possibly slough from caving in.	4.0	96.2	
160	10		D-3	73/7"		SP-SC	@ 10': Reddish brown fine to medium SAND with some clay/ clayey fine to medium SAND, damp to moist, very dense, clay globules in upper rings.	9.2	110.9	
	15		D-4	50/8"			@ 15': Light yellowish brown clean SAND, possibly cuttings that caved in while drilling, tip had reddish brown medium SAND with trace clay, moist, very dense.	4.5	98.0	
			D-5 SB-1	50/1"		SILT STONE	**Monterey Formation (Tm)** @ 19': Driller hit refusal. Sampler full of slough sand. Bedrock is olive brown clayey SILTSTONE, damp to moist, hard, sample taken from shoe.	19.8		SB-1 @ 19.5'
150	20						Notes: Total Depth is 19.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Jetted/Tamped. Patched with Quick-Set Concrete.			
	25									

LOG OF BORING

Lyon Living/ 900 Newport Center Drive
Newport Beach, CA
PROJECT NO. 20108-01

NMG

Report: HOLLOW STEM; Project: 20108-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 3/19/21

Date(s) Drilled	2/17/21	Logged By	BF
Drilling Company	Pacific Drilling Company	Drill Bit Size/Type	6"
Drill Rig Type	Tripod Hollow Stem	Hammer Data	Cat-head, 140 lbs. @ 30-inch drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

HS-5

Sheet 1 of 1

Total Depth Drilled (ft)	18.3
Approximate Ground Surface Elevation (ft)	170.2 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
170	0					SM	Surface: Sidewalk, concrete, ~2" of AB. **Marine Terrace (Qtm)** @ 1': Reddish brown silty fine SAND, moist to wet. @ 3~5': Yellowish/ Reddish silty fine SAND, moist to wet.			
	5	D-1	75/12"				@ 5': Reddish brown silty fine SAND, moist, very dense, slightly micaceous, trace FeO staining, friable.	8.6	107.6	
		D-2	65/12"			SC	@ 7.5': Reddish brown silty clayey fine to medium SAND, moist, very dense, friable.	9.4	108.3	
160	10	D-3	82/10"				@ 10': Reddish brown clayey fine to coarse SAND, moist, very dense, friable, abundant pinhole pores, trace rootlets, ~1/2" clay bed in waste barrel.	9.6	118.6	
	15	D-4	75/11"			SM-ML	@ 15': Upper: Olive brown silty fine SAND/ sandy SILT, moist to wet, very dense/ hard, friable, weathered bedrock.	19.6	88.0	
		D-5	60/10"			SILT STONE	**Monterey Formation (Tm)** Lower: Olive brown sandy SILTSTONE, moist to wet, hard, more well-bedded than top rings, saturation around rings but no groundwater. @ 17.5': Driller hit refusal. Olive brown SILTSTONE, moist, hard, well-bedded.	27.8	79.1	2 Rings.
150	20						Notes: Total Depth is 18.3 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped. Patched with Quick-Set Concrete.			
	25									

LOG OF BORING

Lyon Living/ 900 Newport Center Drive
Newport Beach, CA
PROJECT NO. 20108-01

NMG

Date(s) Drilled	2/17/21	Logged By	BF
Drilling Company	Pacific Drilling Company	Drill Bit Size/Type	6"
Drill Rig Type	Tripod Hollow Stem	Hammer Data	Cat-head, 140 lbs. @ 30-inch drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

HS-6

Sheet 1 of 1

Total Depth Drilled (ft)	7.5
Approximate Ground Surface Elevation (ft)	163.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SC-CL	Surface: Dirt, grassy hillside. **Artificial Fill (Af)** @ 0-1': Brown clayey SAND/ sandy CLAY, moist to wet.			B-1 @ 1-5'
						SP-SM	**Marine Terrace (Qtm)** @ 1-5': Yellowish/ Reddish brown silty fine SAND/ fine SAND with some silt, damp to moist.			
160			B-1							
	5		D-1	90/10"		SILT STONE	**Monterey Formation (Tm)** @ 5': Yellowish brown clayey SILTSTONE, damp, very stiff, weathered at top, less weathered on bottom, FeO staining, bedded	32.7	86.6	
			D-2	79/12"		SILT STONE	bedrock in tip. @ 6.5': Driller hit refusal. Upper: Light reddish brown/ yellowish	19.0	97.3	
						SAND STONE	brown interbedded SILTSTONE and SANDSTONE, damp to moist, hard/ very dense, interbedded claystone.			
							Notes: Total Depth is 7.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	10									
150										
	15									
	20									
140										
	25									

LOG OF BORING

Lyon Living/ 900 Newport Center Drive
Newport Beach, CA
PROJECT NO. 20108-01

NMG

Report: HOLLOW STEM; Project: 20108-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 3/19/21

Date(s) Drilled	2/16/21	Logged By	BF
Drilling Company	Pacific Drilling Company	Drill Bit Size/Type	6"
Drill Rig Type	Tripod Hollow Stem	Hammer Data	Cat-head, 140 lbs. @ 30-inch drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

HS-7

Sheet 1 of 1

Total Depth Drilled (ft)	15.6
Approximate Ground Surface Elevation (ft)	175.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SC-CL	Surface: Dirt, grass **Artificial Fill (Af)** @ 0-4': Yellowish brown silty clayey SAND/ sandy silty CLAY, moist to wet, abundant roots.			
170	5		D-1	33		SM	**Marine Terrace (Qtm)** @ 5': Yellow brown silty fine to very fine SAND, damp, medium dense, trace rootlets, trace pinhole pores, trace root staining.	6.3	115.4	CN
			D-2	70/9"				2.7	107.4	
						SP	@ 8.5': Yellowish brown fine SAND with trace to some silt, damp, very dense, light colored staining.			
	10		D-3	50/6"			@ 10': Upper: Yellowish brown fine SAND with trace to some silt, damp, very dense, trace roots/ rootlets, trace root staining. Lower: Dark yellowish brown fine to medium SAND with trace silt, damp, very dense, abundant pinhole pores.	6.1	112.3	
160	15		D-4	50/5.5"		SILT STONE/ CLAY STONE	@ 15': Upper: Dark yellowish brown fine to medium SAND with trace silt, damp, very dense, abundant pinhole pores. **Monterey Formation (Tm)** Lower: Yellowish/ Reddish brown sandy silty CLAY, damp to moist, very stiff, pieces of shale/ chert, abundant FeO staining. @ 15.5': Driller hit refusal. Yellow/ olive clayey SILTSTONE, damp, very dense, abundant FeO staining.	7.7	110.2	
	20						Notes: Total Depth is 15.6 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
150	25									

LOG OF BORING

Lyon Living/ 900 Newport Center Drive
Newport Beach, CA
PROJECT NO. 20108-01

NMG

Report: HOLLOW STEM; Project: 20108-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 3/19/21

Earth Systems

2122 East Walnut Street, Suite 200, Pasadena 91107
Phone: (626) 356-0955 Fax: (626) 356-0956

EB-1

PROJECT NAME:	Newport Ctr Dr (Marriot Hotel)
PROJECT NUMBER:	304031-001
DRILLING DATE:	8/5/2020
BORING LOCATION:	See Map
BORING NO:	**B1**
DRILL RIG:	Hand Auger
DRILLING METHOD:	3-inch hand auger
LOGGED BY:	KA

