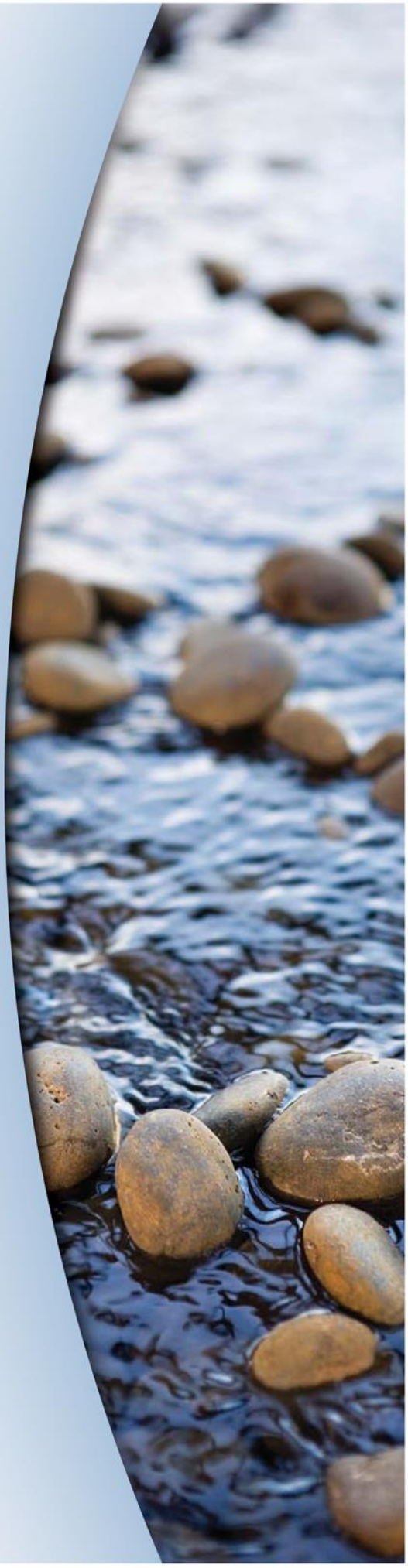

PRELIMINARY
WATER QUALITY MANAGEMENT PLAN (WQMP)

Newport Center Condominiums

City of Newport Beach, California

Prepared For

NEWPORT CENTER ANACAPA ASSOCIATES, LLC
2804 Lafayette Ave
Newport Beach, CA 92660
(949) 723-5854

Prepared By

Fuscoe Engineering, Inc.
16795 Von Karman, Suite 100
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Project Manager:
Oriana Slasor, P.E.

Date Prepared: February 26, 2015
Date Revised: April 10, 2015
Job Number: 1317.001.01

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PRELIMINARY WATER QUALITY MANAGEMENT PLAN (WQMP)

NEWPORT CENTER CONDOMINIUMS

April 10, 2015

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1317.001.01

PRELIMINARY
WATER QUALITY MANAGEMENT PLAN (WQMP)

NEWPORT CENTER CONDOMINIUMS

City of Newport Beach, County of Orange

150 NEWPORT CENTER DRIVE
NEWPORT BEACH, CA 92660

PLAN CHECK NO. PA2014-213
PARCEL 1 P.M.B. 29/34
APN: 442-231-12

Prepared for:

NEWPORT CENTER ANACAPA ASSOCIATES, LLC
2804 Lafayette Ave
Newport Beach, CA 92660
(949) 723-5854

Prepared by:

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

Date Prepared: February 26, 2015
Date Revised: April 10, 2015

PROJECT OWNER'S CERTIFICATION			
Permit/Application No.:	PA2014-213	**Grading Permit No.:**	PENDING
Tract/Parcel Map and Lot(s)No.:	PARCEL 1 P.M.B. 29/34	**Building Permit No.:**	PENDING
Address of Project Site and APN:	150 Newport Center Drive, Newport Beach, CA 92660 APN 442-231-12		

This Water Quality Management Plan (WQMP) has been prepared for Newport Center ANACAPA ASSOCIATES, LLC by FUSCOE ENGINEERING, INC. The WQMP is intended to comply with the requirements of the County of Orange NPDES Storm water 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:	Newport Center Anacapa Associates, LLC
Name:	Tod Ridgeway
Title:	
Company:	Ridgeway Development Company
Address:	2804 Lafayette Ave, Newport Beach, CA 92660
Email:	tridgeway@sbcglobal.net
Telephone:	(949) 723-5854
Signature:	**Date:**

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EXHIBITS & BMP DETAILS (INCLUDED IN SECTION VI)

- Vicinity Map
- Preliminary WQMP Exhibit
- Conceptual Grading Plans (3 Sheets, 11"x17" reduced scale)
- Modular Wetland Details

EDUCATIONAL MATERIALS (INCLUDED IN APPENDIX C)

- The Ocean Begins at Your Front Door
- Household Tips
- Proper Disposal of Household Hazardous Waste
- Recycle at Your Local Used Oil Collection Center (Central County)
- Responsible Pest Control
- Tips for Landscaping and Gardening
- Tips for Pet Care
- Tips for Pool Maintenance
- Tips for Residential Pool, Landscape and Hardscape Drains
- DF-1 Drainage System Operation & Maintenance
- R-4 Home & Garden Care Activities
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- SD-11 Roof Runoff Controls
- SD-12 Efficient Irrigation
- SD-13 Storm Drain Signage

SECTION I DISCRETIONARY PERMITS AND WATER QUALITY CONDITIONS

PROJECT INFORMATION			
Permit/Application No.:	PA2014-213	**Tract/Parcel Map No.:**	PARCEL 1 P.M.B. 29/34
Address of Project Site and APN:	150 Newport Center Drive, Newport Beach, CA APN 442-231-12		
WATER QUALITY CONDITIONS			
Discretionary Permit(s):	Pending issuance, to be provided upon issuance by the City of Newport Beach.		
Water Quality Conditions:	<u>City of Newport Beach Standard Condition:</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.		
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 Newport Center Condominiums project site encompasses approximately 1.26 acres at 150 Newport Center Drive in the City of Newport Beach. The project site is bounded by Newport Center Drive to the north, by Anacapa Drive to the east, and by existing office buildings and asphalt parking lots to the south and west. A Vicinity Map is included in Section VI.

Under existing conditions, the project site is fully developed and serves as an active car wash/service building with asphalt paved parking lots surrounding the building. Adjacent land uses include commercial and office uses as part of the larger Fashion Island Center.

The table below summarizes the proposed project.

DESCRIPTION OF PROPOSED PROJECT				
WQMP Development Category:	Category 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 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.			
Project Area (ft^2):	54,885.6 ft^2 (1.26 acres)			
# of Dwelling Units:	49			
SIC Code:	6531 Real Estate Managers (HOA)			
Narrative Project Description:	The proposed condominium development will consist of a large, three-story subterranean parking garage with an overlying seven-story residential condominium buildings above the parking garage. Other proposed amenities include a leasing office, fitness center, a pool, a lounge, a meeting room, a mail room and a club room.			
Project Area:	**Pervious Area**	**Pervious Area Percentage**	**Impervious Area**	**Impervious Area Percentage**
Pre-Project Conditions:	0.25 ac	20%	1.0 ac	80%
Post-Project Conditions:	0.19 ac	15%	1.07 ac	85%

DESCRIPTION OF PROPOSED PROJECT	
Drainage Patterns/ Connections:	Under existing conditions, storm water runoff generally sheets flows towards the south-southwest portion of the site and ties into an existing 10" storm drain. Under the proposed conditions, an area drain will be installed along the north, east and south perimeter of the site and tie into the existing 10" storm drain. Storm water flows will ultimately discharge to the Lower Newport Bay.

PROJECT FEATURES		
Building Summary:	The proposed project includes 2-3 bedroom condominiums throughout the seven story building. The proposed parking structure will feature three below-ground levels of parking to accommodate the condominiums. Entrance to the parking garage will be from the south of the building to the upper garage level.	
Amenities:	Proposed amenities include a rooftop pool, spa, fitness center, and club room on Level 7 of the proposed building, and a lounge located on Level 1 of the building adjacent to the lobby/reception area. The table below summarizes the proposed amenities. Common area landscaping will be provided surrounding the building, and an artificial turf dog park area will be located on the northwestern corner of the property.	
	Amenity	Area (SF)
	Fitness Center	1,411
	Pool Deck	3,501
	Club Room	1,411
	Lounge	1,478
Landscaped Areas:	Landscaping will be provided around the perimeter of the structure. The landscape will include shrubs, trees, hedges, turf, and succulents. Planter areas immediately adjacent to structures should be avoided (NMG, 2012). Approximately 15% of the site will be landscaped.	
Parking Facilities:	Parking will be provided on-site in subterranean garage below the building. The proposed parking facilities include 98 residential stalls and 25 visitor stalls totaling to 123 stalls.	
Other Project Features:	Trash will be managed indoors within the parking structure. No outdoor storage areas are proposed. The site will not have any outdoor storage areas, loading docks, vehicle/community car wash racks or equipment wash areas. The proposed project will not include restaurant uses/food preparation areas.	
Outdoor Activities:	Outdoor activities are anticipated with passive recreational uses in the common landscapes areas surrounding the building, as well as within the pool recreation area. All vehicular parking will be located indoors within the subterranean parking structure.	

PROJECT FEATURES	
Materials Stored:	No outdoor storage materials is anticipated (materials will be stored indoors). Materials anticipated to be stored on-site include those associated with residential developments (i.e. cleaning products, pool maintenance equipment, storage, etc.); however, no hazardous wastes will be stored on-site. Pool maintenance equipment will be stored indoors within designated storage areas.
Wastes Generated:	The project is not anticipated to generate any wastes other than landscape clippings, typical trash, debris and refuse from the residents. Outdoor trash receptacles will be provided throughout the common areas of the site for the residents to dispose of their refuse in a proper manner, and maintenance crews will provide back up 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 (May 2011), 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 ft^2	E	E	N	E	E	E	N	E
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

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

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. (2011, May 19). 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: Attached residential units

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	N	303(d) listed impairment / TMDL
Pathogens (Bacteria/Virus)	E	303(d) listed impairment / TMDL
Pesticides	E	303(d) listed impairment / TMDL
Oil & Grease	E(2)	
Toxic Organic Compounds	N	
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)**

According to Figure XVI-3b of the Model WQMP Technical Guidance Document (May 2011), the project site is **not** located in an area susceptible to hydromodification impacts. Therefore, the project does not have the potential for a HCOC. A copy of Figure XVI-3b is included in Appendix A.

II.4 POST DEVELOPMENT DRAINAGE CHARACTERISTICS

Under the proposed conditions, runoff will continue to drain towards the southwest portion of the site where a new area storm drain section will be constructed on the south, east and northern sections of the site. The new storm drain lines will tie into the existing 10" storm drain and catch basin at the southwest most end of the site. The storm drain system then discharges into the City MS4 along Civic Center Drive towards Pacific Coast Highway, where it is then conveyed west to the Lower Newport Bay where it is ultimately discharged.

II.5 PROPERTY OWNERSHIP/MANAGEMENT

PROPERTY OWNERSHIP/MANAGEMENT	
Public Streets:	City of Newport Beach
Private Streets:	None proposed.

PROPERTY OWNERSHIP/MANAGEMENT	
Landscaped Areas:	Newport Center Anacapa Associates, LLC/HOA
Open Space:	None proposed.
Amenities:	Newport Center Anacapa Associates, LLC/HOA
Easements:	City of Newport Beach
Parks:	None proposed.
Buildings:	Newport Center Anacapa Associates, LLC/HOA
Structural BMPs:	Newport Center Anacapa Associates, LLC/HOA

A Home Owners Association (HOA) will be formed upon project completion. The HOA will be responsible for inspecting and maintaining all BMPs prescribed for Newport Center Condominiums. Until a HOA is formally established, Newport Center Anacapa Associates, 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:	Newport Center Condominiums Fashion Island
Address:	150 Newport Center Drive, Newport Beach, CA
Project Area Description:	The project site is bounded by Newport Center Drive to the north, by Anacapa Drive to the east, and by existing office buildings and asphalt parking lots to the south and west.
Land Use:	Mixed Use MU-H3
Zoning:	Planned Community PC-56 South Newport Center
Acreage:	1.26 acres
Predominant Soil Type:	B
Impervious Conditions:	Existing Impervious: 80% (20% Pervious) Proposed Impervious: 85% (15% Pervious)

III.2 SITE CHARACTERISTICS

Precipitation Zone:	0.7 inches per Figure XVI-1 (see Appendix A)
Topography:	The project site is currently an active car wash/service building surrounded by paved parking. The site is generally flat and drains towards an existing low point at the southwest portion of the site. Elevations vary from low of 158.5 feet above mean sea level (msl) in the south-southwest corner to a high elevation of 170.5 feet above msl in the northeast corner.
Existing Drainage Patterns/ Connections:	Under existing conditions, storm water runoff generally sheets flows towards the south-southwest where an existing 10" storm line and catch basin intercepts the drainage.
Proposed Drainage Patterns/ Connections:	Under the proposed conditions, an area drain will be installed along the north, east and south perimeter of the site and tie into the existing 10" storm drain at the southwest region of the site. Storm water flows will ultimately discharge to the Lower Newport Bay.

Soil Type, Geology, and Infiltration Properties:	A site-specific geotechnical study has not yet been conducted for the project site. However, a geotechnical review was performed for the site in 2015 by NMG Geotechnical, Inc. (NMG). The site is generally underlain by Quaternary-age marine terrace deposits overlying Miocene-age bedrock of the Monterey Formation. There is 9 to14+ feet of existing artificial fill across the site. The fill materials were found to consist of brown to dark brown and reddish brown sand, silty sand, and clayey sand that was generally damp to moist and medium dense. Gray to dark gray clay and sandy clays were also encountered and were found to be damp and moist and stiff to very stiff. The materials below the artificial fill were described as dark brown silty sand with undisturbed grass. See Appendix F for additional information.
Hydrogeologic (Groundwater) Conditions:	The project site is located in an area where the groundwater table/seepage was not found to depths of 41 feet (NMG, 2012). However, perched groundwater and seepage have been found along the terrace-bedrock at many sites in and around Newport Center.
Geotechnical Conditions (relevant to infiltration):	Although a site-specific geotechnical study has not yet been conducted for the project site, the geotechnical engineer reviewed the proposed site plan to evaluate overall feasibility for the Project and identify any potential geotechnical hazards or concerns based on previous studies conducted on neighboring sites. For the purposes of this Preliminary WQMP, this information was utilized to evaluate the potential for infiltrating runoff within the project boundary in accordance with the 2011 Model WQMP and Technical Guidance Document (TGD). The excavation for the proposed subterranean parking structure is estimated to range from approximately 30-40 feet below the proposed final ground surface. Although perched groundwater was not found at the northern portion of project site at depths up to 41-45 feet during past investigations, much of the surrounding Newport Center area has been found to have groundwater seepage and wet soils (NMG, 2012). Per the Model WQMP and TGD, infiltration BMPs are required to maintain a minimum separation of 10 ft from the bottom of the facility and to be placed at least 10-15 ft away from the building to avoid conflicts with the structure's foundation. In this case, such requirements would extend the infiltration BMPs beyond the scope of the geotechnical study where the possibility of encountering perched groundwater could not be ruled out. Thus, due to the geotechnical conditions on-site, the excavated depth of the proposed building structure, and the anticipated presence of perched groundwater between the marine terrace deposits and bedrock, infiltration of runoff on-site is considered infeasible in accordance with the Model WQMP and TGD. These conclusions will be verified by a site-specific geotechnical study and documented in the Final WQMP. Refer to Section IV.3.2 for further discussion on infiltration feasibility, and Appendix F for supporting documentation available at this preliminary stage of the project.

Off-Site Drainage:	The project site does not receive off-site runon.
Utility and Infrastructure Information:	Dry and wet utilities will be incorporated into the proposed project and will tie into larger existing facilities within the existing development.

III.3 WATERSHED DESCRIPTION

Receiving Waters:	Lower Newport Bay
303(d) Listed Impairments:	Lower Newport Bay: ▪ Chlordane ▪ Copper ▪ DDT ▪ Indicator Bacteria ▪ Nutrients ▪ PCBs ▪ Pesticides ▪ Sediment Toxicity
Applicable TMDLs:	Lower Newport Bay: ▪ Metals ▪ Nutrients ▪ Pathogens ▪ Pesticides ▪ Priority Organics ▪ Siltation
Pollutants of Concern for the Project:	Per Section II.2: ▪ Suspended Solids/Sediment ▪ Nutrients ▪ Pathogens (Bacteria/Virus) ▪ Pesticides ▪ Trash & Debris
Hydrologic Conditions of Concern (HCOCs):	None. Refer to Section II.3 for details.
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 = 85% d = 0.7 inches A = 1.26 acres *DCV* = *(0.75 x* 0.85*+0.15) x* 0.7 *inches x* 1.26 *ac x 43560 sf/ac x 1/12 in/ft* = 2,522 ft^3 *Refer to Section IV.2.2 for specific Drainage Manage Area (DMA) breakdown and Appendix A for detailed calculations (Worksheet B).*

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

Impervious surfaces have been minimized by incorporating landscaped areas throughout the site including around the perimeter of the proposed structures. Runoff from the proposed development will drain to a landscaped proprietary bioretention area.

Maximize Natural Infiltration Capacity

Soil types and geotechnical constraints limit infiltration of runoff on-site. Refer to Section IV.3.2 for further details.

Preserve Existing Drainage Patterns and Time of Concentration

Proposed drainage patterns will largely mimic existing drainage patterns. Runoff will flow in a south/ southwest direction and connect to existing storm drain facilities. Low-flows and first flush runoff will drain through a proprietary biotreatment system prior to discharge.

Disconnect Impervious Areas

Runoff from the proposed improvements, buildings and hardscape areas will drain to bioretention systems to further disconnect impervious areas.

Protect Existing Vegetation and Sensitive Areas, and Revegetate Disturbed Areas

The project site is fully developed under existing conditions. All disturbed areas will either be paved or landscaped.

Xeriscape Landscaping

Native and/or 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 Section 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 A	54,686	1.26	85%	0.7	5	0.26	2,522	0.258

Notes:
1. Refer to exhibits in Section VI for locations of each DMA.
2. Per Figure XVI-1 of the Technical Guidance Document, dated May 19, 2011. See also Appendix A.
3. Per Figure III.4 of the Technical Guidance Document, dated May 19, 2011. 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)	☐

HSCs were not incorporated into the project's design at this stage in the project's development. Any HSC's will be accounted for during final design and the cumulative volume of the HSC's will be subtracted from the required treatment volume in the Final WQMP.

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	☐
	Other:	☐

Although a site-specific geotechnical study has not yet been conducted for the project site, the geotechnical engineer reviewed the proposed site plan to evaluate overall feasibility for the Project and identify any potential geotechnical hazards or concerns based on previous studies conducted on neighboring sites. For the purposes of this Preliminary WQMP, this information was utilized to evaluate the potential for infiltrating runoff within the project boundary in accordance with the 2011 Model WQMP and Technical Guidance Document (TGD). The conclusions presented herein will be verified by a future site-specific study conducted for the Project and documented in the Final WQMP.

As discussed previously in Section III.2, the excavation for the proposed subterranean parking structure is estimated to range from approximately 30-40 feet below the proposed final ground surface. Although perched groundwater was not found at the northern portion of project site at depths up to 41-45 feet, much of the surrounding Newport Center area has been found to have groundwater seepage and wet soils (NMG, 2012).

Per the 2011 Model WQMP and Technical Guidance Document, infiltration BMPs are required to maintain a minimum separation of 10 ft from the bottom of the facility and to be placed at least 10-15 ft away from the building to avoid conflicts with the structure's foundation. In this case, such requirements would extend the infiltration BMPs, such as underground infiltration galleries and drywells, beyond the scope of the geotechnical study where the possibility of encountering perched groundwater

could not be ruled out. Thus, due to the geotechnical conditions on-site, the excavated depth of the proposed building structure, and the anticipated presence of perched groundwater between the marine terrace deposits and bedrock, infiltration of runoff on-site is considered infeasible in accordance with the Model WQMP and TGD. See also Appendix F. Further details will be included in the Final WQMP.

IV.3.3 Evapotranspiration & Rainwater Harvesting BMPs

Evapotranspiration 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:	☐

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	☐
--	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 May 19, 2011.

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:

$$Modified\ EAWU = \frac{(ETo_{wet} \times K_L \times LA \times 0.015)}{IE}$$

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
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. Detailed calculations are provided in Appendix A. The "blend" scenario represents an accurate depiction of the proposed landscaping. Of the proposed area of landscaping around the perimeter of the project site, there is a combination of low-use planting/succulent areas and high-water use turf.

ESTIMATED APPLIED WATER USE (EAWU) FOR COMMON AREA LANDSCAPING									
Landscape Type	Total Area (ac)	% Impervious	Impervious Tributary (ac)	Irrigated LS Area (ac)	ETo_{Wet} [1] (in/mo)	K_L [2]	Modified EAWU (gpd)	Modified EAWU per impervious acre (gpd/ac)	Minimum Capture Threshold [3] (gpd/ac)
Blend	1.26	85%	1.07	0.19	2.75	0.55	208	194	570
Design Capture Volume (gal)				18,859	Drawdown (days)				91

Notes:

1 Per Table X.2 for Santa Ana Region (similar climate type), Model WQMP Technical Guidance Document, dated May 19, 2011.
2 Per Table X.4 of the Model WQMP Technical Guidance Document, dated May 19, 2011.
3 Per Table X.6 of Model WQMP Technical Guidance Document, dated May 19, 2011.

Based on the amount of common area irrigated landscaping throughout the project, the project in gallons per day per acre is below minimum threshold in Table X.6 indicating capture and reuse is not feasible based on the expected landscaping demand. The total site DCV would not be drawn down in less than 30 days indicating capture and reuse is not feasible and would not meet the 40% minimum design capture threshold.

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	☐

BIOTREATMENT		
ID	**Name**	**Included?**
	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 implement a series of proprietary biotreatment systems for water quality treatment to treat all pollutants of concern to a medium to high level of effectiveness.

The systems will include the Modular Wetlands Systems developed by Bio Clean Environmental Services, Inc. There are several advantages of the Modular Wetland System over traditional bioretention planters including the following reasons:

- Modular Wetlands are the only proprietary biotreatment device approved through the Washington State University TAPE (Technology Assessment Protocol – Ecology) program for basic storm water treatment and enhanced treatment including sediment, nutrients and heavy metals (all proposed pollutants of concern for the Lower Newport Bay). TAPE approval is based on a series of independent field studies using strict sampling criteria to validate vendor's claims. TAPE approval is considered one of the most stringent and most reliable in the Country.

- Modular Wetlands have a pre-treatment chamber that is specifically designed to capture fine sediments and particulates through a series of BioMediaGREEN sponges which prohibit the fines and particulates from entering the bioretention chamber and accelerating potential clogging of the bioretention soil. The City of Huntington Beach has installed a Modular Wetland for a residential neighborhood and has monitored the maintenance and functionality of the system for several years. Contact: Mark Birchfield, City of Huntington Beach (714375-5041;MBirchfield@surfcity-hb.org)

- Modular Wetland systems are specifically designed for higher flow through treatment rates which reduce the potential for nutrient and copper leaching under more stagnant conditions (a common occurrence with planters that are left unmaintained).

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.

These systems were selected based on their 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 Modular Wetlands, derived from Table 4.2 of the Technical Guidance Document and testing data provided by the manufacturer. Additional details for the Modular Wetland units included in Section VI of this WQMP.

POLLUTANTS OF CONCERN AND PERFORMANCE RATINGS		
Pollutant of Concern [1]	**Treatment Effectiveness**	
	Bioretention System [2]	**Modular Wetlands Proprietary Bioretention Units** [3]
Oil & Grease	High	High
Trash & Debris	High	High
Oxygen Demanding Substances	N/A	N/A
Toxic Organic Compounds	Medium	N/A[4]
Primary Pollutant of Concern (303d listed impairments & TMDLs)		
Suspended Solids/Sediments	High	High
Nutrients	Low	Medium-High
Metals	High	High
Pathogens/Bacteria	Medium	Medium-High
Pesticides	N/A	N/A

Notes:
1 See Section II.2 of the PWQMP, revised September 27, 2012.
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.

Biotreatment BMP Sizing & Design

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, they were sized utilizing the methodology for flow based BMPs (TGD Section

III.1.2 and Worksheet D). 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 DESIGN SUMMARY					
DMA / BMP ID[1][2]	BMP Name	Total Drainage Area (ac)	Q_{Design}[3] (cfs)	Sizes / Models[4]	Combined Treatment Capacity [5] (cfs)
A - Southwest	MWS-1	1.26	0.258	MWS 4-21 unit	0.267

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

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. Refer to Section II.3 for further details.

IV.3.6 Regional/Sub-Regional LID BMPs

Not applicable. LID BMPs (biotreatment) 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	☐

TREATMENT CONTROL BMPs		
ID	Name	Included?
PRE-2	Catch Basin Insert	☐
	Other:	☐

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

IV.3.8 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	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☐	Not applicable – residential development.
N6	Local Water Quality Permit Compliance	☐	☒	Not applicable – residential development.
N7	Spill Contingency Plan	☐	☐	Not applicable – residential development.
N8	Underground Storage Tank Compliance	☐	☐	No underground storage tanks are proposed.
N9	Hazardous Materials Disclosure Compliance	☐	☐	Hazardous materials will not be stored on-site.
N10	Uniform Fire Code Implementation	☐	☐	Not applicable – residential development.
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☐	No loading docks are proposed.

NON-STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☐	No retail gasoline outlets are proposed.

N1, Education for Property Owners, Tenants and Occupants

Educational materials will be provided to tenants, including brochures and restrictions to reduce pollutants from reaching the storm drain system. Examples include tips for pet care, household tips, and proper household hazardous waste disposal. Tenants will be provided with these materials by the property management prior to occupancy, and periodically thereafter. Refer to Section VII for a list of materials available and attached to this WQMP. Additional materials are available through the County of Orange Storm water Program website (http://ocwatersheds.com/PublicEd/) and the California Storm water Quality Association's (CASQA) BMP Handbooks (http://www.cabmphandbooks.com/).

N2, Activity Restrictions

The HOA 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 HOA 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 HOA 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 HOA 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 HOA 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 HOA 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 HOA shall be responsible for sweeping all on-site drive aisles and parking areas 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 storage areas are proposed.
S3 SD-32	Design and construct trash and waste storage areas to reduce pollution introduction	☐	☒	Not applicable. No outdoor trash storage areas are proposed. Trash will be collected within the subterranean parking structure.
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 the project site.

STRUCTURAL SOURCE CONTROL BMPs				
ID	Name	Included?	Not Applicable?	If Not Applicable, Provide Brief Reason
S6 SD-31	Properly Design: Dock areas	☐	☒	No loading docks are proposed.
S7 SD-31	Properly Design: Maintenance bays	☐	☒	No maintenance bays are proposed.
S8 SD-33	Properly Design: Vehicle wash areas	☐	☒	No vehicle wash areas are proposed.
S9 SD-36	Properly Design: Outdoor processing areas	☐	☒	No outdoor processing areas are proposed.
S10	Properly Design: Equipment wash areas	☐	☒	No equipment wash areas are proposed.
S11 SD-30	Properly Design: Fueling areas	☐	☒	No fueling areas are proposed.
S12 SD-10	Properly Design: Hillside landscaping	☐	☒	There are no major slopes on the project site.
S13	Properly Design: Wash water control for food preparation areas	☐	☒	No food preparation areas/ commercial kitchens are proposed.
S14	Properly Design: Community car wash racks	☐	☒	No community car wash racks are 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 HOA 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 HOA 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).	☐
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 identified at the beginning of this Section.

IV.4.2 Alternative Compliance Plan Information

Not applicable. LID BMPs (biotreatment) 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 Anacapa Associates, LLC shall assume all BMP inspection and maintenance responsibilities for the Newport Center Condominiums project.

Contact Name:	Tod Ridgeway
Title:	
Company:	Ridgeway Development Company
Address:	2804 Lafayette Ave, Newport Beach, CA 92660
Phone:	(949) 723-5854
Fax:	
Email:	tridgeway@sbcglobal.net

Should the maintenance responsibility be transferred at any time during the operational life of Newport Center Condominiums, 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 HOA 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 HOA 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 shall be funded through fees paid into the HOA. Newport Center Anacapa Associates, LLC which will set up the HOA shall oversee that adequate funding for BMP maintenance is included within the HOA fee structure including annual maintenance fees and long-term maintenance reserve funds.

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
BIOTREATMENT BMPs				
BIO-7	Proprietary Biotreatment: Modular Wetlands	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 replacement of the BioMediaGREEN™ drain down filter (if equipped). In addition, plants within the wetland chamber will require trimming as needed in conjunction with routine landscape maintenance activities. No fertilizer shall be used in this chamber. 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. If prior treatment stages are properly maintained, the life of the wetland media can be up to 20 years.	2x per year	Newport Center Anacapa Associates, LLC/ HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
NON-STRUCTURAL SOURCE CONTROL BMPs				
N1	Education for Property Owners, Tenants and Occupants	Educational materials will be provided to tenants annually. Materials to be distributed are found in Appendix C. Tenants will be provided these materials by the Owner prior to occupancy and periodically thereafter.	Annually	Newport Center Anacapa Associates, LLC/ HOA
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 Anacapa Associates, LLC/ HOA
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.	Monthly	Newport Center Anacapa Associates, LLC/ HOA

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
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 Anacapa Associates, LLC/ HOA
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		
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 Anacapa Associates, LLC/ HOA
N12	Employee Training	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.	Annually	Newport Center Anacapa Associates, LLC/ HOA
N13	Housekeeping of Loading Docks	Not Applicable		

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	**Inspection/Maintenance Activities**	**Minimum Frequency**	**Responsible Party**
N14	Common Area Catch Basin Inspection	Catch basin inlets and other drainage facilities shall be inspected after each storm event and once per year. Inlets and other facilities shall be cleaned prior to the rainy season, by October 1 each year.	Annually	Newport Center Anacapa Associates, LLC/ HOA
N15	Street Sweeping Private Streets and Parking Lots	Drive aisles & parking areas must be swept at least quarterly (every 3 months), including prior to the start of the rainy season (October 1).	Quarterly	Newport Center Anacapa Associates, LLC/ HOA
N16	Retail Gasoline Outlets	Not Applicable		
STRUCTURAL SOURCE CONTROL BMPs				
S1 SD-13	Provide storm drain system stenciling and signage	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 Anacapa Associates, LLC/ HOA
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		

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
S4 SD-12	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	In conjunction with routine maintenance activities, verify that landscape design continues to function properly by adjusting properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather, and day or night time 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 Anacapa Associates, LLC/ HOA
S5	Protect slopes and channels and provide energy dissipation	To be performed in conjunction with maintenance activities. Maintain vegetative cover and/or mulch to eliminate exposed soils. Any eroded surfaces to be repaired 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 Anacapa Associates, LLC/ HOA
S6 SD-31	Properly Design: Dock areas	Not Applicable		
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		

BMP INSPECTION & MAINTENANCE RESPONSIBILITY MATRIX				
	BMP	Inspection/Maintenance Activities	Minimum Frequency	Responsible Party
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.

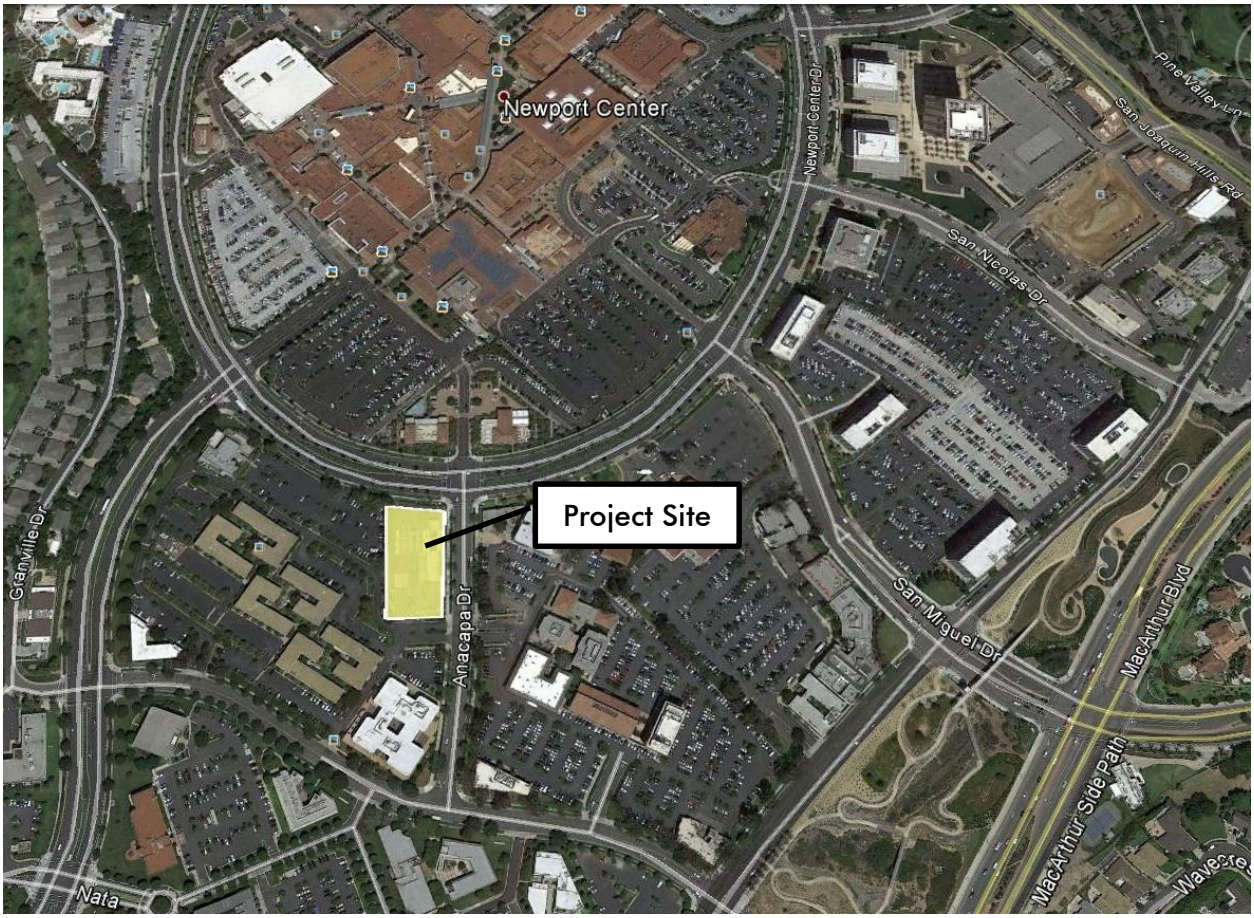
EXHIBITS

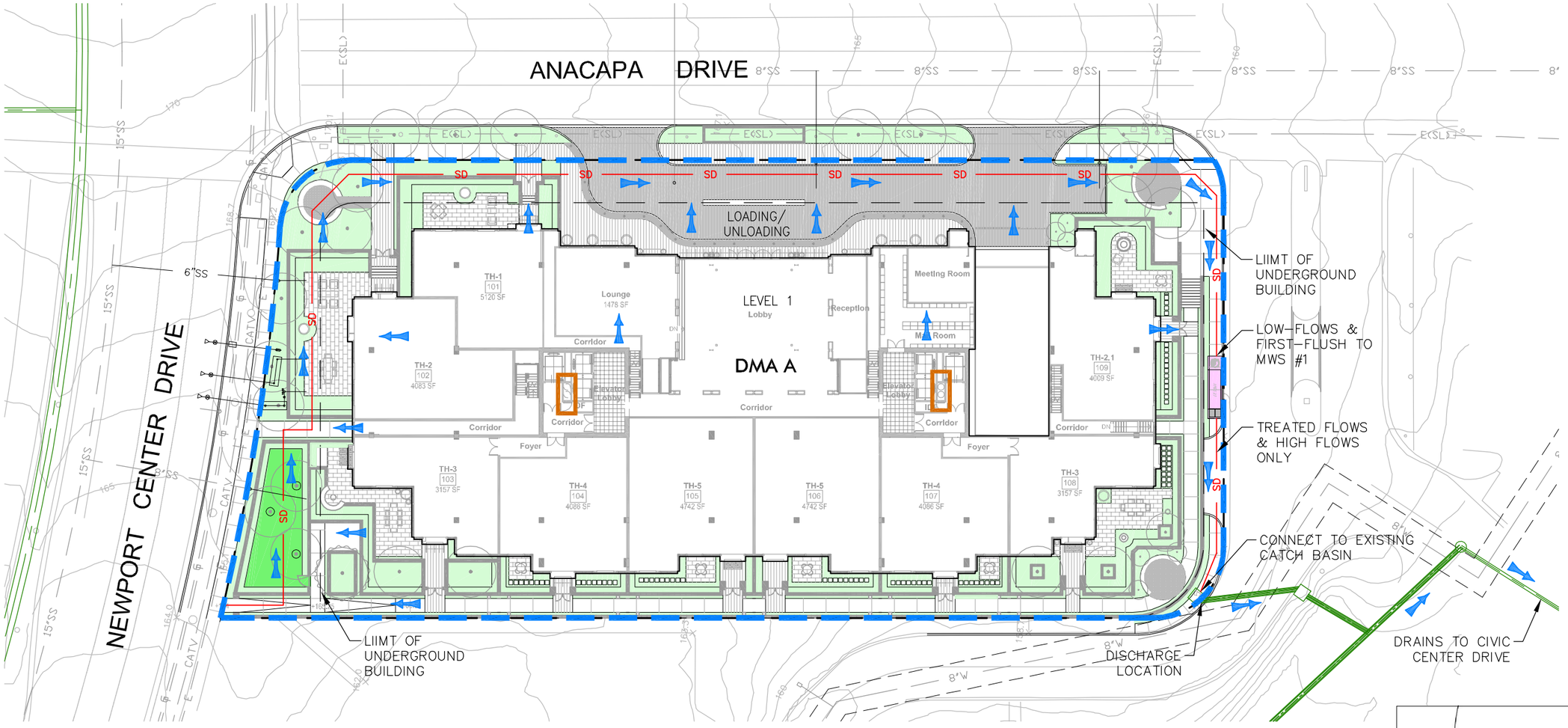
- Vicinity Map
- Preliminary WQMP Exhibit
- Conceptual Grading Plans (3 Sheets, 11"x17" reduced scale)
- Typical Cross Sections

BMP DETAILS & FACT SHEETS

- Proprietary Biotreatment (BIO-7)
- Modular Wetland Systems

VICINITY MAP





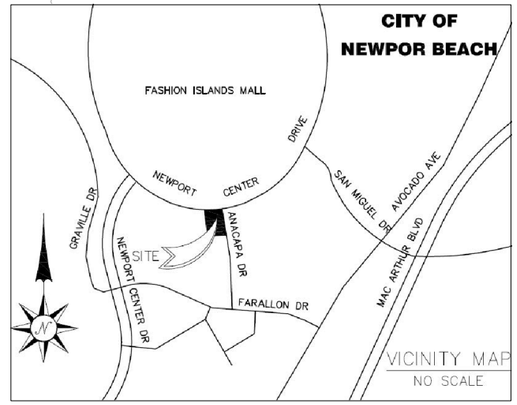
LEGEND

- PROPERTY LINE
- EASEMENT
- EXISTING STORM DRAIN TO REMAIN
- SD — PROPOSED STORM DRAIN
- BMP DRAINAGE AREA BOUNDARY (DMA A)
- PROPOSED COMMON AREA LANDSCAPING
- PROPOSED ARTIFICIAL TURF
- STREET SWEEPING PRIVATE STREETS & PARKING LOTS
- TRASH CHUTE (TO BASEMENT TRASH ROOMS)
- PROPOSED MODULAR WETLAND SYSTEM (BIOTREATMENT)
- DIRECTION OF FLOW

TOTAL AREA	54686 SF	1.26 AC
PERVIOUS	8448 SF	0.19 AC
IMPERVIOUS	46238 SF	1.07 AC

40’ 0’ 20’ 40’

SCALE: 1” = 40’



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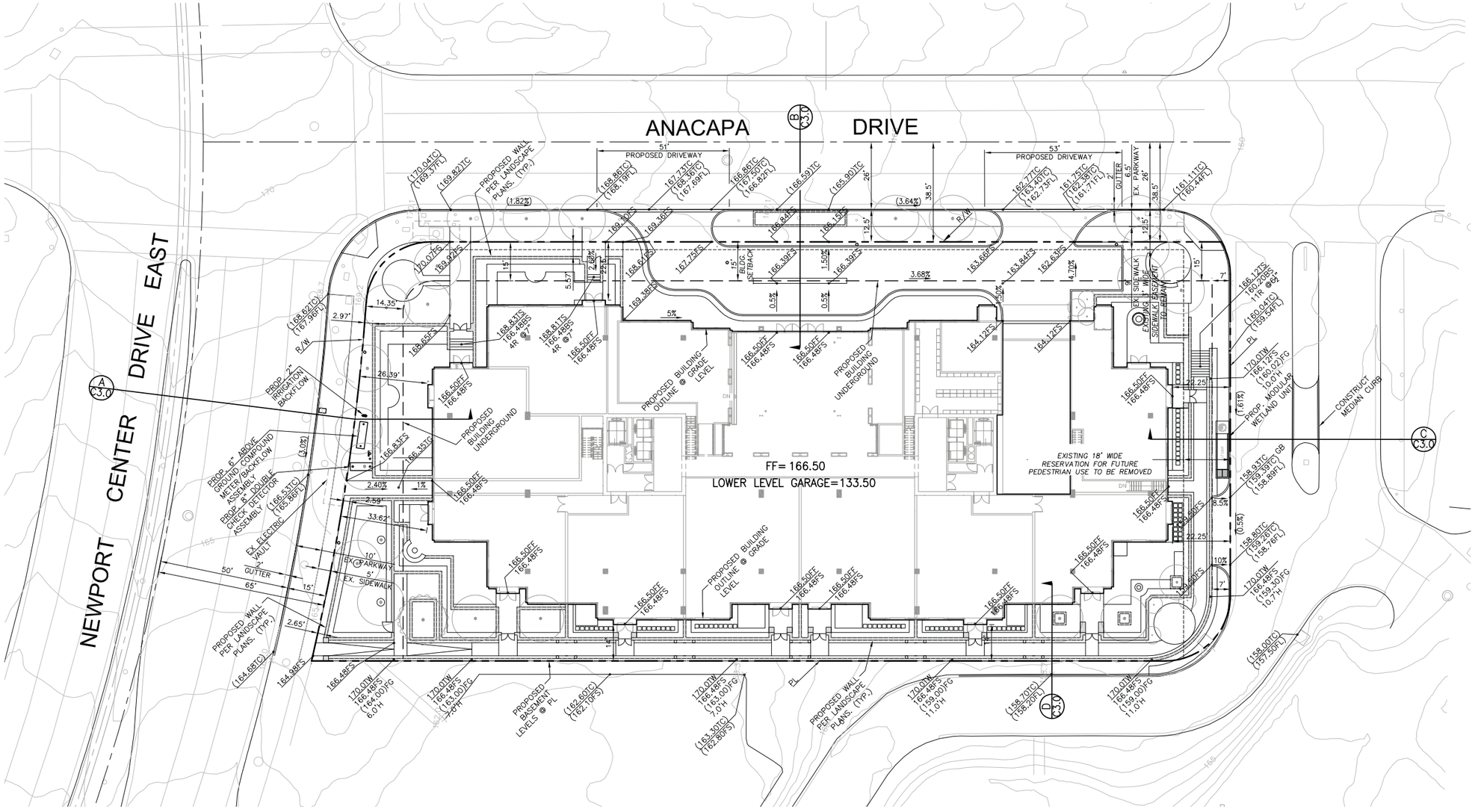
Scale: 1" = 40'

Exhibit Date: 4/8/2015

PRELIMINARY WQMP
NEWPORT CENTER CONDOMINIUMS
150 NEWPORT CENTER DRIVE
NEWPORT BEACH, CA

F:\PROJECTS\1317.001\EXHIBITS\WQMP\1317-001XH-PRELIMINARY WQMP.DWG (04-09-15 9:01:26AM) Plotted by: April McMillion



NOTES:
1. ANACAPA DRIVE STREET IMPROVEMENTS PLANS TO BE PREPARED DURING CONSTRUCTION DOCUMENT PHASE
2. NO STREET IMPROVEMENTS PROPOSED ALONG NEWPORT CENTER DRIVE EAST

LEGEND:

BW	BACK OF WALK
CF	CURB FACE
EX.	EXISTING
FL	FLOW LINE
FF	FINISH FLOOR
FS	FINISH SURFACE
GB	GRADE BREAK
H	HEIGHT
INV	INVERT
MIN	MINIMUM
PL	PROPERTY LINE
POC	POINT OF CONNECTION
R/W	RIGHT OF WAY
TC	TOP OF CURB

EARTHWORK:

RAWCUT	54,300 CY
RAWFILL	0 CY
EXPORT	54,300 CY

20' 0' 10' 20' 40'

SCALE: 1" = 20'

C1.0

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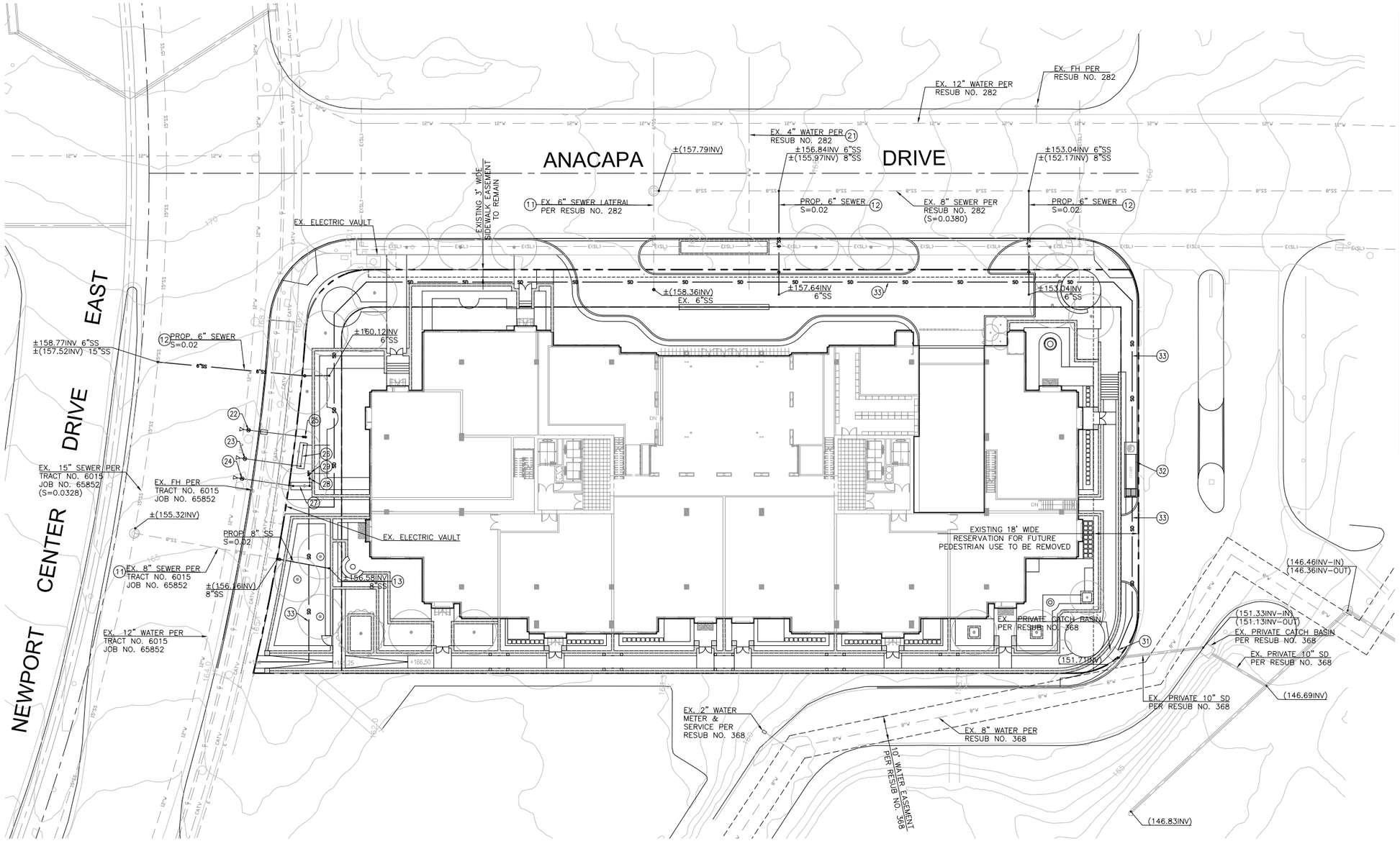
Newport Beach, CA

Note: Conceptual Design Package Subject To Change

CONCEPTUAL GRADING PLAN



CITY OF NEWPORT BEACH
UTILITIES DEPARTMENT

FIRE HYDRANT FLOW TEST

AMOUNT PAID: $343.00 — DATE: 02/25/2015
CHECK NO: N/A — TIME: 10:60 AM
TEST NO: N/A — WEATHER: CLEAR

PROJECT:
PROJECT LOCATION: ANACAPA DRIVE AND NEWPORT CENTER DRIVE
TEST CONDUCTED FOR: FUSCOE ENGINEERING
TEST PERFORMED BY: BULLMAN, AUGER
TEST WITNESSED BY:

FIELD OBSERVATIONS AND FLOW DATA

STATIC HYDRANT # :	1288	LOCATION:	143 NEWPORT CENTER DRIVE
F/H MANUFACTURER:	JONES	NUMBER & SIZE OF OUTLETS:	2-2.5" 1-4"
STATIC PRESSURE, (Ps , psi), PRE-FLOW:		137	
RESIDUAL PRESSURE, (Pr , psi) FLOWING:		114	
FLOW HYDRANT # :	1292	LOCATION:	210 NEWPORT CENTER DRIVE
F/H MANUFACTURER:	JONES	NUMBER & SIZE OF OUTLETS:	2-2.5" 1-4 "
STATIC PRESSURE, PRE-FLOW (INFO ONLY, NOT FOR TEST CALCS) :			
F/H OUTLET SIZE (2.5 or 4.0):	2.5 (d, inches)		
FLOW LOSS COEFFICIENT - TUBE C=1.0 / BUTT C=0.9		0.9	
PITOT GAUGE READING (p, psi):	94		

OBSERVED FLOW: THE OBSERVED FLOW FROM A HYDRANT OUTLET IS CALCULATED FROM THE FOLLOWING EQUATION:

$$Q_o = 29.83(cd^2)\sqrt{p}$$

WHERE, Q IS THE OBSERVED FLOW IN GPM, d IS THE OUTLET DIAMETER IN INCHES, p IS THE PITOT GAUGE PRESSURE IN PSI, AND C IS THE FLOW LOSS COEFFICIENT (C = 1.0 FOR FLOW TUBES AND C = 0.9 FOR BUTT FLOW READINGS)

OBSERVED FLOW (Qo, gpm): 1627 GPM

DISCHARGE CALCS: THE DISCHARGE FOR A GIVEN FIRE HYDRANT CAN BE DETERMINED FROM THE FOLLOWING EQUATION USING THE INITIAL (STATIC) WATER PRESSURE AND THE RESIDUAL (DYNAMIC) WATER PRESSURE:

$$Q_r = Q_o\left(\frac{P_s - 20}{P_s - P_r}\right)^{0.54}$$

WHERE, Q (STATIC OR RESIDUAL) IS THE FLOW IN GPM, AND P (STATIC OR RESIDUAL) IS THE PRESSURE IN PSI. NOTE: A 10 PSI DROP IS REQUIRED FOR VALID TEST

CALCULATED FLOW AT 20 psi (Qr, gpm): 3916 GPM

NOTES:
1. EXISTING UNDERGROUND UTILITIES AND IMPROVEMENTS ARE SHOWN IN THEIR APPROXIMATE LOCATIONS BASED UPON RECORD INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF PLANS. LOCATIONS HAVE NOT BEEN VERIFIED IN THE FIELD.
2. SEWER CLEAN OUTS SHALL BE INSTALLED ON EXISTING SEWER LATERALS THAT WILL BE REUSED PER CITY STANDARD STD-406-L.
3. NEW SEWER LATERALS AND CLEAN OUTS SHALL BE INSTALLED PER CITY STANDARD STD-406-L.
4. ALL EXISTING WATER SERVICES THAT ARE NOT BEING REUSED SHALL BE ABANDONED AT THE MAIN.

LEGEND:

EX.	EXISTING
INV	INVERT
PROP.	PROPOSED
S	SLOPE
SD	STORM DRAIN
SS	SANITARY SEWER

SEWER CONSTRUCTION NOTES

(11) EXISTING SEWER LATERAL TO BE REUSED – ADD CLEAN OUT PER CITY STD. 406-L. FIELD VERIFY EXISTING SEWER LATERAL LOCATION PRIOR TO CONSTRUCTION.
(12) PROPOSED 6" SEWER LATERAL PER STD-406-L
(13) PROPOSED 8" SEWER LATERAL

WATER CONSTRUCTION NOTES

(21) EXISTING WATER SERVICE TO BE ABANDONED AT MAIN
(22) PROPOSED 2" IRRIGATION METER & SERVICE
(23) PROPOSED 6" DOMESTIC SERVICE
(24) PROPOSED 8" FIRE SERVICE
(25) PROPOSED 2" IRRIGATION BACKFLOW
(26) PROPOSED 6" ABOVE GROUND COMPOUND METER/BACKFLOW ASSEMBLY
(27) PROPOSED 8" DOUBLE CHECK DETECTOR ASSEMBLY
(28) PROPOSED POST INDICATOR VALVE
(29) PROPOSED FIRE DEPARTMENT CONNECTION

STORM DRAIN CONSTRUCTION NOTES

(31) CONNECT TO EXISTING PRIVATE CATCH BASIN
(32) PROPOSED MODULAR WETLAND UNIT FOR STORM WATER TREATMENT
(33) PROPOSED AREA DRAIN

20' 0' 10' 20' 40'
SCALE: 1" = 20'

C2.0

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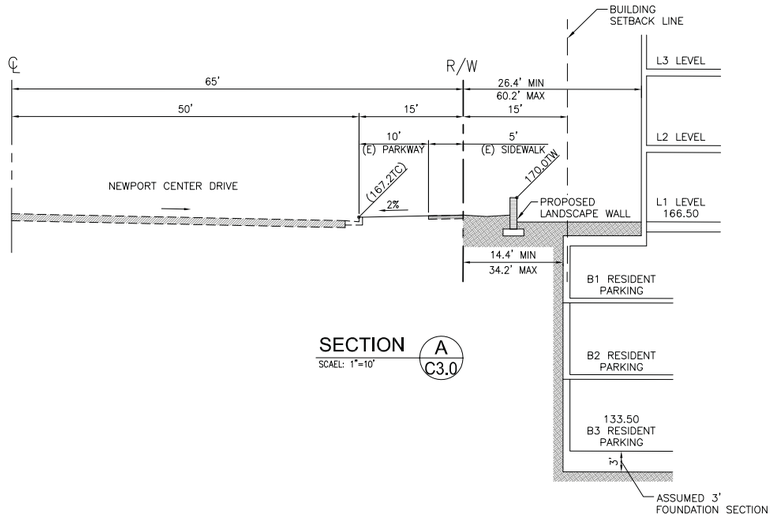
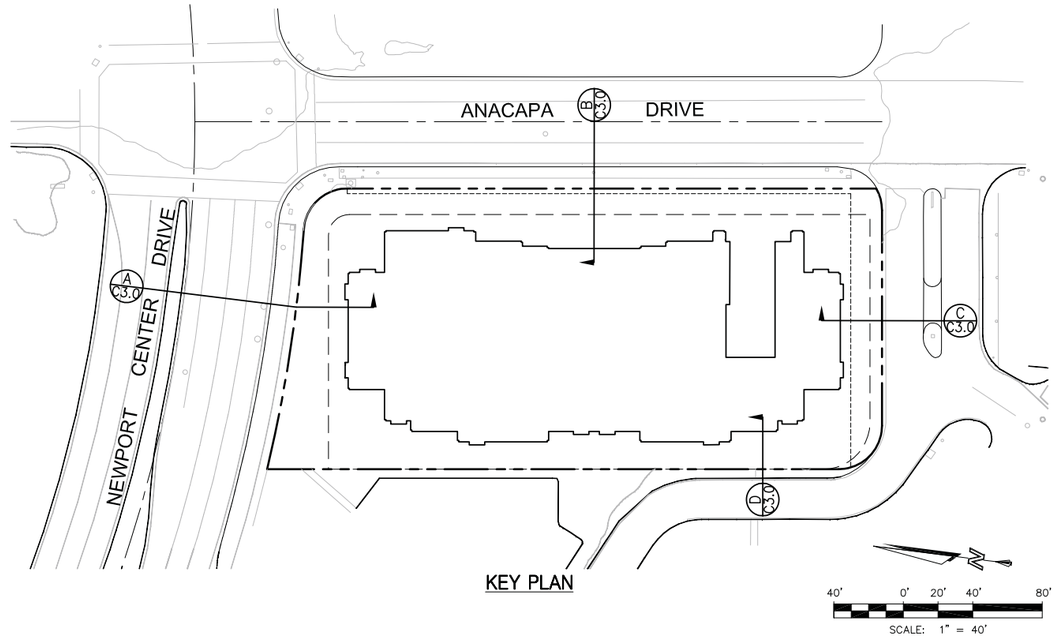
Note: Conceptual Design Package Subject To Change

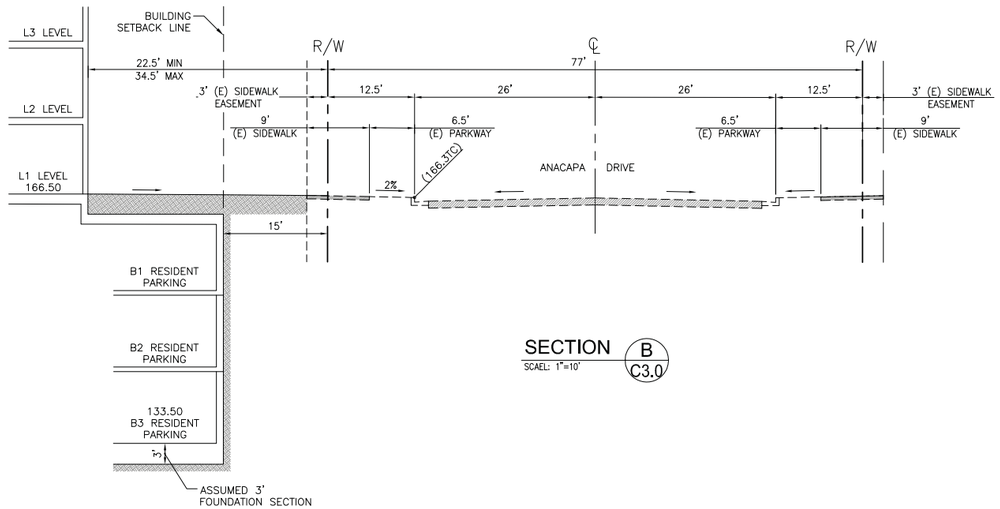
CONCEPTUAL UTILITY PLAN



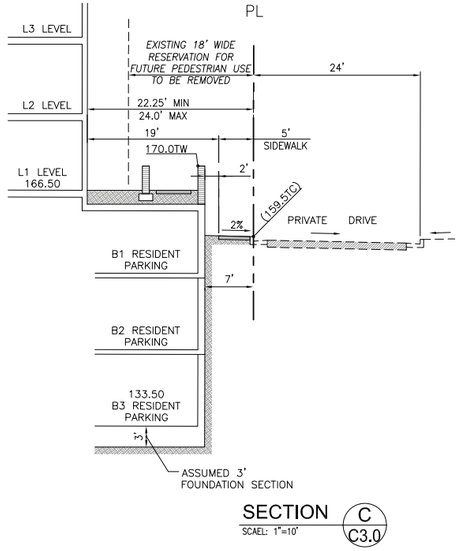
SECTION A
SCAEL: 1"=10' C3.0



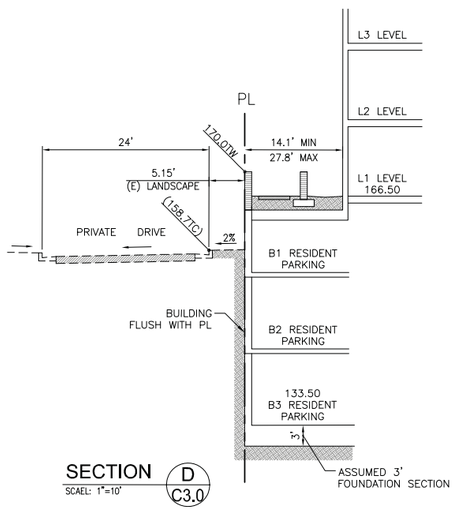
KEY PLAN



SECTION B
SCAEL: 1"=10' C3.0



SECTION C
SCAEL: 1"=10' C3.0



SECTION D
SCAEL: 1"=10' C3.0

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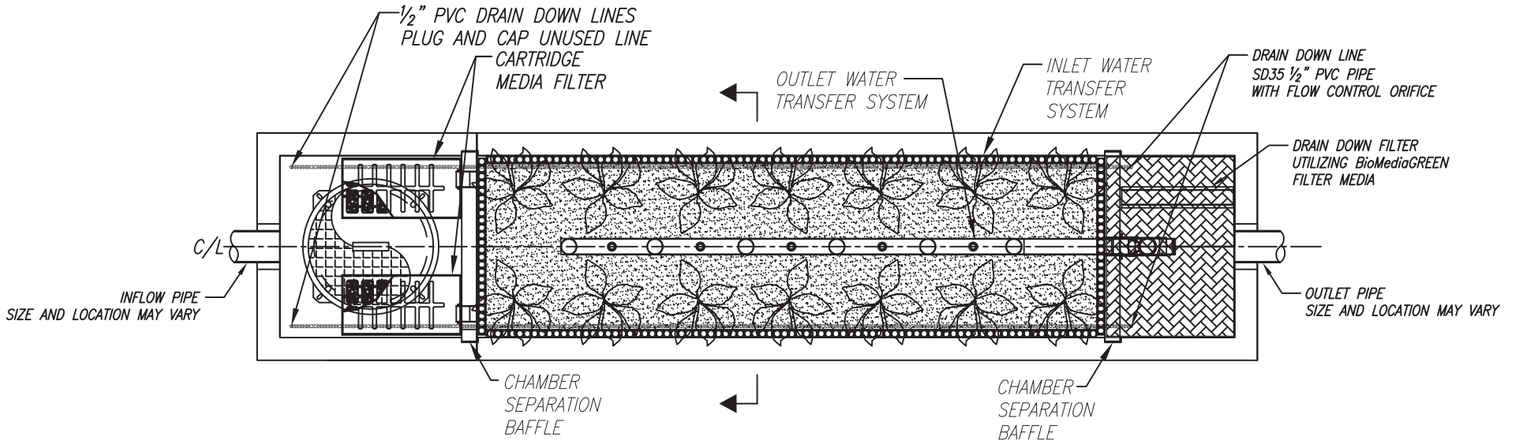
Newport Beach, CA

Note: Conceptual Design Package Subject To Change

SECTIONS

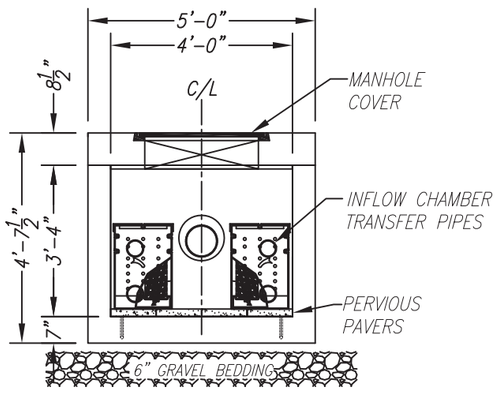
MODULAR WETLAND SYSTEMS - LINEAR 2.0
21' VAULT TYPE

FLOW RATES
PEAK TREATMENT FLOW RATE = .267 CFS OR 119.83 GPM
PEAK BYPASS FLOW RATE = N/A
SPECIFICATIONS
INSTALL AT SURFACE
O.D. DIMENSIONS = 22' X 5' X 4.7'
TOP OF CURB TO INVERT OUT = 4.13'
SEDIMENT STORAGE CAPACITY = 1000 LBS OR 23.5 CF

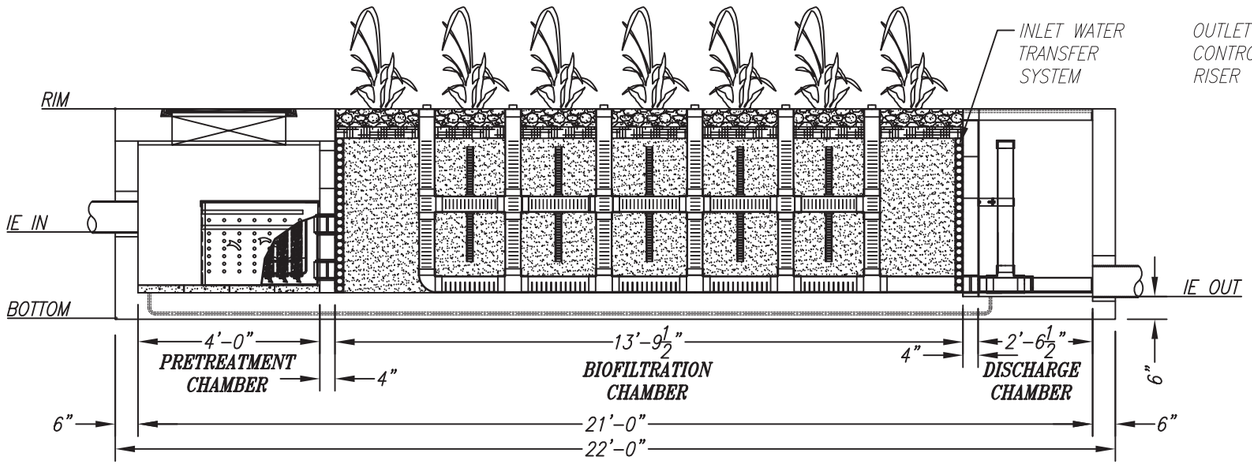


PLAN VIEW

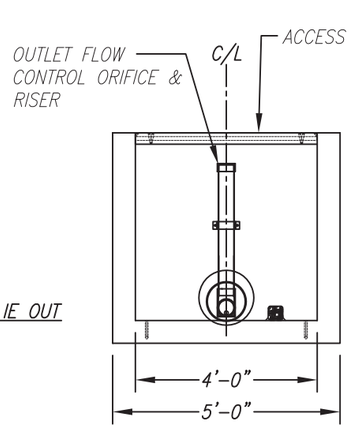
BIOFILTRATION CHAMBER SURFACE AREA CALCS
SIDES = 2
13.5' L x 3.4' H = 45.9 SF
SIDE SURFACE AREA = 91.8 SF
ENDS = 2
3.7' L x 3.4' H = 12.6 SF
END SURFACE AREA = 25.2 SF
TOTAL WETLAND MEDIA SURFACE AREA **= 117.0 SF**
WETLAND MEDIA LOADING RATE 119.83 GPM / 117.0 SF **= 1.02 GPM/SF**
PRETREATMENT FILTER 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 119.83 GPM / 70.56 SF **= 1.69 GPM/SF**



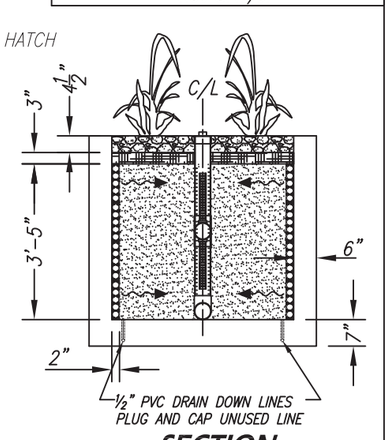
LEFT END VIEW
PRETREATMENT CHAMBER



ELEVATION VIEW



RIGHT END VIEW
DISCHARGE CHAMBER



SECTION
BIOFILTRATION CHAMBER

LEGEND

- 2" DRAIN CELL PERMITER / 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. ALL WALLS ARE 6" THICK, BAFFLES ARE 4" THICK, BOTTOM 7" OR 8" THICK, TOP 8.5" THICK.
6. JOINT SEALANT: BUTYL RUBBER SS-S-00210

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

	NAME	DATE
DRAWN		
EDITED		

COMMENTS:

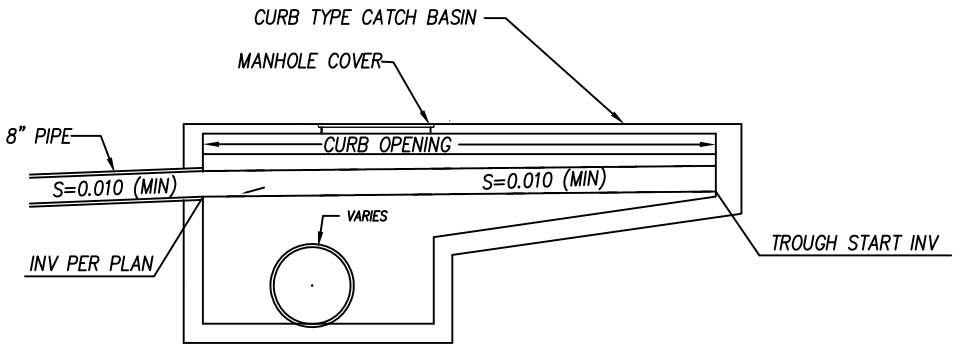
TITLE: MWS LINEAR 2.0 VAULT TYPE

SIZE	DWG. NO.	REV
	MWS-L-4-21-V	

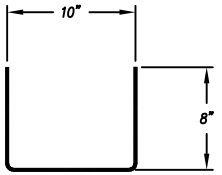
SCALE 1:40 | UNITS = INCHES | SHEET 1 OF 1

DVERT™

MODULAR WATER QUALITY DIVERSION WEIR SYSTEM



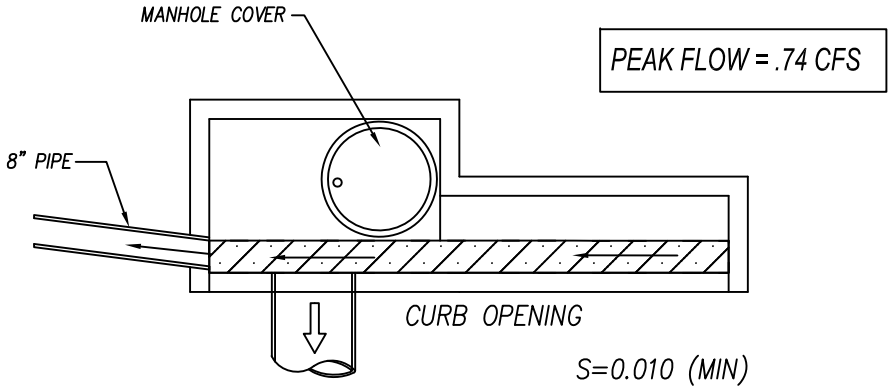
PROFILE - CATCH BASIN



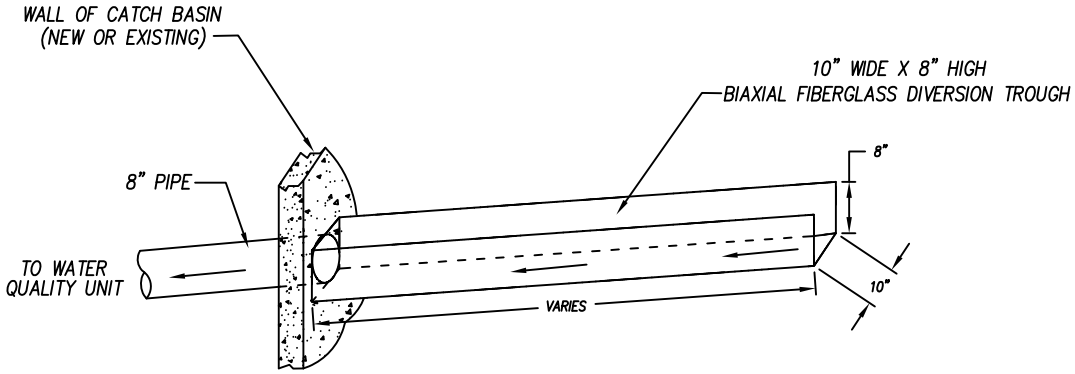
TROUGH END VIEW

TROUGH/PIPE FLOW RATE

PIPE SIZE DIA. (Inches)	8
STATIC HEAD (Inches)	8
SAFETY FACTOR	2
FLOW RATE (cfs)	.74



TOP VIEW - CATCH BASIN



TROUGH ISOMETRIC VIEW

DRAWINGS NOT TO SCALE

PATENT PENDING

INSTALLATION NOTES:

1. TROUGH TO BE CONNECTED TO CONCRETE BELOW CURB OPENING USING 1/2" x 1-1/2" 316 STAINLESS STEEL SPIKE MUSHROOM HEAD DRIVE ANCHORS SPACED 12" ON CETNTER
2. USE DAP CONCRETE WATERTIGHT FILLER & SEALANT TO SEAL SEAM BETWEEN FIBERGLASS WEIR & CONCRETE WALL OF CATCH BASIN.

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	NAME	DATE
DRAWN		
EDITED		

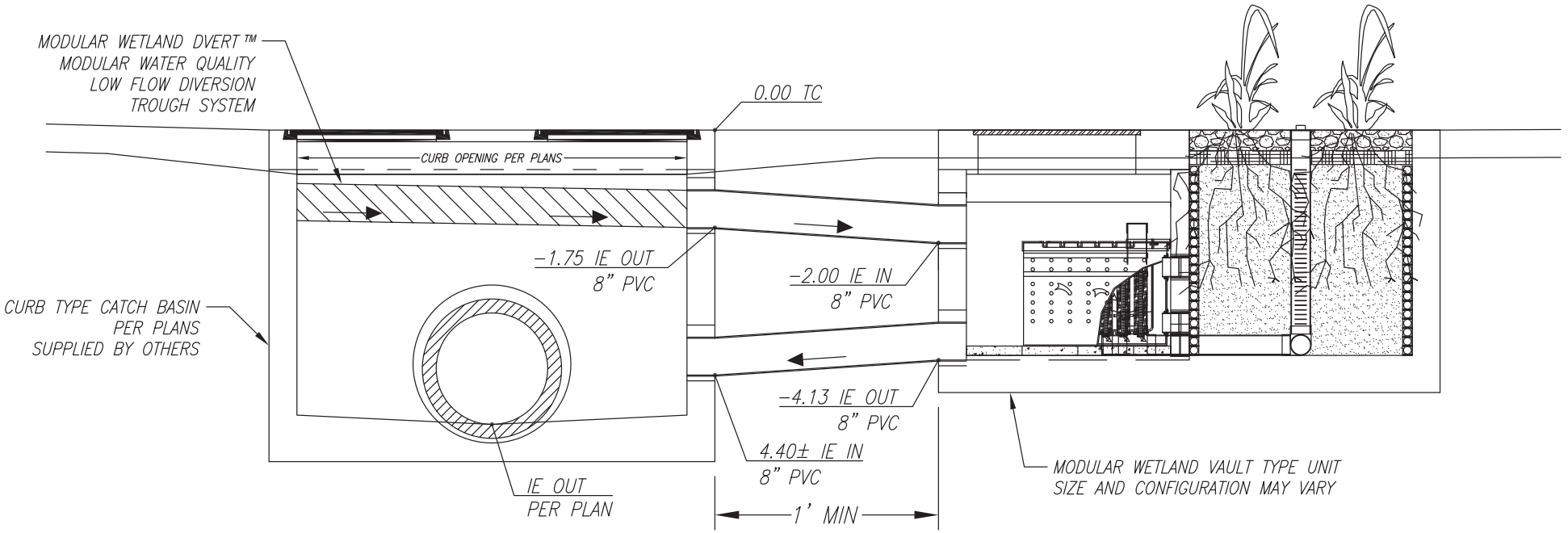
COMMENTS:

TITLE: DVERT SYSTEM

SIZE	DWG. NO.	REV

SCALE NTS | UNITS = INCHES | SHEET 1 OF 1

MODULAR WETLAND SYSTEMS - LINEAR 2.0
STANDARD DVERT ELEVATIONS



TYPICAL ELEVATION VIEW

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OCEANSIDE, CA 92049
www.ModularWetlands.com

	NAME	DATE
DRAWN		
EDITED		

COMMENTS:

TITLE: MWS LINEAR 2.0 DVERT SETUP

SIZE	DWG. NO.	REV

SCALE NTS | 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

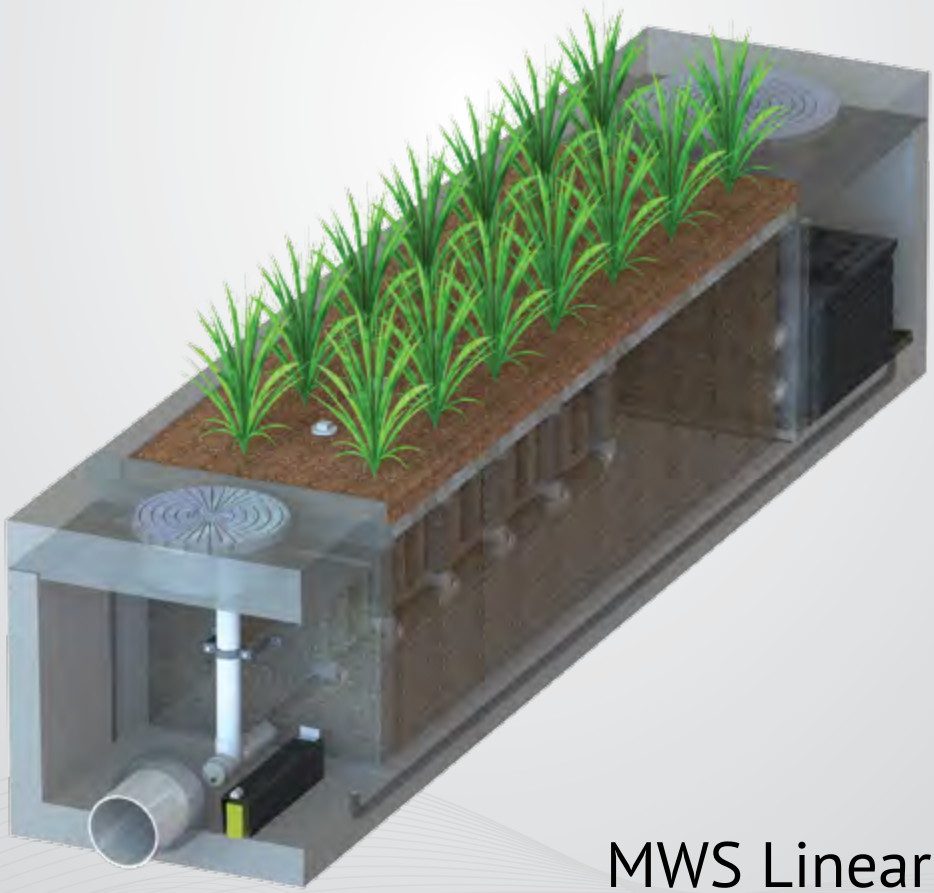
- Proprietary biotreatment devices can be volume based or flow-based BMPs.
- Volume-based proprietary devices should be sized using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** or the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs described in **Appendix 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**

MODULAR WETLANDS™

*Advanced **Stormwater** Biofiltration*



MWS Linear

Contents

The Urban Impact

For hundreds of years natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as our cities grow and develop, these natural wetlands have perished under countless roads, rooftops, and parking lots.

Plant A Wetland

Without natural wetlands our cities are deprived of water purification, flood control, and land stability. Modular Wetlands and the MWS Linear re-establish nature's presence and rejuvenate water ways in urban areas.

MWS Linear

The Modular Wetland System Linear represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint and higher treatment capacity. While most biofilters use little or no pre-treatment, the MWS Linear incorporates an advanced pre-treatment chamber that includes separation and pre-filter cartridges. In this chamber sediment and hydrocarbons are removed from runoff before it enters the biofiltration chamber, in turn reducing maintenance costs and improving performance.

Applications

The MWS Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.

Industrial

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA mandated effluent limits for dissolved metals and other pollutants.

Residential

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.

Streets

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.

Parking Lots

Parking lots are designed to maximize space and the MWS Linear's 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.

Commercial

Compared to bioretention systems, the MWS Linear can treat far more area in less space - meeting treatment and volume control requirements.

Mixed Use

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications are available on our website: www.ModularWetlands.com/Applications

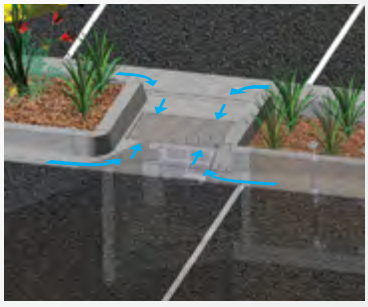
- Agriculture
- Reuse
- Low Impact Development
- Waste Water

Configurations

The MWS Linear is the preferred biofiltration system of Civil Engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your stormdrain design.

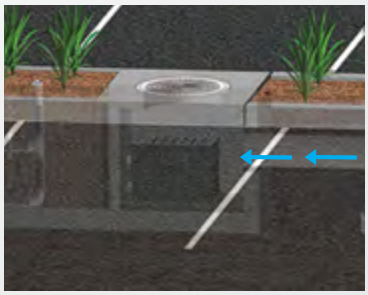
Curb Type

The *Curb Type* configuration accepts sheet flow through a curb opening and is commonly used along road ways and parking lots. It can be used in sump or flow by conditions. Length of curb opening varies based on model and size.



Grate Type

The *Grate Type* configuration offers the same features and benefits as the *Curb Type* but with a grated/drop inlet above the systems pre-treatment chamber. It has the added benefit of allowing for pedestrian access over the inlet. ADA compliant grates are available to assure easy and safe access. The *Grate Type* can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



Vault Type

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pre-treatment chamber, meaning the MWS Linear can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretention systems. Another benefit of the "pipe in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

Downspout Type

The *Downspout Type* is a variation of the *Vault Type* and is designed to accept a vertical downspout pipe from roof top and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

Advantages & Operation

The MWS Linear is the most efficient and versatile biofiltration system on the market, and the only system with horizontal flow which improves performance, reduces footprint, and minimizes maintenance. Figure-1 and Figure-2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

Featured Advantages

- Horizontal Flow Biofiltration
- Greater Filter Surface Area
- Pre-Treatment Chamber
- Patented Perimeter Void Area
- Flow Control
- No Depressed Planter Area

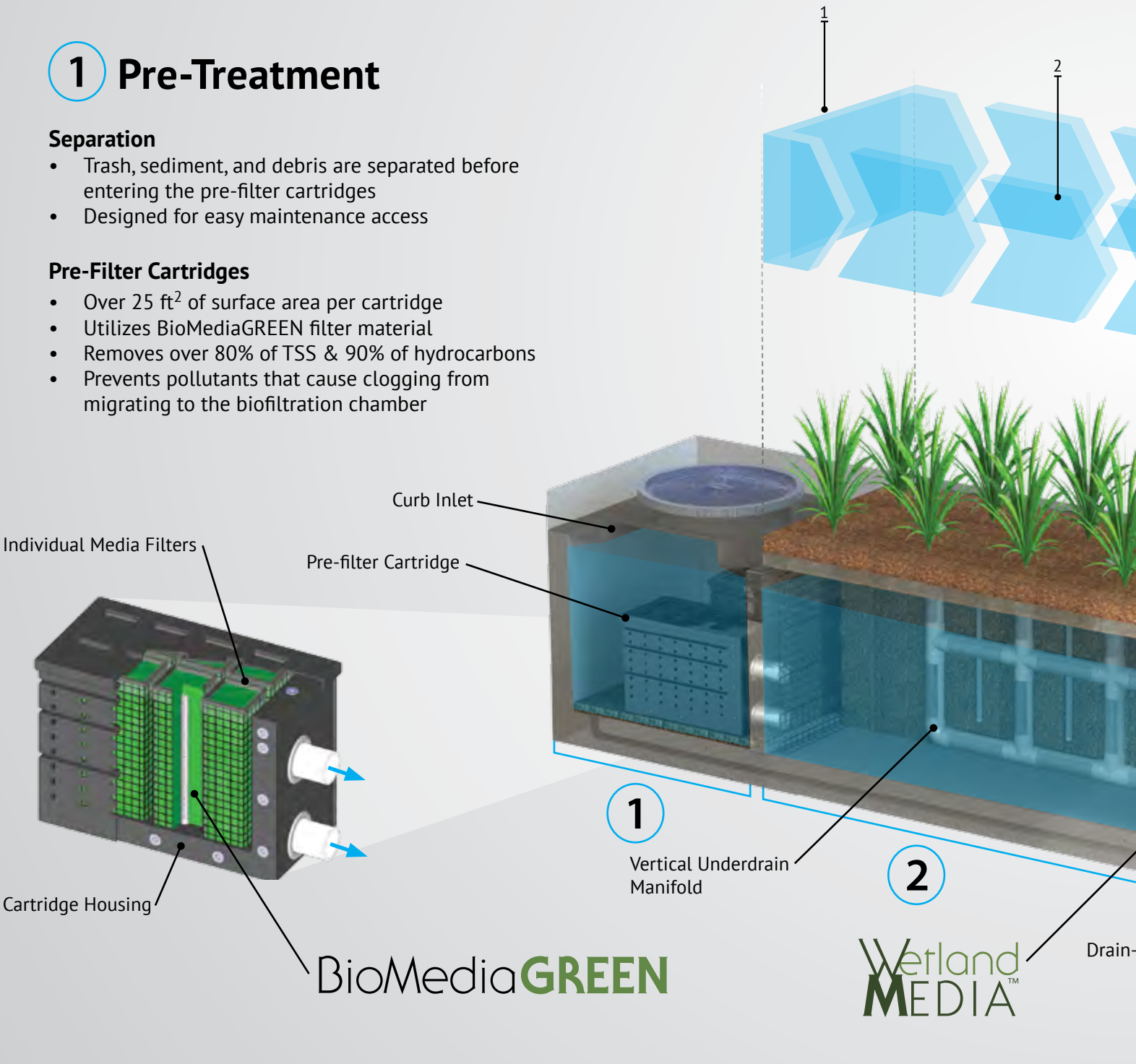
1 Pre-Treatment

Separation

- Trash, sediment, and debris are separated before entering the pre-filter cartridges
- Designed for easy maintenance access

Pre-Filter Cartridges

- Over 25 ft^2 of surface area per cartridge
- Utilizes BioMediaGREEN filter material
- Removes over 80% of TSS & 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber



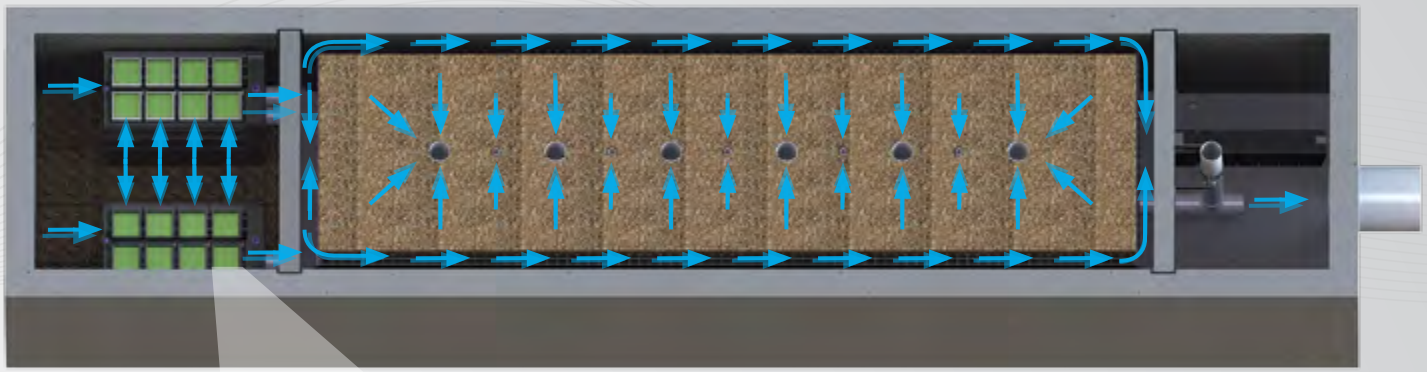


Fig. 2 - Top View

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

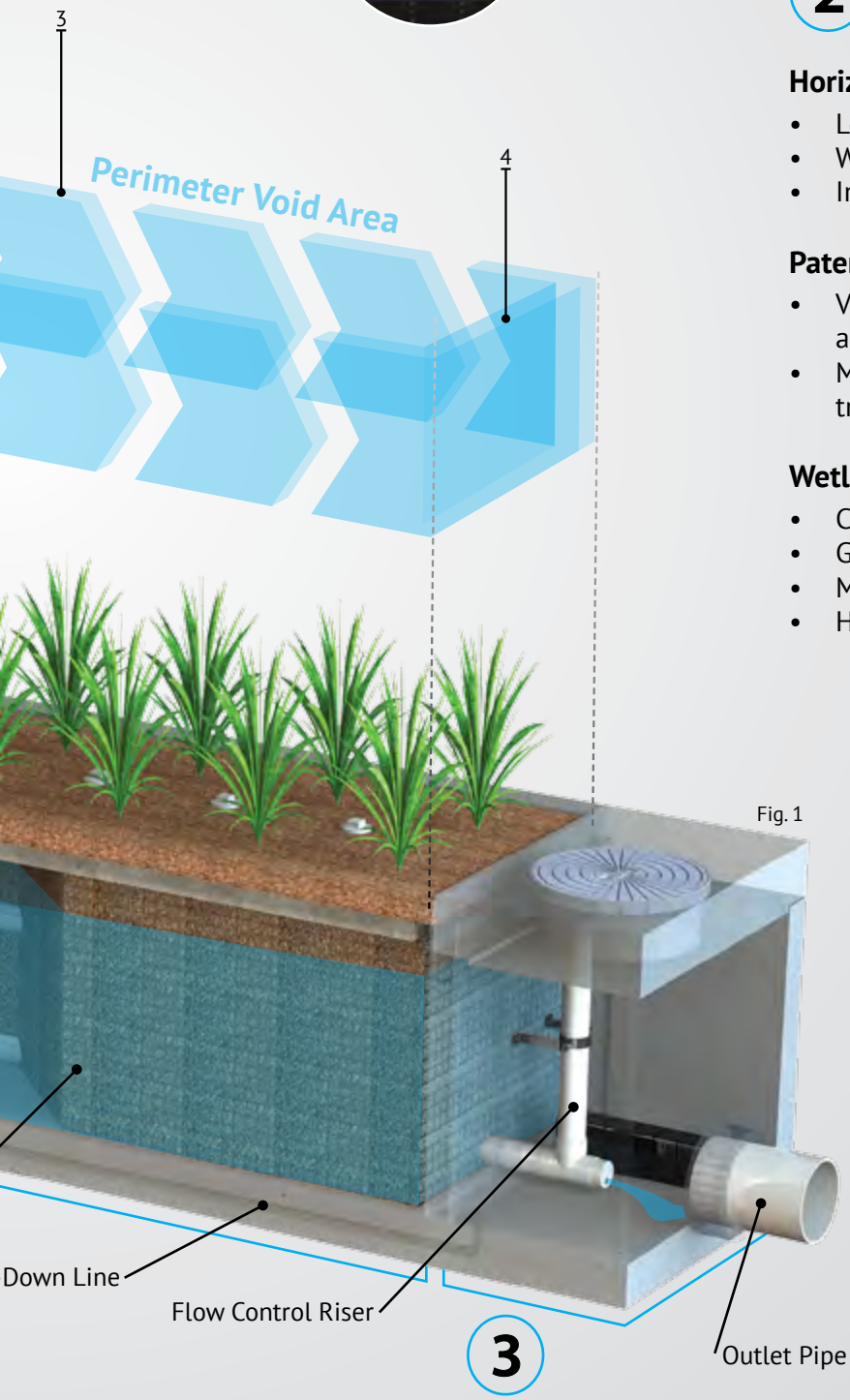


Fig. 1

2 Biofiltration

Horizontal Flow

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

Patented Perimeter Void Area

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

WetlandMEDIA

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

3 Discharge

Flow Control

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

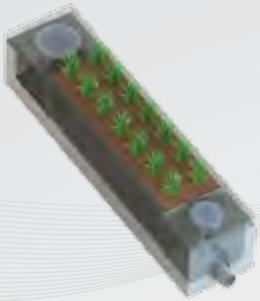
Drain-Down Filter

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

Orientations

Side-By-Side

The *Side-By-Side* orientation places the pre-treatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.



End-To-End

The *End-To-End* orientation places the pre-treatment and discharge chambers on opposite ends of the biofiltration chamber therefore minimizing the width of the system to 5 ft (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is bypass must be external.

Bypass

Internal Bypass Weir (Side-by-Side Only)

The *Side-By-Side* orientation places the pre-treatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pre-treatment chamber directly to the discharge chamber.

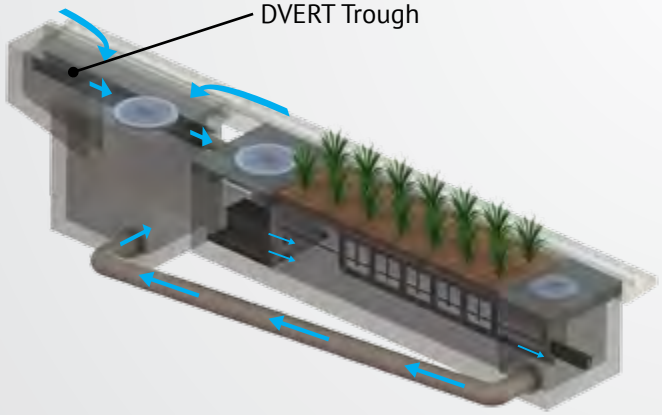
External Diversion Weir Structure

This traditional offline diversion method can be used with the MWS Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

Flow By Design

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT Low Flow Diversion



This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the MWS Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allows the MWS Linear to be installed anywhere space is available.

Performance

The MWS Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country. With it's advanced pre-treatment chamber and innovative horizontal flow biofilter, the system is able to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. With the same biological processes found in natural wetlands, the MWS Linear harnesses natures ability to process, transform, and remove even the most harmful pollutants.

Approvals

The MWS Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation, and perhaps the world.

Washington State DOE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft^2 loading rate. The highest performing BMP on the market for all main pollutant categories.

TSS	Total Phosphorus	Ortho Phosphorus	Nitrogen	Dissolved Zinc	Dissolved Copper	Total Zinc	Total Copper	Motor Oil
85%	64%	67%	45%	66%	38%	69%	50%	95%

DEQ Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear, the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) Technical Criteria.

MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center, issued a technical evaluation report noting removal rates up to 84% TSS, 70% Total Phosphorus, 68.5% Total Zinc, and more.

Rhode Island DEM Approved

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% Pathogens, 30% Total Phosphorus for discharges to freshwater systems, and 30% Total Nitrogen for discharges to saltwater or tidal systems.

Flow Based Sizing

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

Treatment Flow Sizing Table

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

Volume Based Sizing

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

Treatment Volume Sizing Table

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

Installation

The MWS Linear is simple, easy to install, and has a space efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles pre-cast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians are available to supervise installations and provide technical support.

Maintenance

Reduce your maintenance costs, man hours, and materials with the MWS Linear. Unlike other biofiltration systems that provide no pre-treatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pre-treatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pre-treatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pre-treatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter cartridges is required for long term operation and there is absolutely no need to replace expensive biofiltration media.

Plant Selection

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the MWS Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more "contact time" so that pollutants are more successfully decomposed, volatilized and incorporated into the biomass of The MWS Linear's micro/macro flora and fauna.

A wide range of plants are suitable for use in the MWS Linear, but selections vary by location and climate. View suitable plants by selecting the list relative to your project location's hardy zone.

Please visit www.ModularWetlands.com/Plants for more information and various plant lists.

MWS Linear 2.0 Flow Based Sizing Calculations - *State of California*

Model #	Physical Depth of Model from TC, FS, TC to INVERT OUT	Wetland Perimiter (ft)	**Wetland Chamber Max HGL Height (ft)	Wetland Surface Area (sq ft)	Treatment Capacity for Flow Based Design **FLOW DESIGN**	
					GPM	CFS
MWS-L-4-4	4.13'	6.7	3.40	22.78	**23.46**	**0.052**
MWS-L-4-6	4.13'	9.4	3.40	31.96	**32.92**	**0.073**
MWS-L-4-8	4.13'	14.8	3.40	50.32	**51.83**	**0.115**
MWS-L-4-13	4.13'	18.4	3.40	62.56	**64.44**	**0.144**
MWS-L-4-15	4.13'	22.4	3.40	76.16	**78.44**	**0.175**
MWS-L-4-17	4.13'	26.4	3.40	89.76	**92.45**	**0.206**
MWS-L-4-19	4.13'	30.4	3.40	103.36	**106.46**	**0.237**
MWS-L-4-21	4.13'	34.4	3.40	116.96	**120.47**	**0.268**
MWS-L-8-12	4.13'	44.4	3.40	150.96	**155.49**	**0.346**
MWS-L-8-16	4.13'	59.2	3.40	201.28	**207.32**	**0.462**

Shallow or Deeper Units Available. Change in Height Will Affect Treatment Capacity

** Not the physical height of the unit but the max HGL in the system at peak treatment flow rate

Based on loading rate of 100 in/hr or 1.03 gpm/sq ft

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info@modularwetlands.com **P: 760-433-7640** **2972 San Luis Rey Rd, Oceanside CA 92058**

Modular Wetland System - Linear® Plants for Hardy Zone 10

Common Name ***Latin Name***	**Light Exposure**	**Hardy Range**	**Height**	**Flower Color**
canna, canna tropicana, canna lilly *Canna X generalis*	full sun to partial shade	USDA Zones 8-11	2.5 to 8 feet	yellow, orange, red
Lily-of-the-Nile, African Lily, African Blue Lily *Agapanthus spp*	full sun to partial shade	USDA Zones 8-11	2 to 4 feet	blue
Vetiveria zizanioides (L.) Nash Vetiver Grass	full sun	USDA Zones 5-11	2 to 8 feet	green
giant wild rye *Leymus condensatus*	full sun	USDA Zones 3-11	4 to 8 feet	brown
society garlic, pink agapanthus *Tulbaghia violacea*	full sun to full shade	USDA Zones 7-10	1.5 to 3 feet	lavender
Gulf muhlygrass, mist grass, hairawn muhly *Muhlenbergia capillaris*	full sun to partial shade	USDA Zones 5-10	2 to 3 feet	pinkish purple
Lindheimer's muhlygrass, blue muhlygrass *Muhlenbergia lindheimeri*	full sun	USDA Zones 7-11	2 to 4 feet	purple to gray
horsetail, scouring rush, E. prealtum *Equisetum hyemale*	full sun to light shade	USDA Zones 3-11	2 to 4 feet	n/a
cattail, reed-mace *Typha latifolia*	full sun	USDA Zones 2-11	3 to 9 feet	brown
papyrus, Egyptian papyrus, bulrushes *Cyperus papyrus*	full sun to partial shade	USDA Zones 9-11	2 to 10 feet	white
lavender *Lavandula L.*	sun	USDA Zones 5-10	1 to 2 feet	purple

palm sedge *Carex phyllocephala*	full sun to full shade	USDA Zones 7-10	1 to 2 feet	green
lemongrass, oil grass *Cymbopogon citratus*	full sun to partial shade	USDA Zones 10-11	4 to 6 feet	n/a
umbrella sedge, umbrella plant *Cyperus involucratus*	full sun to partial shade	USDA Zones 8-11	2 to 6 feet	green/white
feather grass, Mexican needle grass *Nassella tenuissima*	full sun to partial shade	USDA Zones 7-11	2 to 3 feet	green/brown
sea oats, Chasmanthium paniculatum *Uniola paniculata*	full sun to partial shade	USDA Zones 6-10	3 to 6 feet	golden/brown
Cape lily, Powell's crinum lily *Crinum X powellii*	full sun to partial shade	USDA Zones 6-11	3 to 4 feet	white/pink
African iris, fortnight lily, morea iris *Dietes iridioides*	full sun to partial shade	USDA Zones 8-10	2 to 4 feet	white/purple
whirling butterflies, white gaura *Gaura lindheimeri*	full sun to partial shade	USDA Zones 5-10	2 to 4 feet	white/pink
daylily *Hemerocallis hybrids*	full sun to partial shade	USDA Zones 2-10	1 to 3.5 feet	various
Adam's needle, bear grass, weak-leaf yucca *Yucca filamentosa*	full sun	USDA Zones 5-10	3 to 5 feet	white
brome hummock sedge *carex bromoides*	full sun to partial shade	USDA Zones 2-10	1 ft	green

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The Modular Wetland System - Linear® standard 22' long system will require 18 to 20 plants. Different size systems will require different plant quanitities; please contact us for detailed information.

The plants listed are tolerant to drought and have deep roots to allow for ehanced pollutant removal.

These plants are subject to availability in local areas. If you would like to use a different plant please contact us. We will work with you to ensure the chosen plants work with the projects current landscape theme.

The Modular Wetland System - Linear® should be irrigated like any other planter area. The plants in the system must receive adequate irrigation to ensure plant survival during periods of drier weather. As with all landscape areas the plants within the Modular Wetland System - Linear will require more frequent watering during the establishment period.