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	Penetration Resistance (Blows/6-inches)	Symbol	USCS Classification	Unit Dry Weight (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS
0	X				SM		93.0	7.4	Artificial Fill (af): Silty SAND, light brown, fine -to medium-grained, moist, medium dense.
5					SP		98.8	3.8	Poorly graded SAND, tan brown, fine-to medium-grained, moist, medium dense.
							103.6	3.2	Poorly graded SAND, tan brown, medium-grained, moist, dense.
10							101.7	4.6	Poorly graded SAND, tan brown, medium-grained, moist, dense.
							106.2	10.5	Poorly graded SAND, tan brown, medium-grained, moist, dense.
15									Total depth 13.0 feet No groundwater encountered. Backfilled with soil cuttings.
20									
25									
30									
35									

Earth Systems

2122 East Walnut Street, Suite 200, Pasadena 91107
Phone: (626) 356-0955 Fax: (626) 356-0956

EB-2

PROJECT NAME:	Newport Ctr Dr (Marriot Hotel)	BORING NO:	**B2**
PROJECT NUMBER:	304031-001	DRILL RIG:	Hand Auger
DRILLING DATE:	8/5/2020	DRILLING METHOD:	3-inch hand auger
BORING LOCATION:	See Map	LOGGED BY:	KA

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	Penetration Resistance (Blows/6-inches)	Symbol	USCS Classification	Unit Dry Weight (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS
0					SM		104.6	10.9	Artificial Fill (af): Silty SAND, light brown, fine -to medium-grained, moist, medium dense.
5							102.8	3.5	Poorly graded SAND, tan brown, fine-to medium-grained, moist, medium dense.
					SP		89.6	4.0	Poorly graded SAND, tan brown, fine- to medium-grained, moist, dense.
10							100.7	4.5	Poorly graded SAND, tan brown, medium-grained, moist, dense, trace rubber pieces in slough at top of sample.
							110.1	9.5	Poorly graded SAND, tan brown, medium-grained, moist, dense.
15									Total depth 13.0 feet No groundwater encountered. Backfilled with soil cuttings.
20									
25									
30									
35									

APPENDIX F

APPENDIX F

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

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 Geotechnical Consultant: Prior to commencement of work, the owner shall employ a geotechnical consultant. The geotechnical consultant 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 12 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 D1557-91).

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 D1557-91). 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 D1557-91.

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 Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

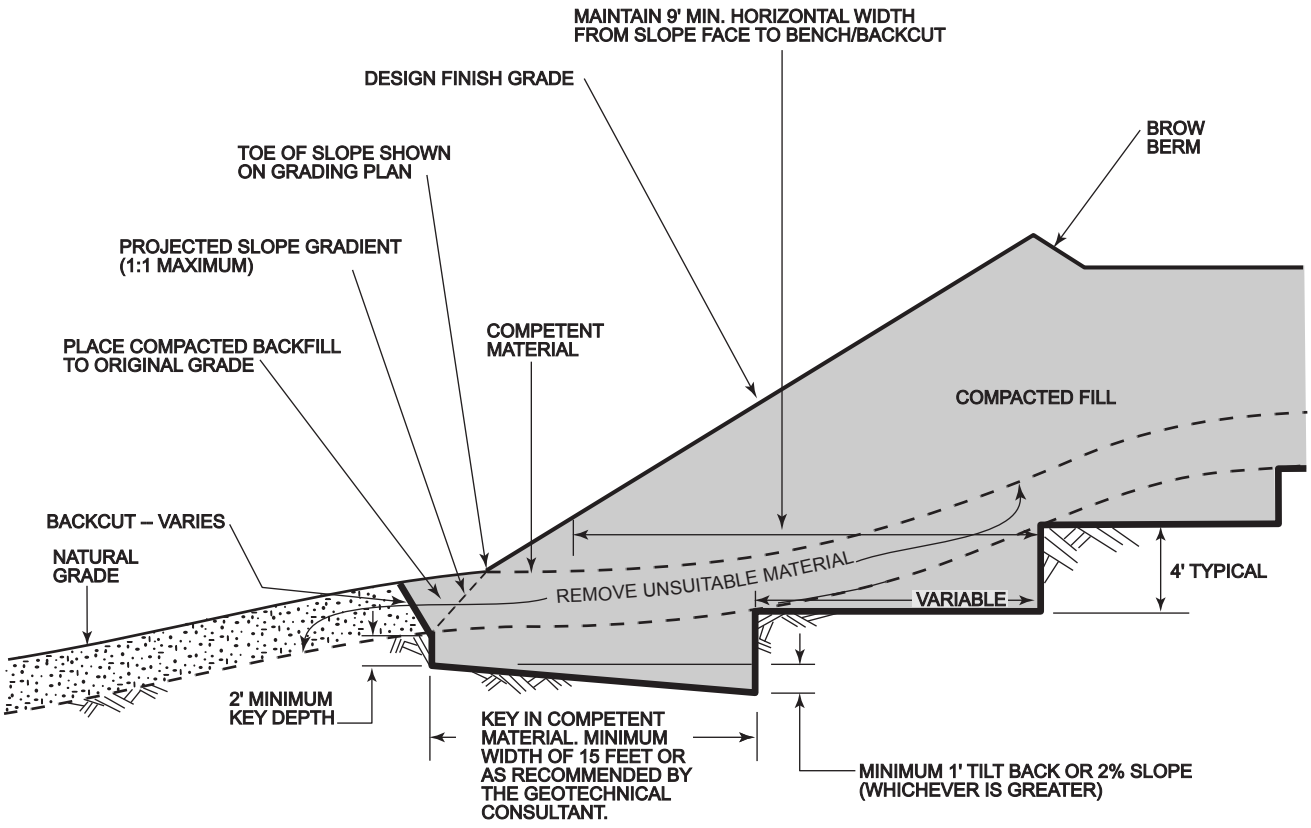
7.2 Bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum 90 percent of maximum from 1 foot above the top of the conduit to the surface, except in traveled ways (see Section 7.6 below).

7.3 Jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

7.4 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.

7.5 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.

7.6 Trench backfill in the upper foot measured from finish grade/subgrade within existing or future traveled way, shoulder, and other paved areas (or areas to receive pavement) should be placed to a minimum 95 percent relative compaction unless specified differently by the governing agency.

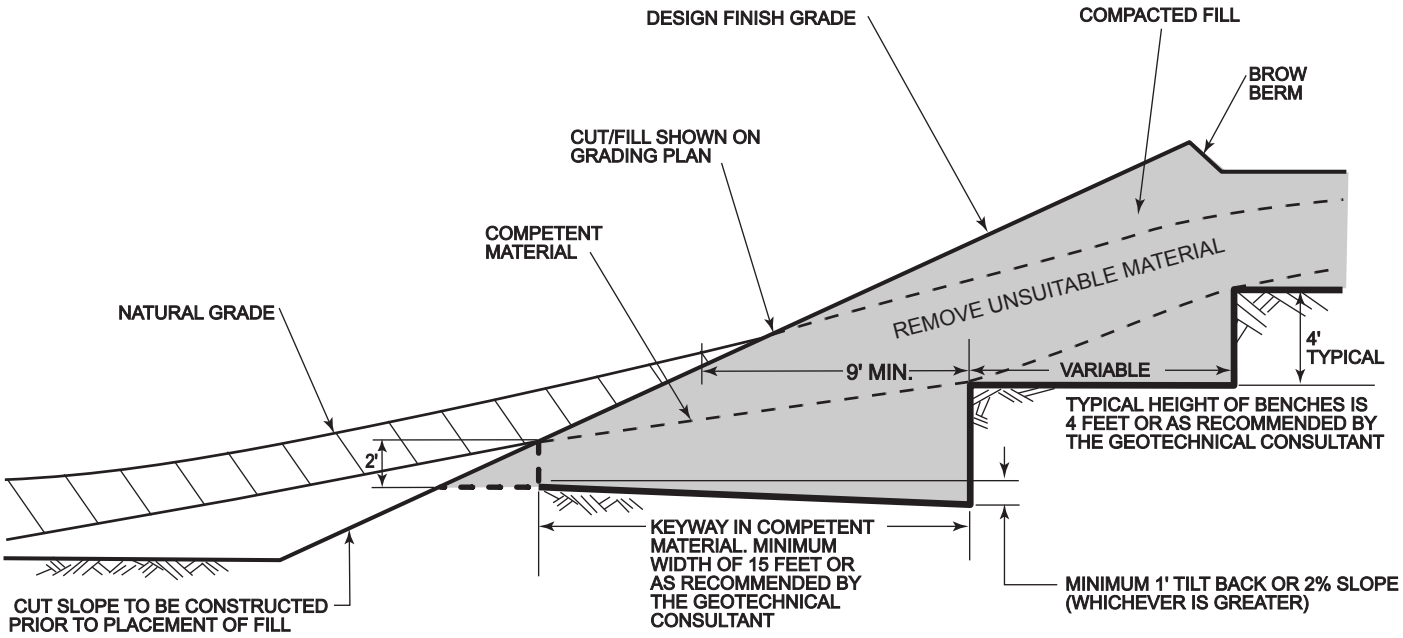


NOTE: BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE SOIL ENGINEER. WHERE THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN SLOPE RATIO, SPECIAL RECOMMENDATIONS WILL BE PROVIDED BY THE GEOTECHNICAL ENGINEER.

FIGURE 1

TYPICAL FILL KEY ABOVE NATURAL SLOPE MINIMUM STANDARD GRADING DETAILS

NMG Geotechnical, Inc.



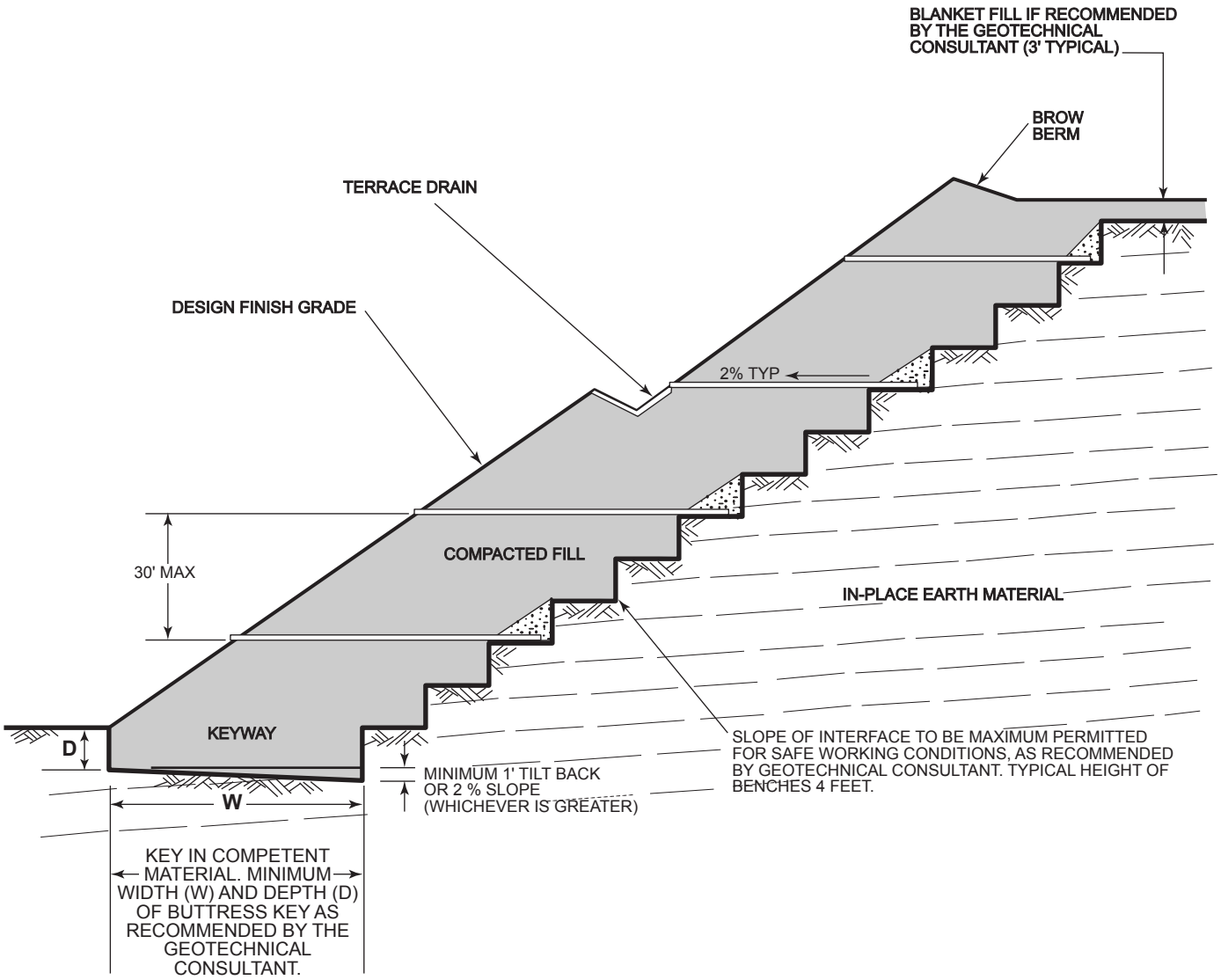
NOTE: THE FILL PORTION OF THE SLOPE SHALL BE COMPACTED AS STATED IN THE PROJECT SPECIFICATIONS.

FIGURE 2

TYPICAL FILL ABOVE CUT SLOPE
MINIMUM STANDARD GRADING DETAILS

NMG Geotechnical, Inc.