For more information please contact at: 760-433-7640 or email: info@modularwetlands.com

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) (http://www.cabmphandbooks.com)**	**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)	☒	R-1 Automobile Repair & Maintenance	☐
Recycle at Your Local Used Oil Collection Center (South County)	☐	R-2 Automobile Washing	☐
Tips for Maintaining Septic Tank Systems	☐	R-3 Automobile Parking	☐
Responsible Pest Control	☒	R-4 Home & Garden Care Activities	☒
Sewer Spill	☐	R-5 Disposal of Pet Waste	☒
Tips for the Home Improvement Projects	☐	R-6 Disposal of Green Waste	☒
Tips for Horse Care	☐	R-7 Household Hazardous Waste	☒
Tips for Landscaping and Gardening	☒	R-8 Water Conservation	☒
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

Worksheet B: Simple Design Capture Volume Sizing Method

Project: Newport Center Condominiums

Date: 2/26/2015

			Total Site	
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=	0.70	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.70	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	1.2600	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	85.0%	%
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.7875	
4	Calculate runoff volume, $V_{design} = (C \times d_{remainder} \times A \times 43560 \times (1/12))$	V_{design}=	2,521.3	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*	in/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=	*N/A*	
3	Calculate design infiltration rate, $K_{design} = K_{measured} / S_{final}$	K_{design}=	*N/A*	in/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=	*N/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}=	*N/A*	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	*N/A*	sq-ft
Infiltraiton is infeasible - Biotreatment will be utilized (see Worksheet D)				

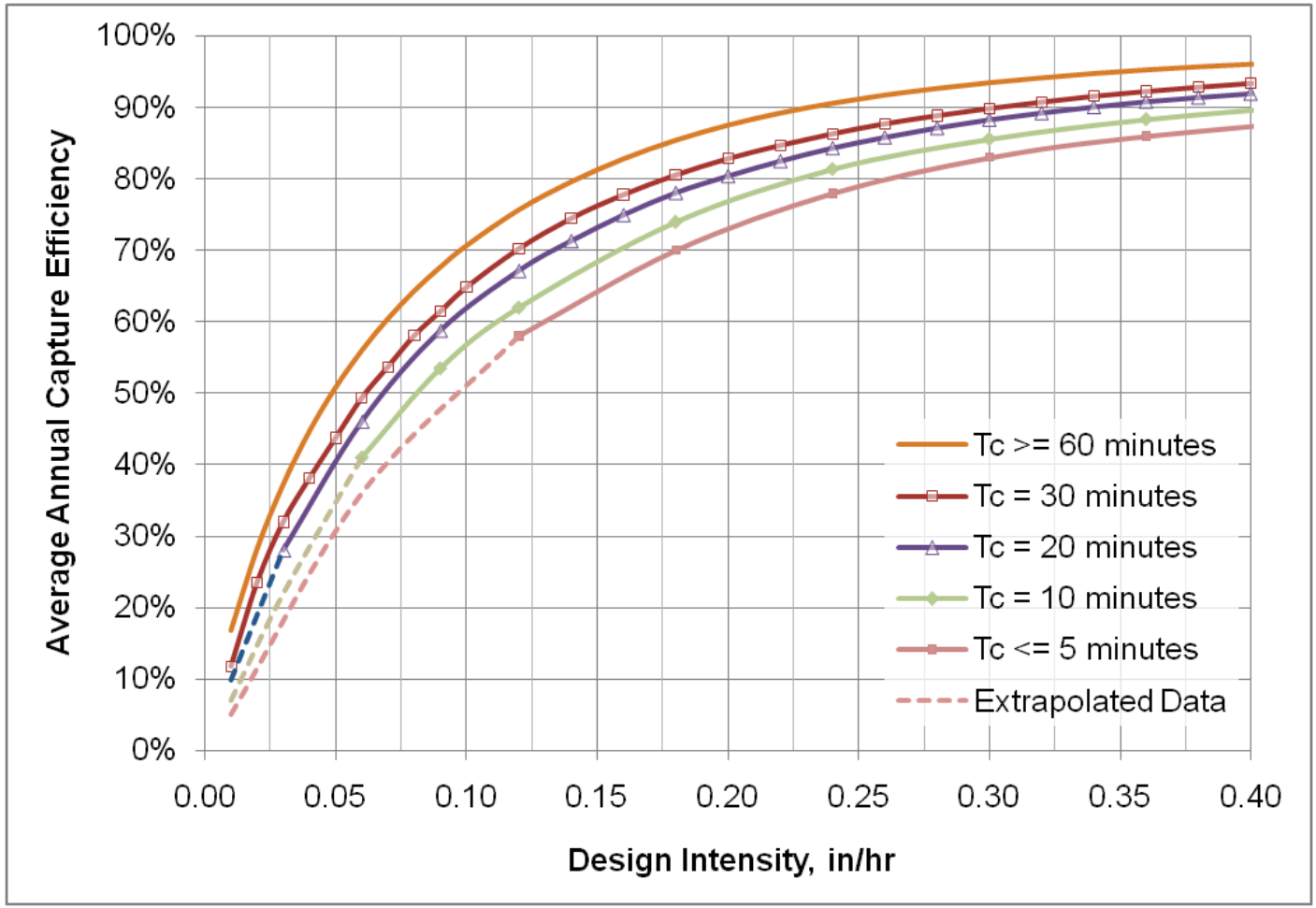
Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Project: Newport Center Condominiums

Date: 2/26/2015

			Total Site	
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	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	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (Worksheet A)	Y_2=	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	in/hr
6	Determine the design intensity that must be provided by BMP, $I_{design} = I_1 - I_2$	I_{design}=	0.260	in/hr
Step 2: Calculate the design flowrate				
1	Enter Project area tributary to BMP(s), *A* (acres)	A=	1.260	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	85.0%	%
3	Calculate runoff coefficient, $C = (0.75 \times imp) + 0.15$	C=	0.788	
4	Calculate design flowrate, $Q_{design} = (C \times i_{design} \times A)$	Q_{design}=	0.258	cfs
Supporting Calculations				
Describe System:				
Proprietary BioTreatment (BIO-7): Modular Wetland Systems (MWS)				
		Unit Size / Model =	*MWS-L-4-21*	
		Unit Size / Model Treatment Capacity =	*0.267*	cfs
		Number of Units Needed =	*1*	
		Total Bio-treatment Provided =	*0.267*	cfs
Provide time of concentration assumptions:				
Assumed = 5 minutes for conservative estimate			*5.0*	min

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



Harvest & Reuse Irrigation Demand Calculations - Newport Center Condominiums

2/26/2015

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	1.07	0.19	85%	0.7875	0.7	1.260	**2,521.3**	**18,859**

	Eto
Irvine	3.00
Laguna Beach	2.75
Santa Ana	2.93

Modified

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

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

High-use Turf 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 (Table X.8)	Drawdown (days)	Drawdown (hours)	% Capture (Fig. III.2)
Total Site	1.2600	54,886	85%	46,653	8,233	2.75	0.7	264.14	246.63	570	No	0.14	0.42	71.4	1,714	<40%

Low Water 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 (Table X.8)	Drawdown (days)	Drawdown (hours)	% Capture (Fig. III.2)
Total Site	1.260	54,886	85%	46,653	8,233	2.75	0.35	132.07	123.31	570	No	0.07	0.84	142.8	3,427	<40%

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	1.260	54,886	85%	46,653	8,233	2.75	0.55	207.54	193.78	570	No	0.11	0.63	90.9	2,181	<40%

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

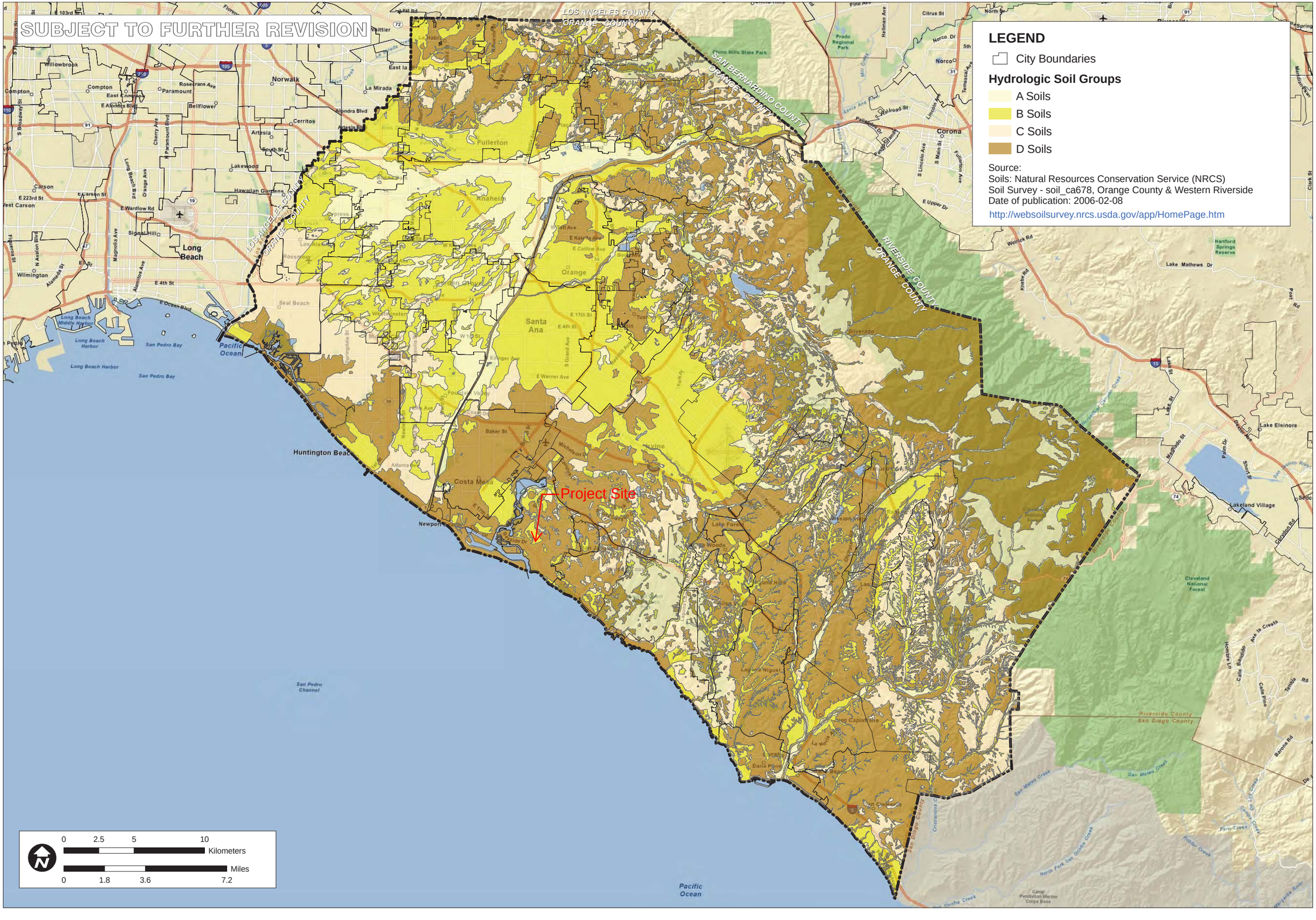
Design Capture Storm Depth, inches	Wet Season Demand Required for Minimum Partial Capture, gpd per impervious acre
0.60	490
0.65	530
0.70	570
0.75	610
0.80	650
0.85	690
0.90	730
0.95	770
1.00	810

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.

SUBJECT TO FURTHER REVISION



LEGEND

- City Boundaries

Hydrologic Soil Groups

- A Soils
- B Soils
- C Soils
- D Soils

Source:
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

0 2.5 5 10 Kilometers
0 1.8 3.6 7.2 Miles

P: \ 9526E \ 6-GIS \ Mxds \ Reports \ InfiltrationFeasability_20110215 \ 9526E_FigureXVI-2a_HydroSoils_20110215.mxd

TITLE
NRCS HYDROLOGIC SOILS GROUPS

JOB
ORANGE COUNTY INFILTRATION STUDY
ORANGE CO. 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-2a

Susceptibility

Potential Areas of Erosion, Habitat, & Physical Structure Susceptibility

Channel Type

- Earth (Unstable)
- Earth (Stabilized)
- Stabilized

Tidal 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

Sand Canyon Reservoir

Laguna Reservoir

Bonita Canyon Reservoir

San Joaquin Reservoir

Big Canyon Reservoir

Harbor View Dam

John Wayne Airport

Village Pond Park

Project Site

0 9,000 18,000 Feet

P:\9526E\16-GIS\Mxds\SuceptabilityMaps_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

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.

0.9
0.9
0.95
0.7
0.75
0.7
0.65
0.75
0.8
0.85
0.9
0.95
1
1.05
Project Site

0 3 6 12 Kilometers
0 1.8 3.6 7.2 Miles

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

APPENDIX B

NOTICE OF TRANSFER OF RESPONSIBILITY

NOTICE OF TRANSFER OF RESPONSIBILITY

WATER QUALITY MANAGEMENT PLAN

Newport Center Condominiums
Parcel 1 P.M.B. 29/34

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?

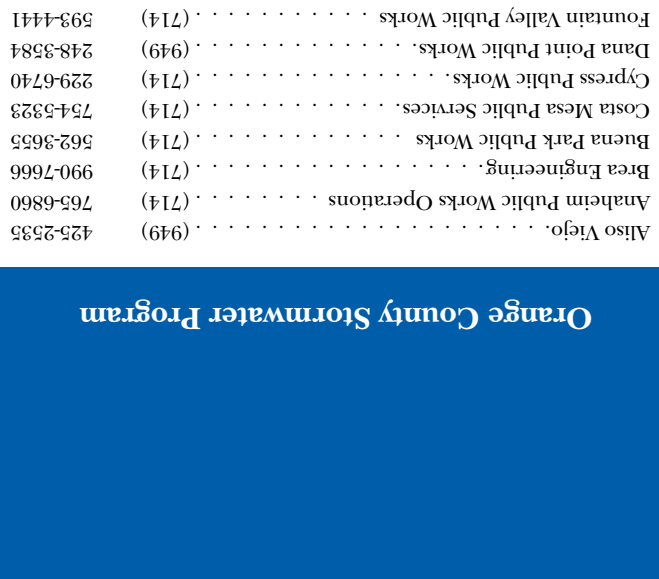
- Most people believe that the largest source of water pollution in urban areas comes from specific sources such as factories and sewage treatment plants. In fact, the largest source of water pollution comes from city streets, neighborhoods, construction sites and parking lots. This type of pollution 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.

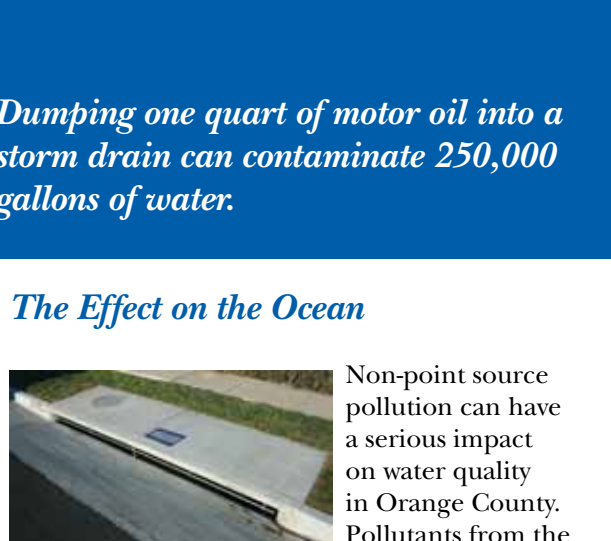


The Effect on the Ocean

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.



For More Information

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

Orange County Stormwater Program

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

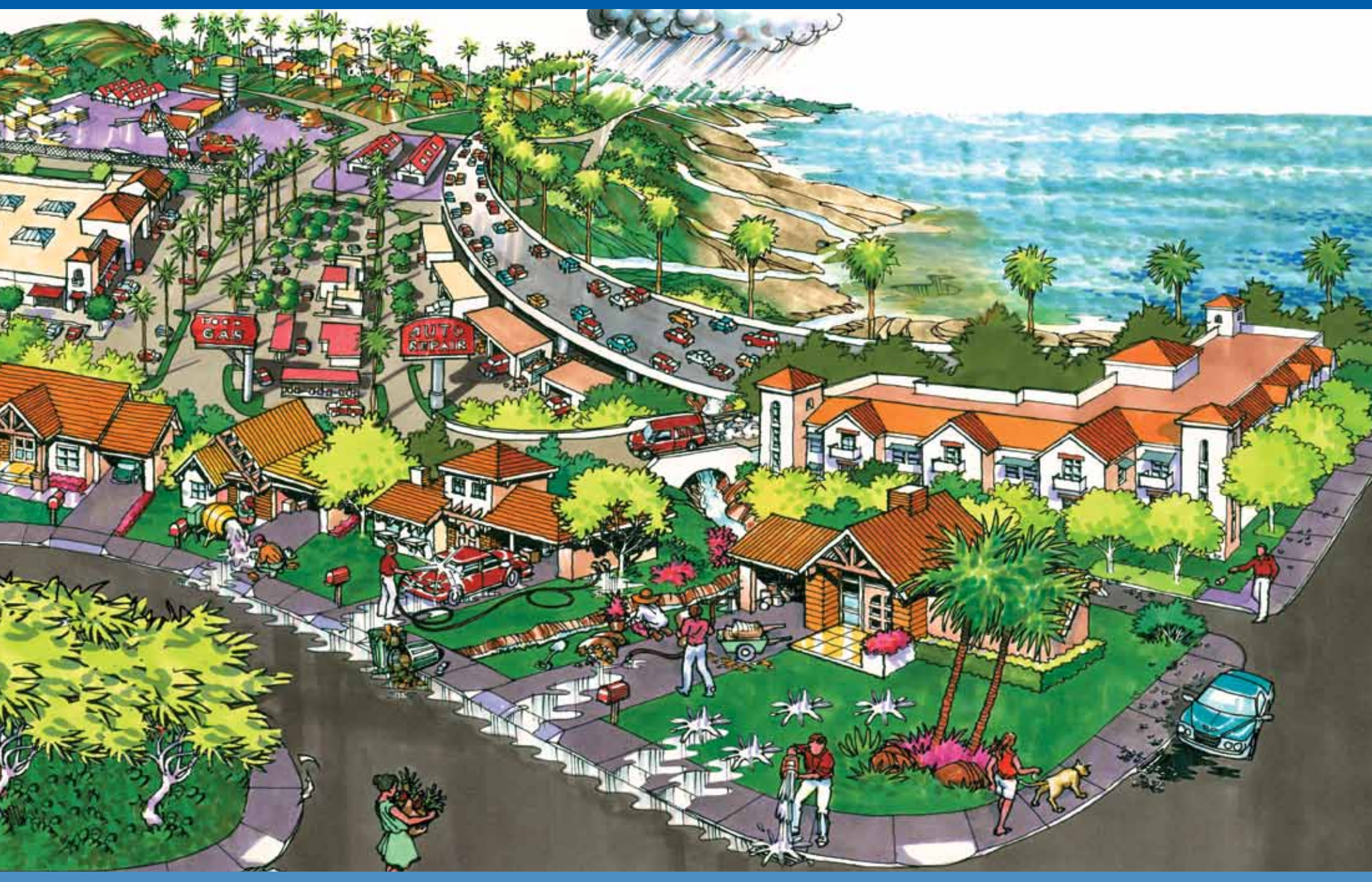
Aliso Viejo	(949)	425-2535
Anaheim Public Works Operations	(714)	765-6860
Brea Engineering	(714)	990-7666
Buena Park Public Works	(714)	562-3655
Costa Mesa Public Services	(714)	754-5323
Cypress Public Works	(714)	229-6740
Dana Point Public Works	(949)	248-3584
Fountain Valley Public Works	(714)	593-4441
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

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

Do your part to prevent water pollution in our creeks, rivers, bays and ocean.

Clean beaches and healthy creeks, rivers, bays, and ocean are important to Orange County. However, many common household activities can lead to water pollution if you're not careful.

Remember the Water in Your Storm Drain is Not Treated BEFORE It Enters Our Waterways

Litter, oil, chemicals and other substances that are left on your yard or driveway can be blown or washed into storm drains that flow to the ocean. Over-watering your lawn and washing your car can also flush materials into the storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated.

You would never pour soap, fertilizers or oil into the ocean, so don't let them enter streets, gutters or storm drains. Follow the easy tips in this brochure 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 Problem 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 performing everyday household activities. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

GENUINE RECYCLED PAPER
50% PRE-CONSUMER AND 15% POST-CONSUMER

RECYCLE USED OIL

Help Prevent Ocean Pollution:

Household Tips

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Pollution Prevention

Household Activities

- **Do not rinse spills with water!** Sweep outdoor spills and dispose of in the trash. For wet spills like oil, apply cat litter or another absorbent material, then sweep and bring to a household hazardous waste collection center (HHWCC).
- Securely cover trash cans.
- Take household hazardous waste to a household hazardous waste collection center.
- Store household hazardous waste in closed, labeled containers inside or under a cover.
- Do not hose down your driveway, sidewalk or patio. Sweep up debris and dispose of in trash.
- Always pick up after your pet. Flush waste down the toilet or dispose of in the trash.
- Bathe pets indoors or have them professionally groomed.

Household Hazardous Wastes include:

- ▲ **Batteries**
- ▲ **Paint thinners, paint strippers and removers**
- ▲ **Adhesives**
- ▲ **Drain openers**
- ▲ **Oven cleaners**
- ▲ **Wood and metal cleaners and polishes**
- ▲ **Herbicides and pesticides**
- ▲ **Fungicides/wood preservatives**
- ▲ **Automotive fluids and products**
- ▲ **Grease and rust solvents**
- ▲ **Thermometers and other products containing mercury**
- ▲ **Fluorescent lamps**
- ▲ **Cathode ray tubes, e.g. TVs, computer monitors**
- ▲ **Pool and spa chemicals**

Gardening Activities

- Follow directions on pesticides and fertilizers, (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Water your lawn and garden by hand to control the amount of water you use. Set irrigation systems to reflect seasonal water needs. If water flows off your yard and onto your driveway or sidewalk, your system is over-watering.
- Mulch clippings or leave them on the lawn. If necessary, dispose in a green waste container.
- Cultivate your garden often to control weeds.

Washing and Maintaining Your Car

- Take your car to a commercial car wash whenever possible.
- Choose soaps, cleaners, or detergents labeled "non-toxic," "phosphate free" or "biodegradable." Vegetable and citrus-based products are typically safest for the environment, **but even these should not be allowed into the storm drain.**
- Shake floor mats into a trash can or vacuum to clean.
- Do not use acid-based wheel cleaners and "hose off" engine degreasers at home. They can be used at a commercial facility, which can properly process the washwater.
- **Do not dump washwater onto your driveway, sidewalk, street, gutter or storm drain.** Excess washwater should be disposed of in the sanitary sewers (through a sink, or toilet) or onto an absorbent surface like your lawn.
- Use a nozzle to turn off water when not actively washing down automobile.
- Monitor vehicles for leaks and place pans under leaks. Keep your car well maintained to stop and prevent leaks.
- Use cat litter or other absorbents and sweep to remove any materials deposited by vehicles. Contain sweepings and dispose of at a HHWCC.
- Perform automobile repair and maintenance under a covered area and use drip pans or plastic sheeting to keep spills and waste material from reaching storm drains.
- **Never pour oil or antifreeze in the street, gutter or storm drains.** Recycle these substances at a service station, HHWCC, or used oil recycling center. For the nearest Used Oil Collection Center call 1-800-CLEANUP or visit www.ciwmb.ca.gov/UsedOil.

For locations and hours of Household Hazardous Waste Collection Centers in Anaheim, Huntington Beach, Irvine and San Juan Capistrano, call (714)834-6752 or visit www.oclandfills.com.

Do your part to prevent water pollution in our creeks, rivers, bays and ocean.

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, not properly disposing of household hazardous waste can lead to water pollution. Batteries, electronics, paint, oil, gardening chemicals, cleaners and other hazardous materials cannot be thrown in the trash. They also must never be poured or thrown into yards, sidewalks, driveways, gutters or streets. Rain or other water could wash the materials into the storm drain and eventually into our waterways and the ocean. In addition, hazardous waste must not be poured in the sanitary sewers (sinks and toilets).

NEVER DISPOSE OF HOUSEHOLD HAZARDOUS WASTE IN THE TRASH, STREET, GUTTER, STORM DRAIN OR SEWER.

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 Illegal Dumping of Household Hazardous Waste call 1-800-69-TOXIC

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

For emergencies, dial 911.

RECYCLE USED OIL

Printed on Recycled Paper

Help Prevent Ocean Pollution:

Proper Disposal of Household Hazardous Waste

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

ORANGE COUNTY

Pollution Prevention

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "household hazardous waste" or "HHW." HHW can be found throughout your home, including the bathroom, kitchen, laundry room and garage.

WHEN POSSIBLE, USE NON-HAZARDOUS OR LESS-HAZARDOUS PRODUCTS.

Disposal of HHW down the drain, on the ground, into storm drains, or in the trash is illegal and unsafe.

Proper disposal of HHW is actually easy. Simply drop them off at a Household Hazardous Waste Collection Center (HHWCC) for free disposal and recycling. Many materials including anti-freeze, latex-based paint, motor oil and batteries can be recycled. Some centers have a "Stop & Swap" program that lets you take partially used home, garden, and automobile products free of charge. There are four HHWCCs in Orange County:

Anaheim:.....1071 N. Blue Gum St
Huntington Beach:.....17121 Nichols St
Irvine:..... 6411 Oak Canyon
San Juan Capistrano:... 32250 La Pata Ave

Centers are open Tuesday-Saturday, 9 a.m.-3 p.m. Centers are closed on rainy days and major holidays. For more information, call **(714) 834-6752** or visit **www.oclandfills.com.**

Common household hazardous wastes

- Batteries
- Paint and paint products
- Adhesives
- Drain openers
- Household cleaning products
- Wood and metal cleaners and polishes
- Pesticides
- Fungicides/wood preservatives
- Automotive products (antifreeze, motor oil, fluids)
- Grease and rust solvents
- Fluorescent lamps
- Mercury (thermometers & thermostats)
- All forms of electronic waste including computers and microwaves
- Pool & spa chemicals
- Cleaners
- Medications
- Propane (camping & BBQ)
- Mercury-containing lamps
- Television & monitors (CRTs, flatscreens)

Tips for household hazardous waste

- Never dispose of HHW in the trash, street, gutter, storm drain or sewer.
- Keep these materials in closed, labeled containers and store materials indoors or under a cover.
- When possible, use non-hazardous products.
- Reuse products whenever possible or share with family and friends.
- Purchase only as much of a product as you'll need. Empty containers may be disposed of in the trash.
- HHW can be harmful to humans, pets and the environment. Report emergencies to 911.

Did you know that just one quart of oil can pollute 250,000 gallons of water?

A clean ocean and healthy creeks, rivers, bays and beaches are important to Orange County. However, not properly disposing of used oil can lead to water pollution. If you pour or drain oil onto driveways, sidewalks or streets, it can be washed into the storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering the ocean. Help prevent water pollution by taking your used oil to a used oil collection center.

Included in this brochure is a list of locations that will accept up to five gallons of used motor oil at no cost. Many also accept used oil filters. Please contact the facility before delivering your used oil. This listing of companies is for your reference and does not constitute a recommendation or endorsement of the company.

Please note that used oil filters may not be disposed of with regular household trash. They must be taken to a household hazardous waste collection or recycling center in Anaheim, Huntington Beach, Irvine or San Juan Capistrano. For information about these centers, visit www.oclandfills.com.

Please do not mix your oil with other substances!

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

For information about the proper disposal of household hazardous waste, call the Household Waste Hotline at (714) 834-6752 or visit www.oclandfills.com.

RECYCLE USED OIL

For additional information about the nearest oil recycling center, call the Used Oil Program at 1-800-CLEANUP or visit www.cleanup.org.

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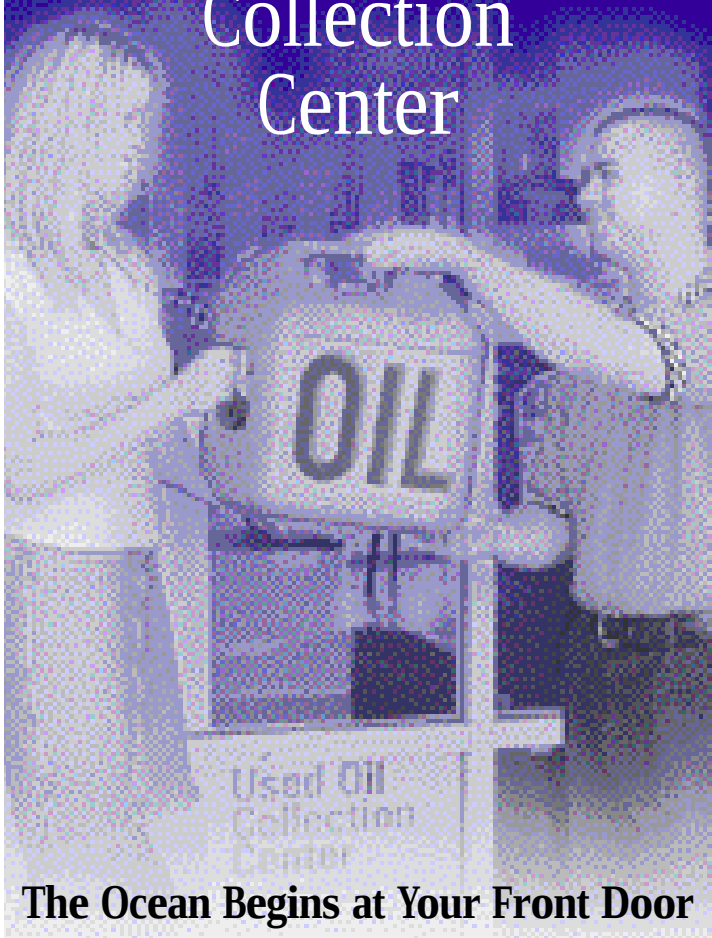
Help Prevent Ocean Pollution:

Recycle at Your Local Used Oil Collection Center



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

CENTRAL COUNTY

Used Oil Collection Centers

Balboa

Hill's Boat Service
814 E Bay Ave., Balboa, CA 92661
(949)675-0740( )
CIWMB#: 30-C-03538

Balboa Island

Island Marine Fuel
406 S Bay Front, Balboa Island, CA 92662
(949)673-1103( )
CIWMB#: 30-C-03728

Corona Del Mar

Corona Del Mar 76
2201 E. Pacific Coast Hwy., Corona Del Mar, CA 92625
(949)673-3320( )
CIWMB#: 30-C-06620

Corona Del Mar Chevron
2546 E. Coast Hwy., Corona Del Mar, CA 92625
(949)495-0774(14)
CIWMB#: 30-C-06424

Mobil (Harbor View)
2500 San Joaquin Hills Rd., Corona Del Mar, CA 92625
(949)640-4759( )
CIWMB#: 30-C-03363

Costa Mesa

AutoZone #5520
744 W. 19th St., Costa Mesa, CA 92627
(901)495-7159( )
CIWMB#: 30-C-05992

Big O Tires #5571
3181 Harbor Blvd., Costa Mesa, CA 92626
(949)443-4155( )
CIWMB#: 30-C-04676

Big O Tires #694
322 E. 17th St., Costa Mesa, CA 92627
(949)642-4131( )
CIWMB#: 30-C-05811

Coast General Performance
2855 Harbor Blvd., Costa Mesa, CA 92626
(714)540-5710( )
CIWMB#: 30-C-05916

Connell Chevrolet
2828 Harbor Blvd., Costa Mesa, CA 92626
(714)546-1200( )
CIWMB#: 30-C-06286

EZ Lube Inc #15
3599 Harbor Blvd., Costa Mesa, CA 92626
(714)966-1647( )
CIWMB#: 30-C-03137

EZ Lube Inc #46
400 E 17th St., Costa Mesa, CA 92627
(714)556-1312( )
CIWMB#: 30-C-05779

EZ Lube Inc. #44
2248 Harbor Blvd., Costa Mesa, CA 92627
(714)556-1312( )
CIWMB#: 30-C-05737

Firestone Store #71T7
475 E 17th St., Costa Mesa, CA 92627
(949)646-2444( )
CIWMB#: 30-C-02120

Jiffy Lube #1969
300 E 17th St., Costa Mesa, CA 92627
(949)548-2505( )
CIWMB#: 30-C-05553

Jiffy Lube #1970
2175 Newport Blvd., Costa Mesa, CA 92627
(949)548-4150( )
CIWMB#: 30-C-05554

Jiffy Lube #607
2255 Fairview Rd., Costa Mesa, CA 92627
(949)650-5823( )
CIWMB#: 30-C-05551

Jiffy Lube #861
375 Bristol St., Costa Mesa, CA 92626
(714)557-5823( )
CIWMB#: 30-C-05552

Kragen Auto Parts #0725
1739 Superior Ave., Costa Mesa, CA 92627
(949)642-3384( )
CIWMB#: 30-C-02624

Kragen Auto Parts #0796
1175 Baker Blvd., Unit E, Costa Mesa, CA 92626
(714)662-2005( )
CIWMB#: 30-C-02664

Nabers Cadillac
2600 Harbor Blvd., Costa Mesa, CA 92626
(714)444-5200( )
CIWMB#: 30-C-05051

Oil Stop Inc.
Oil Stop Inc. Costa Mesa, CA 92626
(714)434-8350( )
CIWMB#: 30-C-06293

Pep Boys #660
2946 Bristol St., Costa Mesa, CA 92626
(714)549-1533( )
CIWMB#: 30-C-03416

Plaza Chevron Service Center
3048 Bristol Costa Mesa, CA 92626
(714)545-4257( )
CIWMB#: 30-C-01123

Scher Tire Inc #15 dba Goodyear Tire
1596 Newport Blvd., Costa Mesa, CA 92627
(949)548-9384( )
CIWMB#: 30-C-03034

Fountain Valley

Firestone Store #7147
17975 Magnolia Ave., Fountain Valley, CA 92708
(714)842-3341( )
CIWMB#: 30-C-01219

Golden Shell
8520 Warner Ave., Fountain Valley, CA 92708
(714)842-7150( )
CIWMB#: 30-P-05002

Kragen Auto Parts #0734
9880 Warner Ave., Fountain Valley, CA 92708
(714)964-6427( )
CIWMB#: 30-C-02609

Kragen Auto Parts #1505
16147 Harbor Blvd., Fountain Valley, CA 92708
(714)531-8525( )
CIWMB#: 30-C-04125

Oil Can Henry's
9525 Warner Ave., Fountain Valley, CA 92708
(714)473-7705( )
CIWMB#: 30-C-05843

Purrfect Auto Service #10
16780 Harbor Blvd., Fountain Valley, CA 92708
(714)839-3899( )
CIWMB#: 30-C-01380

Huntington Beach

AutoZone #5528
6800 Warner Ave., Huntington Beach, CA 92647
(714)891-8211( )
CIWMB#: 30-C-04777

Bella Terra Car Wash
16061 Beach Blvd., Huntington Beach, CA 92647
(714)847-4924( )
CIWMB#: 30-C-06195

Big O Tires #553
19411 Beach Blvd., Huntington Beach, CA 92648
(714)536-7571( )
CIWMB#: 30-C-00970

Econo Lube N' Tune #26
19961 Beach Blvd., Huntington Beach, CA 92648
(714)536-6519( )
CIWMB#: 30-C-06117

Expertec Automotive
7680 Talbert Ave Suite A & B, Huntington Beach, CA 92648
(714)848-9222( )
CIWMB#: 30-C-05914

EZ Lube Inc #16
7361 Edinger Ave., Huntington Beach, CA 92647
(714)899-3600( )
CIWMB#: 30-C-03289

EZ Lube Inc. #79
9862 Adams St., Huntington Beach, CA 92647
(714)556-1312( )
CIWMB#: 30-C-06547

Firestone Store #71T5
16171 Beach Blvd., Huntington Beach, CA 92647
(714)847-6081( )
CIWMB#: 30-C-02118

Huntington Beach Car Wash
18971 Beach Blvd., Huntington Beach, CA 92648
(714)847-4924( )
CIWMB#: 30-C-05303

Jiffy Lube #1857
8971 Warner Ave., Huntington Beach, CA 92647
(714)596-7213( )
CIWMB#: 30-C-05053

Kragen Auto Parts #1468
10072 Adams Ave., Huntington Beach, CA 92646
(714)593-6156( )
CIWMB#: 30-C-04284

Kragen Auto Parts #1511
7171 Warner Ave., Huntington Beach, CA 92647
(714)842-4531( )
CIWMB#: 30-C-04129

Kragen Auto Parts #1633
18888 Beach Blvd., Huntington Beach, CA 92648
(714)965-2353( )
CIWMB#: 30-C-02645

Oilmax 10 Minute Lube/Wash
9862 Adams Ave., Huntington Beach, CA 92646
(714)964-7110( )
CIWMB#: 30-C-03219

Pep Boys #799
19122 Brookhurst St., Huntington Beach, CA 92646
(714)964-0777( )
CIWMB#: 30-C-03439

Quik Change Lube & Oil
5841 Warner Ave., Huntington Beach, CA 92649
(714)840-2331( )
CIWMB#: 30-C-03208

R Kids Tire and Service #6
5062 Warner Ave., Huntington Beach, CA 92647
(714)846-1189( )
CIWMB#: 30-C-05691

Saturn of Huntington Beach
18801 Beach Blvd., Huntington Beach, CA 92648
(714)841-5428( )
CIWMB#: 30-C-05221

USA Express Tire & Service Inc
7232 Edinger Ave., Huntington Beach, CA 92647
(714)842-0717( )
CIWMB#: 30-C-04429

Zito's Auto Care
19002 Magnolia St., Huntington Beach, CA 92646
(714)968-8788( )
CIWMB#: 30-C-03251

Irvine

Firestone Store #71W4
51 Auto Center Dr., Irvine, CA 92618
(949)829-8710( )
CIWMB#: 30-C-03689

Irvine City Auto Parts
14427 Culver Dr., Irvine, CA 92604
(949)551-5588( )
CIWMB#: 30-C-02186

Jiffy Lube #1856 Irvine Spectrum
8777 Irvine Center Dr., Irvine, CA 92618
(949)753-0485( )
CIWMB#: 30-C-06094

Jiffy Lube #1988
3080 Main St., Irvine, CA 92614
(714)961-5491(27)
CIWMB#: 30-C-04450

Kragen Auto Parts #4174
15315 Culver Dr., Ste.#170, Irvine, CA 92604
(602)631-7115( )
CIWMB#: 30-C-06417

Newport Beach

Jiffy Lube #2811
1520 W Coast Hwy., Newport Beach, CA 92663
(949)764-9255( )
CIWMB#: 30-C-05629

Newport Landing Fuel Dock
503 E Edgewater Newport Beach, CA 92661
(949)673-7878( )
CIWMB#: 30-C-03628

Orange

AutoZone #5942
1330 N. Glassell Orange, CA 92867
(714)538-4551( )
CIWMB#: 30-C-04553

Big O Tires #570
1825 E Katella Ave., Orange, CA 92867
(714)538-0016( )
CIWMB#: 30-C-00974

David Wilsons Ford of Orange
1350 W Katella Ave., Orange, CA 92867
(714)633-6731( )
CIWMB#: 30-C-02341

EZ Lube #74
3232 Chapman Ave. #E, Orange, CA 92869
(714)556-1312(106)
CIWMB#: 30-C-06627

Firestone Store #7185
1690 N Tustin Ave., Orange, CA 92867
(714)282-8144( )
CIWMB#: 30-C-0122

Jiffy Lube #1457
433 W. Katella Ave., Orange, CA 92867
(714)720-5757( )
CIWMB#: 30-C-06280

Kragen Auto Parts #1764
910 Tustin St., Orange, CA 92867
(714)771-3000( )
CIWMB#: 30-C-02625

Managed Mobile, Inc.
1030 N Batavia St., #B, Orange, CA 92867
(714)400-0250( )
CIWMB#: 30-C-05776

Pep Boys #806
215 E Katella Ave., Orange, CA 92867
(714)997-1540( )
CIWMB#: 30-C-01759

Santiago Hills Car Care
8544 East Chapman Ave., Orange, CA 92869
(714)919-1060( )
CIWMB#: 30-C-05622

Scher Tire #33
1821 E. Katella Ave., Orange, CA 92867
(909)343-3100( )
CIWMB#: 30-C-06324

Tabassi Shell Service Station
830 E Katella Ave., Orange, CA 92867
(714)771-6990( )
CIWMB#: 30-C-00552

The Tune-up Center
193 S Main St., Orange, CA 92868
(714)633-1876( )
CIWMB#: 30-C-02091

Tony's Fuel and Towing
1650 W La Veta Ave., Orange, CA 92868
(714)953-7676( )
CIWMB#: 30-C-00868

Truck Lubrication Company
143 S. Pixley Orange, CA 92868
(714)997-7730( )
CIWMB#: 30-C-06001

Santa Ana

All Phase Environmental
910 E. Fourth St., Santa Ana, CA 92701
(714)731-5995( )
CIWMB#: 30-C-06116

Archie's Tire & Towing
4518 Westminster Ave., Santa Ana, CA 92703
(714)636-4518( )
CIWMB#: 30-C-02058

AutoZone #3320
2007 S. Main St., Santa Ana, CA 92707
(901)495-7217( )
CIWMB#: 30-C-06508

AutoZone #5232
430 W 17th Santa Ana, CA 92706
(714)547-7003( )
CIWMB#: 30-C-04609

AutoZone #5538
1101 S Bristol Santa Ana, CA 92704
(714)241-0335( )
CIWMB#: 30-C-00829

Big O Tires
1211 W. Warner Ave., Santa Ana, CA 92707
(714)540-8646( )
CIWMB#: 30-C-04679

Big O Tires #712
1302 E. 17th St., Santa Ana, CA 92705
(714)541-6811( )
CIWMB#: 30-C-05813

Firestone Store #7175
3733 S Bristol Santa Ana, CA 92704
(714)549-4015( )
CIWMB#: 30-C-01223

Firestone Store #71TA
101 S Main St., Santa Ana, CA 92701
(714)542-8857( )
CIWMB#: 30-C-02123

Firestone Store #71W6
2005 N Tustin Ave., Ste A, Santa Ana, CA 92705
(714)541-7977( )
CIWMB#: 30-C-03688

Guaranty Chevrolet Motors Inc.
711 E 17th St., Santa Ana, CA 92701
(714)973-1711(277)
CIWMB#: 30-C-06506

Jiffy Lube #1303
2025 N. Tustin Santa Ana, CA 92701
(714)720-5757( )
CIWMB#: 30-C-06283

John's Mobil
1465 S Main St., Santa Ana, CA 92707
(714)835-3266( )
CIWMB#: 30-C-00578

Kragen Auto Parts #0736
1302 E 17th St., Santa Ana, CA 92705
(714)953-6061( )
CIWMB#: 30-C-02610

Kragen Auto Parts #1253
1400 W Edinger Ave., Santa Ana, CA 92704
(714)754-1432( )
CIWMB#: 30-C-02627

Kragen Auto Parts #1376
521 W 17th St., Santa Ana, CA 92706
(714)543-4492( )
CIWMB#: 30-C-03901

Kragen Auto Parts #1516
2337 S Bristol Ave., Santa Ana, CA 92704
(714)557-0787( )
CIWMB#: 30-C-04106

Kragen Auto Parts #1648
1015 S Main St., Santa Ana, CA 92701
(714)568-1570( )
CIWMB#: 30-C-05664

Pep Boys #609
120 E 1st St., Santa Ana, CA 92701
(714)547-7477( )
CIWMB#: 30-C-01738

Pep Boys #802
1107 S Harbor Blvd., Santa Ana, CA 92704
(714)775-0828( )
CIWMB#: 30-C-01739

Purrfect Auto Service
2519 S Main St., Santa Ana, CA 92707
(714)549-7900( )
CIWMB#: 30-C-02085

Saturn of Santa Ana
1350 Auto Mall Dr., Santa Ana, CA 92705
(714)648-2444( )
CIWMB#: 30-C-05222

Scher Tire #28
1805 N Grand Ave., Santa Ana, CA 92705
(714)558-8644( )
CIWMB#: 30-C-03225

Tustin

Big O Tires #555
131 E 1st St., Tustin, CA 92780
(714)544-9431( )
CIWMB#: 30-C-00972

EZ Lube #42
12972 Newport Ave., Tustin, CA 92780
(714)556-1312( )
CIWMB#: 30-C-06408

Jiffy Lube #1406
3087 Edinger Ave., Tustin, CA 92780
(949)651-8814( )
CIWMB#: 30-C-03778

Kragen Auto Parts #1533
502 B E 1st St., Tustin, CA 92780
(714)544-9249( )
CIWMB#: 30-C-04128

Scher Tire Inc #17 dba Goodyear Tire
14511 Redhill Ave., Tustin, CA 92780
(714)832-6011( )
CIWMB#: 30-C-03035

Villa Park

Phil's Villa Park 76
17771 Santiago Blvd., Villa Park, CA 92861
(714)637-0854( )
CIWMB#: 30-C-06579

This information was provided by the County of Orange Integrated Waste Management Department and the California Integrated Waste Management Board (CIWMB).

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities such as pest control can lead to water pollution if you're not careful. Pesticide treatments must be planned and applied properly to ensure that pesticides do not enter the street, gutter or storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never dump pesticides into the ocean, so don't let it enter the storm drains. Pesticides can cause significant damage to our environment if used improperly. If you are thinking of using a pesticide to control a pest, there are some important things to consider.

For more information,
please call
University of California Cooperative
Extension Master Gardeners at
(714) 708-1646
or visit these Web sites:
www.uccemg.org
www.ipm.ucdavis.edu

For instructions on collecting a specimen sample visit the Orange County Agriculture Commissioner's website at:
http://www.ocagcomm.com/ser_lab.asp

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.

Information From:
Cheryl Wilen, Area IPM Advisor; Darren Haver, Watershed Management Advisor; Mary Louise Flint, IPM Education and Publication Director; Pamela M. Geisel, Environmental Horticulture Advisor; Carolyn L. Unruh, University of California Cooperative Extension staff writer. Photos courtesy of the UC Statewide IPM Program and Darren Haver.

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Help Prevent Ocean Pollution:

Responsible Pest Control

Tips for Pest Control

Key Steps to Follow:

Step 1: **Correctly identify the pest (insect, weed, rodent, or disease) and verify that it is actually causing the problem.**

Three life stages of the common lady beetle, a beneficial insect.

This is important because beneficial insects are often mistaken for pests and sprayed with pesticides needlessly.

Consult with a Certified Nursery Professional at a local nursery or garden center or send a sample of the pest to the Orange County Agricultural Commissioner's Office.

Determine if the pest is still present – even though you see damage, the pest may have left.

Step 2: **Determine how many pests are present and causing damage.**

Small pest populations may be controlled more safely using non-pesticide techniques. These include removing food sources, washing off leaves with a strong stream of water, blocking entry into the home using caulking and replacing problem plants with ones less susceptible to pests.

Integrated Pest Management (IPM) usually combines several least toxic pest control methods for long-term prevention and management of pest problems without harming you, your family, or the environment.

UC CE University of California Cooperative Extension

Step 3: **If a pesticide must be used, choose the least toxic chemical.**

Obtain information on the least toxic pesticides that are effective at controlling the target pest from the UC Statewide Integrated Pest Management (IPM) Program's Web site at www.ipm.ucdavis.edu.

Seek out the assistance of a Certified Nursery Professional at a local nursery or garden center when selecting a pesticide. Purchase the smallest amount of pesticide available.

Apply the pesticide to the pest during its most vulnerable life stage. This information can be found on the pesticide label.

Step 4: **Wear appropriate protective clothing.**

Follow pesticide labels regarding specific types of protective equipment you should wear. Protective clothing should always be washed separately from other clothing.

Step 5: **Continuously monitor external conditions when applying pesticides such as weather, irrigation, and the presence of children and animals.**

Never apply pesticides when rain is predicted within the next 48 hours. Also, do not water after applying pesticides unless the directions say it is necessary.

Apply pesticides when the air is still; breezy conditions may cause the spray or dust to drift away from your targeted area.

In case of an emergency call 911 and/or the regional poison control number at (714) 634-5988 or (800) 544-4404 (CA only).

For general questions you may also visit www.calpoison.org.

Step 6: **In the event of accidental spills, sweep up or use an absorbent agent to remove any excess pesticides. Avoid the use of water.**

Be prepared. Have a broom, dust pan, or dry absorbent material, such as cat litter, newspapers or paper towels, ready to assist in cleaning up spills.

Contain and clean up the spill right away. Place contaminated materials in a doubled plastic bag. All materials used to clean up the spill should be properly disposed of according to your local Household Hazardous Waste Disposal site.

Step 7: **Properly store and dispose of unused pesticides.**

Purchase Ready-To-Use (RTU) products to avoid storing large concentrated quantities of pesticides.

Store unused chemicals in a locked cabinet.

Unused pesticide chemicals may be disposed of at a Household Hazardous Waste Collection Center.

Empty pesticide containers should be triple rinsed prior to disposing of them in the trash.

Household Hazardous Waste Collection Center
(714) 834-6752
www.oclandfills.com

PROJECT Pollution PREVENTION

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.

The tips contained in this brochure provide useful information to help prevent water pollution. 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 Residential Pool, Landscape and Hardscape Drains

The Ocean Begins at Your Front Door

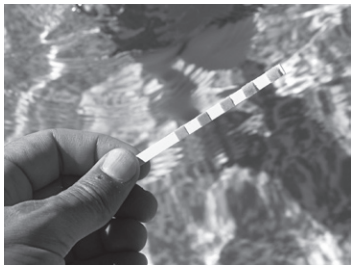
PROJECT Pollution PREVENTION

Tips for Residential Pool, Landscape and Hardscape Drains

Pool Maintenance

All pool water discharged to the curb, gutter or permitted pool drain from your property must meet the following water quality criteria:

- 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.
- There is no discharge of filter media or acid cleaning wastes.



Some cities have ordinances that do not allow pool water to be discharged to the storm drain. Check with your city.

Landscape and Hardscape Drains

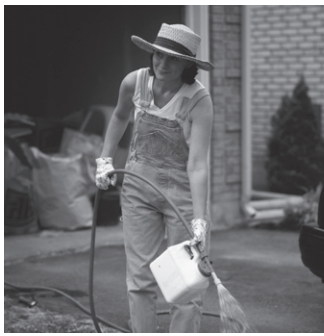
The following recommendations will help reduce or prevent pollutants from your landscape and hardscape drains from entering the street, gutter or storm drain. Unlike water that enters the sewer (from sinks and toilets), water that enters a landscape or hardscape drain is not treated before entering our creeks, rivers, bays and ocean.

Household Activities

- Do not rinse spills of materials or chemicals to any drain.
- Use dry cleanup methods such as applying cat litter or another absorbent material, then sweep it up and dispose of it in the trash. If the material is hazardous, dispose of it at a Household Hazardous Waste Collection Center (HHWCC). For locations, call **(714) 834-6752** or visit **www.oclandfills.com**.
- Do not hose down your driveways, sidewalks or patios to your landscape or hardscape drain. Sweep up debris and dispose of it in the trash.
- Always pick up after your pet. Flush waste down the toilet or dispose of it in the trash.
- Do not store items such as cleaners, batteries, automotive fluids, paint products, TVs, or computer monitors uncovered outdoors. Take them to a HHWCC for disposal.

Yard Maintenance

- Do not overwater. Water by hand or set automated irrigation systems to reflect seasonal water needs.
- Follow directions on pesticides and fertilizers (measure, do not estimate amounts) and do not use if rain is predicted within 48 hours.
- Cultivate your garden often to control weeds and reduce the need to use chemicals.



Vehicle Maintenance

- Never pour oil or antifreeze down your landscape or hardscape drain. Recycle these substances at a service station, a waste collection center or used oil recycling center. For locations, contact the Used Oil Program at **1-800-CLEANUP** or visit **www.CLEANUP.org**.
- Whenever possible, take your vehicle to a commercial car wash.
- If you do wash your vehicle at home, do not allow the washwater to go down your landscape or hardscape drain. Instead, dispose of it in the sanitary sewer (a sink or toilet) or onto an absorbent surface such as your lawn.
- Use a spray nozzle that will shut off the water when not in use.

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. Fertilizers, pesticides and other chemicals that are left on yards or driveways can be blown or washed into storm drains that flow to the ocean. Overwatering lawns can also send materials into storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never pour gardening products into the ocean, so don't let them 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

UCCE Master Gardener Hotline:
(714) 708-1646

To report a spill,
call the
Orange County 24-Hour
Water Pollution Problem
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 landscaping or gardening. 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 Landscape & Gardening

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Tips for Landscape & Gardening

Never allow gardening products or polluted water to enter the street, gutter or storm drain.