8/03 TYP FILL ABOVE CUT SLOPE.ai

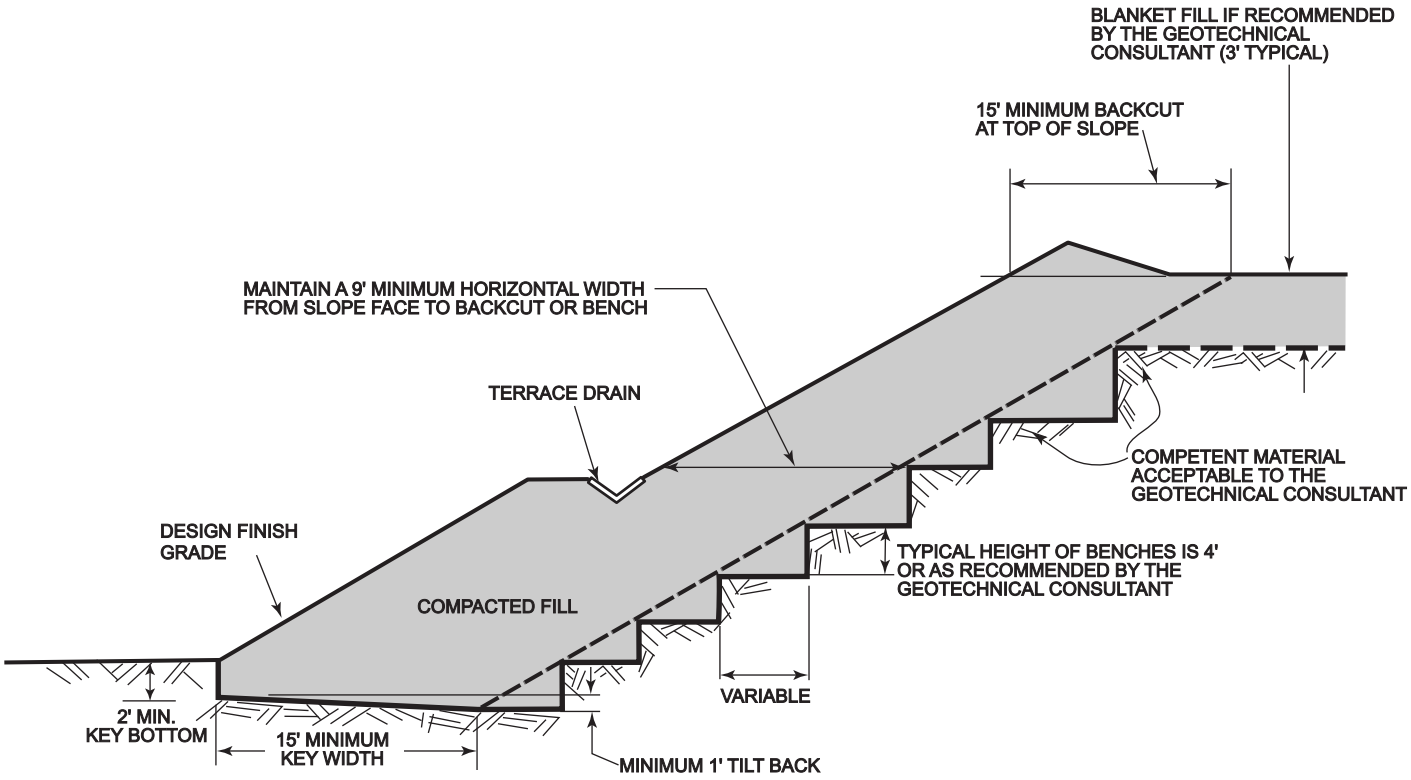


NOTE: SUBDRAIN DETAILS, SEE FIGURE 5.

FIGURE 3

TYPICAL BUTTRESS FILL
MINIMUM STANDARD GRADING DETAILS

NMG Geotechnical, Inc.

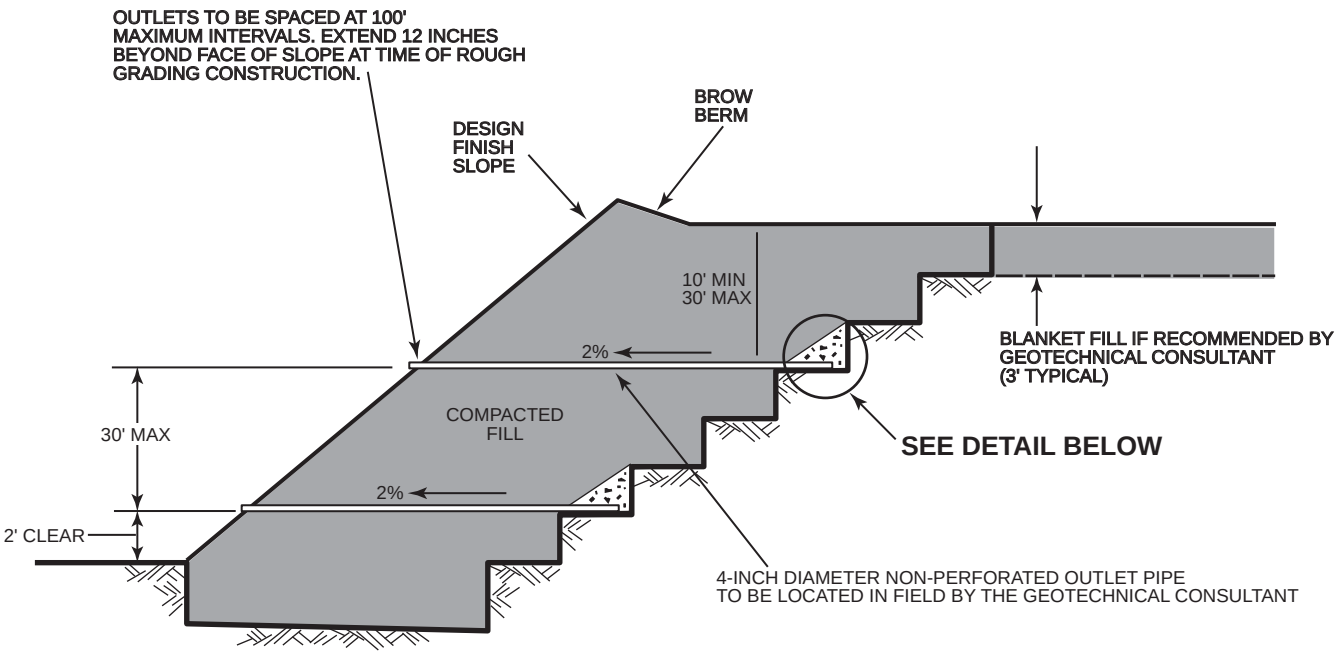


NOTE:
SEE FIGURE 5 FOR TYPICAL SUBDRAIN DETAILS FOR STABILIZATION FILLS

FIGURE 4

TYPICAL STABILIZATION FILL MINIMUM STANDARD GRADING DETAILS

NMG Geotechnical, Inc.



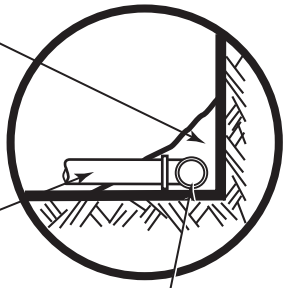
FILTER MATERIAL - MINIMUM OF THREE CUBIC FEET PER FOOT OF PIPE. SEE FILTER MATERIAL SPECIFICATION.

ALTERNATE: IN LIEU OF FILTER MATERIAL, THREE CUBIC FEET OF GRAVEL PER FOOT OF SUBDRAIN (WITHOUT PIPE) MAY BE ENCASED IN FILTER FABRIC. SEE GRAVEL SPECIFICATION, AND FIGURE 6 FOR FILTER FABRIC SPECIFICATION

"GRAVEL" TO CONSIST OF 1/2" TO 1" CRUSHED ROCK PER STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.

FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS.

DETAIL



OUTLET PIPE TO BE CONNECTED TO SUBDRAIN PIPE WITH TEE OR ELBOW

MINIMUM 4-INCH DIAMETER SCHEDULE 40 ASTM D1527 OR D1785 OR SDR 35 ASTM D2751 OR D 3034. FOR FILL DEPTH OF 90 FEET OR GREATER, USE ONLY SCHEDULE 40 OR EQUIVALENT. THERE SHALL BE A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE. PROVIDE CAP AT UPSTREAM END OF PIPE. SLOPE AT 2 PERCENT TO OUTLET PIPE.

"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT.

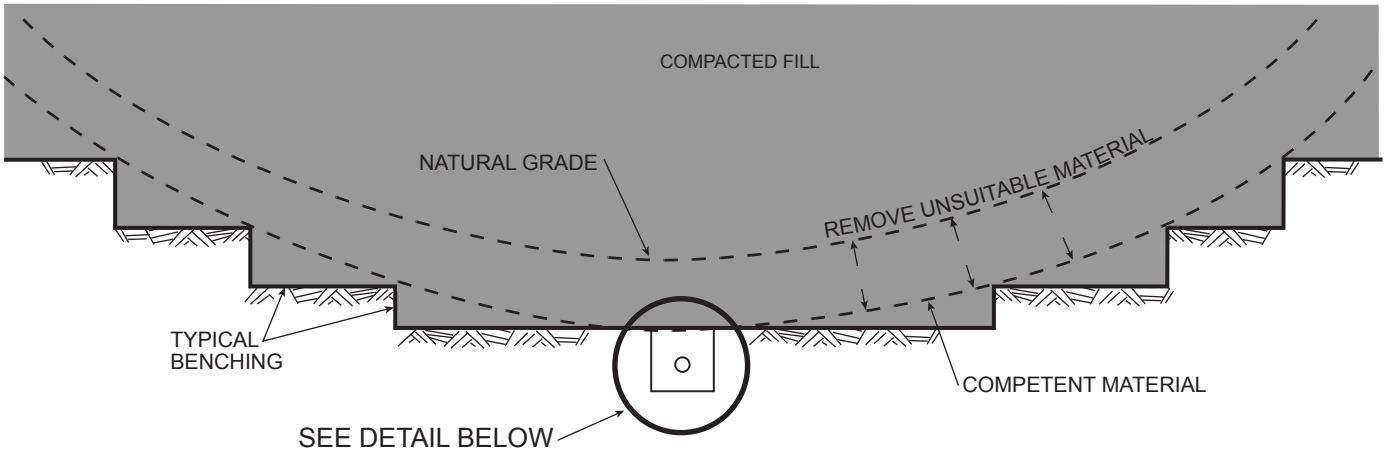
SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

NOTE:
TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

FIGURE 5

TYPICAL STABILIZATION AND BUTTRESS FILL SUBDRAINS MINIMUM STANDARD GRADING DETAILS

NMG Geotechnical, Inc.



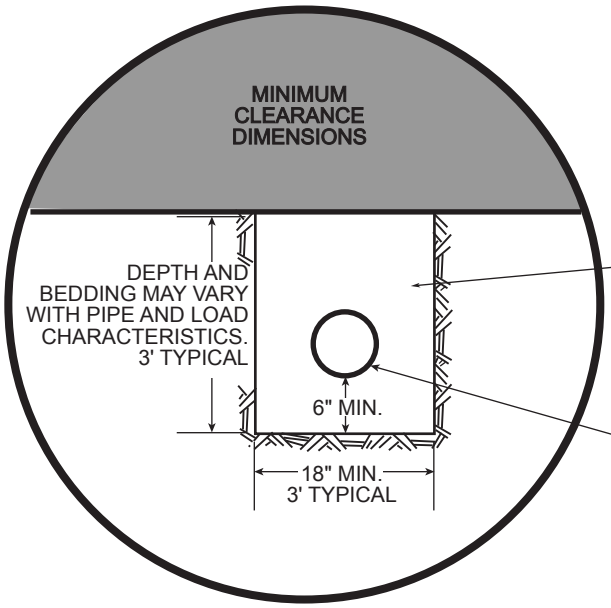
FILTER FABRICS SHALL BE PERMEABLE NON-WOVEN POLYESTER, NYLON, OR POLYPROPYLENE MATERIAL CONFORMING TO THE FOLLOWING:

1) GRAB TENSILE STRENGTH. POUNDS, MIN. ASTM D 4632.....90
2) ELONGATION, AT PEAK LOAD, PERCENT, MIN. ASTM D 4632.....50
3) PUNCTURE STRENGTH, LBS., MIN. ASTM D 3787.....45
4) COEFFICIENT OF WATER PERMITTIVITY, 1/SEC. ASTM D 4491.....>0.7
5) BURST STRENGTH, P.S.I., MIN. ASTM D 3786.....180

NOTES: DOWNSTREAM 20' OF PIPE AT OUTLET SHALL BE NON-PERFORATED AND BACKFILLED WITH FINE-GRAINED MATERIAL

PIPE SHALL BE A MINIMUM OF 4-INCH DIAMETER. FOR RUNS OF 500 FEET OR MORE, USE 6-INCH DIAMETER PIPE, OR AS RECOMMENDED BY THE GEOTECHNICAL CONSULTANT

DETAIL



FILTER MATERIAL - MINIMUM OF NINE CUBIC FEET PER FOOT OF PIPE. SEE FIGURE 5 FOR FILTER MATERIAL SPECIFICATIONS.

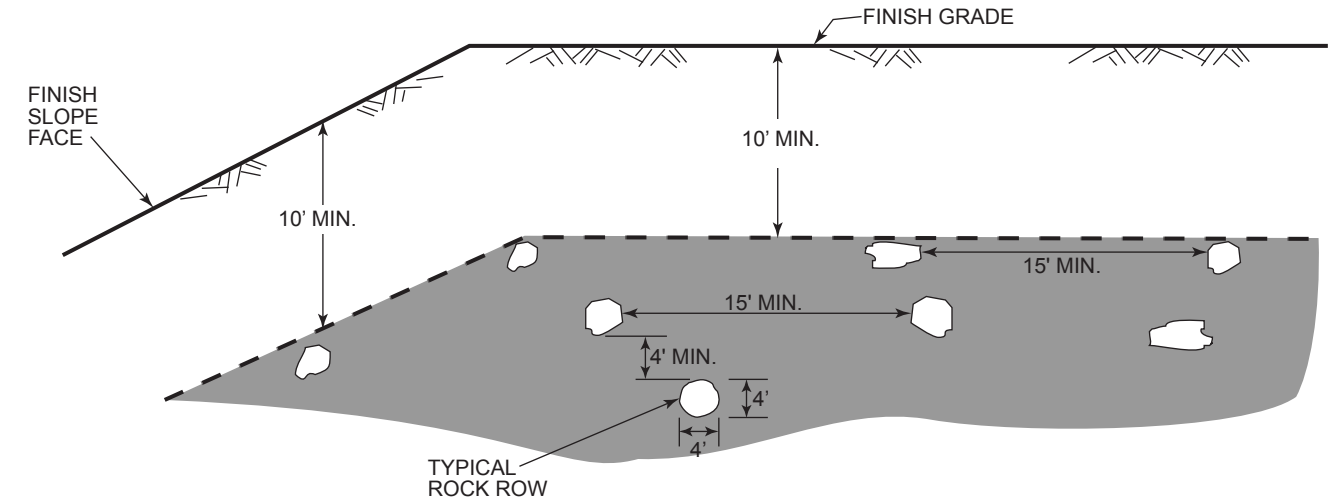
ALTERNATE: IN LIEU OF FILTER MATERIAL, NINE CUBIC FEET OF GRAVEL PER FOOT OF SUBDRAIN (WITHOUT PIPE) MAY BE ENCASED IN FILTER FABRIC. SEE FIGURE 5 TO GRAVEL SPECIFICATION. SEE ABOVE FOR FILTER FABRIC SPECIFICATION. FILTER FABRIC SHALL BE LAPPED MINIMUM OF 12 INCHES ON ALL JOINTS.