General Landscaping Tips

- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.
- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.
- Plant native vegetation to reduce the amount of water, fertilizers, and pesticide applied to the landscape.

- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.

Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro spray systems. 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 green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.

- Use slow-release fertilizers to minimize leaching, and use organic fertilizers.
- Read labels and use only as directed. Do not over-apply pesticides or fertilizers. Apply to spots as needed, rather than blanketing an entire area.
- Store pesticides, fertilizers and other chemicals in a dry covered area to prevent exposure that may result in the deterioration of containers and packaging.

- Rinse empty pesticide containers and re-use rinse water as you would use the product. Do not dump rinse water down storm drains. Dispose of empty containers in the trash.
- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting. For more information, visit **www.ipm.ucdavis.edu**.
- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.
- Take unwanted pesticides to a Household Hazardous Waste Collection Center to be recycled. Locations are provided below.

Household Hazardous Waste Collection Centers

Anaheim:	1071 N. Blue Gum St.
Huntington Beach:	17121 Nichols St.
Irvine:	6411 Oak Canyon
San Juan Capistrano:	32250 La Pata Ave.

For more information, call (714) 834-6752 or visit www.oclandfills.com

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. Pet waste and pet care products can be washed into the 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 put pet waste or pet care products into the ocean, so don't let them 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 Problem Reporting Hotline
1-877-89-SPILL (1-877-897-7455).

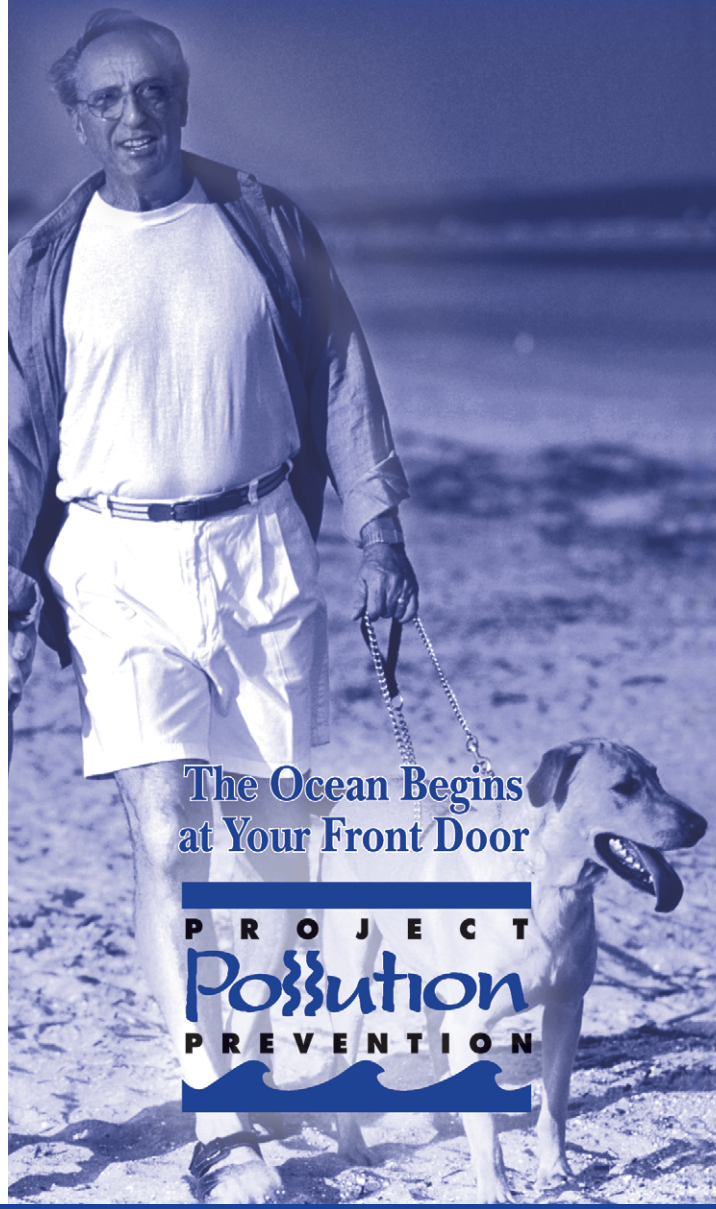
For emergencies, dial 911.

The tips contained in this brochure provide useful information to help prevent water pollution while caring for your pet. 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 Pet Care



Tips for Pet Care

Never let any pet care products or washwater run off your yard and into the street, gutter or storm drain.

Washing Your Pets

Even biodegradable soaps and shampoos can be harmful to marine life and the environment.

- If possible, bathe your pets indoors using less-toxic shampoos or have your pet professionally groomed. Follow instructions on the products and clean up spills.

- If you bathe your pet outside, wash it on your lawn or another absorbent/ permeable surface to keep the washwater from running into the street, gutter or storm drain.

Flea Control

- Consider using oral or topical flea control products.

- If you use flea control products such as shampoos, sprays or collars, make sure to dispose of any unused products at a Household Hazardous Waste Collection Center. For location information, call **(714) 834-6752**.

Why You Should Pick Up After Your Pet

It's the law! Every city has an ordinance requiring you to pick up after your pet. Besides being a nuisance, pet waste can lead to water pollution, even if you live inland. During rainfall, pet waste left outdoors can wash into storm drains. This waste flows directly into our waterways and the ocean where it can harm human health, marine life and the environment.

As it decomposes, pet waste demands a high level of oxygen from water. This decomposition can contribute to killing marine life by reducing the amount of dissolved oxygen available to them.

Have fun with your pets, but please be a responsible pet owner by taking care of them and the environment.

- Take a bag with you on walks to pick up after your pet.

- Dispose of the waste in the trash or in a toilet.

PROJECT Pollution PREVENTION

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

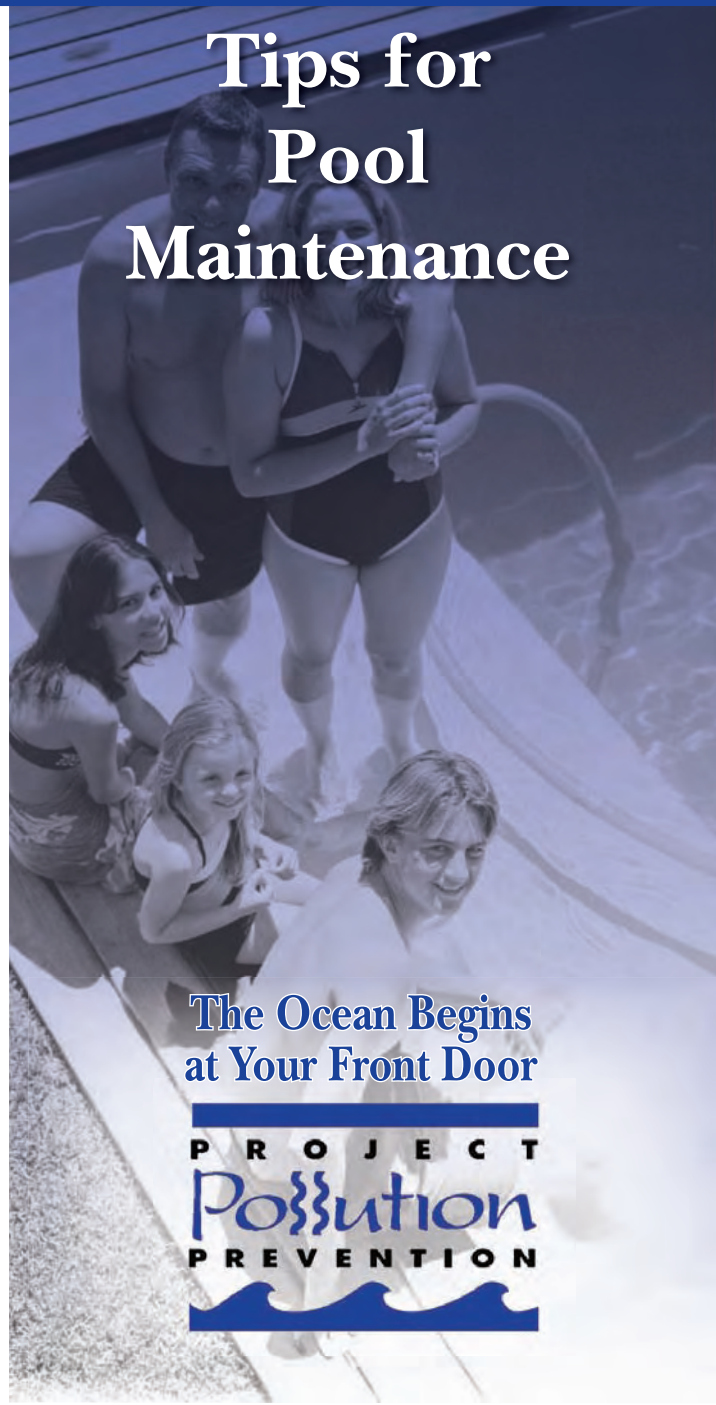
To report a spill,
call the
Orange County 24-Hour
Water Pollution Reporting Hotline
1-877-89-SPILL (1-877-897-7455).

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

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
☐	☐
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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.

R-4
HOME AND GARDEN CARE ACTIVITIES

The activities outlined in this fact sheet target the following pollutants:	
Sediment	x
Nutrients	
Bacteria	x
Foaming Agents	x
Metals	x
Hydrocarbons	x
Hazardous Materials	x
Pesticides and Herbicides	
Other	x

HOME CARE

Many hazardous materials may be used in and around residences during routine maintenance activities (such as: oils, paints, cleaners, bleaches, pesticides, glues, solvents, and other products). Improper or excessive use of these products can increase the potential for pollutants to be transported to the storm drain by runoff. The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

Think before conducting home care activities. Remember - The ocean starts at your front door.

Required Activities

- Clean out painting equipment in an area where the waste can be contained and properly disposed of (latex – sewer, oil based – household hazardous waste center).
- Rinse off cement mixers and cement laden tools in a contained washout area. Dispose of dried concrete waste in household trash.
- If safe, contain, clean up, and properly dispose all household hazardous waste spills. If an unsafe condition exists, call 911 to activate the proper response team.
- Household hazardous materials must be stored indoors or under cover, and in closed and labeled containers. Dispose of them at a household hazardous waste center.
- Household wash waters (e.g. washer machine effluent, mop water, etc.) must be disposed of in the sanitary sewer.
- Pool and spa water may be discharged to the storm drain if residual chlorine is less than 0.1 mg/L, the pH is between 6.5 and 8.5, and the water is free from any unusual coloration. (Call 714-834-6107 to obtain information on a pool drain permit). Pool filter media must be contained and disposed of properly.

Recommended Activities

- Only purchase the types and amounts of materials needed.
- Share unused portions of products with neighbors or community programs (latex paint)

For additional information contact:
County of Orange, OC Watershed
Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL
or visit our website at: www.ocwatersheds.com

GARDEN CARE

Garden activities may contribute pollutants via soil erosion, green waste, fertilizer and pesticide use. Plant and garden care activities such as landscape maintenance, fertilization, and pesticide application have the potential to discharge significant quantities of pollutants to the storm drain system. Nonvegetated surfaces may allow for significant erosion leading to high sediment loads. Other pollutants such as pesticides may adsorb onto the soil particles and be transported off site. Excess fertilizer and pesticide pollutants from over application may be carried to the storm drain by dissolving in irrigation runoff or rainwater. Green wastes may also contain organic matter and may have adsorbed fertilizers and pesticides.

The activities outlined in this fact sheet target the following pollutants:	
Sediment	x
Nutrients	x
Bacteria	x
Foaming Agents	
Metals	
Hydrocarbons	
Hazardous Materials	
Pesticides and Herbicides	x
Other	x

Excessive irrigation is often the most significant factor in home and garden care activities. Pollutants may dissolve in irrigation water and then be transported to the storm drain, or particles and materials coated with fertilizers and pesticides may be suspended in the irrigation flow and carried to the storm drain. The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

Think before conducting garden care activities. Remember - The ocean starts at your front door.

Required Activities

- Irrigation systems must be properly adjusted to reflect seasonal water needs.
- Minimize the use of pesticides and fertilizers. Read the labels and follow directions to avoid improper use. Do not apply chemicals if it is windy or about to rain.
- Properly clean up and dispose of spills of gardening chemicals, fertilizes, or soils. If possible, return the spilled material to the container for future use.
- Lawn and garden care products must be stored in closed labeled containers, in covered areas, or off-ground and under protective tarps.
- Household hazardous waste must be properly disposed at a household hazardous waste center.
- Cover nonvegetated surfaces to prevent erosion.

Recommended Activities

- Utilize xeroscaping and use of drought and insect resistant landscaping.
- Cultivate garden often to control weeds
- Use integrated pest management (IPM). Planting pest repelling plants (e.g. Marigolds) or using pest eating insects (e.g. ladybugs) may reduce the need for pesticides.
- Do not leave food (human or pet) outside overnight
- Remove fruit and garden waste

For additional information contact:
County of Orange, OC Watershed
Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL
or visit our website at: www.ocwatersheds.com

R-5
DISPOSAL OF PET WASTES

Pet wastes left in the environment may introduce solids, bacteria, and nutrients to the storm drain. The type and quantity of waste will dictate the proper disposal method. Small quantities of waste are best disposed with regular trash or flushed down a toilet. Large quantities of wastes from herbivore animals may be composted for subsequent use or disposal to landfill.

The activities outlined in this fact sheet target the following pollutants:	
Sediment	x
Nutrients	x
Bacteria	x
Foaming Agents	
Metals	
Hydrocarbons	
Hazardous Materials	
Pesticides and Herbicides	
Other	

Pick up after your pet! It's as easy as 1-2-3. 1) Bring a bag. 2) Clean it up. 3) Dispose of it properly (toilet or trash). The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

Think before you dispose of any pet wastes. Remember - The ocean starts at your front door.

Required Activities

- All pet wastes must be picked up and properly disposed of. Pet waste should be disposed of in the regular trash, flushed down a toilet, or composted as type and quantities dictate.
- Properly dispose of unused flea control products (shampoo, sprays, or collars).
- Manure produced by livestock in uncovered areas should be removed at least daily for composting, or storage in water-tight container prior to disposal. Never hose down to stream or storm drain. Composting or storage areas should be configured and maintained so as not to allow contact with runoff. Compost may be donated to greenhouses, nurseries, and botanical parks. Topsoil companies and composting centers may also accept composted manure.
- Line waste pits or trenches with an impermeable layer, such as thick plastic sheeting.
- When possible, allow wash water to infiltrate into the ground, or collect in an area that is routed to the sanitary sewer.
- Confine livestock in fenced in areas except during exercise and grazing times. Restrict animal access to creeks and streams, preferably by fencing.

For additional information contact:
County of Orange, OC Watershed
Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL
or visit our website at: www.ocwatersheds.com

- Install gutters that will divert roof runoff away from livestock areas.

Recommended Activities

- In order to properly dispose of pet waste, carry bags, pooper-scooper, or equivalent to safely pick up pet wastes while walking with pets.

- Bathe pets indoors and use less toxic shampoos. When possible, have pets professionally groomed.

- Properly inoculate your pet in order to maintain their health and reduce the possibility of pathogens in pet wastes.

- Maintain healthy and vigorous pastures with at least three inches of leafy material.

- Consider indoor feeding of livestock during heavy rainfall, to minimize manure exposed to potential runoff.

- Locate barns, corrals, and other high use areas on portions of property that either drain away from or are located distant form nearby creeks or storm drains.

For additional information contact:
County of Orange, OC Watershed
Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL
or visit our website at: www.ocwatersheds.com

R-6
DISPOSAL OF GREEN WASTES

The activities outlined in this fact sheet target the following pollutants:	
Sediment	x
Nutrients	x
Bacteria	x
Foaming Agents	
Metals	
Hydrocarbons	
Hazardous Materials	x
Pesticides and Herbicides	x
Other	

Green wastes entering the storm drain may clog the system creating flooding problems. Green wastes washed into receiving waters create an oxygen demand as they are decomposed, reducing the available oxygen for aquatic life. Pesticide and nutrient residues may be carried to the receiving water with the green wastes. The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

Think before disposing of any green wastes – Remember - The ocean starts at your front door.

Required Activities

- Green wastes can not be disposed of in the street, gutter, public right-of-way, storm drain, or receiving water. Dispose of green wastes as a part of the household trash. If the quantities are too large, arrange a pick up with the local waste hauler.

- After conducting yard or garden activities sweep the area and properly dispose of the clippings and waste. Do not sweep or blow out into the street or gutter.

Recommended Activities

- Utilize a commercial landscape company to conduct the landscape activities and waste disposal.

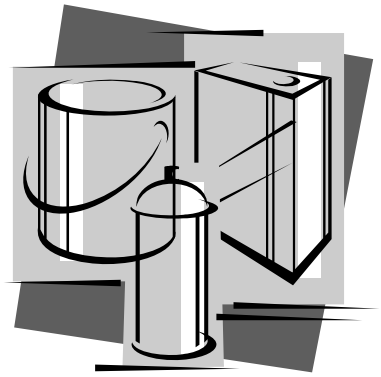
- Utilize native plants and drought tolerant species to reduce the water use and green waste produced.

- Use a lawn mower that has a mulcher so that the grass clippings remain on the lawn and do not have to be collected and disposed of.

- Compost materials in a designated area within the yard.

- Recycle lawn clippings and greenery waste through local programs if available.

For additional information contact:
County of Orange, OC Watershed
Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL
or visit our website at: www.ocwatersheds.com



R-7
HOUSEHOLD HAZARDOUS WASTE

Household hazardous wastes (HHW) are defined as waste materials which are typically found in homes or similar sources, which exhibit characteristics such as: corrosivity, ignitability, reactivity, and/or toxicity, or are listed as hazardous materials by EPA.

The activities outlined in this fact sheet target the following pollutants:	
Sediment	
Nutrients	
Bacteria	
Foaming Agents	x
Metals	x
Hydrocarbons	x
Hazardous Materials	x
Pesticides and Herbicides	x
Other	x

List of most common HHW products:

Drain openers
Oven cleaners
Wood and metal cleaners and polishes
Automotive oil and fuel additives
Grease and rust solvents
Carburetor and fuel injection cleaners
Starter fluids
Batteries
Paint Thinners
Paint strippers and removers
Adhesives
Herbicides
Pesticides
Fungicides/wood preservatives

Many types of waste can be recycled, however options for each waste type are limited. Recycling is always preferable to disposal of unwanted materials. All gasoline, antifreeze, waste oil, and lead-acid batteries can be recycled. Latex and oil-based paint can be reused, as well as recycled. Materials that cannot be reused or recycled should be disposed of at a properly permitted landfill.

Think before disposing of any household hazardous waste. Remember - The ocean starts at your front door.

RECYCLE USED OIL

Required Activities

- Dispose of HHW at a local collection facility. Call (714) 834-6752 for the household hazardous waste center closest to your area.
- Household hazardous materials must be stored indoors or under cover, and in closed and labeled containers.
- If safe, contain, clean up, and properly dispose all household hazardous waste spills. If an unsafe condition exists, call 911 to activate the proper response team.

Recommended Activities

- Use non-hazardous or less-hazardous products.
- Participate in HHW reuse and recycling. Call (714) 834-6752 for the participating household hazardous waste centers.

The California Integrated Waste Management Board has a Recycling Hotline (800) 553-2962, that provides information and recycling locations for used oil.

For additional information contact:
County of Orange, OC Watershed
Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL
or visit our website at: www.ocwatersheds.com

R-8
WATER CONSERVATION

The activities outlined in this fact sheet target the following pollutants:	
Sediment	x
Nutrients	x
Bacteria	x
Foaming Agents	x
Metals	x
Hydrocarbons	x
Hazardous Materials	x
Pesticides and Herbicides	x
Other	x

Excessive irrigation and/or the overuse of water is often the most significant factor in transporting pollutants to the storm drain system. Pollutants from a wide variety of sources including automobile repair and maintenance, automobile washing, automobile parking, home and garden care activities and pet care may dissolve in the water and be transported to the storm drain. In addition, particles and materials coated with fertilizers and pesticides may be suspended in the flow and be transported to the storm drain.

Hosing off outside areas to wash them down not only consumes large quantities of water, but also transports any pollutants, sediments, and waste to the storm drain system. The pollution prevention activities outlined in this fact sheets are used to prevent the discharge of pollutants to the storm drain system.

Think before using water. Remember - The ocean starts at your front door.

Required Activities

- Irrigation systems must be properly adjusted to reflect seasonal water needs.
- Do not hose off outside surfaces to clean, sweep with a broom instead.

Recommended Activities

- Fix any leaking faucets and eliminate unnecessary water sources.
- Use xeroscaping and drought tolerant landscaping to reduce the watering needs.
- Do not over watering lawns or gardens. Over watering wastes water and promotes diseases.
- Use a bucket to re-soak sponges/rags while washing automobiles and other items outdoors. Use hose only for rinsing.
- Wash automobiles at a commercial car wash employing water recycling.

For additional information contact:
County of Orange, OC Watershed
Main: (714) 955-0600/ 24hr Water Pollution Discharge Hotline 1-877-89-SPILL
or visit our website at: www.ocwatersheds.com

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.

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- 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

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– 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

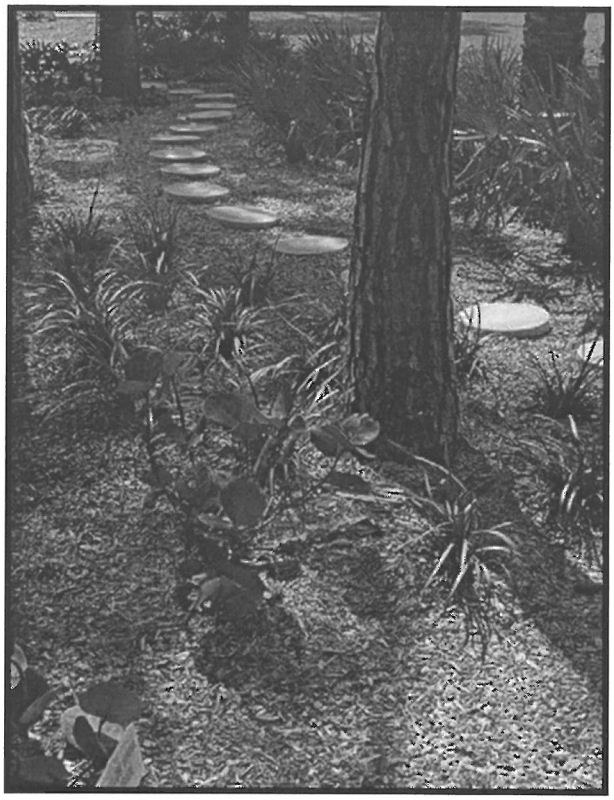
A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

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.

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.

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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.

APPENDIX D

BMP MAINTENANCE SUPPLEMENT / O&M PLAN

OPERATIONS AND MAINTENANCE (O&M) PLAN

Water Quality Management Plan

For

Newport Center Condominiums

150 Newport Center Drive, Newport Beach, CA 92660

APN 442-231-12

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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	**N1. Education for Property Owners, Tenants and Occupants** Educational materials will be provided to tenants, including brochures and restrictions to reduce pollutants from reaching the storm drain system. Examples include tips for pet care, household tips, and proper household hazardous waste disposal. Tenants will be provided with these materials by the property management prior to occupancy, and periodically thereafter. Refer to Section VII for a list of materials available and attached to this WQMP. Additional materials are available through the County of Orange Storm water Program website (http://ocwatersheds.com/PublicEd/) and the California Storm water Quality Association's (CASQA) BMP Handbooks (http://www.cabmphandbooks.com/).	Educational materials will be provided to tenants annually. Materials to be distributed are found in Appendix C. Tenants will be provided these materials by the Owner prior to occupancy and periodically thereafter. Frequency: Annually	Newport Center Anacapa Associates, LLC, Calmwater Capital 3, LLC / HOA

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**
	N2. Activity Restrictions The HOA 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.	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 Anacapa Associates, LLC, Calmwater Capital 3, LLC / HOA

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**
	N3. Common Area Landscape Management Management programs will be designed and implemented by the HOA 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.	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 Anacapa Associates, LLC, Calmwater Capital 3, LLC / HOA
	N4. BMP Maintenance The HOA 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.	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. Frequency: Ongoing	Newport Center Anacapa Associates, LLC, Calmwater Capital 3, LLC / HOA

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**
No	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	
	N9. Hazardous Materials Disclosure Compliance	Not Applicable	
	N10. Uniform Fire Code Implementation	Not Applicable	
	N11. Common Area Litter Control The HOA 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.	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 Anacapa Associates, LLC, Calmwater Capital 3, LLC / HOA

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**
	N12. Employee Training All employees of the HOA 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.	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. Frequency: Annually	Newport Center Anacapa Associates, LLC, Calmwater Capital 3, LLC / HOA
	N13. Housekeeping of Loading Docks	Not Applicable	
	N14. Common Area Catch Basin Inspection All on-site catch basin inlets and drainage facilities shall be inspected and maintained by the HOA at least once a year, prior to the rainy season, no later than October 1st of each year.	Catch basin inlets and other drainage facilities shall be inspected after each storm event and once per year. Inlets and other facilities shall be cleaned prior to the rainy season, by October 1 each year. Frequency: Annually	Newport Center Anacapa Associates, LLC, Calmwater Capital 3, LLC / HOA
	N15. Street Sweeping Private Streets and Parking Lots The HOA shall be responsible for sweeping all on-site drive aisles and parking areas within the project on a quarterly basis.	Drive aisles & parking areas must be swept at least quarterly (every 3 months), including prior to the start of the rainy season (October 1). Frequency: Quarterly	Newport Center Anacapa Associates, LLC, Calmwater Capital 3, LLC / HOA
	N16. Retail Gasoline Outlets	Not Applicable	
STRUCTURAL SOURCE CONTROL BMPs			

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**
	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. Stencils shall be inspected for legibility on an annual basis and re-stenciled as necessary.	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. Frequency: Annually	Newport Center Anacapa Associates, LLC, Calmwater Capital 3, LLC / HOA
	S2. Design and construct outdoor material storage areas to reduce pollution introduction	Not Applicable	
	S3. Design and construct trash and waste storage areas to reduce pollution introduction	Not Applicable	

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**
	S4. Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control The HOA 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 HOA 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.	In conjunction with routine maintenance activities, verify that landscape design continues to function properly by adjusting properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather, and day or night time 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 Anacapa Associates, LLC, Calmwater Capital 3, LLC / HOA
	S5. Protect slopes and channels and provide energy dissipation	Not Applicable	
	S6. Dock areas	Not Applicable	
	S7. Maintenance bays	Not Applicable	
	S8. Vehicle wash areas	Not Applicable	
	S9. Outdoor processing areas	Not Applicable	

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
	S10. Equipment wash areas	Not Applicable	
	S11. Fueling areas	Not Applicable	
	S12. Hillside landscaping	Not Applicable	
	S13. Wash water control for food preparation areas	Not Applicable	
	S14. Community car wash racks	Not Applicable	

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		
Biotreatment BMP # 1: Proprietary Biotreatment: Modular Wetlands 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.	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 replacement of the BioMediaGREEN™ drain down filter (if equipped). In addition, plants within the wetland chamber will require trimming as needed in conjunction with routine landscape maintenance activities. No fertilizer shall be used in this chamber. 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. If prior treatment stages are properly maintained, the life of the wetland media can be up to 20 years. Frequency: 2x per year	Newport Center Anacapa Associates, LLC, Calmwater Capital 3, LLC / HOA

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: _____

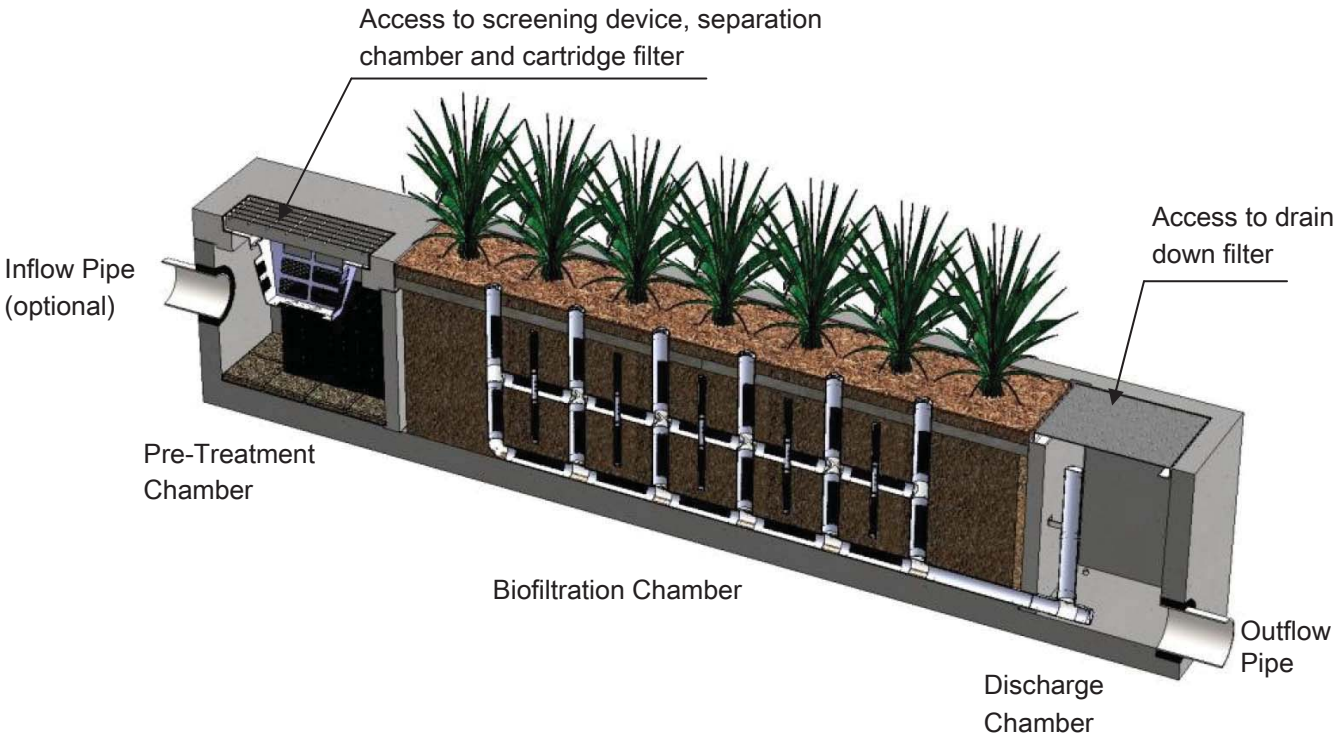
BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

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.

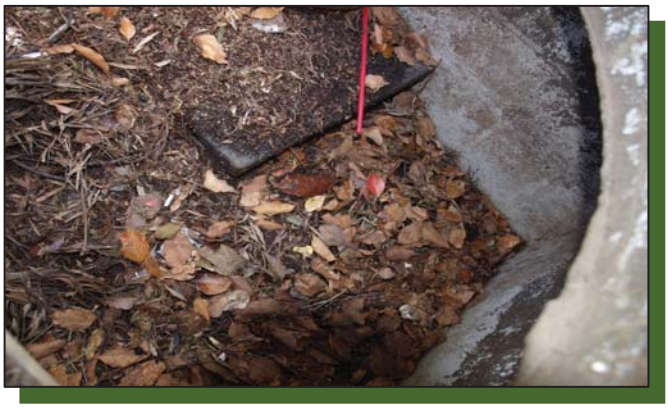
Maintenance Procedure Illustration

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

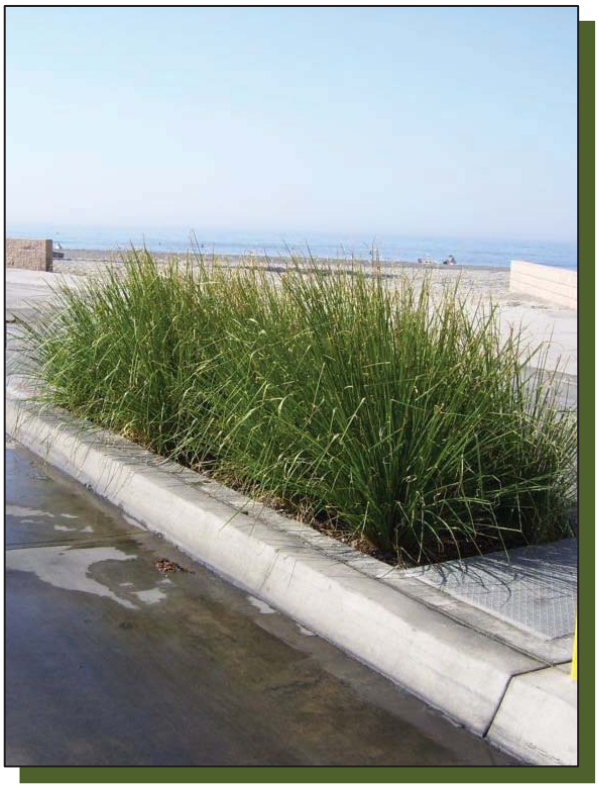
The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.

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

APPENDIX E

CONDITIONS OF APPROVAL

PLACEHOLDER – PENDING ISSUANCE

APPENDIX F

GEOTECHNICAL INFORMATION

NMG Geotechnical, Inc.

February 3, 2015

Project No. 14117-01

To: Newport Center Anacapa Associates, LLC
c/o Ridgeway Development Company
2804 Lafayette Avenue
Newport Beach, California 92663

Attention: Mr. Ron Soderling

Subject: Feasibility Report for Proposed Newport Center Condominium Site Development, 150 Newport Center Drive, City of Newport Beach, California

In accordance with your authorization, NMG Geotechnical, Inc. (NMG) has performed a feasibility study for the proposed condominium development at 150 Newport Center, in the City of Newport Beach, California. The primary purpose of our study was to provide a summary of the geologic and geotechnical conditions of the site to identify potential geotechnical issues that might impact the proposed re-development.

The project site is approximately 1.25 acres and is currently an active car wash with surrounding asphalt parking lot. The site is located at the southwest corner of Newport Center Drive and Anacapa Drive (Figure 1). We understand the proposed development will be a condominium complex consisting of three subterranean parking levels with seven-story residential building above the parking structure. We have reviewed a conceptual design package showing the current design scheme, prepared by MVE Partners and received by NMG on January 26, 2015. A recently flown and scribed topographic map was also provided by Fuscoe Engineering. A grading plan has not yet been prepared at this time.

The main geotechnical issues for the proposed subterranean development include:

1) The presence of varying earth units across the site; fill of varying composition, sandy marine terrace deposits, and potentially diatomaceous siltstone and sandstone bedrock.

2) The potential for presence of perched groundwater along the terrace/bedrock contact. This condition has been encountered at sites within the Fashion Island/Newport Center area (but was not reported during prior investigations in the adjacent properties, by NMG and others, as deep as 45.5 feet below ground surface).

3) The potential for presence of saturated soils at the fill/terrace contact. This was encountered across the street during the grading operations for the new restaurants.

4) The potential for presence of weathered/low density bedrock at the terrace/bedrock contact.

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

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.

Anthony Zepeda, GIT 458
Senior Staff Geologist

Terri Wright, CEG 1342
Principal Geologist

Shahrooz "Bob" Karimi, RCE 54250
Principal Engineer

AZ/TW/SBK/je

Distribution: (2) Addressee
(3) Mr. Pat Fuscoe, Fuscoe Engineering (includes copies for agency submittal)

TABLE OF CONTENTS

Appendices

List of Attachments

1.0 INTRODUCTION

1.1 Purpose and Scope of Work

In accordance with your request, NMG Geotechnical, Inc. (NMG) has prepared this feasibility report for the Newport Center Condominium Development, in the City of Newport Beach, California. The primary purpose of our study was to provide a summary of the geologic and geotechnical conditions of the site to identify potential geotechnical issues that might impact the proposed re-development. We have reviewed the conceptual design package prepared by MVE Partners, received by NMG on January 26, 2015. Fuscoe Engineering has also prepared a topographic map of the site portraying the current site conditions that was used as the base map for the Boring/Trench Location Map (Figure 2).

Our scope of work was as follows:

- Acquisition, review and analysis of available geotechnical reports and maps for the subject site and surrounding area. This included a search through the city of Newport Beach archives for the prior geotechnical work performed at and surrounding the site. A list of references is included in Appendix A.
- Review of historic aerial photographs dating back to the late 1930's. A list of the photographs reviewed is included in Appendix A.
- Compilation of laboratory test results by NMG and others from previous geotechnical investigations (Appendix C). Laboratory testing includes in-situ moisture and density, grain-size analysis, consolidation, shear strength, Atterberg limits, maximum density and optimum moisture content, and expansion index.
- Evaluation of faulting and seismicity in accordance with the 2013 California Building Code (CBC).
- Geotechnical review of the compiled data including the geologic and soil conditions. Preliminary engineering evaluation included settlement and liquefaction potential, and remedial grading, preliminary foundation and grading considerations.
- Preparation of illustrations including: a Site and Seismic Hazard Location Map (Figure 1), a Geotechnical Map on Existing Topographic Map (Figure 2), Historic Topographic Map (Figure 3) and a Boring Location Map (Figure 4) which provides a compilation of the boring and trench locations that were excavated at the site and on adjacent sites, from previous geotechnical studies by NMG and others.
- Preparation of this report with our findings, conclusions, and preliminary considerations and recommendations for the proposed condominium site.

1.2 Site Location and Description

The project site is approximately 1-1/4 acres in size and is bordered to the north by Newport Center Drive, to the east by Anacapa Drive, and to the south and west by existing office buildings and asphalt parking lots (Figure 1). The site is essentially flat, gently sloping toward the southwest. Elevations vary from a low of 158.5 feet above mean sea level (msl) in the south-southwest corner to a high elevation of 170.3 feet above msl in the northeast corner. Slopes and

retaining walls are located along the northern and eastern perimeter of the site, ascending up to Newport Center Drive and Anacapa Drive, varying in height from 2 to 8 feet. Drainage at the site sheet flows towards the south-southwest. Currently, there is an active car wash/service building in the center of the property, with asphalt paved parking lots surrounding the building.

1.3 Site History and Prior Investigations

Based on review of historic aerial photographs dating back to the late 1930s, the prior use for the subject site was for agricultural (ranching) activities through the mid-1960's when The Irvine Company graded and developed the surrounding Fashion Island/Newport Center area. By 1972, the subject site was in its current state, Fashion Island was built, and the majority of the adjacent streets were constructed or being graded. The adjacent office buildings to the west, and theatre to the east, within the 100 and 300 blocks of Newport Center Drive, were being constructed between 1972 and 1975. By 1992, the subject site and adjacent buildings are essentially in their current state.

The aerial photos suggest the site was originally graded in the mid-1960s with the Fashion Island grading; however, we have not been able to find a report for this grading. Subsequently, in the early 1970s the subject site was re-graded to the existing conditions and the car wash was constructed. The latter grading was relatively minor to create a level pad; we have not been able to find a copy of this report either.

Historically the subject site was a generally flat area located on a marine terrace/old wave-cut platform with elevations ranging from 140 feet above msl along the southwestern portion to an elevation of 160 feet above msl along the northeastern portion (Figure 3). A stream-cut draw trending northeast lies to the west of the subject site and can be seen in early United States Geological Survey (USGS) Topographic maps (USGS, 1949, 1950 and 1951) and on aerial photographs from 1939. This canyon was in-filled with artificial fill during early grading activities and was documented during prior investigations (W.A. Wahler, 1970 and G.A. Nicoll, 1972). Documentation of the early grading mentioned in these reports was not found during our search through the city of Newport Beach files.

Prior geotechnical investigations were performed by W.A. Wahler & Associates (1970) at the subject site prior to development of the car wash (Figures 2 and 4). This investigation included excavation of 5 exploratory test pits (trenches) across the subject site and collection of bulk and in-situ soil samples. Test pits were excavated up to 14 feet deep and encountered fill material and native soil. Fill material generally ranged in thickness from 9 to 14+ feet. In the western portion of the property the fill extended below a depth of 14 feet, native soil was not encountered.

Numerous geotechnical investigations have been performed by NMG and others within the vicinity of the subject site (Figure 4). NMG performed a geotechnical exploration for two restaurant pads north of the subject site, on the north side of Newport Center Drive (NMG, 2012a and 2012b). The exploration included excavation of five hollow-stem auger borings and laboratory testing to determine the engineering characteristics of the on-site soils. In 1972, G.A. Nicoll performed a geotechnical investigation for the adjacent six office buildings, southwest of

the subject site, which included excavation of 17 bucket-auger borings and laboratory testing. Moore & Taber performed a geotechnical investigation in 1975 for the bank building to the west, which included excavation of three bucket auger borings. Two geotechnical investigations were performed for expansion of the existing Edwards Theatre to the east of the site by Soils International (1988) and R.T. Frankian (1994) which included excavation of two and three hollow-stem auger borings, respectively.

The data from the prior investigations by NMG and others were reviewed for our study. Boring and trench logs are included in Appendix B and laboratory testing data are included in Appendix C.

1.4 Proposed Development

The proposed condominium development will consist of a large, three-story subterranean parking garage with an overlying seven-story residential condominium buildings above the parking garage. We understand there is a planned pool area on the seventh level of the planned building.

The lowest garage level will be at an elevation of 136 feet above mean sea level (msl) and nearly spans the footprint of the proposed condominium structure. This level is anticipated to overlie native soils and require excavations, up to 31 feet deep. The other garage levels and the residential building overlie this garage level. Entrance to the parking garage will be from the south of the building to the upper garage level.

2.0 GEOTECHNICAL FINDINGS

2.1 Geologic Setting

The site is located on the Newport Mesa, approximately ¾-mile 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 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. The subject site is located on the second elevated terrace deposit, mapped as Qtm2 by the State (Tan, 1976).

2.2 Earth Units

Our evaluation of the onsite data indicates that the site is underlain by marine terrace deposits and bedrock of the Monterey Formation. Existing artificial fill overlies these native deposits and was found to be 9 to 14+ feet thick at the subject site. These units are described below, in the order of youngest to oldest.

Artificial Fill (Af): Based on review of the prior geotechnical report at the site (W.A. Wahler, 1970), there is between 9 to 14+ feet of existing artificial fill across the site. The bottom of the existing fill was not encountered in their test pits excavated in the western portion of the site. The fill materials were found to consist of brown to dark brown and reddish brown sand, silty sand, and clayey sand that was generally damp to moist and medium dense. Gray to dark gray clay and sandy clays were also encountered and were found to be damp to moist and stiff to very stiff. Undisturbed samples of the artificial fill were collected during the investigation. In-situ dry densities for sandy fill material ranged from 108.8 pounds-per-cubic-foot (pcf) to 127.8 pcf with moisture contents ranging from 6.9 to 16.0 percent. In-situ dry densities for clayey fill material ranged from 86.3 pcf to 134.3 pcf with moisture contents ranging from 13.2 to 30.4 percent.

It appears little to no remedial removals were performed during the original grading at the subject site. The materials below the fill, at the top of the native marine terrace deposits, were described by W.A. Wahler as dark brown silty sand with undisturbed grass. It is anticipated that the existing fill and the terrace materials will be removed under the proposed building with the subterranean excavation.

Marine Terrace Deposit (Qtm): Quaternary-age marine terrace deposits underlie the existing artificial fill and overlie the Monterey Formation bedrock. These deposits consist primarily of yellowish brown, dark brown, reddish brown and grayish brown clean fine to medium sands with

local zones of silty and/or clayey fine to medium sands. The terrace deposits were encountered in two of the five test pits excavated by W.A. Wahler. The terrace material was found to be damp and medium dense. The basal portions of these deposits often contain rounded cobbles, fragments of the underlying bedrock, and sometimes shells. It is not known whether the terrace deposits underlie the fill in the southern portion of the site.

Monterey Formation (Tm): Bedrock of the Miocene-age Monterey Formation underlies the marine terrace deposits and generally consists of olive gray interbedded fine sandstone, siltstone and claystone. Bedding thickness varies from thin to laminated with localized thin beds of cemented siltstone (or shale, up to ½ inch thick). The bedrock underlying the wave cut bench near the contact is typically found to be highly weathered. Bedrock was not encountered during the geotechnical investigations at the subject site by W.A. Wahler. The marine terrace/bedrock contact at the site is estimated to be at elevations of 145 to 155 feet above msl, based on boring data by NMG (2012a and 2012b) and G.A. Nicoll (1972). Some of the siltstone within the Monterey Formation has been found to be diatomaceous and was encountered during a geotechnical exploration for the nearby Edwards Cinema to the east of the subject site (Soils International, 1988). The diatomaceous bedrock was generally medium stiff to very stiff, with low dry densities (67 to 87 pcf) and high moisture content (27 to 36 percent). The bedrock encountered to the north by NMG consisted of interbedded light gray to yellow brown sandstone and olive gray siltstone. The dry densities varied from 91.5 to 112 pcf and the moisture contents varied from 7.5 to 24.8 percent.

2.3 Geotechnical Conditions

The following includes a summary of the subsurface geotechnical conditions based on the laboratory test results performed on in-situ and bulk samples from previous investigations (Appendix C). The majority of these tests are from offsite investigations, but the results are summarized below.

Prior laboratory testing by W.A. Whaler for the onsite fill included:

- Field resistivity tests, indicating the corrosivity of the soils to metals, found the fill to have resistivity of 1435 ohm-cm (severe) to 2200 ohm-cm (moderate);
- pH was tested to be 6.8 (slightly acidic);
- Dry densities of 86.3 to 127.8 pcf and moisture contents of 6.9 to 30.4 percent;
- USCS classification of mostly SP, SW, SM, with some SW, SC, CL and CH; and
- Shear strength test indicating an angle of internal friction of 35 degrees and cohesion of 0.75 ksf.

Test results by NMG (2012a and 2012b) north of Newport Center Drive, included very low to low expansion potential in the fill with negligible sulfate potential. USCS classifications were mostly SM and SP, with some SC. The angle of internal friction of the fill varied from 29 to 31 degrees with 0 to 350 psf cohesion. Maximum densities ranged from 125 to 128.5 psf with optimum moistures ranging from 8.5 to 9.5 percent. The upper weathered portion of the terrace deposit was generally found to be more compressible than the fill.

As previously discussed, the composition of the bedrock underlying the site could vary between sandstone, siltstone, and diatomaceous siltstone. Since we believe the building will be founded in bedrock, our proposed investigation is intended to drill to deeper depths to determine the conditions of the bedrock underlying the site.

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 (Hart and Bryant, 2007) and no evidence of active faulting was found during our background study or during our prior work at Fashion Island. Also, based on mapping by the State (Jennings, 2010), there are no active faults mapped at the site.

Using the USGS Deaggregation computer program (USGS, 2013a) and the site coordinates of 33.612 degrees north latitude and -117.875 degrees west longitude, the closest major active faults to the site are the Newport-Inglewood Fault located 2.5 miles (4.1 km) to the south of the site and the San Joaquin Hills Thrust Fault located 3.4 miles (5.4 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 6.97, which would be generated from the San Joaquin Hills Thrust Fault.

Secondary Seismic Hazards: The site is not located in an area classified by the State as having soils that are potentially liquefiable or in a area mapped as susceptible to seismically induced landslides, based on the Seismic Hazard Maps (CDMG, 1998a and 1998b, Figure 1).

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 140 feet above mean sea level (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

The groundwater table and/or seepage were not encountered during the previous investigation by W.A. Wahler or during the investigations for the adjacent office buildings to a depth of 45 feet below ground surface. These studies were done in the 1970s prior to development at the site.

NMG also did not encounter groundwater in borings drilled to the north of the site to depths of up to 41 feet in 2012.

Perched groundwater seepage and wet soils have been found along the terrace-bedrock contact at many sites in and around Newport Center. Only wet conditions were found near this contact in the borings by NMG in 2012. The perched groundwater and/or wet soils are interpreted to be the result of infiltration and return-flow of irrigation water and rainwater into up-gradient sandy terrace deposits which becomes perched on the relatively less permeable bedrock. The water then travels laterally down gradient along the contact and down through fractures in the bedrock and through the sandstone beds, where present.

During grading to the north of the site, wet soils were encountered along the fill-terrace contact during grading observed by NMG. This material required utilization of excavators. Perched groundwater has also been found to extend into the weathered/fractured bedrock below the contact at nearby sites.

2.6 Settlement and Foundation Considerations

The site is underlain by three earth units including 1) marine terrace deposits which are primarily sandy, 2) sandstone and siltstone of the Monterey formation at depth, and 3) compacted fill near surface. Based on our preliminary background investigation, the lowest garage floor, Level 3, will be founded on bedrock. Garage Levels 1 and 2 will be entirely overlying Level 3.

The amount of settlement expected will depend upon the type of foundation(s) selected. Our preliminary settlement analyses for this study indicate the total consolidation (static) settlement may be on the order of 1½ -inches for column loads of up to 1,000 kips and allowable bearing capacity of 4,000 psf. The differential settlement is expected to be on the order of ¾ -inch over a 30-foot span

2.7 Temporary Slope Stability

Temporary cut slopes for this project will expose varying earth materials and potential seepage. The excavation for construction of building and perimeter retaining walls will be up to 31 feet high. These excavations will be close to the property line along the south and west sides and 15 feet from the adjacent road right-of-ways along the north and east sides of the building.

These temporary slopes for the garage will expose up to 20 feet of bedrock, with an estimated 2 to 8 feet of terrace deposits and up to 14+ feet of artificial fill. There may be local seepage and wet sands within the fill/terrace and terrace/bedrock contacts. Locally, these slopes could slough or potentially slump along the contact. The bedding orientation in the bedrock is not known at this time. As a result, we are recommending at least two bucket auger borings at the site that will extend to at least 20 feet below the proposed subgrade. These borings will be downhole logged to determine the geologic structure in the bedrock.

The onsite fill and terrace sands have a high potential for erosion (during rainy periods or uncontrolled runoff). These deposits are considered subject to gross instability in vertical excavations. Therefore, temporary shoring with lagging will need to be designed for the site. NMG will provide shoring design recommendations after the future onsite investigation. It will also be important that the excavations be mapped by an engineering geologist during excavation.

3.0 CONCLUSION AND PRELIMINARY RECOMMENDATIONS

3.1 General Conclusion and Recommendation

Based on our preliminary due diligence study, the site is geotechnically suitable for the proposed development. The most significant geotechnical constraint at the site is the presence of varying earth units and potential for perched groundwater. Geologic hazards related to regional earthquake potential (seismic shaking) are not any greater than at other comparable sites in the vicinity. The site is not located in a seismic hazard zone for potential liquefaction or seismically induced landslides.

We recommend that a site specific geotechnical investigation be performed at the site to better assess the site conditions and provide recommendations for design, grading and construction. The proposed investigation will include drilling, sampling and downhole logging of two bucket auger borings, and drilling, sampling and logging of three hollow stem borings. In addition to the following recommendations, General Earthwork and Grading Specifications are provided in Appendix E.

3.2 Grading Recommendations

Prior to grading, the site should be cleared of heavy vegetation and deleterious materials (including asphalt pavement, concrete and existing utility pipelines to be removed) and disposed of offsite. The proposed excavation to construct the subterranean parking structure is anticipated to remove weathered fill and near-surface soils in the vicinity of the building. The bottom level of parking is planned to cover the majority of the site, so there would be little removals around the building; the extended flatwork on grade around the building is anticipated to be placed on compacted backfill materials.