MINIMUM 4 INCH DIAMETER SCHEDULE 40 ASTM D 1527, OR D 1785, OR SDR 35 ASTM 2751 OR D 3034. FOR FILL DEPTH OF 90 FEET OR GREATER, USE ONLY SCHEDULE 40 OR APPROVED EQUIVALENT. THERE SHALL BE A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE.

FIGURE 6

TYPICAL CANYON SUBDRAIN MINIMUM STANDARD GRADING DETAILS

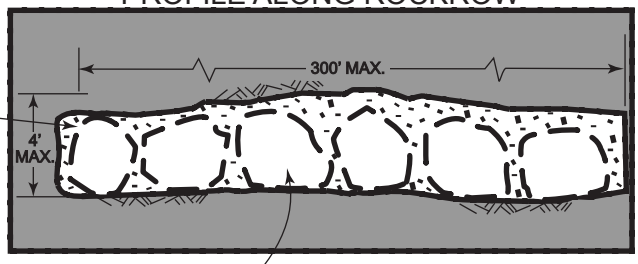
NMG Geotechnical, Inc.



SECTION THROUGH ROCKROW

FILL VOIDS WITH SELECT GRANULAR SOIL PLACED BY WATER DENSIFICATION AND MECHANICAL COMPACTION. NESTING OR STACKING OF OVERSIZE MATERIAL IS NOT ACCEPTABLE.

PROFILE ALONG ROCKROW



PLACE OVERSIZE MATERIAL IN TRENCH. FALSE SLOPE OR CUT SLOT INTO APPROVED MATERIAL. OVERSIZE MATERIAL MAY BE PLACED SIDE BY SIDE IF SIZE PERMITS. (NOT TO EXCEED A WIDTH OF 4 FEET)

NOTES:

A) OVERSIZED ROCK IS DEFINED AS LARGER THAN 12" IN SIZE (IN GREATEST DIMENSION).

B) SPACE BETWEEN ROCKROWS SHOULD BE ONE EQUIPMENT WIDTH OR A MINIMUM OF 15 FEET.

C) THE WIDTH AND HEIGHT OF THE ROCKROW SHALL BE LIMITED TO FOUR FEET AND THE LENGTH LIMITED TO 300 FEET UNLESS APPROVED OTHERWISE BY THE GEOTECHNICAL CONSULTANT. OVERSIZE SHOULD BE PLACED WITH FLATEST SIDE ON THE BOTTOM.

D) OVERSIZE MATERIAL EXCEEDING FOUR FEET MAY BE PLACED ON AN INDIVIDUAL BASIS IF APPROVED BY THE GEOTECHNICAL CONSULTANT.

E) FILLING OF VOIDS WILL REQUIRE SELECT GRANULAR SOIL (SE > 20, OR LESS THAN 20 PERCENT FINES) AS APPROVED BY THE GEOTECHNICAL CONSULTANT. VOIDS IN THE ROCKROW TO BE FILLED BY WATER DENSIFYING GRANULAR SOIL INTO PLACE ALONG WITH MECHANICAL COMPACTION EFFORT.

F) IF APPROVED BY THE GEOTECHNICAL CONSULTANT, ROCKROWS MAY BE PLACED DIRECTLY ON COMPETENT MATERIALS OR BEDROCK, PROVIDED ADEQUATE SPACE IS AVAILABLE FOR COMPACTION.

G) THE FIRST LIFT OF MATERIAL ABOVE THE ROCKROW SHALL CONSIST OF GRANULAR MATERIAL AND SHALL BE PROOF-ROLLED WITH A D-8 OR LARGER DOZER OR EQUIVALENT.

H) ROCKROWS NEAR SLOPES SHOULD BE ORIENTED PARALLEL TO SLOPE FACE.

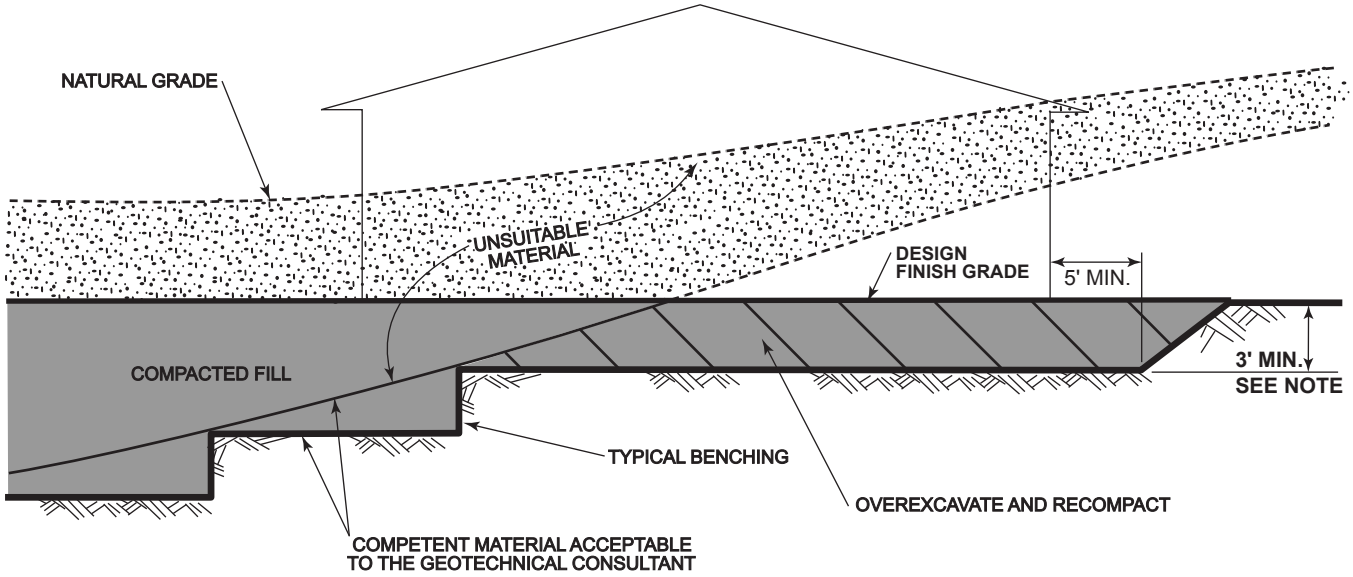
I) NESTING OR STACKING OF ROCKS IS NOT ACCEPTABLE.