There are varying soil types anticipated to be exposed in the building excavation. The subgrade for Level 3 is anticipated to expose bedrock. The composition of the bedrock may have differing expansion potential. If such condition is observed during the site investigation and/or grading operations, the subgrade soils may need to be overexcavated to a depth of 3 to 5 feet below subgrade and replaced with uniform, low expansion potential soils (i.e., the sandy fill and sandy terrace deposits). Onsite soil materials with the exception of highly expansive clays are considered suitable as fill materials below the building slabs and footings. The soils should be mixed to provide a uniform blend of material; sands and clays. Placement of soils with dissimilar expansion potential should be avoided.

The overexcavation bottom (if any) should be scarified a minimum of 6 inches, moisture-conditioned as needed, and compacted in place prior to placement of fill materials. Fill materials should be placed in maximum 8-inch-thick lifts, moisture-conditioned, and compacted to a minimum of 90 percent relative compaction in accordance with ASTM Test Method D1557.

3.3 Temporary Excavations

As previously discussed, the excavations around the building will vary in depth up to 31 feet along the majority of the site perimeter. If overexcavation of the subgrade soils is needed, the heights of these temporary excavations will be greater. These slopes will expose varying earth units and possibly adverse bedding and/or groundwater seepage. There are also utility trenches around the building that might have differing soil types used as backfill, including bedding and shading sands. These materials, when exposed, are considered Type C soils per Cal/OSHA regulations and should be excavated at 1.5H:1V or flatter, with no vertical excavation. Due to the depth of the excavation, it is anticipated that temporary shoring with lagging will be needed. In addition, due to the height of the shoring, it is likely that tie backs may be recommended by the shoring designer. Permission would be needed from the adjacent property owners to use these temporary tie-backs. Alternatively, shoring could be designed with rackers and braces; as cantilever shoring with deeper caissons; or other methods.

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

3.4 Building Foundations

The type of building foundations for the site will depend on the anticipated column loads for the structure and the potential compressibility of the supporting soil/bedrock materials. For preliminary design of shallow foundations, a net allowable bearing capacity of 1,800 psf may be assumed for a 12-inch-wide footing embedded 12 inches below the lowest adjacent grade. The allowable bearing pressure may be increased by 500 psf for every additional foot of embedment and by 200 psf for every additional foot of width to a maximum of 4,000 psf. The allowable bearing pressure may be increased by one-third for wind and seismic loading. We recommend that strip and isolated footings have a minimum embedment depth of 24 inches. For lateral resistance against sliding, a friction coefficient of 0.35 may be used at the soil-foundation interface. In addition, for large foundations and mat type slabs (if any), the subgrade modulus of reaction may be assumed to be 75 pci.

The foundations and slab-on-grade should be designed for a total and differential settlement presented below.

3.5 Settlement

The amount of settlement expected will depend upon the type of foundation(s) selected and the type and extent of the soil improvements. Our preliminary settlement analysis is based on the proposed excavations and remedial grading anticipated at the site, the assumed column loads of up to 1,000-kips for the proposed structure and allowable bearing capacity of 4,000 psf. The total and differential settlement for the proposed improvements at the site is expected to be on the order of 1½ - inches and ¾ - inch over a 30-foot span, respectively. For loads significantly

greater than 1,000-kips, or for smaller differential settlement requirements, alternative foundations, such as deep foundations or mat slabs and foundations may be required.

3.6 Seismic Design Guidelines

The seismic design criteria based on the 2013 California Building Code (CBC) is presented in the following table:

Selected Seismic Design Parameters from 2013 CBC/ASCE 7-10	*Seismic Design Values*	*Reference*
Latitude	33.612 North	
Longitude	117.875 West	
Nearest Seismic Source	Newport-Inglewood Fault	USGS 2013a
Distance to Nearest Seismic Source	2.5 Miles (4.1 km)	USGS 2013a
Site Class per Table 20.3-1 of ASCE 7-10	D	USGS, 2013b
Spectral Acceleration for Short Periods (Ss)	1.681 g	USGS, 2013b
Spectral Accelerations for 1-Second Periods (S1)	0.615 g	USGS, 2013b
Site Coefficient F_a, Table 11.4-1 of ASCE 7-10	1.0	USGS, 2013b
Site Coefficient F_v, Table 11.4-2 of ASCE 7-10	1.5	USGS, 2013b
Design Spectral Response Acceleration at Short Periods (S_{DS}) from Equation 11.4-3 of ASCE 7-10	1.120 g	USGS, 2013b
Design Spectral Response Acceleration at 1-Second Period (S_{D1}) from Equation 11.4-4 of ASCE 7-10	0.615 g	USGS, 2013b
Peak Ground Acceleration (MCE_R) Corrected for Site Class Effects from Equation 11.8-1 of ASCE 7-10	0.685 g	USGS, 2013b
Seismic Design Category, Section 11.6 of ASCE 7-10	D	USGS, 2013b

3.7 Expansion Potential

Based on laboratory testing, the expansion potential of onsite soils is anticipated to generally range from "Very Low" to "Medium" within the terrace and existing fill materials. Soils with "High" expansion are likely to be encountered in the siltstone/claystone of the Monterey Bedrock. Additional laboratory testing should be performed during the recommended geotechnical investigation to determine the expansion potential of the bedrock and also following completion of grading operations around the building to determine the expansion potential of the near-surface soils.

3.8 Cement Type for Construction

Laboratory test results indicate that the soluble sulfate content of current subgrade soils are generally in the negligible range. Additional laboratory testing should be performed during the recommended geotechnical investigation and following completion of grading operations to determine the soluble sulfate content to be used for design of concrete in contact with the soil in compliance with Table 4.3.1 of ACI-318.

3.9 Surface Drainage and Irrigation

Inadequate control of run-off water, heavy irrigation after development of the site, or regional groundwater level changes may result in shallow groundwater conditions where previously none existed. 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 building construction. Positive surface drainage should be provided to direct surface water away from structures and slopes and toward the street or suitable drainage devices. Ponding of water adjacent to the structures should not be allowed. Buildings should have roof gutter systems and the run-off should be directed to parking lot/street gutters by area drain pipes or by sheet flow over paved areas. Paved areas should be provided with adequate drainage devices, gradients, and curbing to prevent run-off flowing from paved areas onto adjacent unpaved areas.

Foundation performance is also dependent upon maintaining adequate surface drainage away from structures. The minimum gradient within 5 feet of the building will depend upon surface landscaping. In general, we suggest that unpaved lawn and landscape areas have a minimum gradient of 2 percent away from structures. Consideration should be given to concrete flatwork construction adjacent to the building.

Construction of planter areas immediately adjacent to structures should be avoided if possible. If planter boxes are constructed adjacent to or near buildings, the planters should be provided with controls to prevent excessive penetration of the irrigation water into the foundation and flatwork subgrades. Provisions should be made to drain excess irrigation water from the planters without saturating the subgrade below or adjacent to the planters. Raised planter boxes may be drained with weepholes. Deep planters (such as palm tree planters) should be drained with below-ground, water-tight drainage lines connected to a suitable outlet. Moisture barriers should also be considered.

It is also important to maintain a consistent level of soil moisture, not allowing the subgrade soils to become overly dry or overly wet. Properly designed landscaping and irrigation systems can help in that regard.

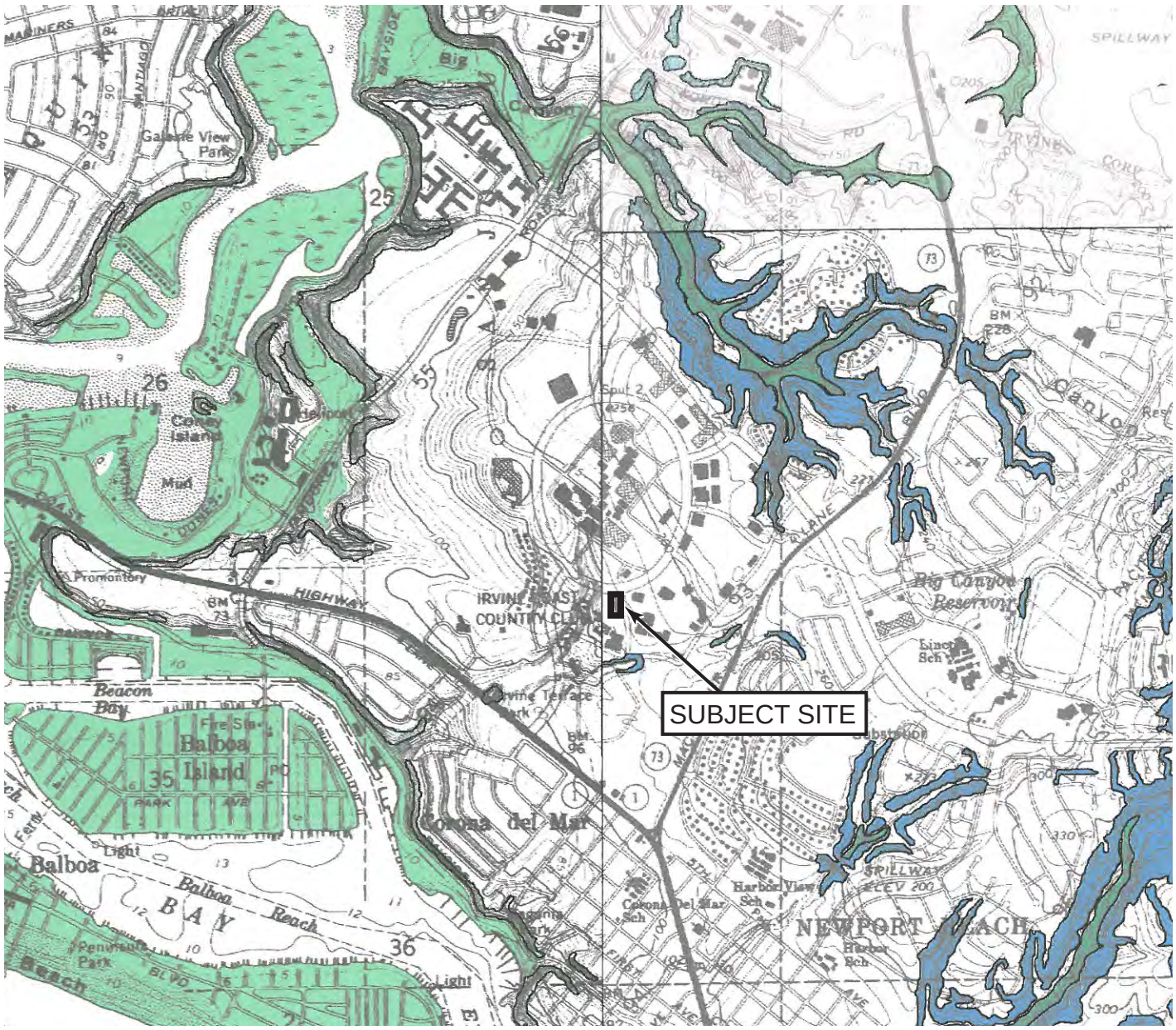
3.10 Geotechnical Investigation and Review of Future Plans

Once a grading plan becomes available, it should be reviewed by the geotechnical consultant. Additional geotechnical investigation is recommended and additional analysis will be necessary for building foundation design in relation to potential settlements and for shoring design for the subterranean structure. The geotechnical consultant will need to work closely with the structural engineer and project team during design. Once the building/grading plan is available, the final geotechnical recommendations for remedial grading and structural design will be provided. A geotechnical grading plan review report should be submitted to the city of Newport Beach for their review and approval prior to issuance of a grading and construction permit.

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



Liquefaction

Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides

Areas where previous occurance of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

SITE LOCATION AND SEISMIC HAZARDS MAP

BASE: DIVISION OF MINES AND GEOLOGY SEISMIC HAZARDS MAPS,
LAGUNA BEACH, NEWPORT BEACH AND TUSTIN QUADRANGLES
Dated: April 15, 1998 and January 17, 2001

N

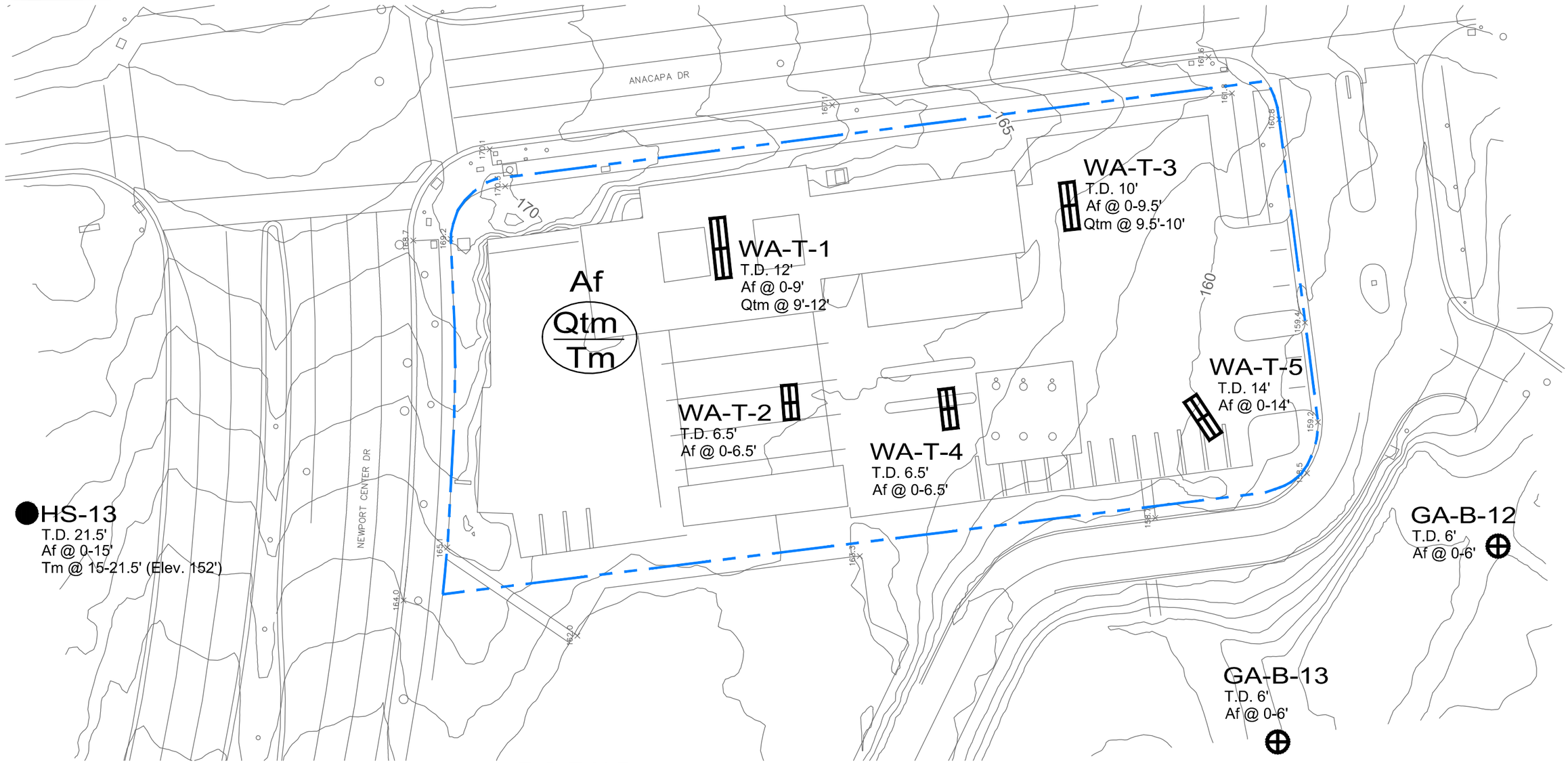
NEWPORT CENTER CONDOMINIUMS
150 NEWPORT CENTER DRIVE
CITY OF NEWPORT BEACH, CALIFORNIA

Project Number: 14117-01

Project Name: NCAA / 150 NCD

Date: 2-3-15 Figure No. 1

NMG Geotechnical, Inc.



LEGEND

SYMBOLS - LOCATIONS ARE APPROXIMATE, QUERIED WHERE UNCERTAIN

- **HS-13** — T.D. 21.5', Af @ 0-15', Tm @ 15-21.5' (Elev. 152'): HOLLOW-STEM AUGER BORING BY NMG GEOTECHNICAL, INC., SHOWING TOTAL DEPTH AND DEPTH TO EARTH UNITS
- **GA-B-13** — T.D. 6', Af @ 0-6': BUCKET AUGER BORING BY G.A. NICOLL, SHOWING TOTAL DEPTH AND DEPTH TO EARTH UNITS
- **WA-T-5** — T.D. 14', Af @ 0-14': TEST PIT BY W.A. WAHLER SHOWING TOTAL DEPTH AND DEPTH TO EARTH UNITS

EARTH UNITS - CIRCLED WHERE BURIED

Af	ARTIFICIAL FILL
Qtm	TERRACE DEPOSIT
Tm	MONTEREY FORMATION
	PROPERTY BOUNDARY

GRAPHIC SCALE

40 0 20 40 80

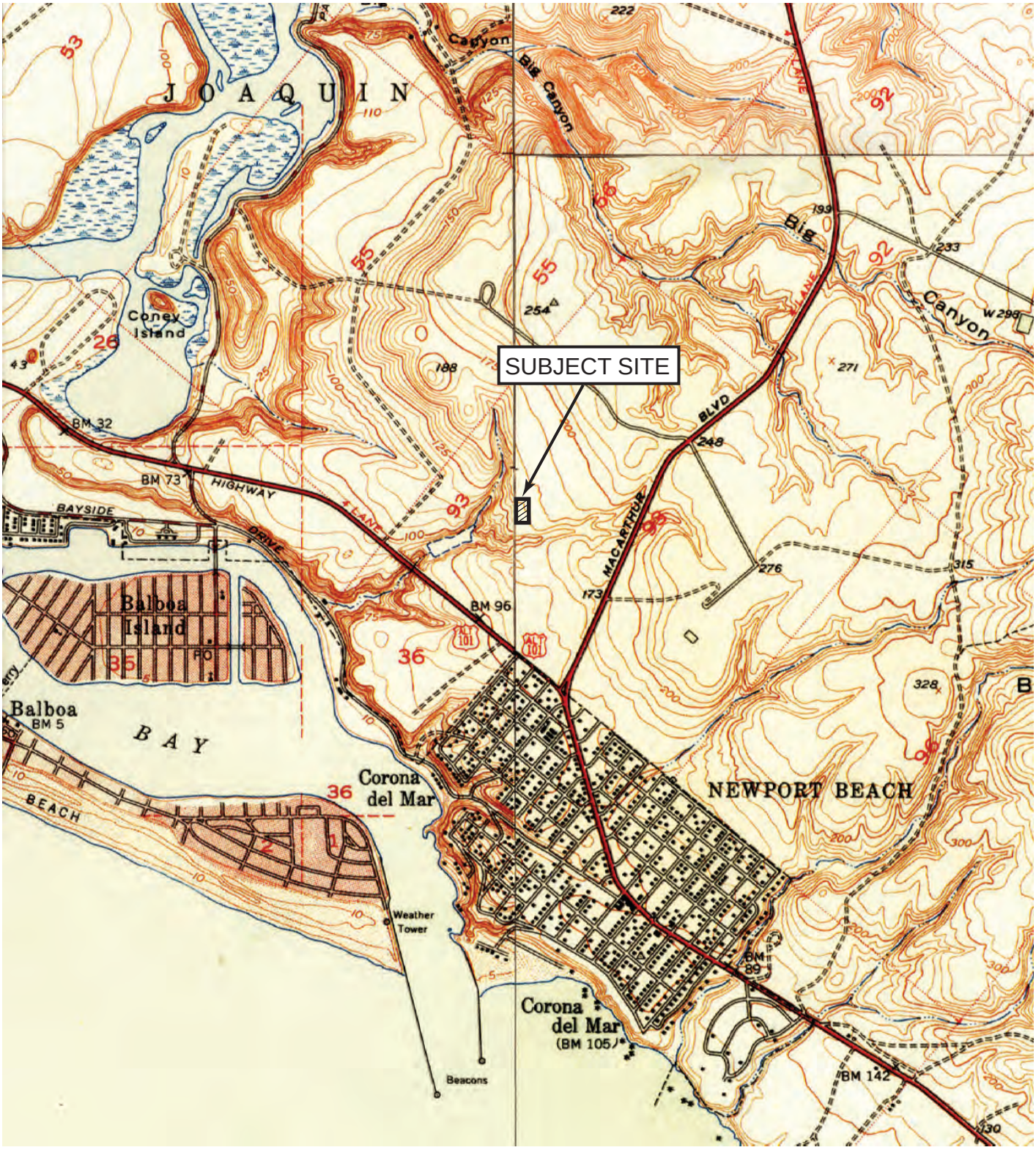
(IN FEET)
1 inch = 40 ft.

FIGURE 2

GEOTECHNICAL MAP
NEWPORT CENTER CONDOMINIUMS
150 NEWPORT CENTER DRIVE
CITY OF NEWPORT BEACH, CALIFORNIA

Project No.: 14117-01
Project Name: NCAA / 150 NCD
Date: 2-3-15 Scale: 1" = 40'

NMG
Geotechnical, Inc.



SITE LOCATION AND TOPOGRAPHIC MAP

BASE: USGS TOPOGRAPHIC MAPS,
LAGUNA BEACH, NEWPORT BEACH AND TUSTIN QUADRANGLES
Dated: 1949 Through 1951

NEWPORT CENTER CONDOMINIUMS
150 NEWPORT CENTER DRIVE
CITY OF NEWPORT BEACH, CALIFORNIA

Project Number: 14117-01
Project Name: NCAA / 150 NCD
Date: 2-3-15 Figure No. 3

NMG Geotechnical, Inc.

Legend

- GAB-17 Boring by G.A. Nicoll (1972)
- HS-4 Boring by NMG Geotechnical, Inc. (2012)
- MTB-3 Boring by Moore & Taber (1975)
- RTF-B-3 Boring by R.T. Frankian (1994)
- SIB-2 Boring By Soils International, Inc. (1988)
- WAT-5 Trench by W.A. Wahler (1970)

HS-4
HS-3
HS-1
HS-12
HS-13
MTB-3
MTB-2
MTB-1
SIB-2
SIB-1
RTF-B-3
RTF-B-2
RTF-B-1
GAB-6
GAB-7
GAB-15
GAB-5
GAB-8
GAB-9
GAB-4
GAB-13
GAB-10
GAB-3
GAB-12
GAB-16
GAB-2
GAB-11
GAB-1
GAB-17
WAT-1
WAT-2
WAT-4
WAT-3
WAT-5
San Miguel Dr
Newport Center Dr
Anacapa Dr
Civic Center Dr
Avocado
Google earth
© 2015 Google
300 ft
N

Boring Location Map

Newport Center Condominiums
Newport Beach, California

Figure 4

Project Name: NCAA/150 Newport Center Drive
Project No.: 14117-01

APPENDIX A

APPENDIX A
REFERENCES

California Division of Mines and Geology, 1980, Classification and Mapping of Quaternary Sedimentary Deposits for Purposes of Seismic Zonation, South Coastal Los Angeles Basin, Orange County, California, Open File Report 80-19 L.A., September 1980.

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, 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, 1998a, Seismic Hazard Zones, Laguna Beach Quadrangle, Official Map dated April 15, 1998.

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

California Division of Mines and Geology, 2001, Seismic Hazard Zones, Tustin Quadrangle, Revised Official Map dated January 17, 2001.

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

G.A. Nicoll & Associates, 1972, Report of Foundation Investigation, Six Proposed Office Buildings, Block 100, Newport Center Drive East, Newport Center, Newport Beach, California, Project 1010, dated November 1972.

Hart, E. W. and Bryant, W.A., 2007, Fault Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault zones Maps, Department of Conservation, Division of Mines and Geology, Special Publication 42, Revised 1997, Interim Revision 2007.

Jennings, Charles W., 2010, Fault Activity Map of California and Adjacent Areas, Department of Conservation, Division of Mines and Geology, Geologic Data Map No. 6

Moore & Taber, 1975, Foundation Investigation, Glendale Federal Savings, 100 Newport Center Drive, Newport Beach, California, Job No. 175-507, dated January 31, 1975.

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)

NMG Geotechnical, Inc., 2012a, Geotechnical Exploration and Review of Rough Grading Plan for Fashion Island Restaurant Pads B and C, City of Newport Beach, California, Project No. 08034-03 and -04, dated May 17, 2012.

NMG Geotechnical, Inc., 2012b, Summary of Geotechnical Exploration and Fill Evaluation Related to Pads "B" and "C", Fashion Island, City of Newport Beach, California, Project No. 08034-03, -04, and -06, dated July 6, 2012.

R.T. Frankian & Associates, 1994, Foundation Investigation, Proposed Edwards Big Newport Cinemas Tri-Plex Addition, 300 Newport Center Drive, Newport Beach, California, Job No. 94-029-A, dated August 18, 1994.

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, 1949, Laguna Beach Quadrangle, Orange County, California, 7.5 Minute Series (Topographic).

U.S. Geological Survey, 1950, Tustin Quadrangle, Orange County, California, 7.5 Minute Series (Topographic).

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

U. S. Geological Survey, 2013a, 2008 Interactive Deaggregations Program; web site address: https://geohazards.usgs.gov/deaggint/2008/

U.S. Geological Survey, 2013b, U.S. Seismic Design Maps, web site address: http://geohazards.usgs.gov/designmaps/us/application.php

W.A. Wahler & Associates, 1970, Soil and Geologic Investigation for Newport Center Car Wash, Newport Beach, California, Project No. 0461, dated January 1970.

AERIAL PHOTOGRAPHS REVEIWED

Date	***Photograph***	***Source***
10-14-1939	5925-112	Continental Aerial Photo
11-18-1952	AXK-1K-43	Continental Aerial Photo
1-13-75	157 7-23	Continental Aerial Photo
1-20-1992	C85-13-20	Continental Aerial Photo

APPENDIX B

TEST PITS BY

W.A. WAHLER & ASSOCIATES (1970)

FOR EXISTING CARWASH

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)

PRIMARY DIVISIONS				GROUP SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS — MORE THAN HALF OF MATERIALS IS LARGER THAN #200 SIEVE SIZE	GRAVELS — MORE THAN HALF OF COARSE FRACTION IS LARGER THAN #4 SIEVE	CLEAN GRAVELS (LESS THAN 5% FINES)		GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
				GP	POORLY GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
		GRAVEL WITH FINES		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURE. NON-PLASTIC FINES.
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES. PLASTIC FINES.
	SANDS — MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN #4 SIEVE	CLEAN SANDS (LESS THAN 5% FINES)		SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.
				SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.
		SANDS WITH FINES		SM	SILTY SANDS, SAND-SILT MIXTURES. NON-PLASTIC FINES.
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES. PLASTIC FINES.
FINE GRAINED SOILS — MORE THAN HALF OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE	SILTS & CLAYS — LIQUID LIMIT IS LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY.
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY.
	SILTS & CLAYS — LIQUID LIMIT IS GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS.
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.
HIGHLY ORGANIC SOILS				PT	PEAT AND OTHER HIGHLY ORGANIC SOILS.

DEFINITION OF TERMS

GRAIN SIZES

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENINGS				
200	50	16	4	3/4"	3"	8"		
SILTS & CLAYS DISTINGUISHED ON BASIS OF PLASTICITY	SAND			GRAVEL		COBBLES	BOULDERS	
	FINE	MEDIUM	COARSE	FINE	COARSE			

MOISTURE CONDITION (INCREASING MOISTURE ——→)

DRY — SLIGHTLY DAMP — DAMP — (PL) MOIST — VERY MOIST — WET (SATURATED) (LL)

CONSISTENCY			RELATIVE DENSITY	
CLAYS & SILTS	BLOWS/FOOT*	STRENGTH ‡	SANDS & GRAVELS	BLOWS/FOOT*
Very Soft	0 – 2	0 – 1/4	Very Loose	0 – 4
Soft	2 – 4	1/4 – 1/2	Loose	4 – 10
Firm	4 – 8	1/2 – 1		
Stiff	8 – 16	1 – 2	Medium Dense	10 – 30
Very Stiff	16 – 32	2 – 4	Dense	30 – 50
Hard	Over 32	Over 4	Very Dense	Over 50

* Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1-3/8 inch I.D.) split spoon (ASTM D-1586).

‡ Unconfined compressive strength in tons/sq ft. Read from a pocket penetrometer.

SOIL MECHANICS and FOUNDATION ENGINEERS Inc.

PALO ALTO • NEWPORT BEACH • CALIF.

NEWPORT CENTER CAR WASH
NEWPORT BEACH, CALIFORNIA

KEY FOR SOIL EXPLORATION LOGS

PROJECT NO.	DATE	DRAWING NO.
0461	JAN. 1970	--

LOGS OF BACKHOE PITS

TEST PIT NO.	DEPTH	DESCRIPTION	SAMPLE TYPE* AND DEPTH
1	0-4.5	FILL: SAND (SP & SW), Clayey SAND (SW-SC), and CLAY (CL) in horizontal layers 2" to 6" thick. Brown, damp, medium dense, and firm. Sparse scattered hard SHALE gravel and cobbles.	U @ 2"
	4.5-9	FILL: SAND (SP) with a few Clayey SAND (SP-SC) layers. Layers horizontal, 1" to 8" thick. Brown, slightly damp, medium dense.	U @ 4.5' U @ 6' B @ 8'
	9-10	Silty SAND (SM) and Sandy CLAY (CL), dark brown, slightly damp, stiff and medium dense. Original ground surface at 9.0 feet.	U @ 9'
	10-12	CLAY (CL), dark brown, slightly damp, very stiff.	
2	0-6.5	FILL: SAND (SP) and Clayey SAND (SC) in horizontal layers 2" to 8" thick. Red-brown, slightly damp to damp, medium dense. Sparse scattered gravel of hard SHALE.	B @ 3"-1'
3	0-5	FILL: SAND (SP) and Clayey SAND (SP-SC, SC) in horizontal layers 2" to 6" thick. Red-brown, slightly damp, medium dense.	U @ 1.5' U @ 3.5'
	5-9.5	FILL: SAND (SP) with minor Clayey SAND (SP-SC) in horizontal layers 1" to 6" thick. Red-brown, slightly damp, medium dense.	U @ 5' U @ 7.5' U @ 9'
	9.5-10	MARINE TERRACE: Silty SAND (SM), dark brown, slightly damp, medium dense. Original ground surface with undisturbed grass at 9.5 feet.	

LOGS OF BACKHOE PITS

TEST PIT NO.	DEPTH	DESCRIPTION	SAMPLE TYPE* AND DEPTH
4	0-4	FILL: SAND (SP) and Clayey SAND (SP-SC) in horizontal layers 2" to 8" thick. Red-brown, slightly damp, medium dense.	
	4-5	FILL: CLAY (CL) with scattered hard SHALE gravel and cobbles. Greenish-gray, slightly damp to damp, firm.	U @ 4.5'
	5-6.5	FILL: SAND (SP) and Clayey SAND (SP-SC) in horizontal layers 1" to 6" thick. Red-brown, slightly damp, medium dense.	
5	0-7.5	FILL: SAND (SP), Clayey SAND (SP-SC), and Sandy CLAY (CL) in horizontal layers 4" to 6" thick. Red-brown and gray, damp, medium dense and firm.	B @ 1'-4'
	7.5-10.5	FILL: SAND (SW), homogenous, slightly damp, moist at 10.0', medium dense.	
	10.5-11.5	FILL: Silty SAND (SM), dark gray, damp to moist, medium dense.	U @ 11'
	11.5-13	FILL: Sandy CLAY (CH) and Clayey SAND (SC), dark gray, moist to damp, medium dense and firm.	B @ 13'
	13-14	FILL: SAND (SP), red-brown, slightly damp, medium dense.	U @ 14'

NOTES:
1. No caving.
2. Groundwater not encountered.
3. All pits backfilled.
*4. U = undisturbed sample; B = bulk sample.

BORING LOGS BY NMG

FOR PADS B & C AT FASHION ISLAND (2012a & b)

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	*GRAVEL AND GRAVELLY SOILS* MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	*CLEAN GRAVELS* (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	*CLEAN SANDS* (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	*SILTS AND CLAYS*	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Dual symbols are used to indicate gravels or sand with 5-12% fines and soils with fines classifying as CL-ML. Symbols separated by a slash indicate borderline soil classifications.

Sampler and Symbol Descriptions

- Modified California sample (63.5 mm diameter)
- Standard Penetration Test
- Undisturbed pushed tube sample
- Large bulk sample
- Small bulk sample
- Approximate depth of perched water or groundwater

Note: Number of blows required to advance driven sample 300 mm (or length noted) is recorded; blow count recorded for seating interval (initial 150 mm of drive) is indicated by an asterisk.

Laboratory and Field Test Abbreviations

MD	Laboratory compaction test
CN	Laboratory consolidation test
DS	Laboratory direct shear test
AL	Atterberg limits
SE	Sand Equivalent
GS	Grain Size Analysis (Sieve and/or Hydro.)
RV	R-Value
CC	Chemical Testing incl. Soluble Sulfate
EI	Expansion Index
UU	Unconsolidated Shear Strength

GENERAL NOTES

1. Station location is indicated with offset to right (R) or left (L) of centerline (CL).
2. Soil classifications are based on the Unified Soil System and include color, moisture, and relative density or consistency. Field descriptions have been modified to reflect results of laboratory tests where deemed appropriate. Bedrock descriptions are based on visual classification and include rock type, moisture, color, grain size, strength, and weathering.
3. Descriptions on these boring logs apply only at the specific boring locations and at the time the borings were made. They are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO LOG OF BORING

Fashion Island/Eastside
Newport Beach, California
PROJECT NO. 08034-01

NMG Geotechnical, Inc.

Date(s) Drilled	6/2/08	Logged By	PA
Drilling Company	2R Drilling	Drill Bit Size/Type	8"
Drill Rig Type	CME-75	Hammer Data	140lbs/ 30" drop
Sampling Method(s)	Bulk, Modified California		
Approximate Groundwater Depth:	Groundwater Not Encountered		
Comments			

HS- 1

Sheet 1 of 2

Total Depth Drilled (ft)	41.0
Approximate Ground Surface Elevation (ft)	171.5

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						@ 0' Asphalt, 4" thick over 6" base.			
170						SM	**Artificial Fill (Af)**			
			B-1							Bag B-1 (0-5')
			D-1	13			@ 2.5' Strong brown slightly silty SAND, locally slightly clayey, moist, medium dense, massive, slightly to moderatly friable, no visable roots/ pores.	10.5	109.6	
	5		D-2	5			@ 5' Strong brown slightly silty SAND, wet, loose, moderatly friable, massive, non-cemented.	8.5	108.3	
			D-3	12		SC	@ 7.5' Brown to olive brown clayey SAND, wet, medium dense, root hairs/ pores, MnO/ FeO stining.	14.6	119.2	
	10		D-4	25		SC/ ML	@ 10' Olive clayey fine SAND with abundant siltstone clasts, moist, medium dense, MnO/ FeO staining, slightly plastic.	15.6	113.6	
160										
	15		D-5	20		SM	**Terrace, Marine (Qtm)** @ 15' Brownish yellow and light olive SAND, moist, medium dense, heavy FeO staining, color banding, micaceous.	12.2	98.3	
	20		D-6	70/11.5"		SM	**Monterey Formation (Tm)** @ 20' Light olive gray silty SANDSTONE, moist, dense, heavy FeO staining, MnO lined fractures/ bedding.	19.4	97.7	
150										
	25		D-7	79/11"			@ 25' Light gray silty SANDSTONE, slightly moist, dense, locally FeO stained, micaceous.	6.3	105.2	
	30									

LOG OF BORING

Fashion Island/ Eastside
Fashion Island Retail Center
PROJECT NO. 08034-01

NMG

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
140	30	D	8	79			@ 30' Light brownish gray silty SANDSTONE, moist, dense, micaceous, massive, FeO staining.	9.1	104.7	
	35	D	9	50/3"			@ 35' Light olive gray silty SANDSTONE, slightly moist, dense, micaceous, MnO/ FeO staining.	8.1	94.2	
130	40	D	10	78/11"		ML/ SM	@ 41' Strong brown and olive gray sandy SILTSTONE and silty SANDSTONE, moist, locally laminated, FeO/ MnO stained bedding surfaces, micaceous, gypsum along fractures.	22.7	96.8	
	45						Notes: Total Depth: 41 ft. Groundwater Not Encountered. Backfilled With Cuttings. Asphalt Patched.			
120	50									
	55									
110	60									
	65									

LOG OF BORING

Fashion Island/ Eastside
Fashion Island Retail Center

PROJECT NO. 08034-01

NMG

Date(s) Drilled	6/3/08	Logged By	PA
Drilling Company	2R Drilling	Drill Bit Size/Type	8"
Drill Rig Type	CME-75	Hammer Data	140lbs/ 30" drop
Sampling Method(s)	Bulk, Modified California		
Approximate Groundwater Depth:	Groundwater Not Encountered		
Comments			

HS-3

Sheet 1 of 1

Total Depth Drilled (ft)	26.0
Approximate Ground Surface Elevation (ft)	182.5

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						@ 0' Asphalt, 4", over 4.5" base.			
						SM	**Artificial Fill (Af)**			
180			B-1					8.6	113.0	Bag B-1 (0-5')
			D-2	40		SM/ SC	@ 2.5' Upper: Brownish yellow silty SAND, moist, medium dense, micaceous. Tip: Very dark gray silty SAND, moist, dense, wood fragments, roots, micaceous.	6.0	118.9	AL, GS, MD, EI, CC, CN, DS
	5		D-3	23			@ 5' Dark brown slightly clayey SAND, moist, medium dense, mica, roots, MnO staining, slightly plastic, pores/ rootholes.	12.1	122.6	
							Terrace, Marine (Qtm)			
			D-4	50/5"		SM	@ 7.5' Olive brown silty SAND, moist, dense, -Disturbed Sample-.	12.0	109.7	
	10		D-5	72/9.5"			@ 10' Brown silty SAND, moist to very moist, dense, micaceous, FeO staining, non-friable.	12.3	110.0	
170										
	15		D-6	32		SM	**Monterey Formation (Tm)** @ 15' Pale olive fine SANDSTONE, moist, medium dense, micaceous, locally heavy FeO staining, lightly cemented.	9.3	102.7	
	20		D-7	32			@ 20' Olive silty fine to medium coarse SANDSTONE with graded beds, very moist, medium dense, scattered small pebbles, FeO/ MnO/ jarosite staining, micaceous, lightly cemented.	14.6	110.4	
160										
	25		D-8	32		ML	@ 25' Light olive gray SILTSTONE, moist, medium dense, heavy FeO/ MnO staining, micaceous, moderately fractured.	24.6	95.3	
	30						Notes: Total Depth: 26 ft. Groundwater Not Encountered. Backfilled With Cuttings. Asphalt Patched.			

LOG OF BORING

Fashion Island/ Eastside
Fashion Island Retail Center
PROJECT NO. 08034-01

NMG

Date(s) Drilled	6/2/08	Logged By	PA
Drilling Company	2R Drilling	Drill Bit Size/Type	8"
Drill Rig Type	CME-75	Hammer Data	140lbs/ 30" drop
Sampling Method(s)	Bulk, Modified California		
Approximate Groundwater Depth:	Groundwater Not Encountered		
Comments			

HS-4

Sheet 1 of 1

Total Depth Drilled (ft)	26.0
Approximate Ground Surface Elevation (ft)	178.0

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						@ 0' Asphalt, 4", over 4" base.			
						SP/ SM	**Artificial Fill (Af)**			
			D-1	37			@ 2.5' Strong brown slightly silty SAND, medium dense, very moist, slightly micaceous.	7.9	114.0	
	5		D-2	40			@ 5' Brown slightly silty SAND, medium dense, very moist, slightly friable, no visible roots/ pores.	9.0	117.6	
170			D-3	6		SM	@ 7.5' Dark brown silty SAND, loose, saturated, root hairs, pores, slightly friable.	16.2	115.0	
	10		D-4	6		SM	**Terrace, Marine (Qtm)** @ 10' Yellowish brown slightly clayey fine to medium coarse SAND, loose, very moist, pores, root hairs.	16.1	112.1	
	15		D-5	38			@ 15' Light olive brown silty SAND, medium dense, moist, micaceous, non-friable, occasional root holes.	12.5	116.2	
160										
	20		D-6	51		ML	**Monterey Formation (Tm)** @ 20' Light olive gray slightly clayey SILTSTONE with trace sand, moist, dense, FeO/ MnO staining along joints/ bedding, micaceous.	24.8	91.5	
	25		D-7	32		SM	@ 25' Yellow to pale yellow SANDSTONE, moist, medium dense, micaceous, massive, non-friable.	7.5	102.8	
150							Notes: Total Depth: 26 ft. Groundwater Not Encountered. Backfilled With Cuttings. Asphalt Patched.			
	30									

LOG OF BORING

Fashion Island/ Eastside
Fashion Island Retail Center
PROJECT NO. 08034-01

NMG

Date(s) Drilled	6/22/12	Logged By	PA
Drilling Company	2R Drilling	Drill Bit Size/Type	8"
Drill Rig Type	CME-75 Track Rig	Hammer Data	140lbs @ 30" Drop
Sampling Method(s)	Bulk, Modified California		
Approximate Groundwater Depth:	Groundwater Not Encountered		
Comments			

HS-12

Sheet 1 of 1

Total Depth Drilled (ft)	21.5
Approximate Ground Surface Elevation (ft)	175.0

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					SM	**Artificial Fill (Af)** Surface: Turf			
			B-1							
			D-1	32			@ 2.5' Reddish brown silty SAND, moist, medium dense, massive, well-sorted.	8.2	115.6	B-1 @ 0-5' MD, GS, EI, CC
170	5		D-2	28			@ 5' Reddish brown silty SAND, moist, medium dense, massive, well-sorted.	8.2	107.9	DS
			D-3	11		CL	**Weathered Marine Terrace (Qtm)** @ 7.5' Pale gray to reddish brown silty sandy CLAY, moist, medium stiff, root hairs, pores.	22.8	105.9	CN
	10		D-4	44		CL	**Marine Terrace (Qtm)** @ 10' Pale olive sandy CLAY, moist, stiff, massive, FeO staining, locally sandy.	14.5	119.1	
160	15		D-5	39		ML	**Monterey Formation (Tm)** @15' Pale gray SILTSTONE, damp, medium dense, local sandstone, heavy FeO staining.	28.2	90.5	
	20		D-6	44			@ 20' Pale gray clayey SILTSTONE, moist, stiff, FeO staining, thinly laminated, scattered sandstone beds.	15.0	98.5	
150	25						Notes: Total Depth 21.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	30									

LOG OF BORING

Fashion Island/Eastside
Newport Beach, California
PROJECT NO. 08034-01

NMG

Date(s) Drilled	6/22/12	Logged By	PA
Drilling Company	2R Drilling	Drill Bit Size/Type	8"
Drill Rig Type	CME-75 Track Rig	Hammer Data	140lbs @ 30" Drop
Sampling Method(s)	Bulk, Modified California		
Approximate Groundwater Depth:	Groundwater Not Encountered		
Comments			

HS-13

Sheet 1 of 1

Total Depth Drilled (ft)	21.5
Approximate Ground Surface Elevation (ft)	167.0

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					SM	**Artificial Fill (Af)** Surface: 4" AC over 6" AB.			
			B-1 D-1	29			@ 2.5' Reddish brown silty SAND, moist, medium dense, massive, slightly mottled.	12.2	118.0	DS B-1 @ 0-5' MD, EI, CC, GS, AL
	5		D-2	38			@ 5' Reddish brown silty SAND, moist, medium dense, massive, well-sorted, uniform.	10.1	126.2	
160			D-3	21			@ 7.5' Reddish brown silty SAND, moist, medium dense, massive, well-sorted, bedrock fragments in upper rings.	16.5	111.6	CN
	10		D-4	34			@ 10' Reddish brown silty SAND, moist, medium dense, massive, well-sorted.	12.1	120.6	
			D-5	17			@ 12.5' Reddish brown silty SAND, saturated, medium dense, massive.	14.6	113.2	
	15		D-6	30		ML-CL	**Monterey Formation (Tm)** @ 15' Olive gray clayey SILTSTONE, moist, stiff, massive, weathered.	22.8	98.2	
150										
	20		D-7	50/5"		SM	@ 20' Very pale gray silty fine-grained SANDSTONE, damp, very dense, massive, FeO staining.	11.4	112.2	
							Notes: Total Depth 21.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	25									
140										
	30									

LOG OF BORING

Fashion Island/Eastside
Newport Beach, California
PROJECT NO. 08034-01

NMG

BORING LOGS BY

G.A. NICOLL & ASSOCIATES
(1972)

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

SILT OR CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

NO. 200 NO. 40 NO. 10 NO. 4 3/4 in. 3 in. (12 in.)

U. S. STANDARD SIEVE SIZE

PLATE A

UNIFIED SOIL CLASSIFICATION SYSTEM

Reference:
The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Vol. I, March, 1953. (Revised April, 1960)

G. A. NICOLL & ASSOCIATES
EARTH SCIENCE CONSULTANTS

DRILL RIG: Bucket Auger		HOLE ELEV.: 152 feet	LOGGED BY: CAN
GROUNDWATER DEPTH: None		HOLE DIA.: 24 inch	DATE: Nov. 3, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								CL	FILL - BROWN TO GREY SILTY CLAY, MOIST, FIRM
7		X		21.0	96.0				
								SC	- TAN CLAYEY FINE SAND, MOIST, MEDIUM DENSE
10		X		8.1	128.0	5		SM	- REDDISH BROWN SILTY FINE SAND, MOIST, MEDIUM DENSE
								SM	- TAN SILTY SAND, FINE, MOIST, MEDIUM DENSE
								SM	TERRACE DEPOSITS
15		X		8.1	115.9	10			- BROWN TO REDDISH BROWN SILTY SAND, MOIST, DENSE
								GM	- WITH COBBLES TO 8 INCHES

NOTES:

1) GROUND WATER ABSENT
2) NO CAVING
3) HOLE BACKFILLED
4) TOTAL DEPTH 14 FEET
5) DRIVING WEIGHT FOR SAMPLES IS 1500 POUND KELLY BAR
6) Boring stopped due to cobbles

G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	DRILLHOLE LOG		HOLE NO.
		Project no.	date	sheet
		1010	Nov. 1972	1 of 1
				B-1

DRILL RIG: Bucket Auger | HOLE ELEV.: 150 feet | LOGGED BY: GAN

GROUNDWATER DEPTH: None | HOLE DIA.: 24 inch | DATE: Nov. 3, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL - TAN SANDY SILT WITH SHALE FRAGMENTS, MOIST
									- BROWN SILTY SAND
6		X		12.6	115.2				- TAN SANDY SILT
									- BROWN SILTY FINE SAND
6		X		17.6	100.5	5			
								CL	- GREY CLAY WITH SHALE FRAGMENTS
								SM	- TAN TO REDDISH BROWN SILTY SAND, MOIST, DENSE
14		X		8.7	116.0	10			
								SM	- GREY SILTY SAND, MOIST DENSE
21		X		10.8	121.0	15		SM	SOIL - GREY SILTY SAND, MOIST, DENSE
									TERRACE DEPOSITS
								SM	- TAN SILTY SAND AND SAND, MOIST, VERY DENSE
17		X		7.7	124.5	20			- SAME BUT GREY
16		X		8.5	124.1	25			- BECOMES REDDISH BROWN
									- WITH GRAVEL OF SILICEOUS SHALE FRAGMENTS
						30		-	BEDROCK - MONTEREY FORMATION
									- GREY SHALE AND TAN SANDSTONE, INTERBEDDED BEDS ¼ inch to paper-thin THICKNESS. CONTACT: N45W, 15°SW; BEDDING: N35W, 45SW
						35			

NOTES:

1) TOTAL DEPTH 36 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) DRIVING WEIGHT FOR SAMPLER IS 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES

Block 100
Newport Center
The Irvine Company

DRILL HOLE LOG

Project no.	date	sheet	HOLE NO.
1010	Nov. 1972	1 of 1	B-2

DRILL RIG: Bucket Auger		HOLE ELEV.: 150 feet	LOGGED BY: GAN
GROUNDWATER DEPTH: None		HOLE DIA.: 24 inch	DATE: Nov. 3, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL – TAN SILTY SAND, DRY, LOOSE
11		X		10.0	113.2			SM	– TAN SILTY SAND, MOIST, MEDIUM DENSE
6		X		13.1	110.7	5			– LOCAL LENSES OF REDDISH BROWN SILTY SAND OR POCKETS OF GREY CLAY
11		X		13.2	104.8	10			
						15			
						20		SM	SOIL – GREY SILTY SAND, MOIST, DENSE
								SM	TERRACE DEPOSITS – GREY SILTY SAND, MOIST, DENSE

NOTES:
1) TOTAL DEPTH 24 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) DRIVING WEIGHT FOR SAMPLER IS 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	DRILL HOLE LOG		HOLE NO.
		Project no.	date	sheet
		1010	Nov. 1972	1 of 1
				B-3

DRILL RIG: Bucket Auger		HOLE ELEV.: 153 feet	LOGGED BY: GAN
GROUNDWATER DEPTH: None		HOLE DIA.: 24 inch	DATE: Nov. 3, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL - TAN SILTY SAND, DRY, LOOSE
5		X		10.8	110.0			SM	- REDDISH BROWN SILTY SAND, MOIST, MEDIUM DENSE
									- LOCALLY TAN
10		X		16.5	105.3	5		CL	- GREY AND BROWN CLAY, SOME SHALE FRAGMENTS AND SAND, MOIST, HARD
									- GREY TO REDDISH BROWN
17		X		10.8	94.3	10		SM	SILTY SAND, MOIST, DENSE
						15			- OCCASIONAL CLAY LAYER OR SHALE FRAGMENTS
						20			
								SM	SOIL - GREY SILTY SAND, MOIST, DENSE
						25		SM	TERRACE DEPOSITS - REDDISH BROWN SILTY SAND, MOIST, VERY DENSE

NOTES:

1) TOTAL DEPTH 26 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) DRIVING WEIGHT FOR SAMPLER IS 1520 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	DRILLHOLE LOG		HOLE NO.
		project no.	date / sheet	
		1010	Nov. 1972 / 1 of 1	B-4

DRILL RIG: Bucket Auger | **HOLE ELEV.:** 152 feet | **LOGGED BY:** GAN

GROUNDWATER DEPTH: None | **HOLE DIA.:** 24 inch | **DATE:** Nov. 3, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil type	DESCRIPTION AND REMARKS
							SM	FILL - TAN SILTY SAND, DRY, LOOSE
							SM	- TAN SILTY SAND, MOIST, MEDIUM DENSE
8		☒		15.9	105.1		CL	- GREY CLAY, SHALE FRAGMENTS, SAND LENSES
12		☒		12.9	125.2	5	SM	- REDDISH BROWN AND TAN SILTY SAND
17		☒		9.7	105.9	10		- WITH GREY CLAY LAYERS
						15		
						20		
						25		
						30		
							GP	- COBBLES WITH DARK GREY SILTY SAND
						35	—	BEDROCK - MONTEREY FORMATION SHALE WITH INTERBEDS OF SANDSTONE. CONTACT [illegible] BEDDING: N84W, 24SW

NOTES:
1) TOTAL DEPTH 38 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) DRIVING WEIGHT FOR SAMPLER - 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	DRILLHOLE LOG			HOLE NO.
		Project no.	date	sheet	
		1010	Nov. 1972	1 of 1	B-5

DRILL RIG: Bucket Auger | HOLE ELEV.: 153 feet | LOGGED BY: GAN

GROUNDWATER DEPTH: None | HOLE DIA.: 24 inch | DATE: Nov. 3, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL - TAN SILTY SAND, DRY, LOOSE
8		X		7.9	116.9			SM	- BROWN SILTY SAND, MOIST, MEDIUM DENSE
12		X		10.8	109.7	5			- LOCAL REDDISH BROWN CLAYEY SAND, SCATTERED GRAVEL
						10			
11		X		10.6	113.0				
						15			
						20			
								CL	- BLACK CLAY, MOIST, STIFF
						25		SM	- REDDISH BROWN SILTY SAND, MOIST, MEDIUM DENSE
								SM	- DARK GREY SILTY SAND, MOIST, MEDIUM DENSE, ROOTS.
						30			- BECOMES GREEN AND GREY
						35		SM	- REDDISH BROWN SILTY SAND, SOME GREY CLAY AND SHALE FRAGMENTS
						40			
									BEDROCK - MONTEREY FORMATION SHALE AND SANDSTONE
						45			

NOTES: 1) TOTAL DEPTH 45½ FT.
2) NO CAVING 3) HOLE BACKFILLED
4) SAMPLE DRIVING WEIGHT IS 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES

Block 100
Newport Center
The Irvine Company

DRILL HOLE LOG

Project no.	date	sheet	HOLE NO.
1010	Nov. 1972	1 of 1	B-6

DRILL RIG: Bucket Auger		HOLE ELEV.: 150 feet	LOGGED BY: GAN
GROUNDWATER DEPTH: None		HOLE DIA.: 24 inch	DATE: Nov. 3, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL – TAN SILTY SAND, DRY, LOOSE
2		X		9.6	104.3				– BECOMES BROWN, MOIST, MEDIUM DENSE
6		X		10.0	107.3	5			
									– LOCALLY REDDISH BROWN
						10			
						15			
5		X		15.1	109.3	20			
						25			
						30			
								GM	– COBBLES
						35			BEDROCK – MONTEREY FORMATION SHALE, SOME SANDSTONE

NOTES:
1) TOTAL DEPTH 36 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) SAMPLE DRIVING WEIGHT, 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	DRILLHOLE LOG		HOLE NO.
		project no.	date	sheet
		1010	Nov. 1972	1 of 1
				B-7

DRILL RIG: Bucket Auger		HOLE ELEV.: 146 feet	LOGGED BY: GAN
GROUNDWATER DEPTH: None		HOLE DIA.: 24 inch	DATE: Nov. 3, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL - TAN SILTY SAND, DRY LOOSE
									- BECOMES BROWN TO REDDISH BROWN, MOIST, MEDIUM DENSE
4		X		18.5	97.3				
						5			
8		X		13.4	104.2				
									- LENS OF GREY CLAY
						10			
						15			
6		X		14.5	113.1				
						20			
						25			
						30			- GREY SILTY SAND
									- REDDISH BROWN SILTY SAND
						35			
									- WITH COBBLES
								-	BEDROCK - MONTEREY FORMATION SHALE AND SANDSTONE
						40			

NOTES:
1) TOTAL DEPTH 40 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) SAMPLER DRIVING WEIGHT IS 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	DRILL HOLE LOG		HOLE NO.
		Project no.	date	sheet
		1010	Nov. 1972	1 of 1
				B-8

DRILL RIG: Bucket Auger	HOLE ELEV.: 147	LOGGED BY: GAN
GROUNDWATER DEPTH: None	HOLE DIA.: 24 inch	DATE: Nov. 4, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL - TAN SILTY SAND, DRY, LOOSE
4		X		8.0	105.5				REDDISH BROWN SILTY SAND
									MOIST, MEDIUM DENSE
10		X		24.0	96.9	5			
								CL	- GREY SANDY CLAY, MOIST, STIFF
								SM	- REDDISH BROWN SILTY
20		X		9.9	105.8	10			SAND, MOIST, MEDIUM DENSE
						15			
						20			
								CL	
						25		SM	
						30			
								CL	- GREY CLAY WITH SHALE
									FRAGMENTS
									BEDROCK - MONTEREY FORMATION
									SHALE & SANDSTONE

NOTES:
1) TOTAL DEPTH 39 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) DRIVING WEIGHT FOR SAMPLER: 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	DRILLHOLE LOG	HOLE NO. B-9

Project no.	date	sheet
1010	Nov. 1972	1 of 1

DRILL RIG: Bucket Auger		HOLE ELEV.: 147 feet	LOGGED BY: GAN
GROUNDWATER DEPTH: None		HOLE DIA.: 24 inch	DATE: Nov. 4, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
		X		21.7	97.1			SM	FILL - BROWN AND REDDISH BROWN SILTY FINE SAND, MOIST, MEDIUM DENSE
		X		22.8	98.8	5			- LAYERS OF GREY AND BROWN SILTY CLAY
		X		15.2	112.9	10			- TAN SILTY FINE SAND
						15			- REDDISH BROWN SILTY FINE SAND
						20			

NOTES:
1) TOTAL DEPTH 20 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) SAMPLER DRIVING WEIGHT IS 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	DRILL HOLE LOG		HOLE NO.
		project no.	date	sheet
		1010	Nov. 1972	1 of 1
				B-10

DRILL RIG: Bucket Auger		HOLE ELEV.: 142 feet	LOGGED BY: GAN
GROUNDWATER DEPTH: None		HOLE DIA.: 24 inch	DATE: Nov. 4, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL — BROWN SILTY SAND, DRY, LOOSE — MOIST BELOW 1 FOOT
6		X		11.6	100.6				
4		X		20.1	100.0	5			
								CL	— GREY SILTY CLAY
								SM	— REDDISH BROWN SILTY SAND WITH SOME GREY CLAY
10		X		17.3	106.7	10			
								CL	— DARK GREY SILTY CLAY, SOME ROOTS, GRAVEL
						15		SM	— REDDISH BROWN SILTY SAND, MOIST, MEDIUM DENSE — BECOMES GREY WITH SOME ORGANICS
8		X		8.8	127.7	20			
								SM	— REDDISH BROWN SILTY SAND
						25			

NOTES:
1) TOTAL DEPTH 25 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) SAMPLER DRIVEN BY 1500 POUND KELLY

G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	DRILL HOLE LOG			HOLE NO.
		project no.	date	sheet	
		1010	Nov. 1972	1 of 1	B-11

DRILL RIG: Bucket Auger | HOLE ELEV.: 154 feet | LOGGED BY: GAN

GROUNDWATER DEPTH: None | HOLE DIA.: 24 inch | DATE: Nov. 4, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL - REDDISH BROWN SILTY SAND, DRY LOOSE
8		X		11.4	109.2				- MOIST AND MEDIUM DENSE
								CL	- SOME GREY SILTY CLAY
								SM	LAYERS
6		X		25.5	96.2	5			

NOTES:
1) TOTAL DEPTH 6 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) DRIVING WEIGHT FOR SAMPLER - 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES

Block 100
Newport Center
The Irvine Company

DRILL HOLE LOG

Project no.	date	sheet	HOLE NO.
1010	Nov. 1972	1 of 1	B-12

DRILL RIG: Bucket Auger		HOLE ELEV.: 154 feet	LOGGED BY: GAN
GROUNDWATER DEPTH: None		HOLE DIA.: 24 inch	DATE: Nov. 4, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pct)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL — TAN SILTY SAND, DRY, LOOSE
8		X		9.7	117.5				— BECOMES MOIST, MEDIUM DENSE
6		X		26.8	94.8	5		CL	— WITH GREY SILTY CLAY LAYERS
									NOTES: 1) TOTAL DEPTH 6 FEET 2) NO CAVING 3) HOLE BACKFILLED 4) SAMPLER DRIVING WEIGHT IS 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	DRILLHOLE LOG		HOLE NO.
		Project no.	date	sheet
		1010	Nov. 1972	1 of 1
				B-13

DRILL RIG: Bucket Auger	HOLE ELEV.: 161 feet	LOGGED BY: GAN
GROUNDWATER DEPTH: None	HOLE DIA.: 24 inch	DATE: Nov. 4, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL - TAN SILTY SAND, DRY, LOOSE
2		X		7.9	106.1				- MOIST, LOOSE
						5			- BECOMES MEDIUM DENSE
14		X		8.2	109.2				
						10			

NOTES:
1) TOTAL DEPTH 10 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) SAMPLER DRIVEN BY 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	DRILL HOLE LOG		HOLE NO.
		project no.	date	sheet
		1010	Nov. 1972	1 of 1
				B-14

DRILL RIG: Bucket Auger | HOLE ELEV.: 145 feet | LOGGED BY: GAN

GROUNDWATER DEPTH: None | HOLE DIA.: 24 inch | DATE: Nov. 4, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL - SILTY SAND, DRY, LOOSE
									- MOIST, MEDIUM DENSE
									- LOCAL CLAYEY SILT
16		X		16.5	109.8	5			

NOTES:
1) TOTAL DEPTH 6 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) DRIVING WEIGHT FOR SAMPLER - 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES

Block 100
Newport Center
The Irvine Company

DRILL HOLE LOG

Project no.	date	sheet	HOLE NO.
1010	Nov. 1972	1 of 1	B-15

DRILL RIG: Bucket Auger									HOLE ELEV.: 122 feet	LOGGED BY: GAN
GROUNDWATER DEPTH: None									HOLE DIA.: 24 inch	DATE: Nov. 4, 1972
blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS	
8		X		10.2	110.7	5		SM	FILL – TAN SILTY SAND, DRY, LOOSE – MOIST, MEDIUM DENSE – LOCAL REDDISH BROWN SANDY CLAY	

NOTES:
1) TOTAL DEPTH 5 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) SAMPLE DRIVING WEIGHT – 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	DRILLHOLE LOG			HOLE NO.
		Project no.	date	sheet	
		1010	Nov. 1972	1 of 1	B-16

DRILL RIG: Bucket Auger | HOLE ELEV.: 142 feet | LOGGED BY: GAN

GROUNDWATER DEPTH: None | HOLE DIA.: 24 inch | DATE: Nov. 4, 1972

blows/foot	sampler: bulk	sampler: split spoon	sampler: tube	moisture (%)	dry density (pcf)	depth (feet)	soil symbol	soil type	DESCRIPTION AND REMARKS
								SM	FILL - TAN SILTY SAND, DRY, LOOSE
									- MOIST, MEDIUM DENSE
								CL	- GRAY CLAY, MOIST, STIFF
20		X		7.1	109.2	5		SM	- REDDISH BROWN SILTY SAND MOIST, DENSE
								SM	- TAN SILTY SAND, MOIST, DENSE
								SM	- GREY SILTY SAND, MOIST, DENSE
								SM	- REDDISH BROWN SILTY SAND, MOIST, DENSE
						10			

NOTES:
1) TOTAL DEPTH 10 FEET
2) NO CAVING
3) HOLE BACKFILLED
4) SAMPLER DRIVING WEIGHT = 1500 POUND KELLY BAR

G. A. NICOLL & ASSOCIATES

Block 100
Newport Center
The Irvine Company

DRILLHOLE LOG

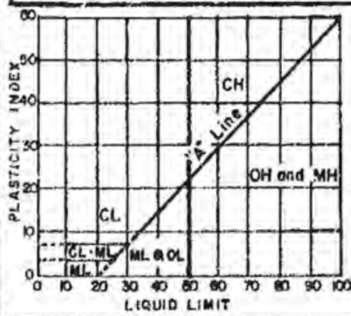
Project no.	date	sheet	HOLE NO.
1010	Nov. 1972	1 of 1	B-17

BORING LOGS BY

MOORE & TABER
(1975)

UNIFIED SOIL CLASSIFICATION

Pt	OH	CH	MH	OL	CL	ML	SC	SM	SP	SW	GC	GM	GP	GW
Highly organic soils	Silts and clays Liquid limit greater than 50			Silts and clays Liquid limit less than 50			Sands with fines >12% fines		Clean sands <5% fines		Gravels with fines >12% fines		Clean gravels <5% fines	
							Sands - more than 50% of coarse fraction is smaller than Nº 4 sieve.				Gravels - more than 50% of coarse fraction is larger than Nº 4 sieve.			
Fine grained soils (More than 50% is smaller than Nº 200 sieve)							Coarse grained soils (More than 50% is larger than Nº 200 sieve)							



LABORATORY CLASSIFICATION CRITERIA

GW and SW - $C_u = \frac{D_{60}}{D_{10}}$ greater than 4 for GW & 6 for SW; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 & 3.

GP and SP - Clean gravel or sand not meeting requirements for GW and SW.

GM and SM - Atterberg limits below "A" line or P. I. less than 4.

GC and SC - Atterberg limits above "A" line with P. I. greater than 7.

Fines (silt or clay)	Fine sand	Medium sand	Coarse sand	Fine gravel	Coarse gravel	Cobbles	Boulders
Sieve sizes	200	40	10	4	3/4"	3"	12"

Classification of earth materials shown on this sheet is based on field inspection and should not be construed to imply laboratory analysis unless so stated.

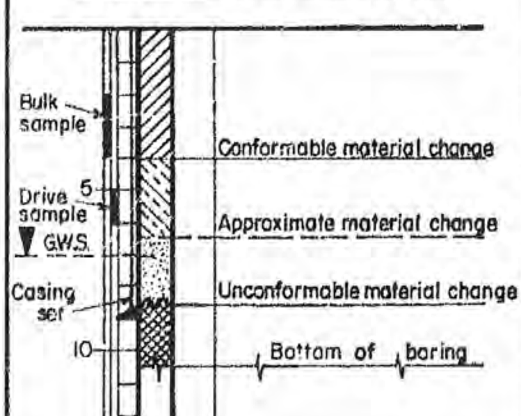
MATERIAL SYMBOLS

CONSISTENCY CLASSIFICATION FOR SOILS

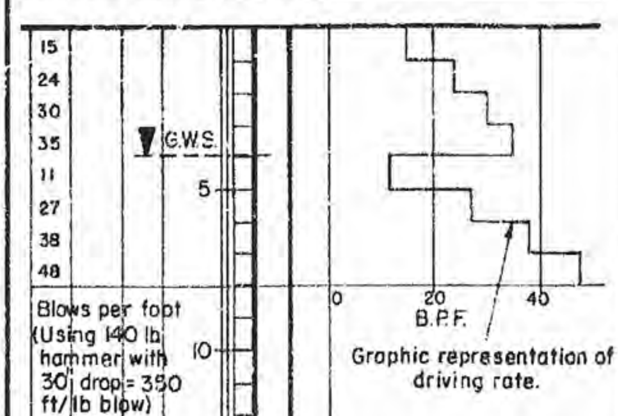
According to the Standard Penetration Test

Nº of blows	Granular	Cohesive
0 - 5	Very loose	Very soft
6 - 10	Loose	Soft
11 - 20	Semicompact	Stiff
21 - 35	Compact	Very stiff
36 - 70	Dense	Hard
>70	Very dense	Very hard

LEGEND OF BORING



LEGEND OF PENETRATION TEST



MOORE & TAL R CONSULTING ENGINEERS AND GEOLOGISTS

TEST BORING LOG

TYPE 18" Bucket Auger | ELEVATION ~101* | BORING 1

STRIKE / DIP	RELATIVE COMPACTION	DRY DENSITY (LBS/CU.FT.)	MOISTURE (%)	BLOWS/FOOT /300 FT. LBS.	SAMPLE SIZE (INCHES)	SAMPLE Nº	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS.	
		114	5.6	10	2.5	1			SC	Red-brown fine to medium CLAYEY SAND - FILL
					Bag	2				
		96	11.1	5	2.5	3	5		SC	Yellow-brown fine CLAYEY SAND - FILL
		111	10.4	10	2.5	4	10		SM	Light brown fine SILTY SAND - FILL
									CL	Greenish SILTY CLAY - FILL
		111	11.9	10	2.5	5	15		SM	Red-brown fine to medium SILTY SAND
									SC	Red-brown fine to medium CLAYEY SAND - FILL
		114	8.8	6	2.5	6	20		SM	Light brown fine SILTY SAND - FILL
									SM	Dark brown SILTY SAND
		118	7.4	25	2.5	7	25		SM	Red-brown fine SILTY SAND

NOTES

1. No caving
2. No water seepage encountered

* Elevations based on assumed elevation of 100 at top of curb, Newport Center Drive East.

LOGGED BY WMC | DATE 1/14/75

MOORE & TABER CONSULTING ENGINEERS AND GEOLOGISTS

TEST BORING LOG

TYPE 18" Bucket Auger | ELEVATION ~100.5 | BORING 2

Depth (ft)	Sample No.	Depth in Feet	Sample Size (inches)	Blows/Foot (300 ft-lbs)	Moisture (%)	Dry Density (lbs/cu ft)	Unified Soil Class.	Material Symbol	Description
							SC		Red-brown fine CLAYEY SAND - FILL
	1	5	2.5	11	26.9	91	SM		Red-brown fine SILTY SAND - FILL
	2		2.5	5	11.7	106	CL		Greenish SILTY CLAY
							SM		Red-brown fine SILTY SAND
	3	10	2.5	8	8.3	108	CL		Red-brown & Greenish SILTY CLAY - FILL
							SM		Red-brown fine SILTY SAND - FILL
	4	15	2.5	8	13.5	109	SM		Red-brown fine SILTY SAND - FILL
							SM		Gray-brown fine to medium SILTY SAND & red-brown CLAYEY SAND - FILL
	5	20	2.5	6	5.9	109	SM		Brown fine SILTY SAND ... changing to red-brown
	6	25	2.5	5	5.4	109			
	7	30	2.5	15	7.2	114	SC		Mottled red-brown and gray CLAYEY SAND

NOTES

1. No caving
2. No water seepage encountered

LOGGED BY WMC | DATE 1/14/75

MOORE & TABER CONSULTING ENGINEERS AND GEOLOGISTS

TEST BORING LOG

TYPE 18" Bucket Auger | ELEVATION ≈100.0 | BORING 1

Strike / Dip	Relative Compaction	Dry Density (lbs/cu.ft)	Moisture (%)	Blows/Foot	Sample Size (inches)	Sample Nº	Depth in Feet
		38	23.8	6	2.5	1	
					Bag	2	5
		84	38.1	4	2.5	3	
		116	12.5	4	2.5	4	10
		123	7.5	5	2.5	5	15
		113	5.3	10	2.5	6	20
		101	3.1	18	2.5	7	25

Unified Soil Class.	Description
SC	Red-brown fine CLAYEY SAND - FILL
SC	Yellow-brown fine CLAYEY SAND with SHALE - FILL
SM	Red-brown fine SILTY SAND
SC	Gray-brown mottled CLAYEY SAND
ML	Gray-brown SANDY SILT
SM	Red-brown fine SILTY SAND ... some fine CLAYEY SAND layers - FILL
SC	Red-brown fine to medium CLAYEY SAND
SM	Mottled gray and brown fine to coarse SILTY SANDS - FILL
SM	Brown fine SILTY SAND ... changing to red-brown
SP	Light brown fine SAND

NOTES

1. No caving
2. No water seepage encountered

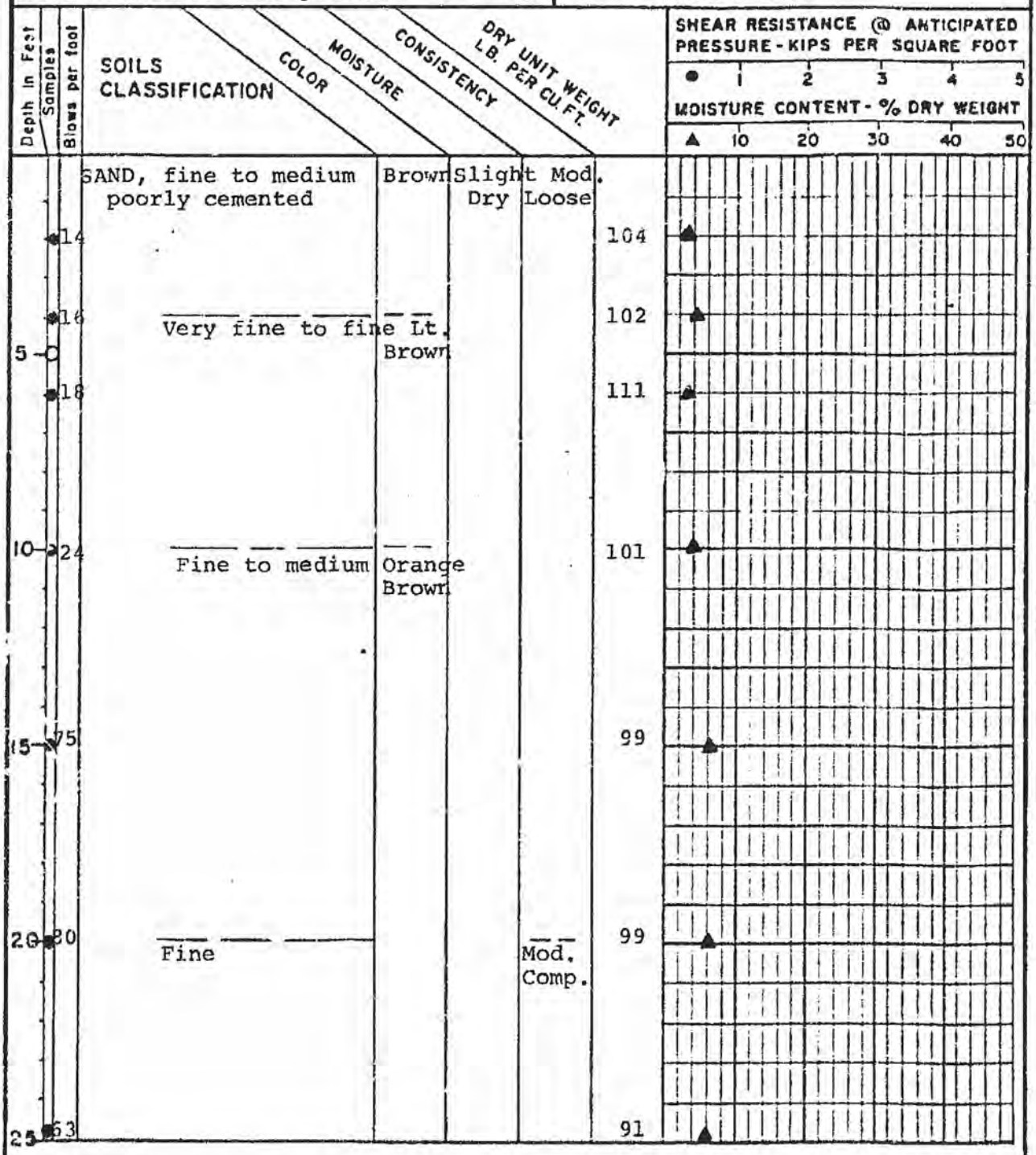
LOGGED BY WMC | DATE 1/14/75

BORING LOGS BY

SOILS INTERNATIONAL
(1988)

LOG OF BORING Nº 1

DATE DRILLED 3-25-88	DRILLING EQUIPMENT 8" Hollowstem
DRIVING WEIGHT 140 pounds - 30" drop	SURFACE ELEVATION



Edwards Theatre 300 Newport Center Drive Newport Beach, Calif.	PROJECT No.	S-1093-F
	PLATE	B

SOILS INTERNATIONAL
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

LOG OF BORING Nº 1 continued . . .

DATE DRILLED 3-25-88 | DRILLING EQUIPMENT 8" Hollowstem

DRIVING WEIGHT 140 pounds - 30" drop | SURFACE ELEVATION

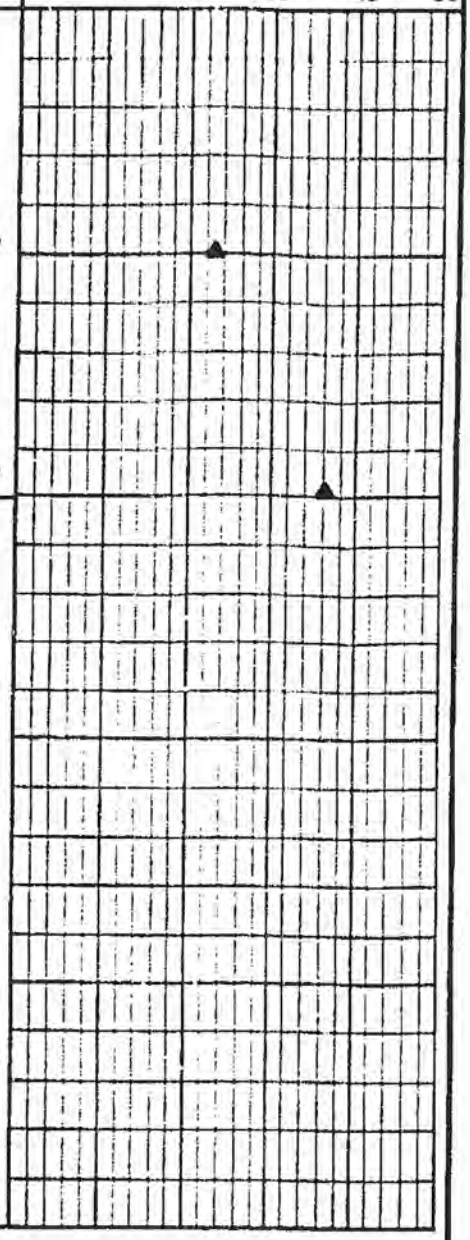
Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT L.B. PER CU. FT.
			Sand, fine to medium		Sl. Moist	Mod. Comp.	
			Siltstone		Moist	Comp.	
30	●	29					87
			Sandstone with siltstone fragments				
35	●	20					67
			End of Boring @ 35 feet No caving No groundwater				
40			● Core Sample ○ Bulk Sample				
45							
50							

SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT

● 1 2 3 4 5

MOISTURE CONTENT - % DRY WEIGHT

▲ 10 20 30 40 50



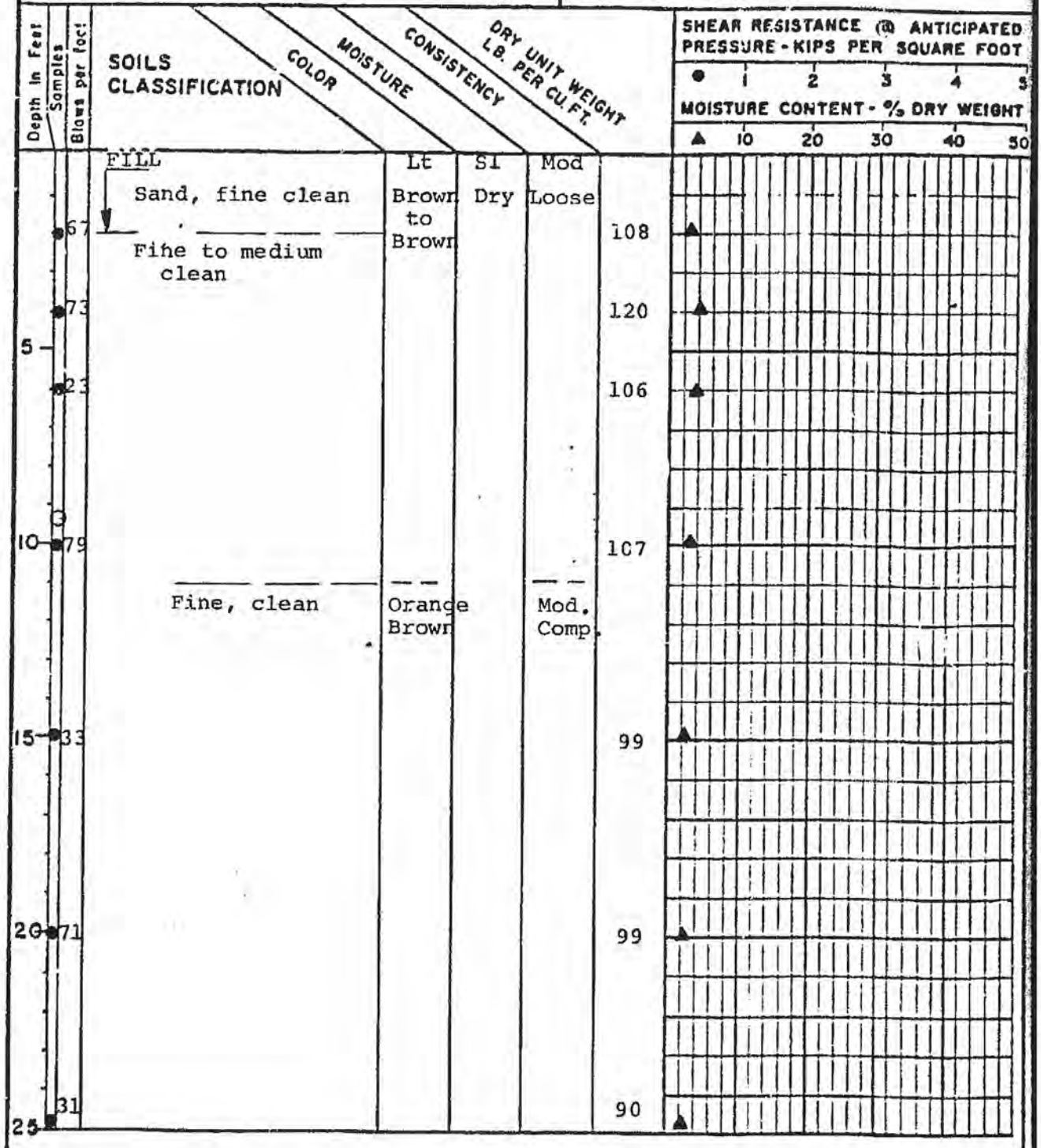
Edwards Theatre
300 Newport Center Drive
Newport Beach, CAlif.

PROJECT No.	S-1093-F
PLATE	C

SOILS INTERNATIONAL
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

LOG OF BORING Nº 2

DATE DRILLED 3-25-88	DRILLING EQUIPMENT 8" Hollowstem
DRIVING WEIGHT 140 pounds - 30" drop	SURFACE ELEVATION



Edwards Theatre
300 Newport Center Drive
Newport Beach, Calif.

PROJECT No.	S-1093-F
PLATE	D

SOILS INTERNATIONAL
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

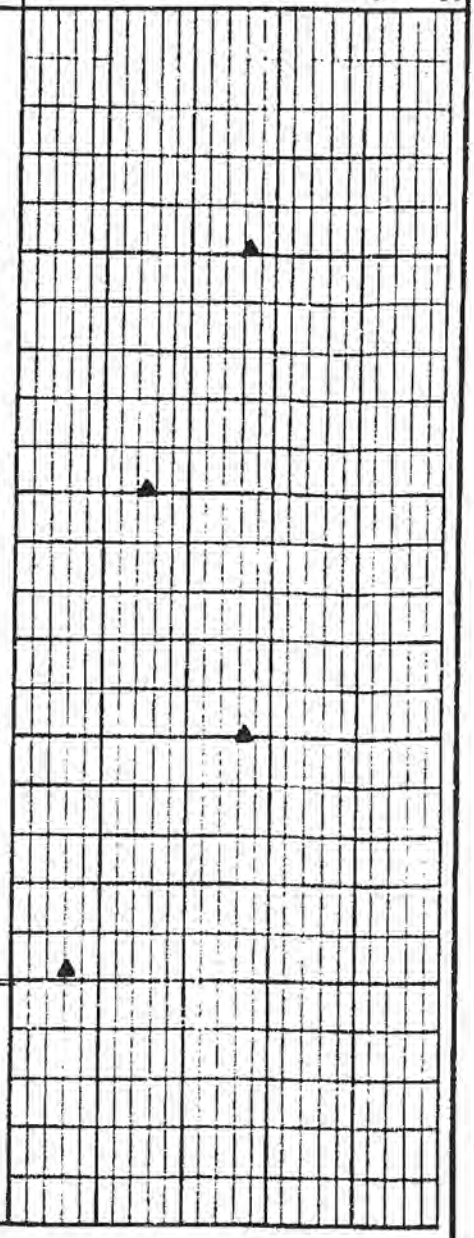
LOG OF BORING Nº 2 continued. . .

DATE DRILLED 3-25-88	DRILLING EQUIPMENT 8" Hollowstem
DRIVING WEIGHT 140 pounds - 30" Drop	SURFACE ELEVATION

Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT L.B. PER CU.FT.
			SAND, fine to medium	Orange Brown	Sl. Moist	Mod. Comp.	
30		36	Siltstone/sandstone	Tan	Moist	Comp.	77
35		52					93
40		79	Sandstone lense of siltstone	Grey Tan			82
45		95					95
			End of Boring @ 45' No caving No groundwater				
50							

SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT
● 1 2 3 4 5

MOISTURE CONTENT - % DRY WEIGHT
▲ 10 20 30 40 50



Edwards Theatre
300 Newport Center Drive
Newport Beach, Calif.

PROJECT No.	S-1093-F
PLATE	E

SOILS INTERNATIONAL
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

BORING LOGS BY

R.T. FRANKIAN & ASSOCIATES
(1994)

LOG OF BORINGS 94-029-A BORING NUMBER 1

CLIENT _____ JOB NO. _____

ELEVATION 69½±

Sample Depth	Blows Per Foot	Moisture Content (%)	Dry Unit Weight Lbs. Per Cu. Ft.	Depth In Feet	DESCRIPTION
					Surface Conditions: Asphalt 6" thick - no base
				0	
1½	5	11	120		SM SAND: Tan-brown, silty, fine to medium moist, dense to very dense mottled tan-brown and medium brown
3	8	11	113		Ss SANDSTONE? Mottled rust-brown-gray, fine sandstone, moist, hard
				5	
6	10	9	109		
					mottled rust-brown-olive-gray with olive-gray shale bedrock, root fragment
10	6	23	92	10	
					mottled rust-brown-white, and olive-gray, fine sandstone with olive-gray siltstone bedding, moist, firm to medium hard
14	7	28	87		
				15	grades olive-buff colored fine sandstone, less moist
					lenses of very hard hsale
				20	End of boring at 20 feet No water - no caving

R.T. FRANKIAN & ASSOCIATES
Theoretical and Applied Earth Mechanics

LOG OF BORINGS 94-029-A BORING NUMBER 2

CLIENT _____ JOB NO. _____

ELEVATION: 72½±

Sample Depth	Blows Per Foot	Moisture Content (%)	Dry Unit Weight Lbs. Per Cu. Ft.	Depth In Feet	DESCRIPTION
					Surface Conditions: Asphalt 7" thick - no base
				0	
2	9/ 10"	9	118		SAND: Tan-brown silty fine sand, damp to moist, dense to very dense
4	10	5	110		SANDSTONE: Mottled tan-brown to dark-brown, fine, damp to moist, hard to very hard
				Ss	
				5	
7	12	6	112		grades tan to medium brown sandstone, damp to moist, very hard
					grades olive-gray, moist
				10	
10½	6	26	92		olive to light green fine sandstone
					SILTSTONE: Mottled rust-brown and gray siltstone, moist, very firm
				S_i	
				15	
16	12/ 7"	3	107		SANDSTONE: Buff-gray fine sandstone, damp, very hard
				Ss	
					occasional layers of hard shale bedding
20	10/ 8"	26	87	20	
					End of boring at 20 feet No water - no caving

R.T. FRANKIAN & ASSOCIATES

LOG OF BORINGS 94-029-A BORING NUMBER 3

CLIENT _____ JOB NO. _____

ELEVATION: 76±

Sample Depth	Blows Per Foot	Moisture Content (%)	Dry Unit Weight Lbs. Per Cu. Ft.	Depth In Feet	DESCRIPTION
					Surface Conditions: Concrete 5" thick (+/-) reinforced
				0	
					Af
					FILL: Gray silty clay, moist to very moist
2	Push &Tap	15	112		grades red-brown almoost clean sand, very moist, loose
					grades dark olive-brown to black slightly silty sand with lenses of olive colored silty clay, very moist, loose
				5	
8	6	11	114		SM
					SAND: Mottled light brown, medium brown, and rust brown, silty, fine, moist, dense to very dense
				10	
11	10	10	114		S_s
					SANDSTONE: Mottled rust-brown and gray, fine sandstone, moist, very hard
					occasional lense of silty clay
15	12	7	107	15	mottled rust-brown, olive, tan colored fine sandstone, moist
20	15	26	93	20	occasional lense of hard shale

R.T. FRANKIAN & ASSOCIATES

APPENDIX C

LABORATORY TEST RESULTS BY

W.A. WAHLER
(1970)

FOR EXISTING CARWASH SITE

TABLE A-1

FIELD RESISTIVITY TEST RESULTS

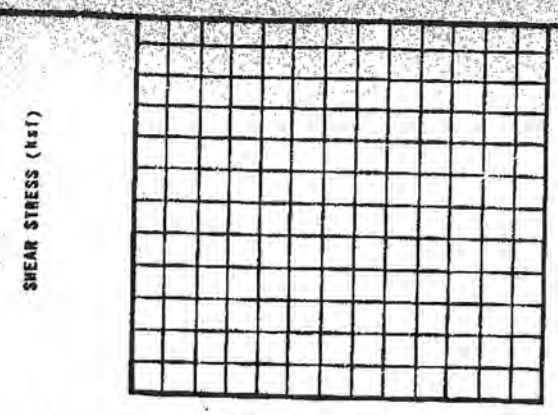
Alignment No.	Test Depth	Soil Classification	Resistivity (ohm-cm)	Corrosivity	Service Life
1	2.5'	Clayey SAND	1435	Severe	10-15
	4.5'	Clayey SAND	1700	Moderate	15-20
	9.0'	SAND	2552	Moderate	15-20
2	2.5'	Clayey SAND	1558	Moderate	15-20
	4.5'	Clayey SAND	1530	Moderate	15-20
	9.0'	SAND	2200	Moderate	15-20
3	10.0'	SAND	1495	Moderate to Severe	12-20
	11.5'	Sandy CLAY	1632	Moderate	15-20

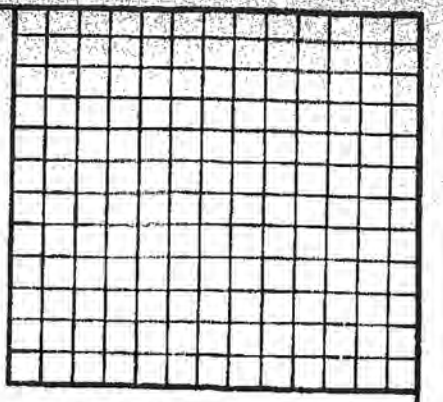
NOTE: pH's were determined for samples from depths of 1', 4.5', 11', 13', and 14'. The pH of each sample was 6.8.

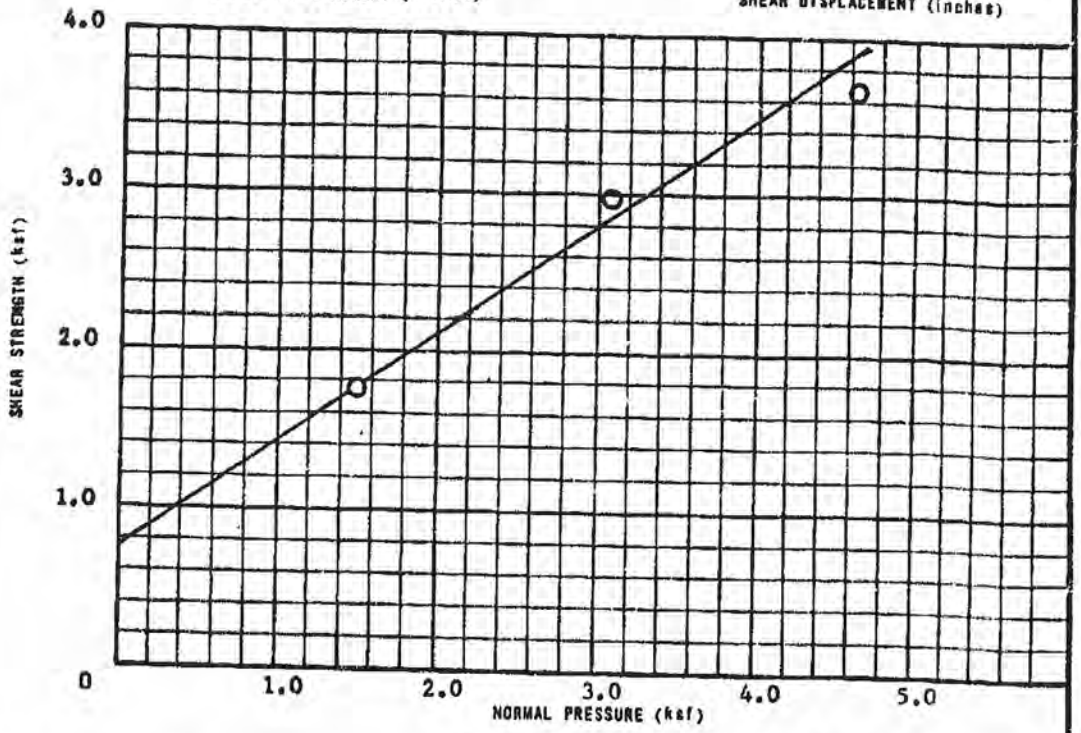
TABLE B-1

DETERMINATION OF NATURAL WATER CONTENT, DRY DENSITY, AND pH

Pit No.	Depth (Ft.)	Sample Description	Unified Soil Classification	Natural Water Content (%)	Natural Dry Density (pcf)	pH
1	0.25	SAND	SP	6.9	112.1	-
	4.5	Clayey SAND	SW-SC	9.1	119.2	6.8
	6	Silty SAND	SP-SM	7.1	108.8	-
	8	Silty SAND	SM	9.7	-	-
	9	Sandy CLAY	CL	13.2	134.3	-
3	1.5	Clayey SAND	SC	16.0	109.8	-
	3.5	Clayey SAND	SP-SC	9.0	119.3	-
4	4.5	Sandy CLAY	CL	30.4	86.3	-
5	1-4	Sandy CLAY	SC	-	-	6.8
	11	Silty SAND	SM	7.2	127.8	6.8
	13	Sandy CLAY	CH	-	-	6.8
	14	SAND	SP	7.1	116.8	6.8







HOLE NO. 1
DEPTH (ft) 4.5
SAMPLE DESCRIPTION Light Brown Clayey SAND
TEST DESIGNATION Q Sat
RATE OF STRAIN .025 in/min.

SPECIMEN NUMBER	1	2	3	
NORMAL PRESSURE (ksf)	1.56	3.09	4.63	
SHEAR STRENGTH (ksf)	1.75	2.99	3.65	
INITIAL WATER CONTENT (%)	9.1	9.1	9.1	
FINAL WATER CONTENT (%)	15.6	14.3	13.4	
DRY DENSITY (pcf)	119.2	119.2	119.2	

NOTE: $\phi = 35^{\circ}$ C = 0.75 ksf

SOIL MECHANICS and FOUNDATION ENGINEERS Inc.
PALO ALTO • NEWPORT BEACH • CALIF.

NEWPORT CENTER CAR WASH
NEWPORT BEACH, CALIFORNIA

DIRECT SHEAR TEST

PROJECT NO.	DATE	DRAWING NO.
0461	JAN. 1970	FIGURE B-1

811-2 Rev. 2/69

LABORATORY TEST RESULTS BY

NMG
(2012a & b)

FOR PADS B & C AT FASHION ISLAND

Sample	Compacted Moisture (%)	Compacted Dry Density (pcf)	Final Moisture (%)	Volumetric Swell (%)	Expansion Index[1] Value/Method		Expansive Classification[2]	Soluble Sulfate (%)	Sulfate Exposure[3]
HS-3 B-1 0-5'	8.6	114.8	13.1	2.8	28	B	Low	.05	Negligible
HS-12 B-1 0-5'	7.5	113.4	12.3	0	0	B	Very Low	0.05	Negligible
HS-13 B-1 0-5'	10.6	112.1	15.7	0.2	5	B	Very Low	0.05	Negligible

Test Method:

ASTM D4829 / UBC Standard 18-2

HACH SF-1 (Turbidimetric)

Notes:

1. Expansion Index (EI) method of determination:
   [A] E.I. determined by adjusting water content to achieve a 50 ±1% degree of saturation
   [B] E.I. calculated based on measured saturation within the range of 40% and 60%
2. 1997 UBC Table 18-1-B *(Classification of Expansive Soil)*
3. 1997 UBC Table 19-A-4 *(Requirement for Concrete Exposed to Sulfate-Containing Solutions)*

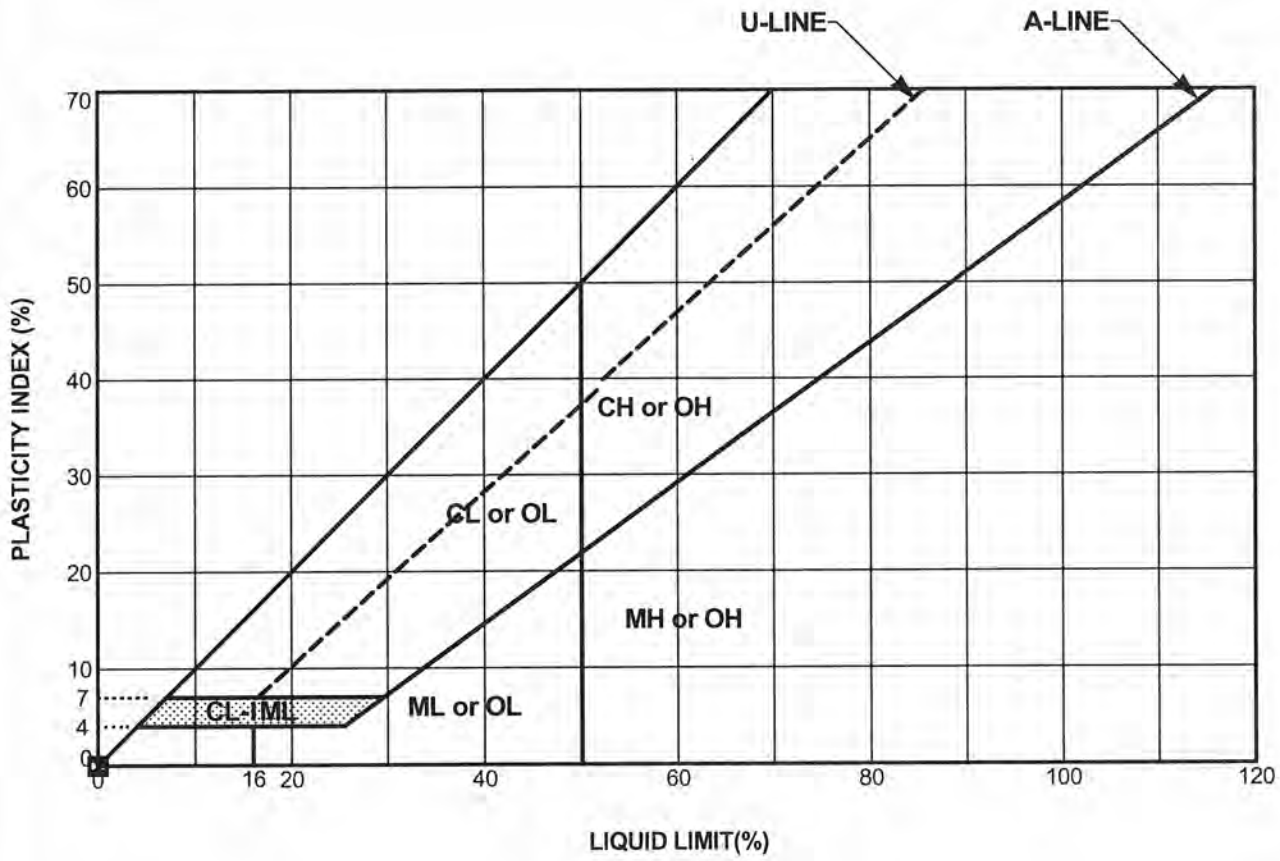
Expansion Index and Soluble Sulfate Test Results

(FRM001 Rev.5)

Project No. 08034-01 and -03

Project Name: FI Eastside

NMG



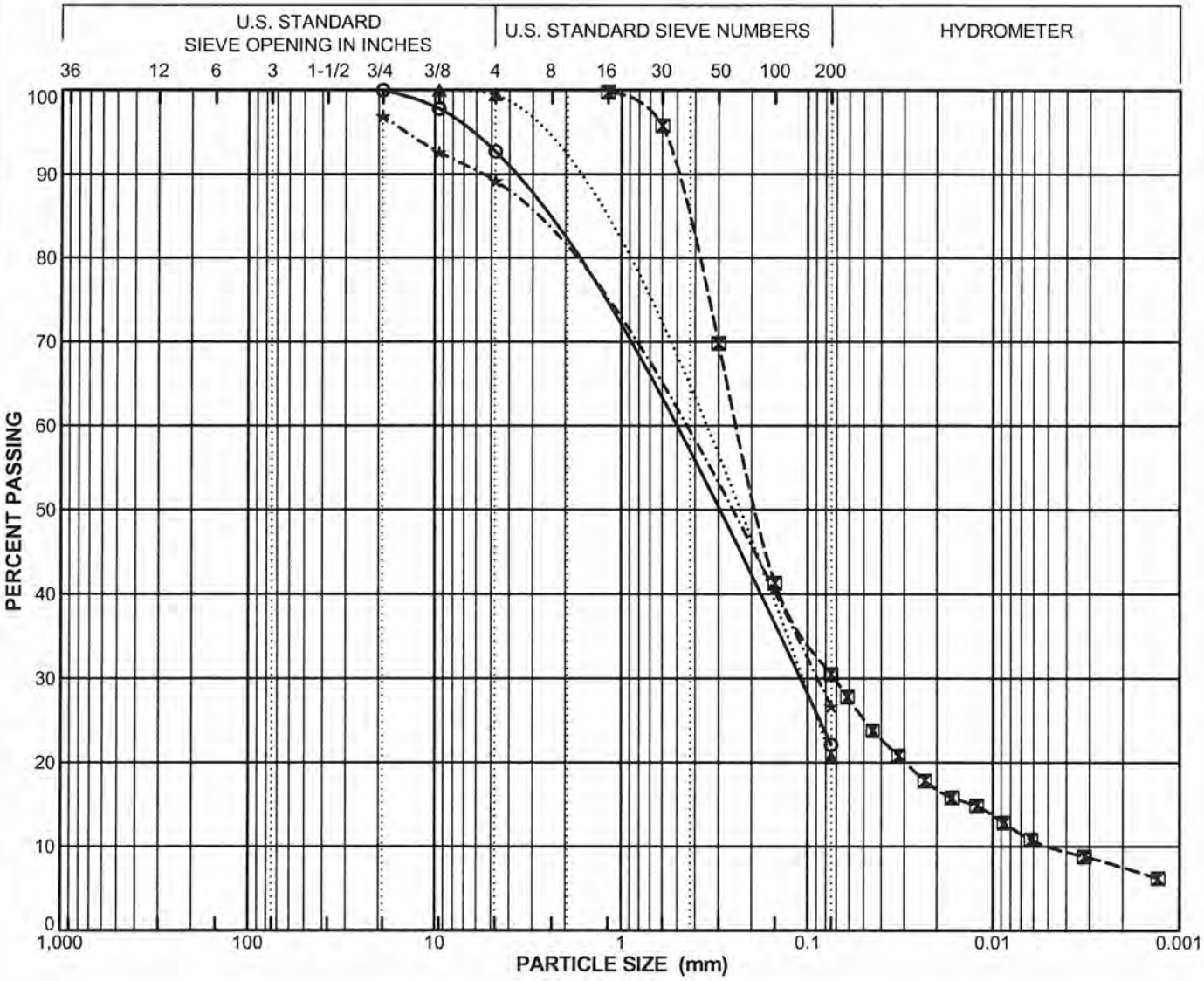
Symbol	Boring Number	Depth (feet)	Sample Number	Passing No. 200 Sieve (%)	LL	PI	USCS	Description
O	HS- 3	2.0	B-1	31	NP	NP	SM	(Af) Dark Brown Silty SAND
⊠	HS-13	2.0	B-1	27	NP	NP	SM	(Af) Brown Silty SAND

PLASTICITY CHART

Fashion Island/Eastside
Newport Beach, California
PROJECT NO. 08034-01

NMG Geotechnical, Inc.