FIGURE 7

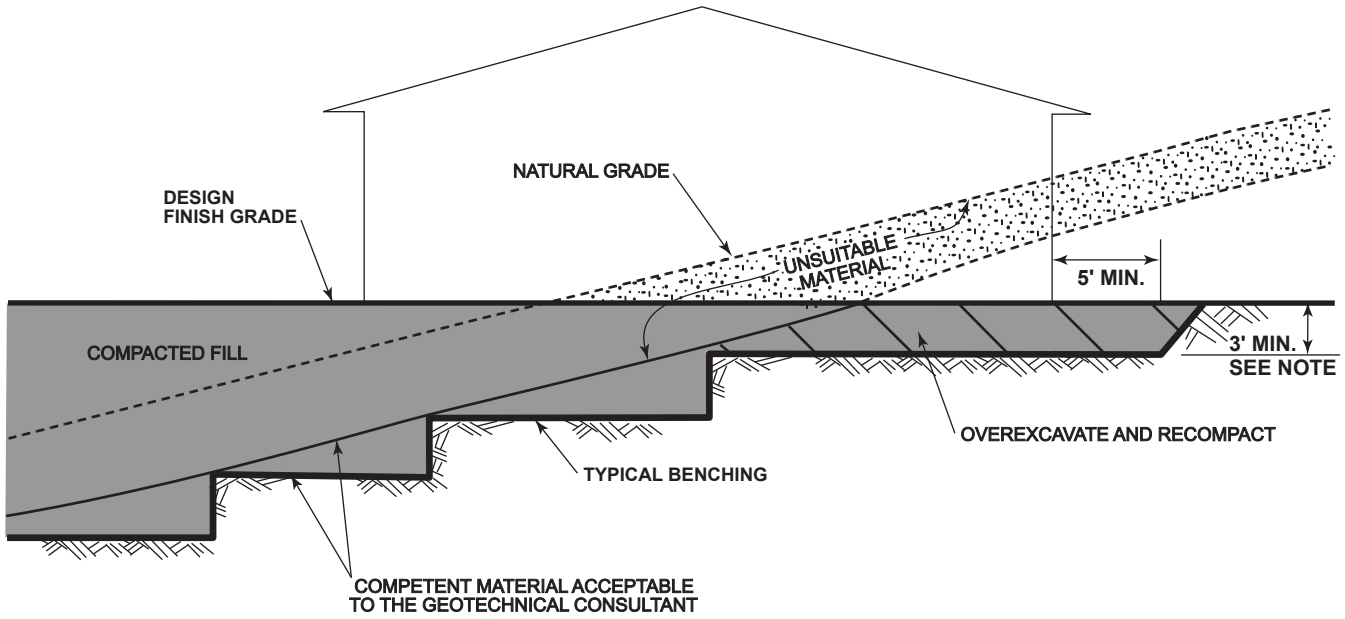
TYPICAL OVERSIZE ROCK PLACEMENT METHOD MINIMUM STANDARD GRADING DETAIL FOR STRUCTURAL FILL

NMG Geotechnical, Inc.

CUT LOT



CUT FILL LOT (TRANSITION)

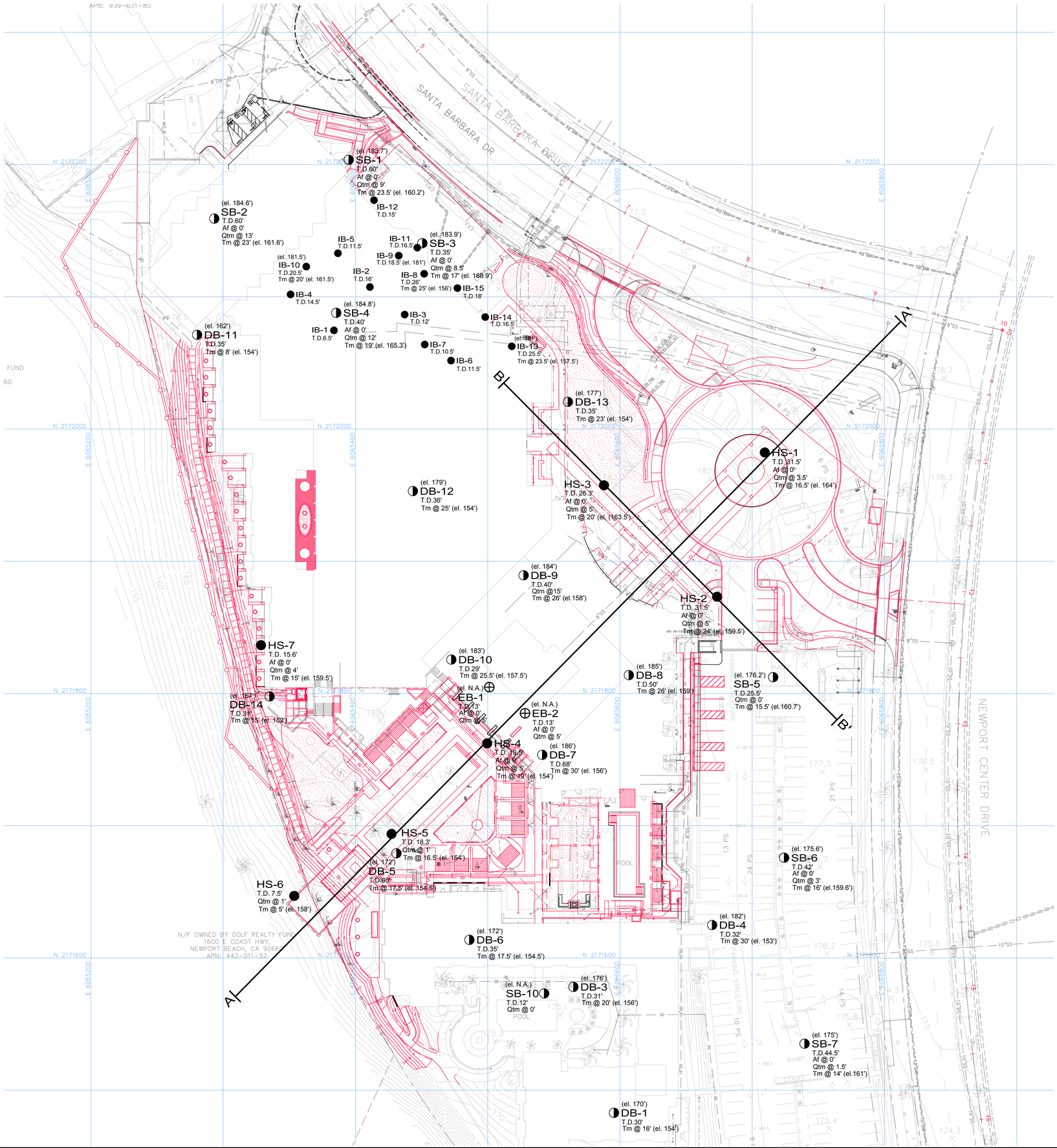


NOTE: DEEPER THAN THE 3-FOOT OVEREXCAVATION MAY BE RECOMMENDED BY THE GEOTECHNICAL CONSULTANT IN STEEP TRANSITIONS.