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	

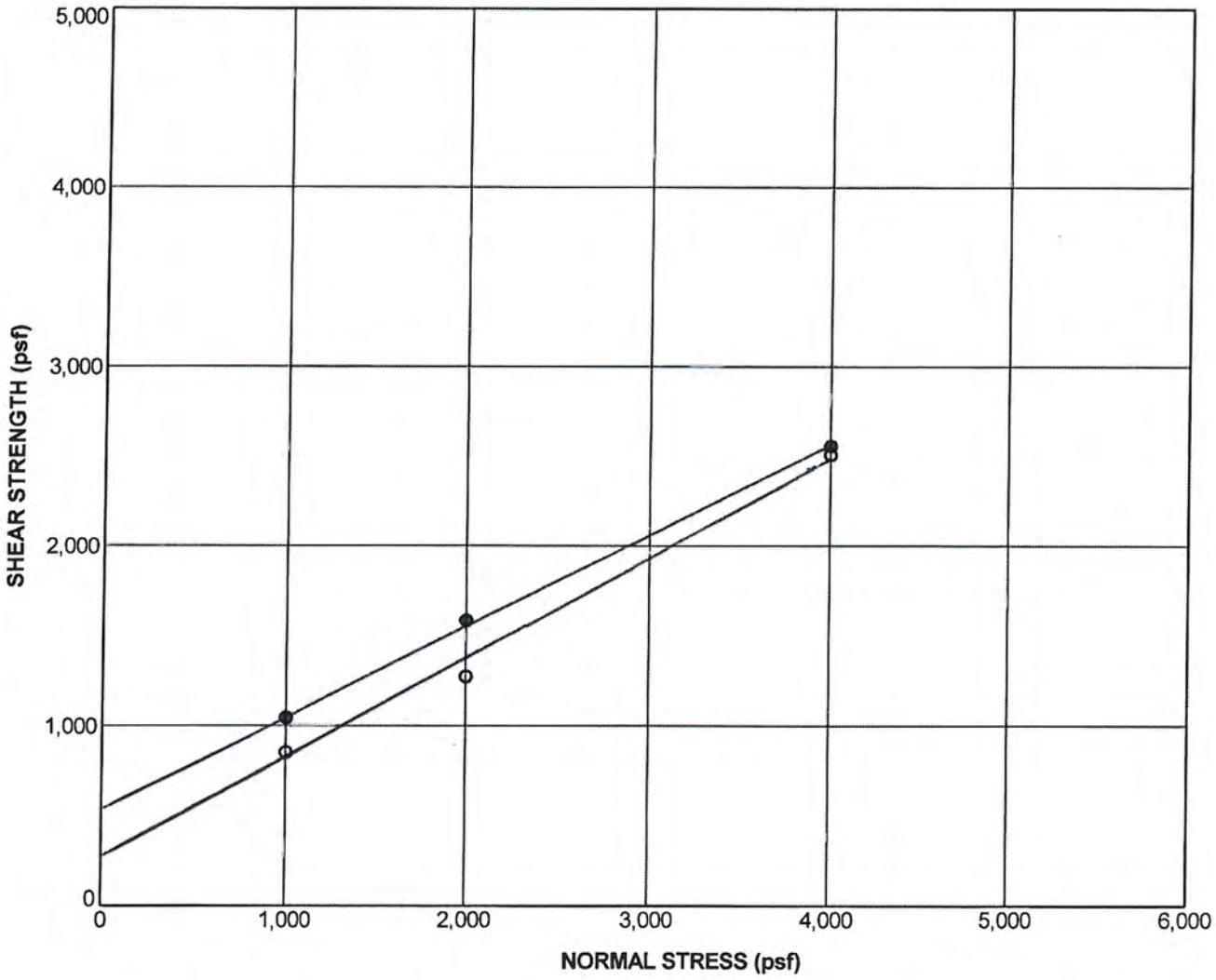


Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2μ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2μ (%)	USCS
O	HS- 1	B-1	2.0							22		SP
⊠	HS- 3	B-1	2.0	9	NP	NP				31	7	SM
▲	HS-12	B-1	2.0							21		SM
★	HS-13	B-1	2.0		NP	NP				27		SM

PARTICLE SIZE DISTRIBUTION

Fashion Island/Eastside
Newport Beach, California
PROJECT NO. 08034-01

NMG Geotechnical, Inc.



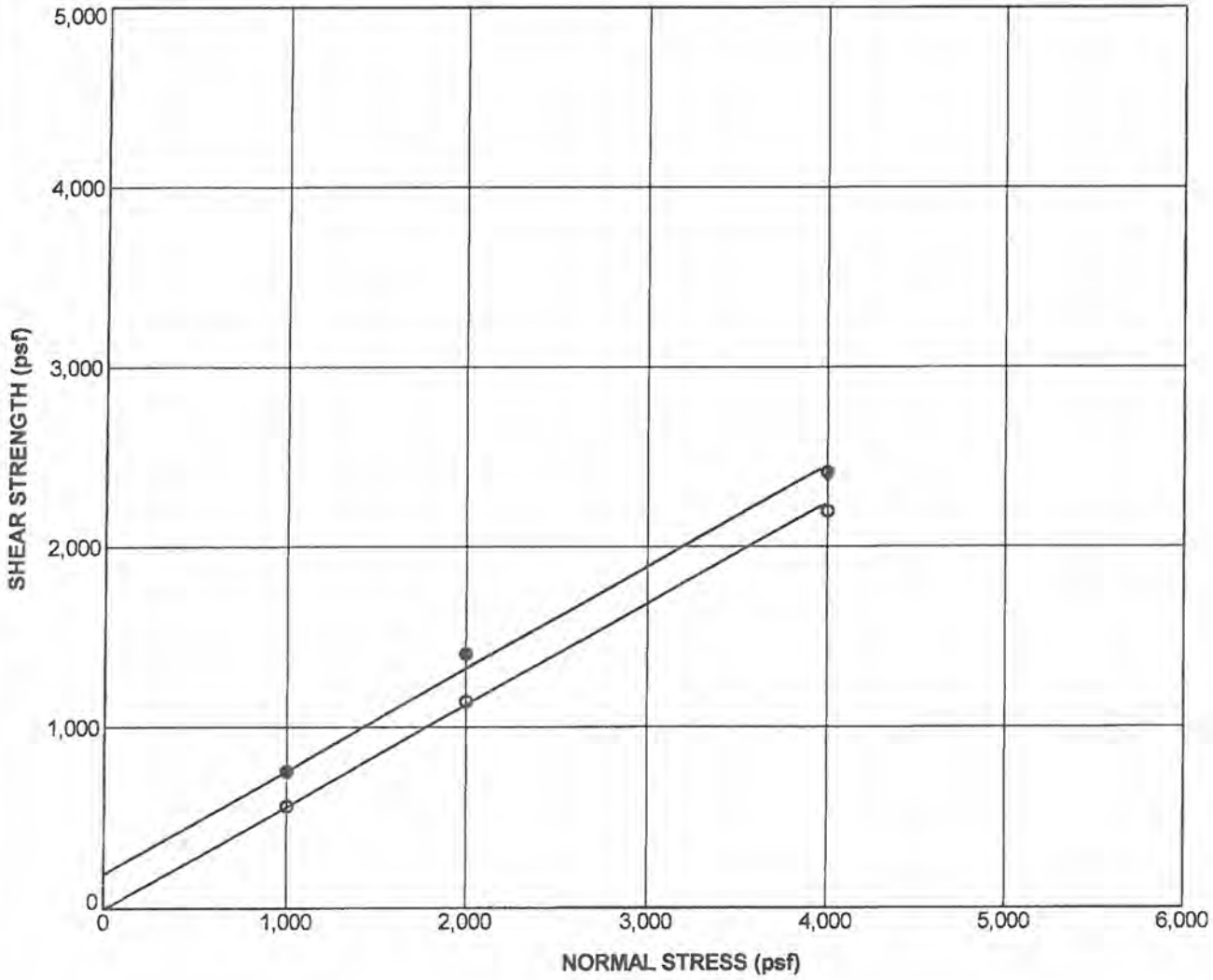
Boring No. HS-3		Sample No. B-1		Depth: 2.0 ft	
Sample Description:	(Af) Dark Brown Silty SAND				
Liquid Limit:	NP	Plasticity Index:	NP	Percent Passing No. 200 Sieve:	31
Moisture Content (%):	16.4	Dry Density (pcf):	112.7	Degree of Saturation (%):	93
Sample Type:	Remolded to 90% RC	Rate of Shear (in./min.):	0.05		

SHEAR STRENGTH PARAMETERS		
Parameter	Peak ●	Ultimate O
Cohesion (psf)	500	250
Friction Angle (degrees)	27	29.0

DIRECT SHEAR TEST RESULTS

Fashion Island/ Eastside
Fashion Island Retail Center
PROJECT NO. 08034-01

NMG Geotechnical, Inc.



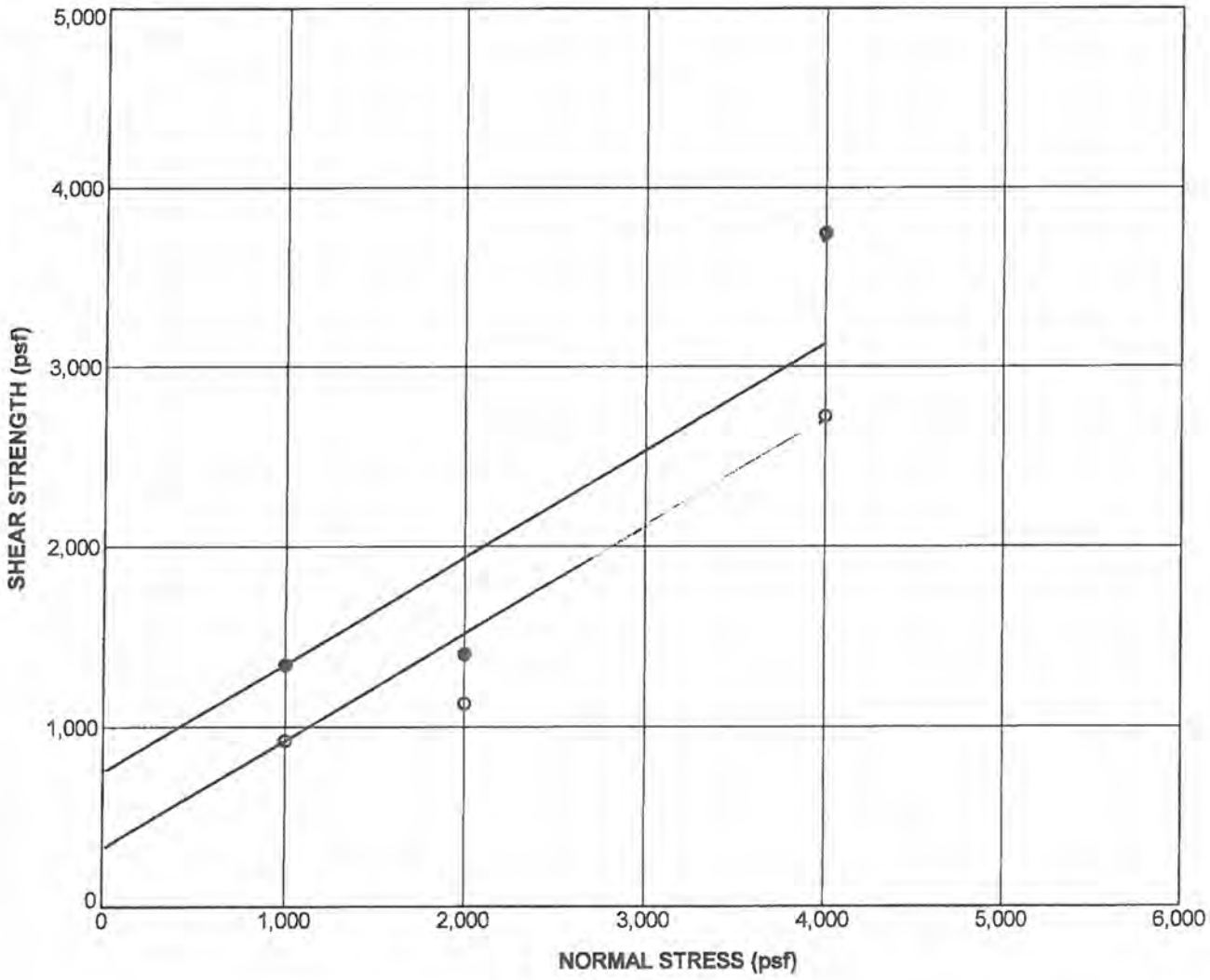
Boring No. HS-12	Sample No. D-2	Depth: 5.0 ft
Sample Description: (Af) Brown Clayey SAND		
Liquid Limit:	Plasticity Index:	Percent Passing No. 200 Sieve:
Moisture Content (%): 20.6	Dry Density (pcf): 105.0	Degree of Saturation (%): 95
Sample Type: Undisturbed	Rate of Shear (in./min.): 0.05	

SHEAR STRENGTH PARAMETERS		
Parameter	Peak ●	Ultimate ○
Cohesion (psf)	200	0
Friction Angle (degrees)	30	30.0

DIRECT SHEAR TEST RESULTS

Fashion Island/Eastside
Newport Beach, California
PROJECT NO. 08034-01

NMG Geotechnical, Inc.



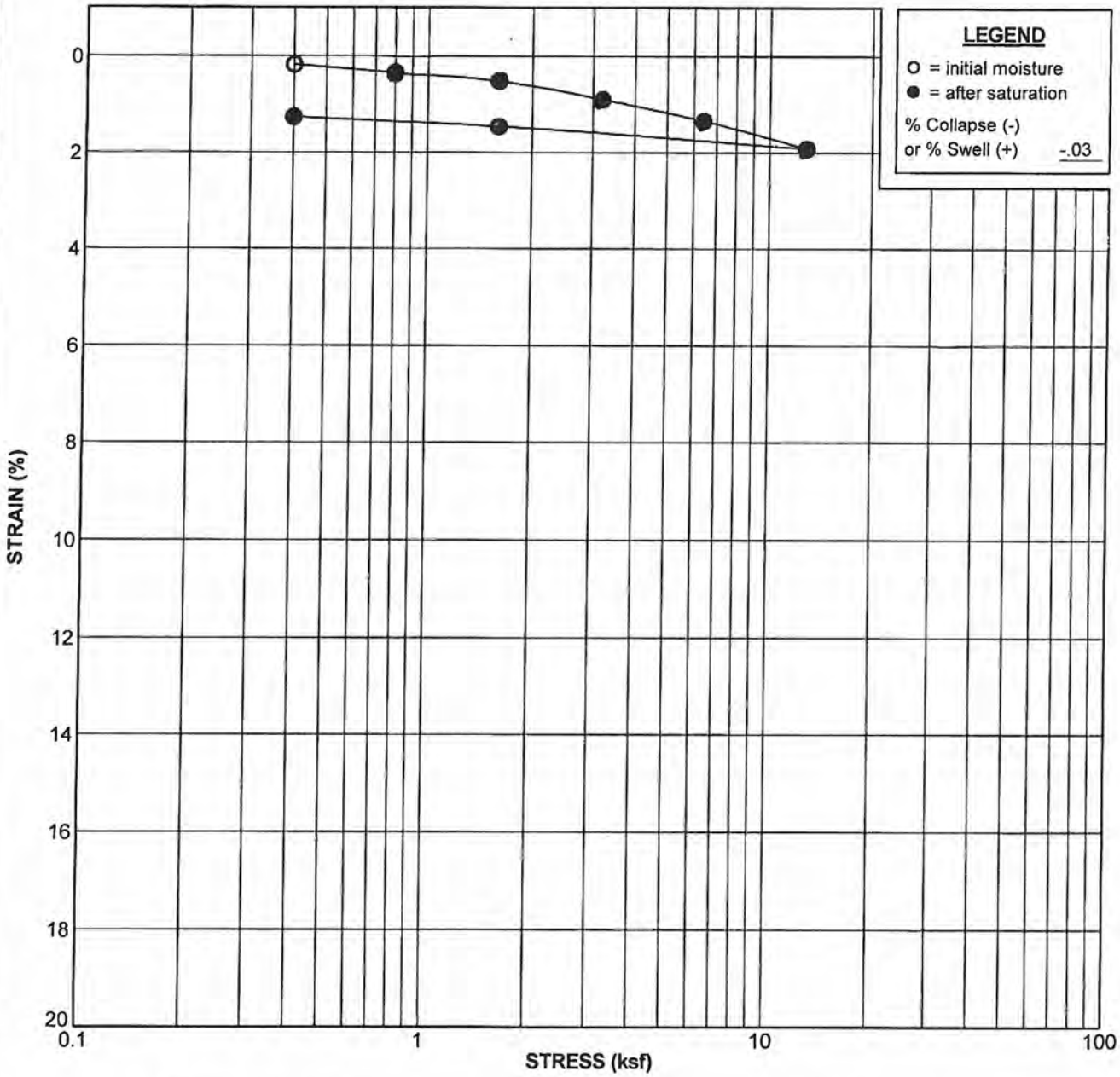
Boring No. HS-13	Sample No. D-1	Depth: 2.5 ft
Sample Description:	(Af) Brown Silty SAND	
Liquid Limit:	Plasticity Index:	Percent Passing No. 200 Sieve:
Moisture Content (%): 15.5	Dry Density (pcf): 114.5	Degree of Saturation (%): 92
Sample Type: Undisturbed	Rate of Shear (in./min.): 0.05	

SHEAR STRENGTH PARAMETERS		
Parameter	Peak ⊗	Ultimate O
Cohesion (psf)	750	350
Friction Angle (degrees)	31	31.0

DIRECT SHEAR TEST RESULTS

Fashion Island/Eastside
Newport Beach, California
PROJECT NO. 08034-01

NMG Geotechnical, Inc.



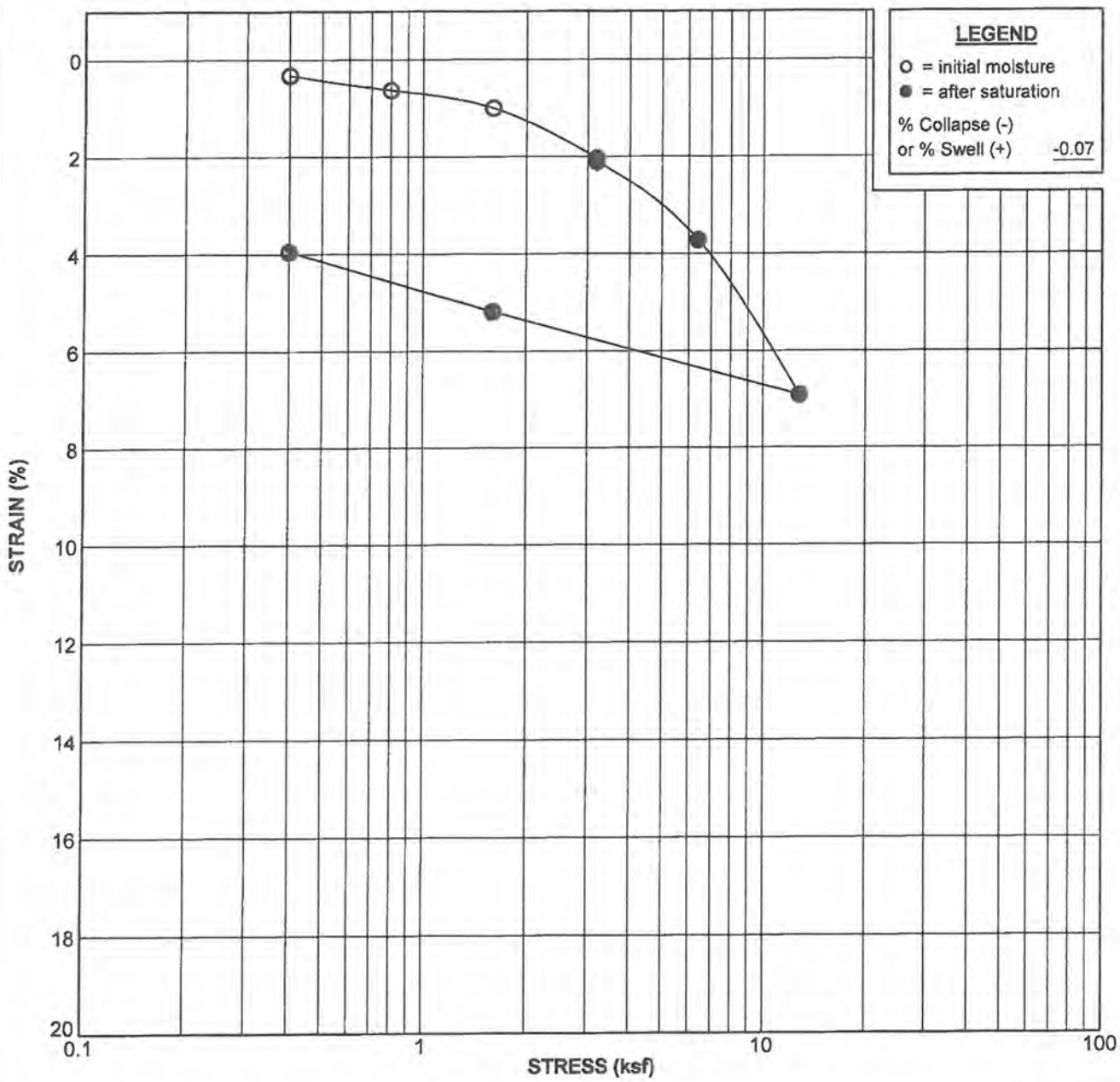
Boring No. HS-3	Sample No. B-1	Depth: 2.0 ft
Sample Description:	(Af) Dark Brown Silty SAND (Remolded to 90%RC)	
Liquid Limit: NP	Plasticity Index: NP	Percent Passing No. 200 Sieve: 31

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	8.6	113.0	49.2	0.463
Final	15.4	114.4	91.6	0.445

CONSOLIDATION TEST RESULTS

Fashion Island/ Eastside
Fashion Island Retail Center
PROJECT NO. 08034-01

NMG Geotechnical, Inc.



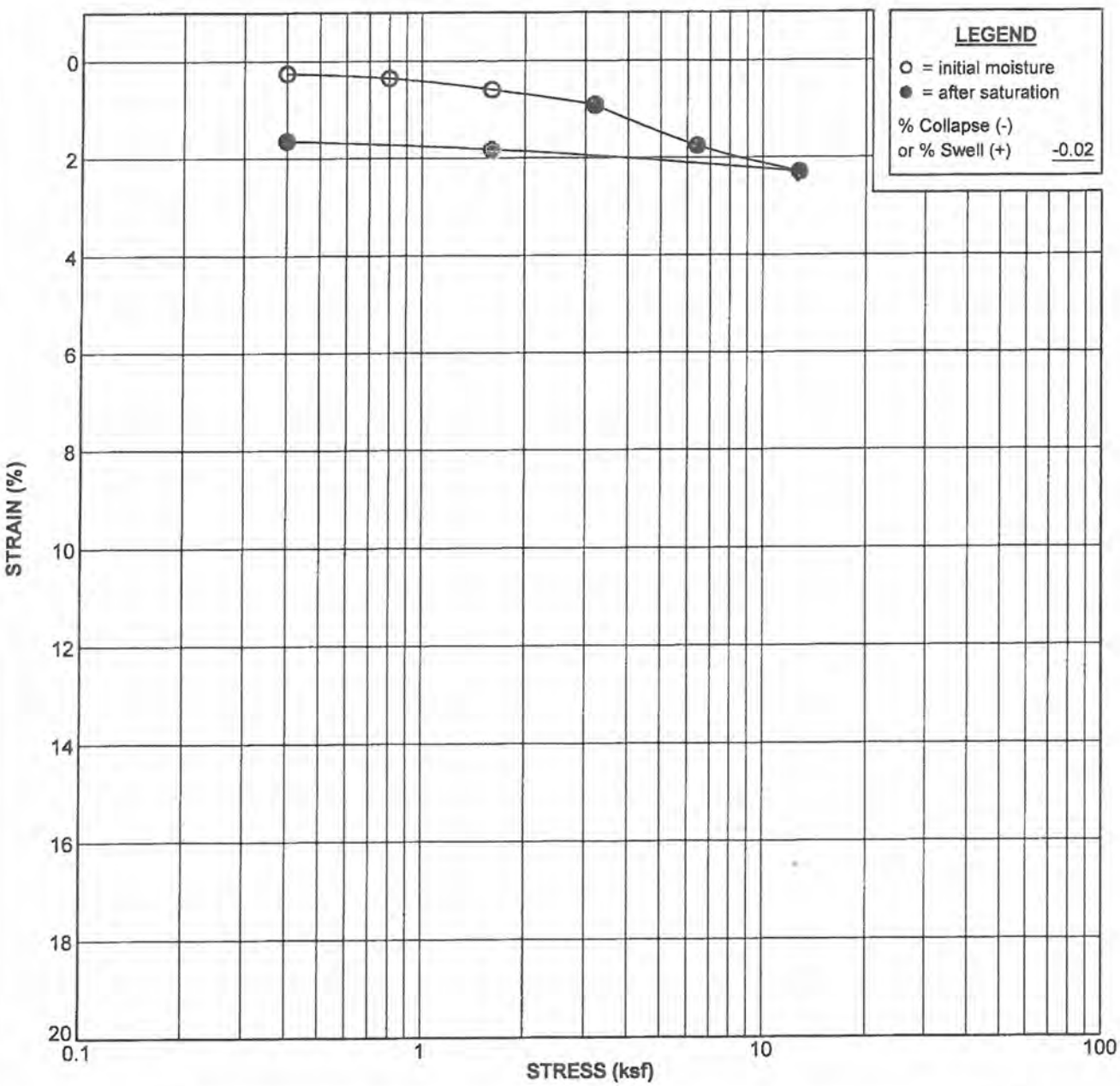
Boring No. HS-12	Sample No. D-3	Depth: 7.5 ft
Sample Description:	(Qal) Pale Gray to Reddish Brown Silty Sandy CLAY	
Liquid Limit:	Plasticity Index:	Percent Passing No. 200 Sieve:

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	22.0	102.3	94.6	0.616
Final	22.2	106.4	106.2	0.554

CONSOLIDATION TEST RESULTS

Fashion Island/Eastside
Newport Beach, California
PROJECT NO. 08034-01

NMG Geotechnical, Inc.



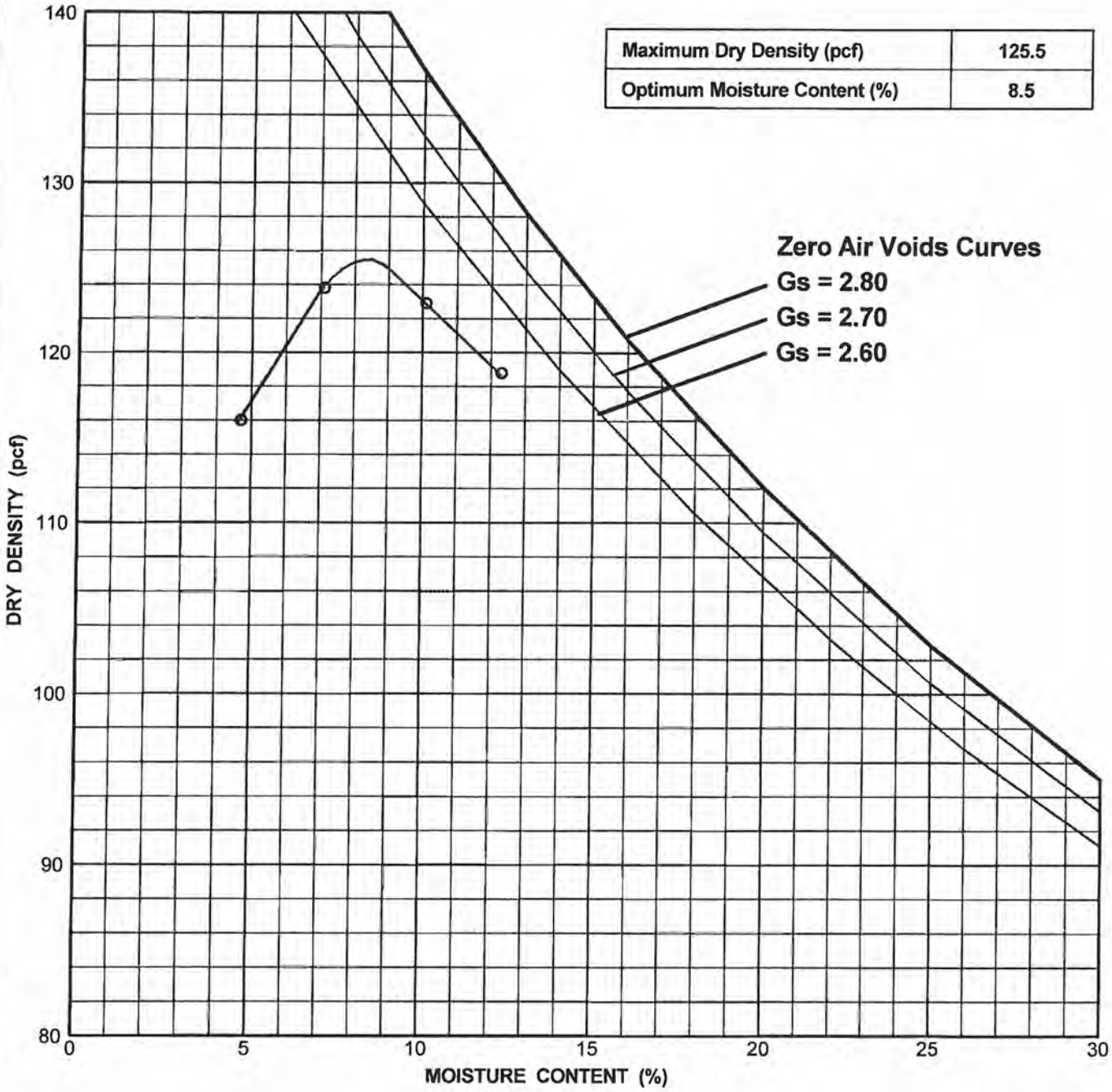
Boring No. HS-13	Sample No. D-3	Depth: 7.5 ft
Sample Description:	(Af) Reddish Brown Silty SAND	
Liquid Limit:	Plasticity Index:	Percent Passing No. 200 Sieve:

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	9.9	113.2	56.9	0.461
Final	13.1	115.1	79.5	0.437

CONSOLIDATION TEST RESULTS

Fashion Island/Eastside
Newport Beach, California
PROJECT NO. 08034-01

NMG Geotechnical, Inc.



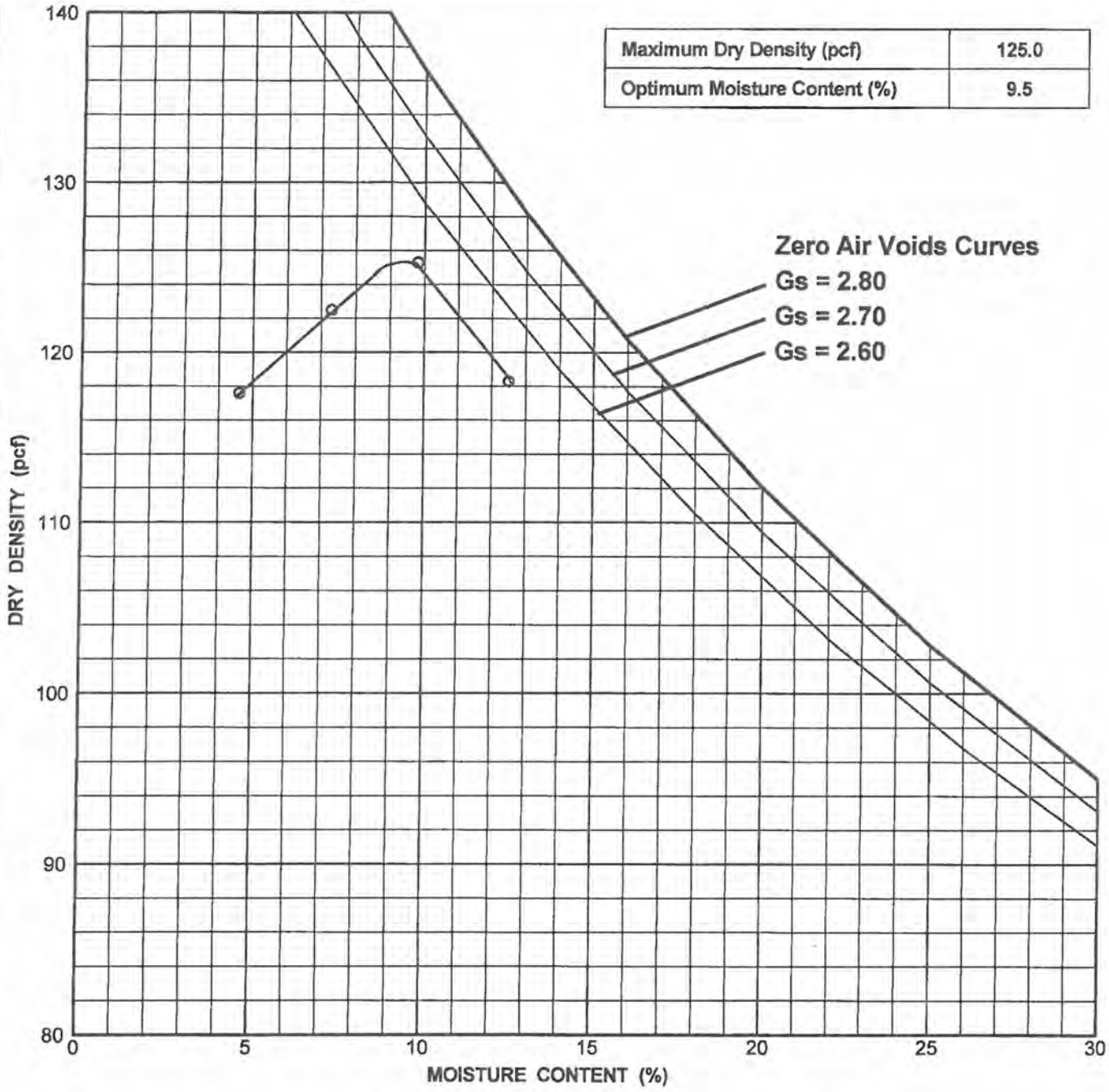
Maximum Dry Density (pcf)	125.5
Optimum Moisture Content (%)	8.5

Boring No. HS-3	Sample No. B-1	Depth: 2.0 ft
Sample Description: (Af) Dark Brown Silty SAND		
Liquid Limit: NP	Plasticity Index: NP	Percent Passing No. 200 Sieve: 31
Comments: 1557A		

COMPACTION TEST RESULTS

Fashion Island/ Eastside
Fashion Island Retail Center
PROJECT NO. 08034-01

NMG Geotechnical, Inc.



Maximum Dry Density (pcf)	125.0
Optimum Moisture Content (%)	9.5

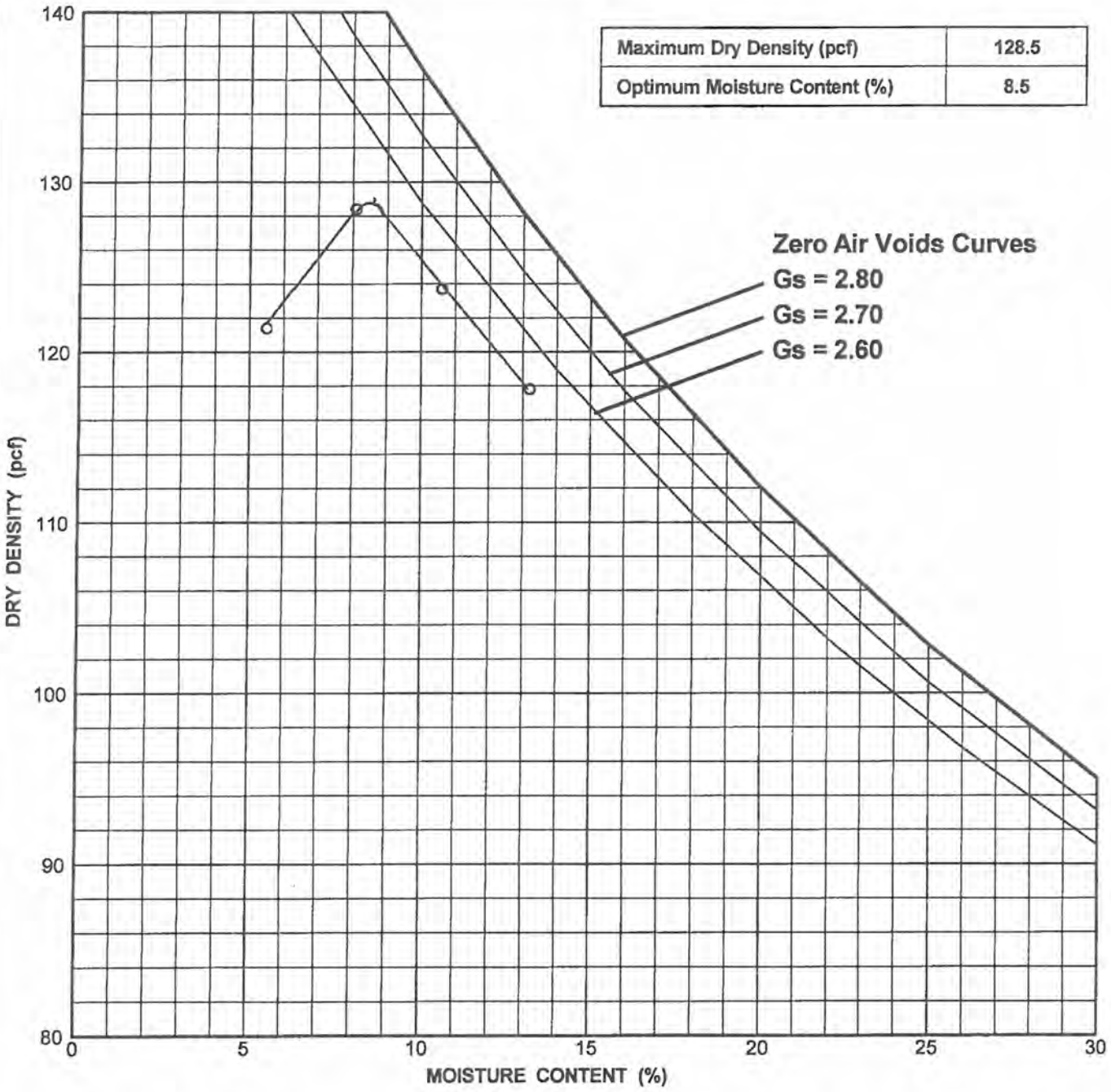
Boring No. HS-12	**Sample No. B-1**	**Depth: 2.0 ft**
Sample Description: (Af) Reddish Brown Silty SAND		
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 21
Comments: 1557A		

COMPACTION TEST RESULTS

Fashion Island/Eastside
Newport Beach, California
PROJECT NO. 08034-01

NMG Geotechnical, Inc.

Maximum Dry Density (pcf)	128.5
Optimum Moisture Content (%)	8.5



Boring No. HS-13	**Sample No. B-1**		**Depth: 2.0 ft**
Sample Description:	(Af) Brown Silty SAND		
Liquid Limit: NP	**Plasticity Index:**	NP	**Percent Passing No. 200 Sieve:** 27
Comments:	1557A		

COMPACTION TEST RESULTS

Fashion Island/Eastside
Newport Beach, California
PROJECT NO. 08034-01

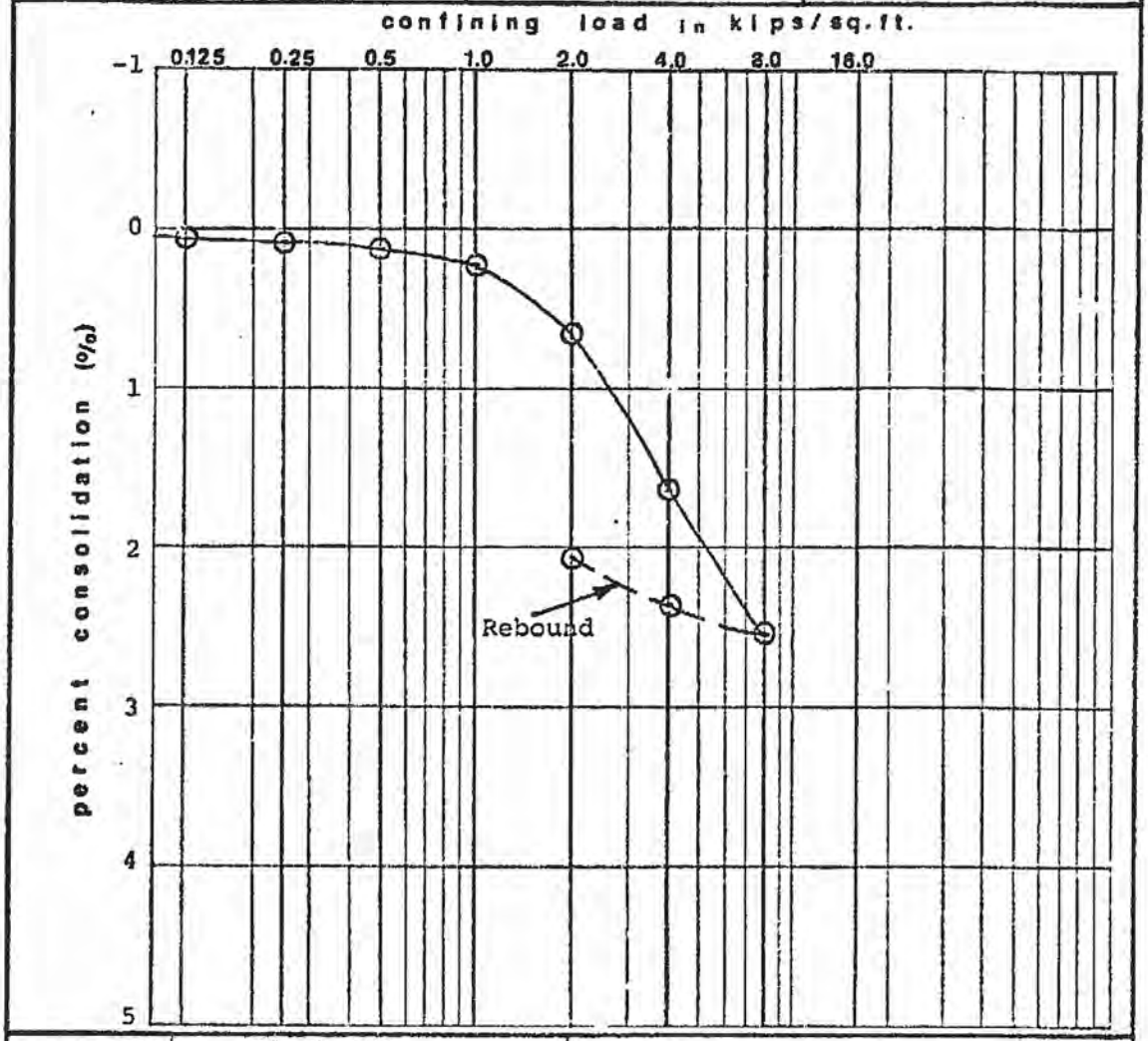
NMG Geotechnical, Inc.

LABORATORY TEST RESULTS BY

G.A. NICOLL & ASSOCIATES (1972)

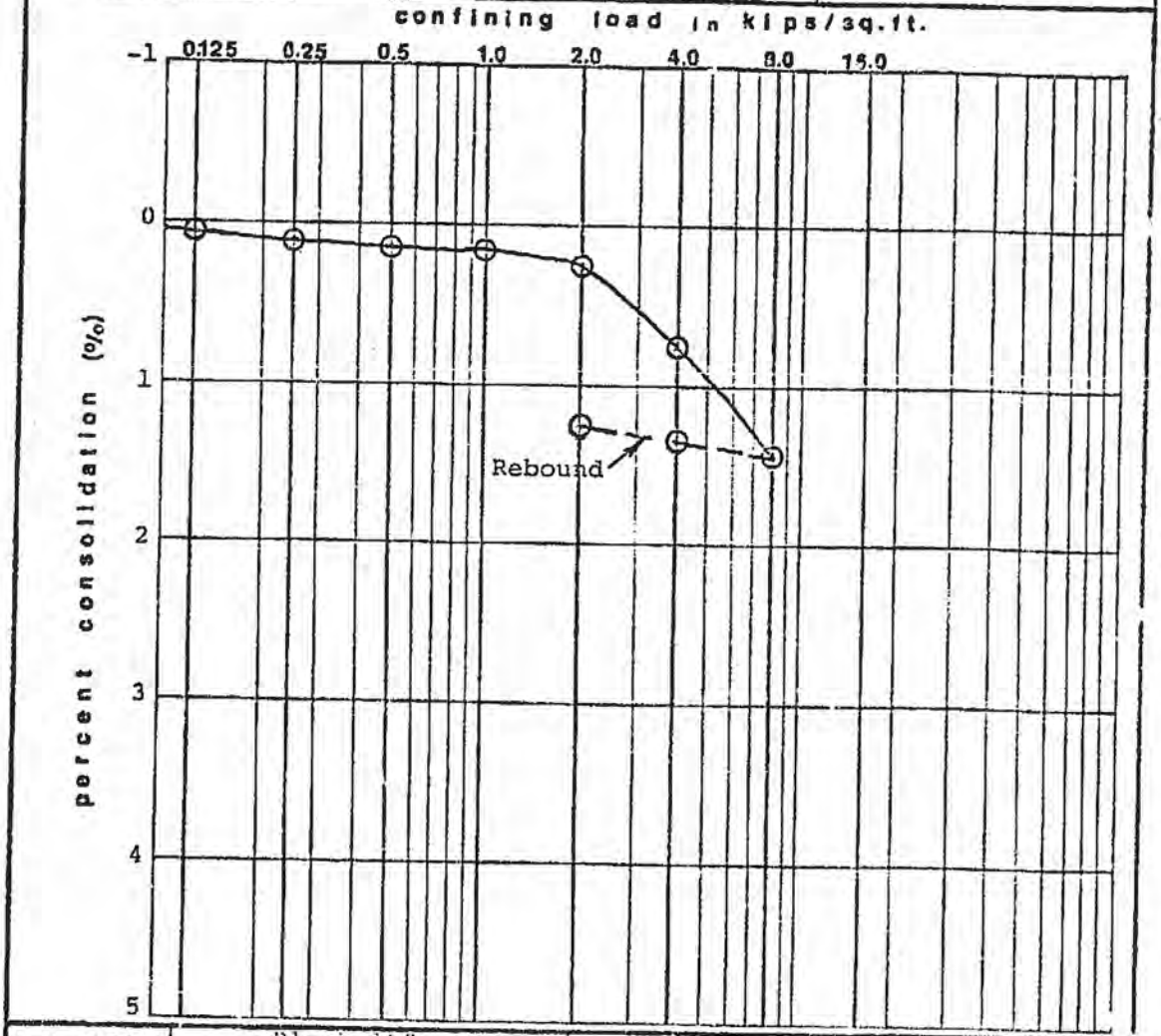
FOR SIX PROPOSED OFFICE BUILDINGS

symbol	specimen	boring no.	sample depth	sample condition	moisture condition
○	A	B-3	2.0 ft	Silty Sand, med/den.	Moist
◔	A				
⬡	B				
◔	B				
▽	C				
▼	C				



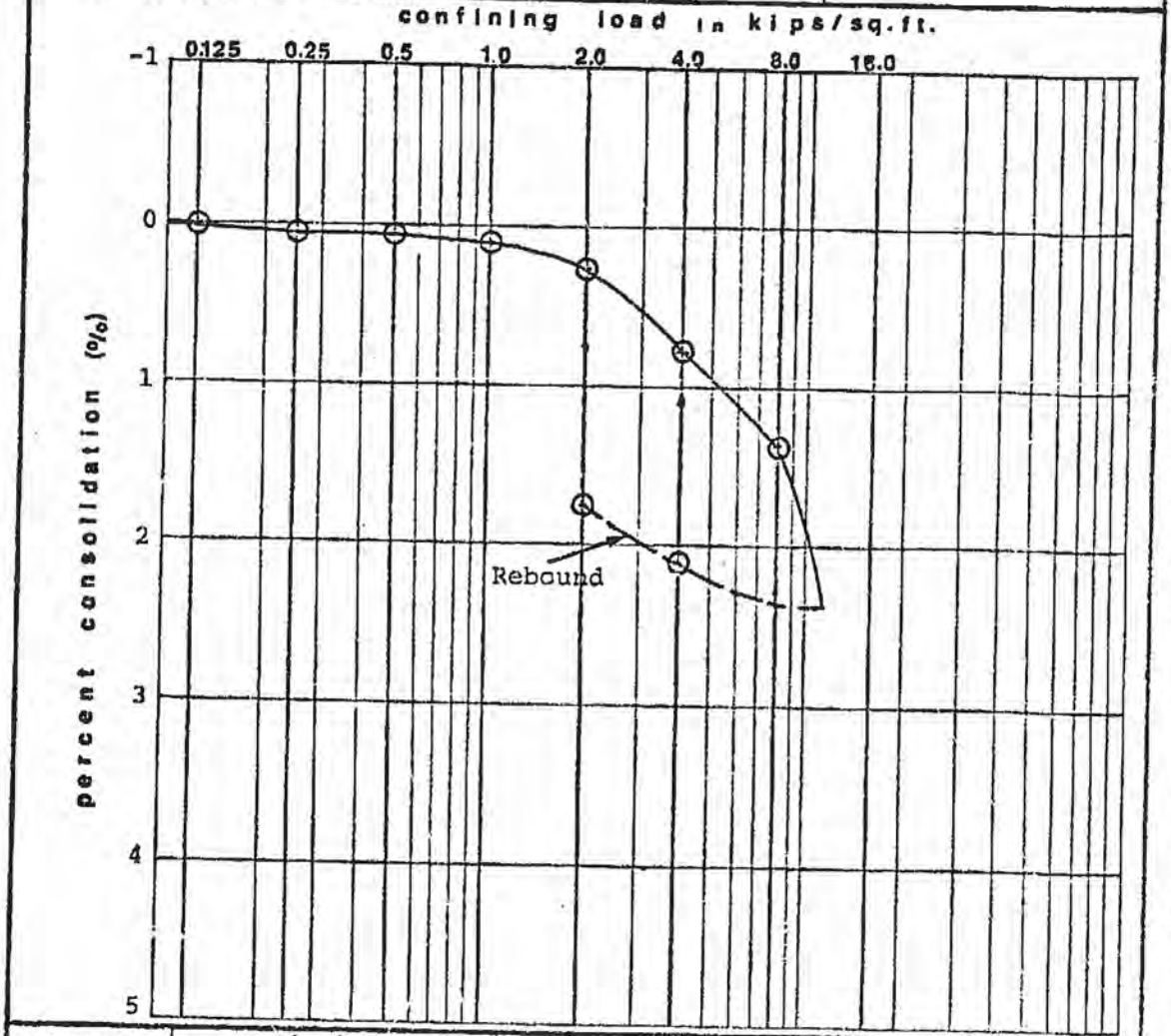
G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	CONSOLIDATION TEST		
		Project no. 1010	date Nov. 1972	figure no. 2

symbol	specimen	boring no.	sample depth	sample condition	moisture condition
○	A	B-6	2.0 Ft.	Silty SAND, med/den.	Moist
◐	A				
⬡	B				
◑	B				
▽	C				
◥	C				



G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	CONSOLIDATION TEST	
		Project no. 1010	date Nov. 1972
		figure no. 3	

symbol	specimen	boring no.	sample depth	sample condition	moisture condition
○	A	B-10	5.0 Ft.	Silty SAND, Med/den. Silty CLAY, Stiff	Moist
◑	A				
⬡	B				
◑	B				
▽	C				
◥	C				



G. A. NICOLL & ASSOCIATES	Block 100 Newport Center The Irvine Company	CONSOLIDATION TEST Project no. 1010 · date Nov. 1972 · figure no. 4

DIRECT SHEAR TEST RESULTS

Boring Number	B-3	B-6	B-10
Sample Depth, Feet	2	2	5
Soil Classification	SM	SM	CL/SM
Normal Stress 1000 PSF Shear Stress, PSF	1016	508	508
Normal Stress 3000 PSF Shear Stress, PSF	2016	1760	1251
Normal Stress 8000 PSF Shear Stress, PSF	563	4653	3461
Angle of Internal Friction, Degrees	27-1/2	30-1/2	23
Apparent Cohesion, PSF	500	0	75

Table 1

LABORATORY TEST RESULTS BY

MOORE & TABER
(1975)

FOR GLENDALE FEDERAL BANK

MOORE & TABER-*Engineers-Geologists*

SOIL TEST RESULTS

BORING Nº / SAMPLE Nº	1/2	3/1	3/2		
DESCRIPTION	Light Brown fine SILTY SAND	Yellow-brown SANDY SILT	Light Brown SANDY SILT		
UNIFIED SOIL CLASSIFICATION	SM	ML	ML		
MECHANICAL ANALYSIS					
Passing N° 200 sieve %					
ATTERBERG LIMITS					
Liquid Limit %					
Plastic Limit %					
Plastic Index %					
COMPACTION TEST *(ASTM D1557-66T)*					
Maximum Density (lbs/cu.ft)					
Optimum Moisture %					
EXPANSION TEST *(type)*	INDEX		INDEX		
Initial Dry Density (lbs./cu.ft.)	109.2		101.9		
Initial Moisture %	10.0		12.0		
Confining Pressure (lbs./sq.ft.)	144		144		
Expansion Index	0		21		
DIRECT SHEAR TEST *(type)*		UNDISTURBED			
Initial Moisture Content %		23.8 23.8 23.8			
Test Moisture Content %		SATURATED			
Normal Stress (lbs./sq.ft.)		990 1980 2970			
Peak Shear Stress (lbs./sq.ft.)		1610 2260 3680			
Ultimate Shear Stress (lbs./sq.ft.)		960 2090 2810			
Angle of Internal Friction (degrees)		40 (ult.)			
Cohesion (lbs/sq.ft.)		250 (ult.)			