FIGURE 8

TYPICAL OVEREXCAVATION OF DAYLIGHT LINE MINIMUM STANDARD GRADING DETAILS

NMG Geotechnical, Inc.



LEGEND

SYMBOLS - LOCATIONS ARE APPROXIMATE

- HS-7 (T.D. 15.6' Af @ 0' Qtm @ 4' Tm @ 15' (el. 159.5')) — HOLLOW STEM BORING, THIS INVESTIGATION, SHOWING TOTAL DEPTH, DEPTH TO EARTH UNITS AND ELEVATION OF BEDROCK ABOVE MEAN SEA LEVEL
- (el. N.A.) EB-2 (T.D. 13' Af @ 0' Qtm @ 5') — HAND AUGER BORINGS BY EARTH SYSTEMS PACIFIC (2020), SHOWING, TOTAL DEPTH AND DEPTH TO EARTH UNITS, (TOP OF BORING ELEVATION NOT AVAILABLE)
- (el. 176') SB-9 (T.D. 34.5' Af @ 0' Qtm @ 20' Tm @ 23.5' (el. 152.5')) — HOLLOW STEM BORINGS BY SOILS INTERNATIONAL, SHOWING TOP OF BORING ELEVATION, TOTAL DEPTH, DEPTH OF EARTH UNITS AND ELEVATION OF BEDROCK CONTACT
- IB-15 (T.D. 18') — HOLLOW STEM BORING BY IRVINE SOILS (1981), SHOWING TOTAL DEPTH
- (el. 167') DB-14 (T.D. 31' Tm @ 15' (el. 152')) — HOLLOW STEM BORINGS BY DAMES AND MOORE (1973, 1975), SHOWING TOP OF BORING ELEVATION, TOTAL DEPTH, DEPTH OF EARTH UNITS AND ELEVATION OF BEDROCK CONTACT
- B — B' — CROSS-SECTION

GRAPHIC SCALE

30 0 15 30 60

(IN FEET)

1 inch = 30 ft.

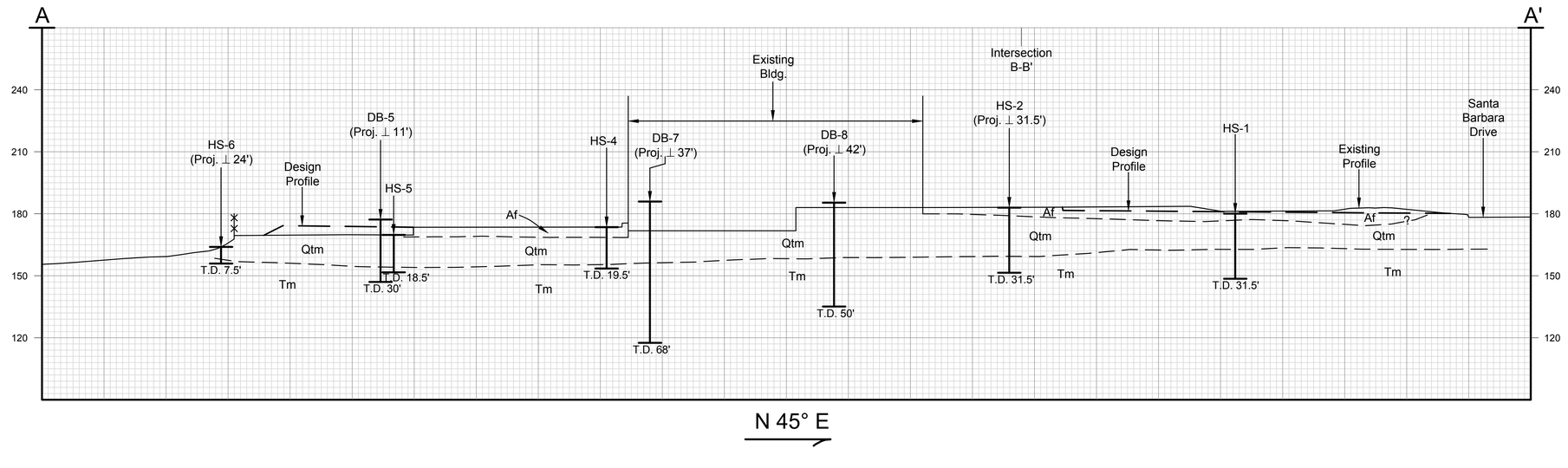
PLATE 1

GEOTECHNICAL MAP
NEWPORT BEACH MARRIOTT IMPROVEMENTS
900 NEWPORT CENTER DRIVE
CITY OF NEWPORT BEACH, CALIFORNIA

Project No.: 20108-01 By: SBK/TW
Project Name: Lyon Living/ 900 NCD Drive
Date: 4/8/2021 SCALE: 1" = 30'

NMG Geotechnical, Inc.

Drawing: P:\2020\20108-01 Lyon Liv - 900 NCD\Drafting_WP\20108-01 Plate.dwg Layout: 1 Last Saved: Wed Apr 07, 2021 - 3:01pm Last Plotted: Thu Apr 08, 2021 - 12:06pm By: jschneider



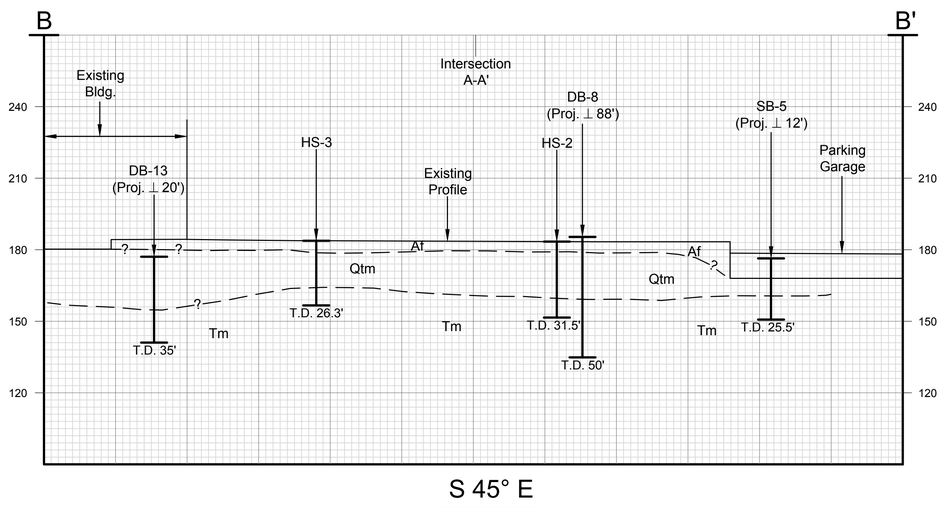


PLATE 2

Project No.: 20108-01	By: SBK/TW
Project Name: Lyon Living/ 900 NCD Drive	
Date: 4/8/2021	SCALE: 1" = 30'

NMG Geotechnical, Inc.

Drawing: P:\2020\20108-01 Lyon Liv - 900 NCD\Drafting_MAP\sect_30.dwg Layout: 1-1' Last Saved: Wed Apr 07, 2021 - 3:01pm Last Plotted: Thu Apr 08, 2021 - 12:16pm By: jschneider