Job No. 175-507 - January 31, 1975

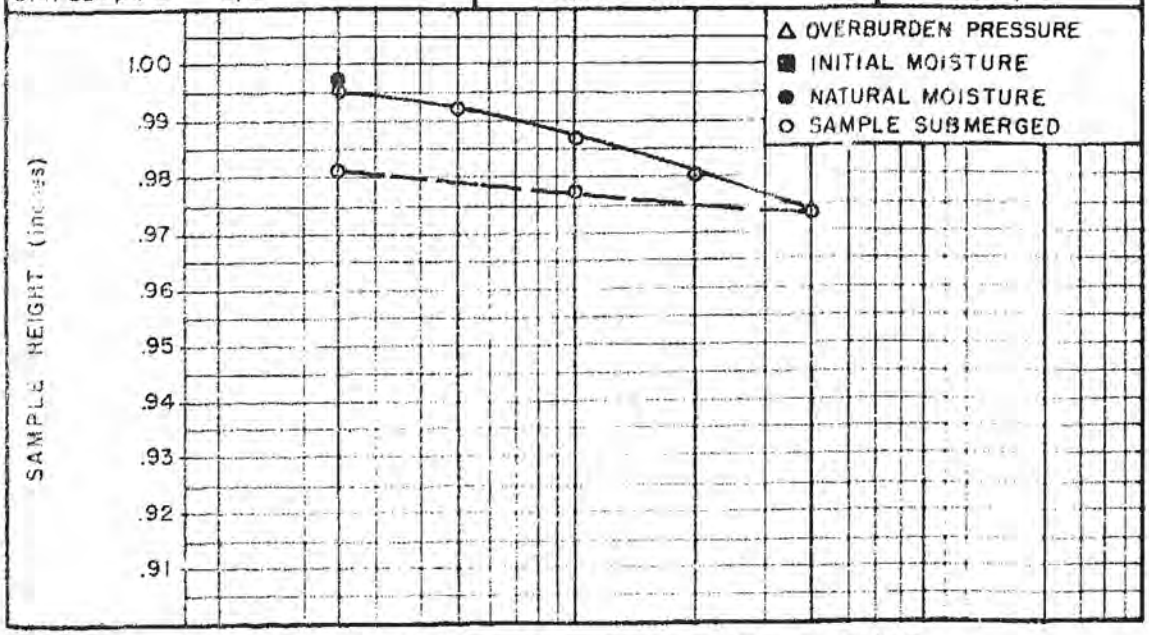
A-5

UP 8769

MOORE & TABER CONSULTING ENGINEERS AND GEOLOGISTS

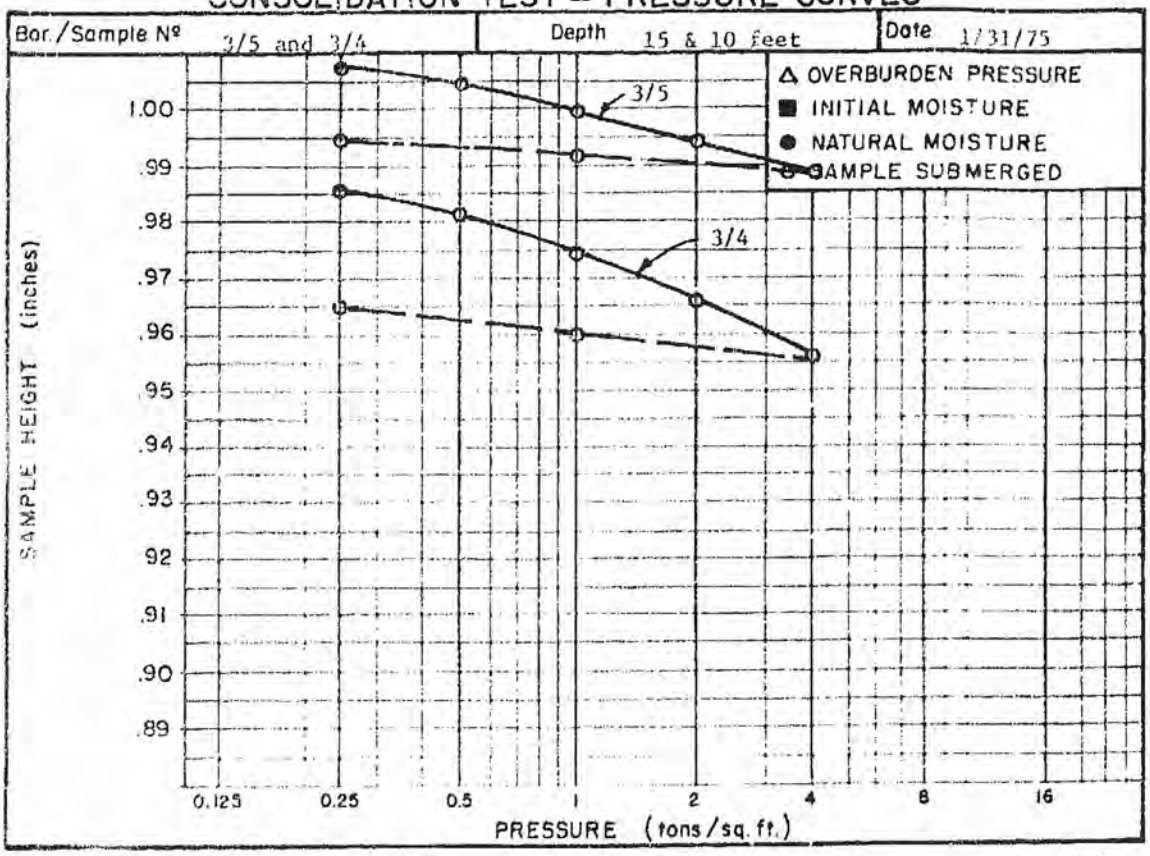
CONSOLIDATION TEST – PRESSURE CURVES

Bor./Sample Nº 2/2 | Depth 5 feet | Date 1/31/75



CONSOLIDATION TEST – PRESSURE CURVES

Bor./Sample Nº 3/5 and 3/4 | Depth 15 & 10 feet | Date 1/31/75



Job No. 75-507 - January 31, 1975

RESISTANCE VALUES

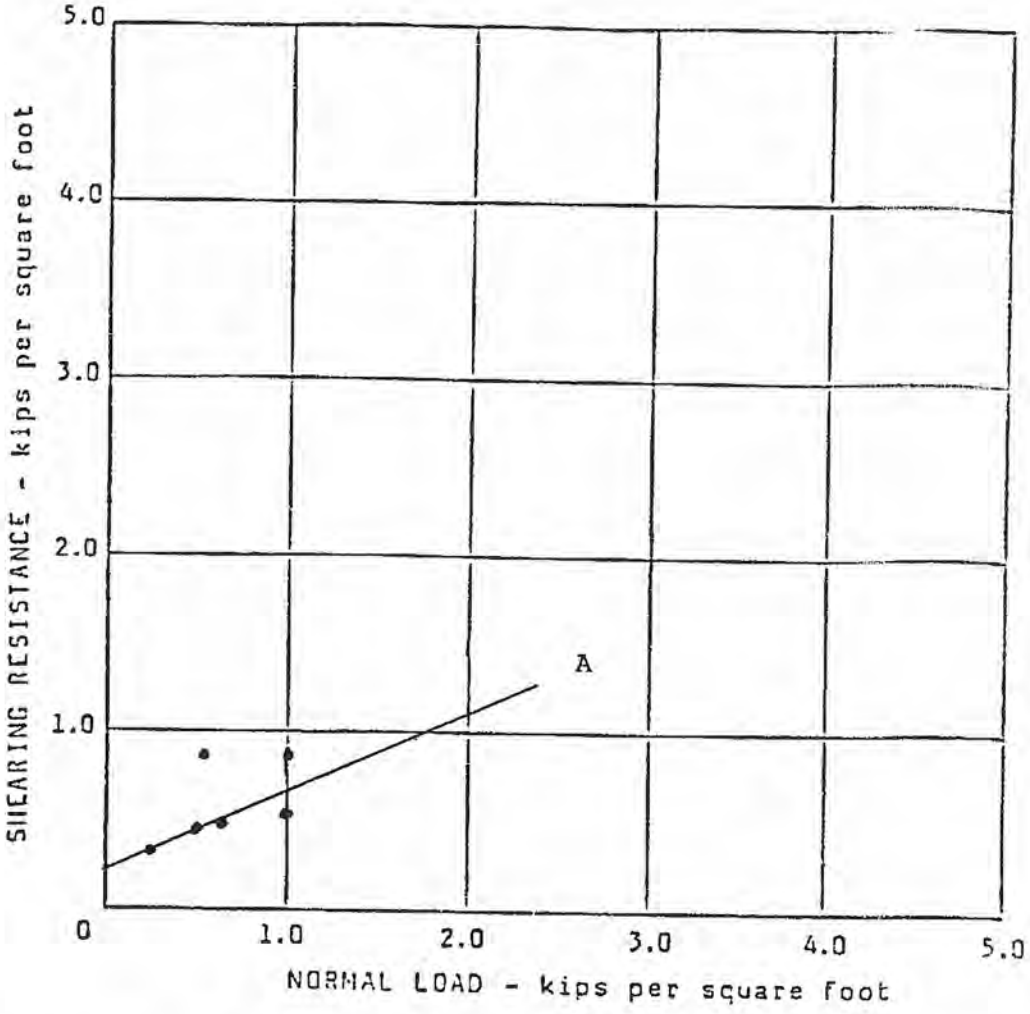
Moisture Content (%)	Dry Density (p.c.f.)	Exudation Pressure (p.s.i.)	Expansion Dial ($x10^{-4}$)	Stabilometer 'R' Value
12.8	121.1	400	0	45
13.7	118.6	215	0	38
14.6	116.5	175	0	28

LABORATORY TEST RESULTS BY

SOILS INTERNATIONAL
(1988)

FOR EDWARDS THEATER

DIRECT SHEAR TEST



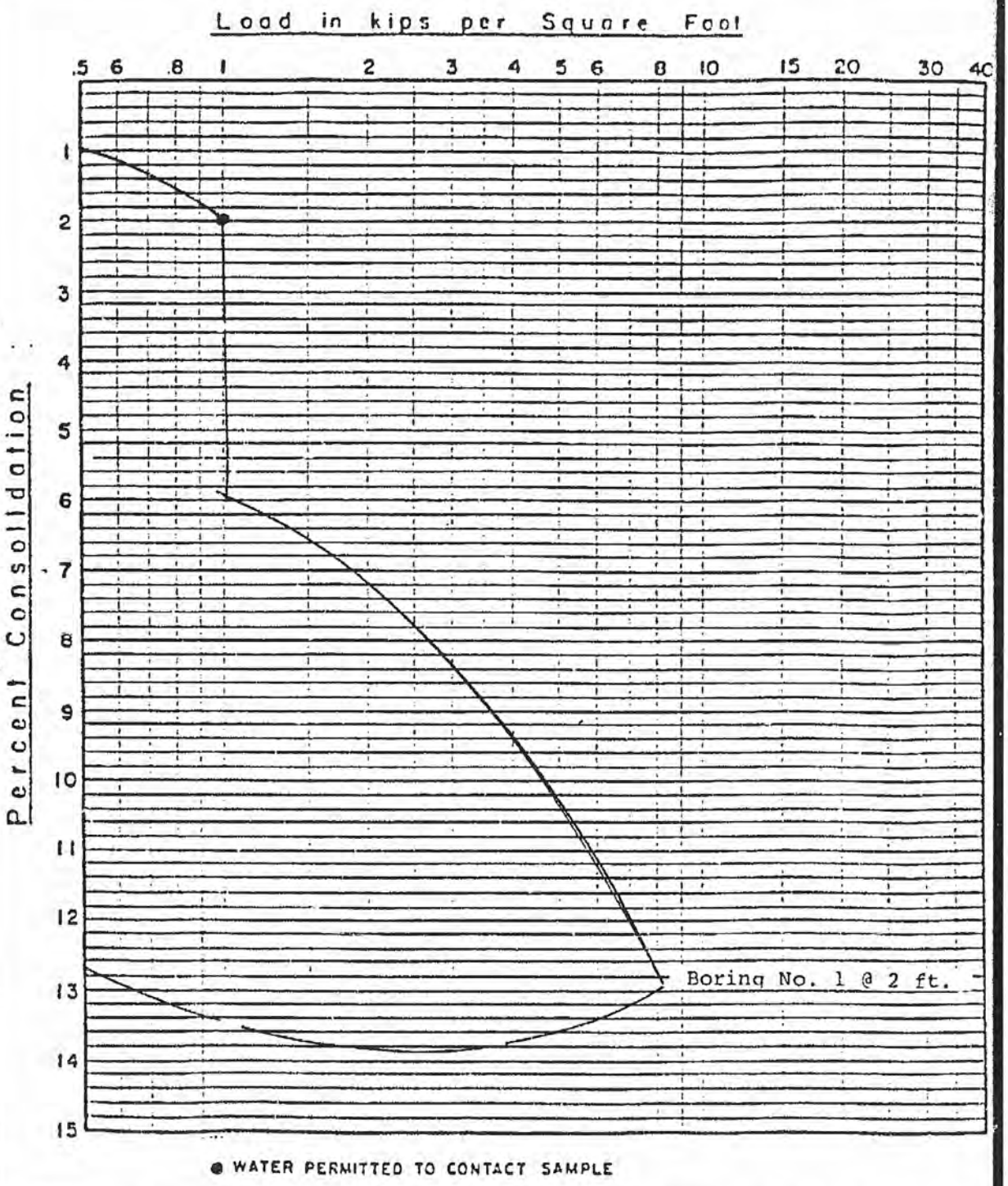
SYMBOL	LOCATION	DEPTH (FT.)	TEST CONDITION	COHESION (P.S.F.)	FRICTION (DEG.)
A	Boring No. 1	2-4	Saturated and Drained	200	20

Edwards Theatre
300 Newport Center Drive
Newport Beach, Calif.

PROJECT NO.	S1-093-F
PLATE	F

SOILS INTERNATIONAL
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

CONSOLIDATION TESTS



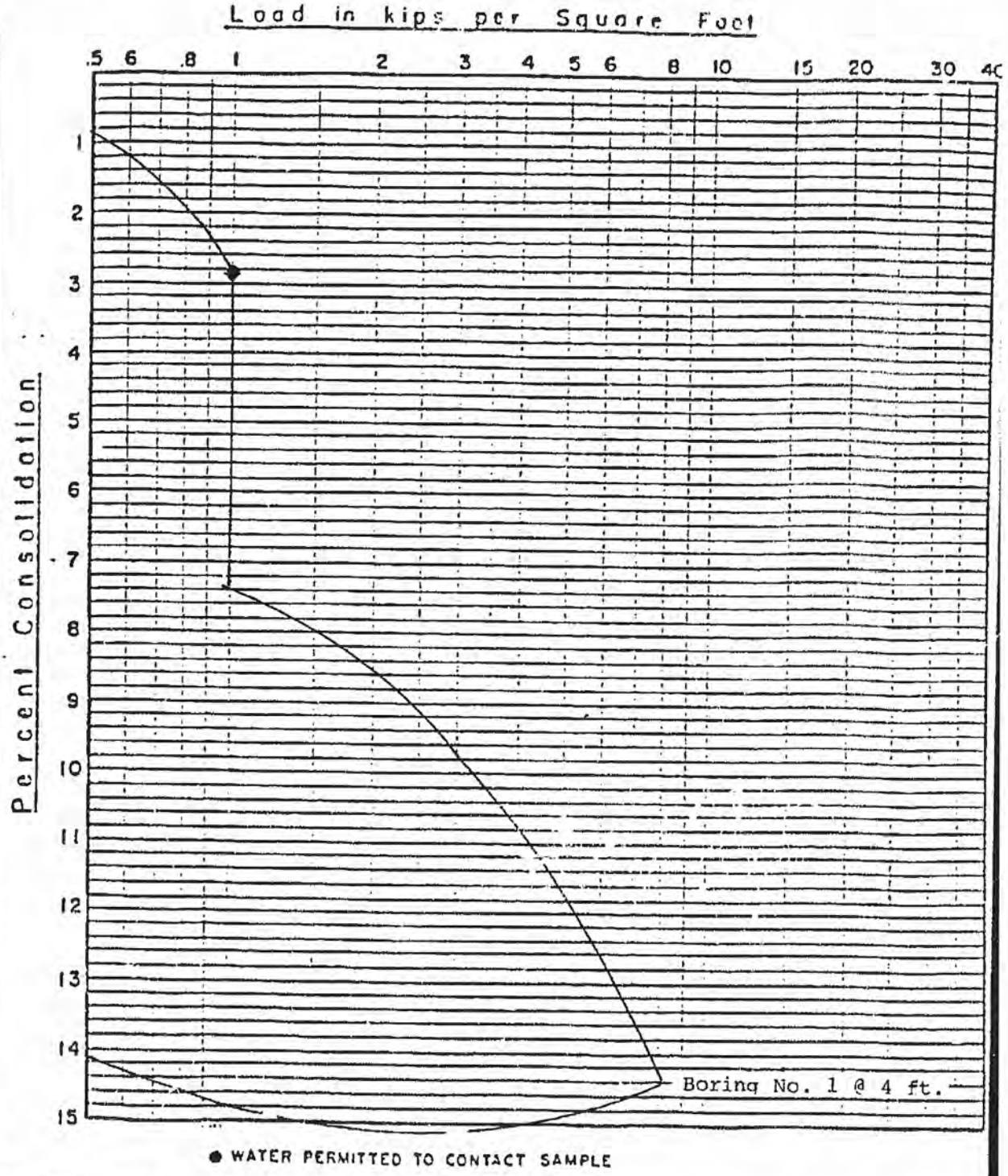
● WATER PERMITTED TO CONTACT SAMPLE

Edwards Theatre 300 Newport Center Drive Newport Beach, Calif.	PROJECT No.	S-1093-F
	PLATE	G

SOILS INTERNATIONAL

CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

CONSOLIDATION TESTS



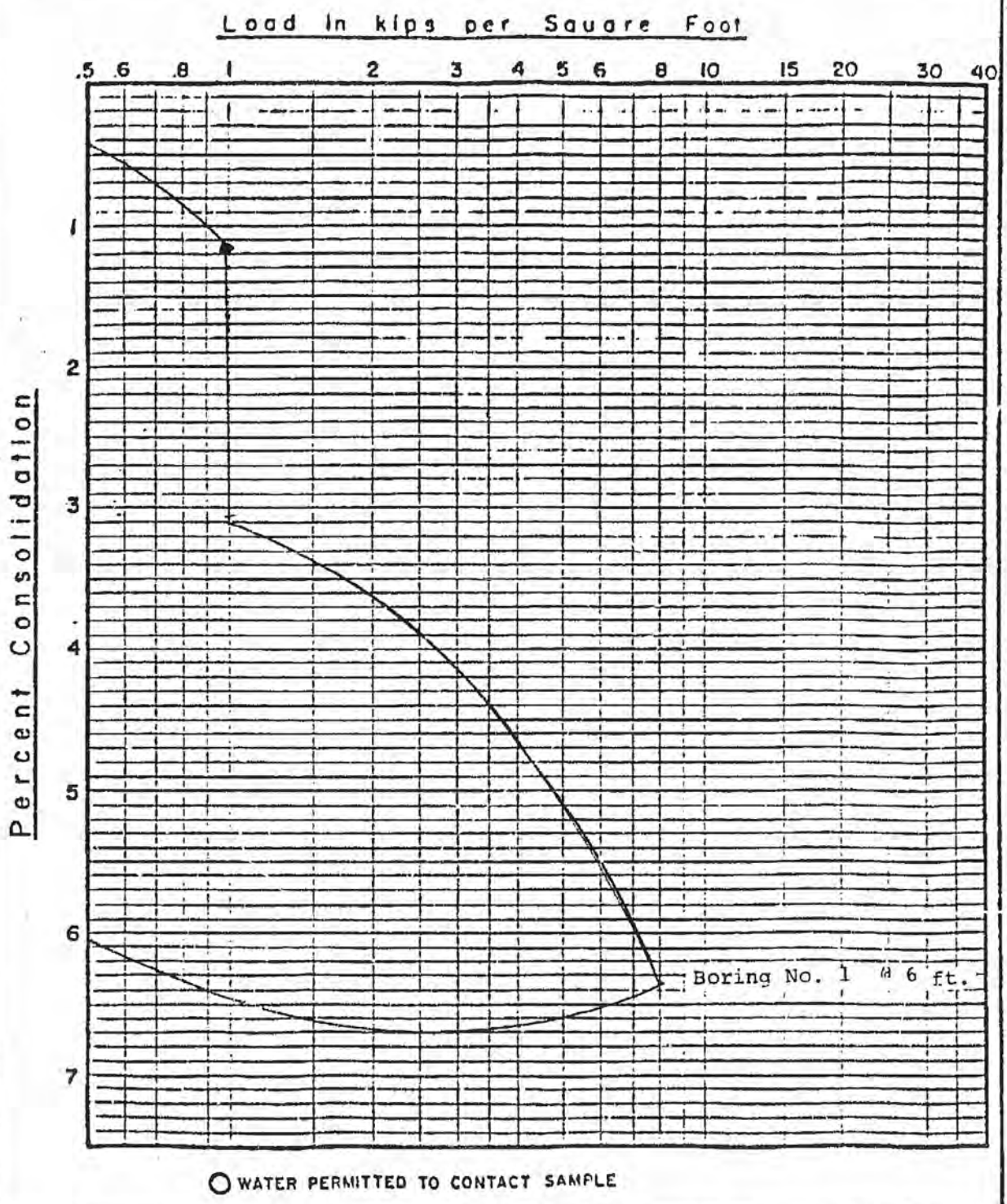
● WATER PERMITTED TO CONTACT SAMPLE

Edwards Theatre
300 Newport Center Drive
Newport Beach, Calif.

PROJECT No	S-1093-F
PLATE	H

SOILS INTERNATIONAL
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

CONSOLIDATION TESTS



○ WATER PERMITTED TO CONTACT SAMPLE

Edwards Theatre 300 Newport Center Drive Newport Beach, Calif.	PROJECT No	S-1093-F
	PLATE	I

SOILS INTERNATIONAL

CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

APPENDIX D

USGS Design Maps Detailed Report

ASCE 7-10 Standard (33.612°N, 117.875°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1] $S_S = 1.681$ g

From Figure 22-2 [2] $S_1 = 0.615$ g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 1.681 g, F_a = 1.000

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.615 g, F_v = 1.500

Equation (11.4–1): $S_{MS} = F_a S_S = 1.000 \times 1.681 = 1.681$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.500 \times 0.615 = 0.922$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

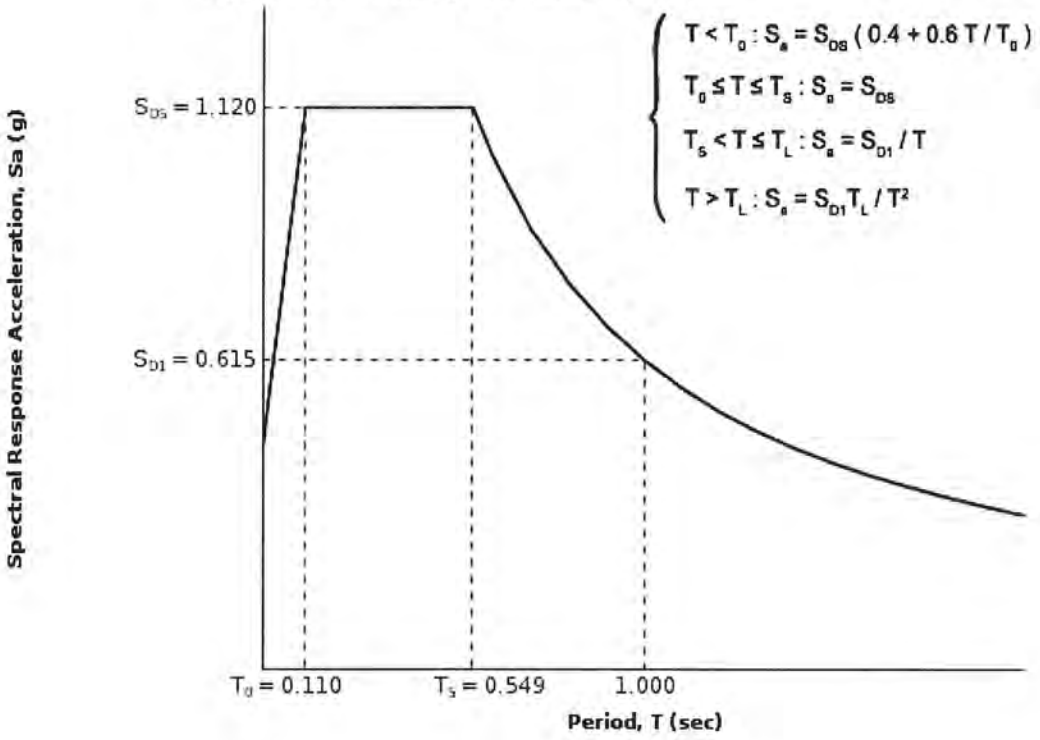
Equation (11.4–3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.681 = 1.120$ g

Equation (11.4–4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.922 = 0.615$ g

Section 11.4.5 — Design Response Spectrum

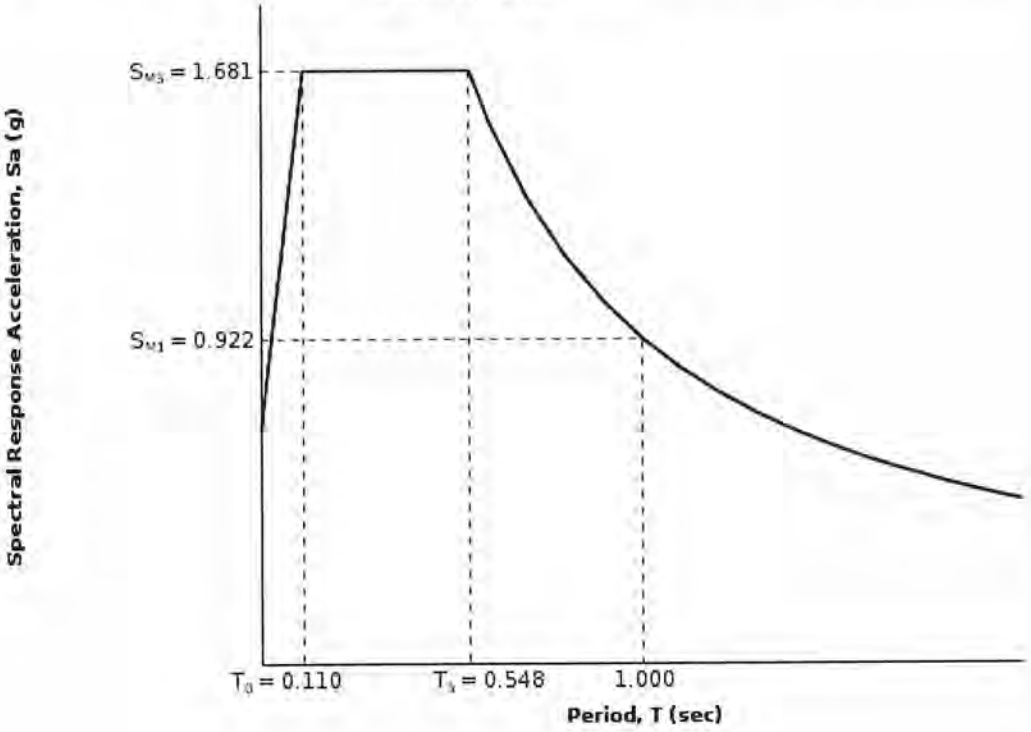
From Figure 22-12 [3] $T_L = 8$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.685

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.685 = 0.685$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.685 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.909

From Figure 22-18 [6] C_{R1} = 0.930

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 1.120 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.615 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

*** Deaggregation of Seismic Hazard at One Period of Spectral Accel. ***
*** Data from U.S.G.S. National Seismic Hazards Mapping Project, 2008 version ***
PSHA Deaggregation. %contributions. site: 150_Newport_Cen long: 117.875 W., lat: 33.612 N.
Vs30(m/s)= 260.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08 See USGS OFR 2008-1128. dM=0.2 below
Return period: 2475 yrs. Exceedance PGA =0.6372 g. Weight * Computed_Rate_Ex 0.404E-03
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00391
#This deaggregation corresponds to Mean Hazard w/all GMPEs

DIST(KM)	MAG(MW)	ALL_EPS	EPSILON>2	1<EPS<2	0<EPS<1	-1<EPS<0	-2<EPS<-1	EPS<-2
6.3	5.05	1.100	0.611	0.489	0.000	0.000	0.000	0.000
12.7	5.05	0.141	0.141	0.000	0.000	0.000	0.000	0.000
6.3	5.20	2.225	1.014	1.211	0.000	0.000	0.000	0.000
12.9	5.20	0.375	0.375	0.000	0.000	0.000	0.000	0.000
6.4	5.40	2.182	0.809	1.268	0.105	0.000	0.000	0.000
13.1	5.40	0.514	0.514	0.000	0.000	0.000	0.000	0.000
6.5	5.60	2.010	0.645	1.156	0.209	0.000	0.000	0.000
13.3	5.60	0.641	0.633	0.008	0.000	0.000	0.000	0.000
6.5	5.80	1.745	0.467	1.048	0.230	0.000	0.000	0.000
13.5	5.80	0.717	0.673	0.044	0.000	0.000	0.000	0.000
7.1	6.02	2.237	0.638	1.401	0.199	0.000	0.000	0.000
14.3	5.99	0.687	0.612	0.075	0.000	0.000	0.000	0.000
23.2	6.01	0.078	0.078	0.000	0.000	0.000	0.000	0.000
7.4	6.20	2.859	0.725	1.885	0.249	0.000	0.000	0.000
14.6	6.20	0.859	0.693	0.166	0.000	0.000	0.000	0.000
24.1	6.21	0.135	0.135	0.000	0.000	0.000	0.000	0.000
7.5	6.40	2.699	0.545	1.788	0.365	0.000	0.000	0.000
14.5	6.40	1.021	0.692	0.330	0.000	0.000	0.000	0.000
24.9	6.41	0.213	0.213	0.000	0.000	0.000	0.000	0.000
32.9	6.41	0.116	0.116	0.000	0.000	0.000	0.000	0.000
5.4	6.61	14.179	1.326	6.369	6.137	0.347	0.000	0.000
13.4	6.60	0.542	0.339	0.202	0.000	0.000	0.000	0.000
25.6	6.60	0.240	0.240	0.000	0.000	0.000	0.000	0.000
34.2	6.59	0.288	0.288	0.000	0.000	0.000	0.000	0.000
5.2	6.80	16.718	1.556	7.539	7.028	0.594	0.000	0.000
13.6	6.79	0.573	0.315	0.258	0.000	0.000	0.000	0.000
25.2	6.79	0.280	0.279	0.001	0.000	0.000	0.000	0.000
34.6	6.78	0.739	0.739	0.000	0.000	0.000	0.000	0.000
5.1	6.97	19.615	1.679	8.445	8.435	1.048	0.007	0.000
13.6	6.98	0.368	0.172	0.193	0.003	0.000	0.000	0.000
24.3	7.02	0.461	0.389	0.072	0.000	0.000	0.000	0.000
34.0	6.98	0.780	0.735	0.045	0.000	0.000	0.000	0.000
45.5	7.00	0.096	0.096	0.000	0.000	0.000	0.000	0.000
5.1	7.15	9.071	0.809	3.756	3.735	0.753	0.018	0.000
13.1	7.16	0.085	0.030	0.052	0.004	0.000	0.000	0.000
23.6	7.20	0.694	0.486	0.207	0.000	0.000	0.000	0.000
35.3	7.20	0.695	0.574	0.121	0.000	0.000	0.000	0.000
4.5	7.39	4.252	0.434	1.888	1.723	0.205	0.003	0.000
23.5	7.36	0.857	0.487	0.370	0.000	0.000	0.000	0.000
35.9	7.37	0.416	0.330	0.086	0.000	0.000	0.000	0.000
75.7	7.42	0.074	0.074	0.000	0.000	0.000	0.000	0.000
4.1	7.55	2.356	0.275	1.314	0.731	0.036	0.000	0.000
23.6	7.58	0.353	0.179	0.174	0.000	0.000	0.000	0.000
35.4	7.57	0.346	0.268	0.078	0.000	0.000	0.000	0.000
45.4	7.57	0.150	0.127	0.022	0.000	0.000	0.000	0.000
75.6	7.60	0.146	0.146	0.000	0.000	0.000	0.000	0.000
83.0	7.56	0.067	0.067	0.000	0.000	0.000	0.000	0.000
4.1	7.71	0.353	0.036	0.164	0.139	0.014	0.000	0.000
23.5	7.74	0.803	0.355	0.448	0.000	0.000	0.000	0.000
35.0	7.76	0.489	0.354	0.135	0.000	0.000	0.000	0.000
45.5	7.74	0.137	0.108	0.029	0.000	0.000	0.000	0.000
74.3	7.80	0.143	0.143	0.000	0.000	0.000	0.000	0.000

83.1	7.77	0.143	0.143	0.000	0.000	0.000	0.000	0.000
23.5	7.91	0.100	0.041	0.060	0.000	0.000	0.000	0.000
35.1	7.93	0.056	0.038	0.019	0.000	0.000	0.000	0.000
83.1	7.98	0.286	0.286	0.000	0.000	0.000	0.000	0.000

Summary statistics for above PSHA PGA deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%): 100.0
Mean src-site R= 9.0 km; M= 6.71; eps0= 0.79. Mean calculated for all sources.
Modal src-site R= 5.1 km; M= 6.97; eps0= 0.33 from peak (R,M) bin
MODE R*= 5.0km; M*= 6.97; EPS.INTERVAL: 1 to 2 sigma % CONTRIB.= 8.445

Principal sources (faults, subduction, random seismicity having > 3% contribution)

Source Category:	% contr.	R(km)	M	epsilon0 (mean values).
California B-faults Char	42.73	6.9	7.06	0.53
California B-faults GR	28.33	6.5	6.78	0.43
California A-faults	4.22	46.0	7.36	2.21
CA Compr. crustal gridded	24.71	9.0	5.90	1.39

Individual fault hazard details if its contribution to mean hazard > 2%:

Fault ID	% contr.	Rcd(km)	M	epsilon0	Site-to-src azimuth(d)
Newport-Inglewood (Offshore) Cha	11.05	4.1	6.88	0.83	-139.3
Newport-Inglewood, alt 1 Char	2.13	5.4	7.15	0.75	-85.1
Newport-Inglewood, alt 2 Char	2.39	4.6	7.15	0.68	-98.2
San Joaquin Hills Char	18.56	5.4	6.97	0.04	4.3
Newport Inglewood Connected alt	2.46	4.1	7.50	0.53	-139.3
Newport Inglewood Connected alt	2.45	4.1	7.50	0.53	-139.3
Newport-Inglewood (Offshore) GR	2.39	7.6	6.71	1.15	-176.7
San Joaquin Hills GR	20.28	5.5	6.73	0.16	5.6

#*********End of deaggregation corresponding to Mean Hazard w/all GMPEs *********#

PSHA Deaggregation. %contributions. site: 150_Newport_Cen long: 117.875 W., lat: 33.612 N.
Vs30(m/s)= 260.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08 See USGS OFR 2008-1128. dM=0.2 below
Return period: 2475 yrs. Exceedance PGA =0.6372 g. Weight * Computed_Rate_Ex 0.144E-03
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00045
#This deaggregation corresponds to Boore-Atkinson 2008

DIST(KM)	MAG(MW)	ALL_EPS	EPSILON>2	1<EPS<2	0<EPS<1	-1<EPS<0	-2<EPS<-1	EPS<-2
5.9	5.05	0.194	0.186	0.008	0.000	0.000	0.000	0.000
6.0	5.20	0.413	0.357	0.056	0.000	0.000	0.000	0.000
6.1	5.40	0.428	0.341	0.088	0.000	0.000	0.000	0.000
12.9	5.41	0.038	0.038	0.000	0.000	0.000	0.000	0.000
6.2	5.60	0.423	0.323	0.099	0.000	0.000	0.000	0.000
13.4	5.61	0.083	0.083	0.000	0.000	0.000	0.000	0.000
6.3	5.80	0.400	0.291	0.109	0.000	0.000	0.000	0.000
13.8	5.80	0.132	0.132	0.000	0.000	0.000	0.000	0.000
6.7	6.02	0.544	0.367	0.177	0.000	0.000	0.000	0.000
14.8	6.00	0.164	0.164	0.000	0.000	0.000	0.000	0.000
23.8	6.01	0.040	0.040	0.000	0.000	0.000	0.000	0.000
7.0	6.20	0.696	0.472	0.224	0.000	0.000	0.000	0.000
15.2	6.20	0.237	0.237	0.000	0.000	0.000	0.000	0.000
24.6	6.21	0.079	0.079	0.000	0.000	0.000	0.000	0.000
33.0	6.23	0.026	0.026	0.000	0.000	0.000	0.000	0.000
7.2	6.40	0.651	0.409	0.242	0.000	0.000	0.000	0.000
15.1	6.40	0.298	0.298	0.001	0.000	0.000	0.000	0.000
25.4	6.41	0.131	0.131	0.000	0.000	0.000	0.000	0.000
32.9	6.41	0.112	0.112	0.000	0.000	0.000	0.000	0.000
5.3	6.61	4.204	0.566	2.243	1.395	0.000	0.000	0.000
13.8	6.60	0.254	0.195	0.059	0.000	0.000	0.000	0.000
25.7	6.60	0.207	0.207	0.000	0.000	0.000	0.000	0.000
34.2	6.59	0.287	0.287	0.000	0.000	0.000	0.000	0.000
5.1	6.79	5.230	0.631	2.829	1.770	0.000	0.000	0.000

14.1	6.79	0.285	0.196	0.088	0.000	0.000	0.000	0.000
25.3	6.79	0.237	0.237	0.000	0.000	0.000	0.000	0.000
34.6	6.78	0.733	0.733	0.000	0.000	0.000	0.000	0.000
45.4	6.79	0.044	0.044	0.000	0.000	0.000	0.000	0.000
56.8	6.77	0.018	0.018	0.000	0.000	0.000	0.000	0.000
5.0	6.97	6.459	0.713	3.601	2.102	0.043	0.000	0.000
14.1	6.99	0.198	0.109	0.088	0.001	0.000	0.000	0.000
24.3	7.02	0.383	0.317	0.066	0.000	0.000	0.000	0.000
34.0	6.98	0.754	0.709	0.045	0.000	0.000	0.000	0.000
45.5	7.00	0.095	0.095	0.000	0.000	0.000	0.000	0.000
57.3	7.04	0.023	0.023	0.000	0.000	0.000	0.000	0.000
5.1	7.15	2.988	0.301	1.442	1.168	0.077	0.000	0.000
13.5	7.16	0.051	0.016	0.032	0.002	0.000	0.000	0.000
23.6	7.20	0.567	0.380	0.187	0.000	0.000	0.000	0.000
35.3	7.20	0.644	0.523	0.120	0.000	0.000	0.000	0.000
45.3	7.19	0.030	0.030	0.000	0.000	0.000	0.000	0.000
57.7	7.20	0.032	0.032	0.000	0.000	0.000	0.000	0.000
74.8	7.25	0.034	0.034	0.000	0.000	0.000	0.000	0.000
4.4	7.42	2.155	0.234	1.254	0.660	0.007	0.000	0.000
23.5	7.37	0.680	0.366	0.313	0.000	0.000	0.000	0.000
35.9	7.37	0.381	0.295	0.086	0.000	0.000	0.000	0.000
45.2	7.40	0.027	0.026	0.001	0.000	0.000	0.000	0.000
57.6	7.34	0.037	0.037	0.000	0.000	0.000	0.000	0.000
75.7	7.42	0.074	0.074	0.000	0.000	0.000	0.000	0.000
83.3	7.38	0.026	0.026	0.000	0.000	0.000	0.000	0.000
4.1	7.60	0.446	0.063	0.250	0.133	0.000	0.000	0.000
23.7	7.59	0.242	0.107	0.134	0.000	0.000	0.000	0.000
35.4	7.57	0.306	0.228	0.078	0.000	0.000	0.000	0.000
45.4	7.57	0.141	0.119	0.022	0.000	0.000	0.000	0.000
75.6	7.60	0.146	0.146	0.000	0.000	0.000	0.000	0.000
83.0	7.56	0.067	0.067	0.000	0.000	0.000	0.000	0.000
4.1	7.71	0.141	0.015	0.077	0.049	0.000	0.000	0.000
23.5	7.74	0.549	0.207	0.342	0.000	0.000	0.000	0.000
34.9	7.76	0.410	0.277	0.133	0.000	0.000	0.000	0.000
45.5	7.74	0.125	0.096	0.029	0.000	0.000	0.000	0.000
74.3	7.80	0.143	0.143	0.000	0.000	0.000	0.000	0.000
83.1	7.77	0.143	0.143	0.000	0.000	0.000	0.000	0.000
23.5	7.92	0.043	0.018	0.025	0.000	0.000	0.000	0.000
35.3	7.93	0.039	0.025	0.015	0.000	0.000	0.000	0.000
83.1	7.98	0.282	0.282	0.000	0.000	0.000	0.000	0.000
82.5	8.20	0.030	0.030	0.000	0.000	0.000	0.000	0.000

Summary statistics for above PSHA PGA deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%): 35.6
Mean src-site R= 13.2 km; M= 6.87; eps0= 1.12. Mean calculated for all sources.
Modal src-site R= 5.0 km; M= 6.97; eps0= 0.64 from peak (R,M) bin
MODE R*= 4.9km; M*= 6.97; EPS.INTERVAL: 1 to 2 sigma % CONTRIB.= 3.601

Principal sources (faults, subduction, random seismicity having > 3% contribution)

Source Category:	% contr.	R(km)	M	epsilon0 (mean values).
California B-faults Char	16.25	9.0	7.09	0.86
California B-faults GR	9.58	8.2	6.82	0.82
California A-faults	4.01	46.5	7.34	2.20
CA Compr. crustal gridded	5.77	10.1	6.02	1.61

Individual fault hazard details if its contribution to mean hazard > 2%:

Fault ID	% contr.	Rcd(km)	M	epsilon0	Site-to-src azimuth(d)
Newport-Inglewood (Offshore) Cha	4.53	4.1	6.88	0.93	-139.3
Newport-Inglewood, alt 1 Char	0.90	5.4	7.15	0.84	-85.1
Newport-Inglewood, alt 2 Char	0.97	4.6	7.15	0.80	-98.2
San Joaquin Hills Char	5.00	5.4	6.97	0.34	4.3
Newport Inglewood Connected alt	0.99	4.1	7.50	0.66	-139.3
Newport Inglewood Connected alt	0.97	4.1	7.50	0.67	-139.3

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Newport-Inglewood (Offshore) GR     1.06     8.6   6.71    1.33    -176.7
San Joaquin Hills GR                5.51     5.5   6.73    0.42       5.6
#*********End of deaggregation corresponding to Boore-Atkinson 2008      *********#

PSHA Deaggregation. %contributions. site: 150_Newport_Cen long: 117.875 W., lat:
33.612 N.
 Vs30(m/s)= 260.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08  See USGS OFR 2008-1128. dM=0.2 below
Return period: 2475  yrs. Exceedance PGA =0.6372   g. Weight * Computed_Rate_Ex
0.675E-04
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00211
#This deaggregation corresponds to Campbell-Bozorgnia 2008
DIST(KM) MAG(MW) ALL_EPS EPSILON>2  1<EPS<2 0<EPS<1 -1<EPS<0 -2<EPS<-1 EPS<-2
    6.2    5.05    0.162    0.162    0.000    0.000    0.000     0.000    0.000
    6.3    5.20    0.394    0.338    0.056    0.000    0.000     0.000    0.000
   12.3    5.22    0.019    0.019    0.000    0.000    0.000     0.000    0.000
    6.4    5.40    0.477    0.365    0.112    0.000    0.000     0.000    0.000
   12.7    5.41    0.061    0.061    0.000    0.000    0.000     0.000    0.000
    6.5    5.60    0.469    0.334    0.136    0.000    0.000     0.000    0.000
   13.0    5.60    0.102    0.102    0.000    0.000    0.000     0.000    0.000
    6.6    5.80    0.391    0.265    0.126    0.000    0.000     0.000    0.000
   13.2    5.80    0.113    0.113    0.000    0.000    0.000     0.000    0.000
    7.1    6.01    0.455    0.349    0.106    0.000    0.000     0.000    0.000
   13.9    5.99    0.106    0.106    0.000    0.000    0.000     0.000    0.000
    7.4    6.20    0.596    0.454    0.142    0.000    0.000     0.000    0.000
   14.1    6.20    0.138    0.138    0.000    0.000    0.000     0.000    0.000
    7.5    6.40    0.612    0.401    0.211    0.000    0.000     0.000    0.000
   14.1    6.40    0.176    0.176    0.000    0.000    0.000     0.000    0.000
   24.1    6.42    0.016    0.016    0.000    0.000    0.000     0.000    0.000
    5.4    6.61    3.309    0.362    1.355    1.526    0.067     0.000    0.000
   13.4    6.60    0.059    0.056    0.003    0.000    0.000     0.000    0.000
   25.3    6.60    0.010    0.010    0.000    0.000    0.000     0.000    0.000
    5.4    6.80    3.396    0.389    1.404    1.525    0.077     0.000    0.000
   13.6    6.80    0.059    0.056    0.003    0.000    0.000     0.000    0.000
   25.7    6.78    0.010    0.010    0.000    0.000    0.000     0.000    0.000
    5.4    6.96    3.560    0.368    1.317    1.714    0.162     0.000    0.000
   13.5    6.95    0.028    0.026    0.002    0.000    0.000     0.000    0.000
    5.4    7.13    1.602    0.168    0.567    0.708    0.159     0.000    0.000
    4.7    7.38    0.308    0.096    0.137    0.061    0.014     0.000    0.000
    4.1    7.61    0.041    0.018    0.022    0.000    0.000     0.000    0.000
    4.1    7.71    0.014    0.006    0.008    0.000    0.000     0.000    0.000

Summary statistics for above PSHA PGA  deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%):   16.7
 Mean src-site R=    6.2 km; M= 6.59; eps0=   0.72. Mean calculated for all sources.
Modal src-site R=    5.4 km; M= 6.96; eps0=   0.35 from peak (R,M) bin
 MODE R*=   5.4km; M*= 6.95; EPS.INTERVAL: 1 to 2 sigma  % CONTRIB.=  1.714

Principal sources (faults, subduction, random seismicity having > 3% contribution)
Source Category:                 % contr.  R(km)    M   epsilon0 (mean values).
California B-faults Char           5.99     5.4   6.99    0.43
California B-faults GR             5.90     5.4   6.73    0.34
CA Compr. crustal gridded          4.84     8.1   5.94    1.53
Individual fault hazard details if its contribution to mean hazard > 2%:
Fault ID                         % contr.   Rcd(km)  M   epsilon0 Site-to-src
azimuth(d)
Newport-Inglewood (Offshore) Cha    0.37     4.1   6.90    1.92    -139.3
Newport-Inglewood, alt 1 Char       0.08     5.4   7.15    1.76     -85.1
Newport-Inglewood, alt 2 Char       0.10     4.6   7.15    1.69     -98.2
San Joaquin Hills Char              5.22     5.4   6.97    0.23       4.3
Newport Inglewood Connected alt     0.10     4.1   7.50    1.61    -139.3
Newport Inglewood Connected alt     0.10     4.1   7.50    1.61    -139.3
Newport-Inglewood (Offshore) GR     0.01     5.1   6.71    2.52    -176.7
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San Joaquin Hills GR 5.85 5.5 6.72 0.32 5.6
#*********End of deaggregation corresponding to Campbell-Bozorgnia 2008 *********#

PSHA Deaggregation. %contributions. site: 150_Newport_Cen long: 117.875 W., lat: 33.612 N.
Vs30(m/s)= 260.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08 See USGS OFR 2008-1128. dM=0.2 below
Return period: 2475 yrs. Exceedance PGA =0.6372 g. Weight * Computed_Rate_Ex 0.192E-03
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00923
#This deaggregation corresponds to Chiou-Youngs 2008

DIST(KM)	MAG(MW)	ALL_EPS	EPSILON>2	1<EPS<2	0<EPS<1	-1<EPS<0	-2<EPS<-1	EPS<-2
6.4	5.05	0.744	0.586	0.158	0.000	0.000	0.000	0.000
12.8	5.05	0.138	0.138	0.000	0.000	0.000	0.000	0.000
6.5	5.20	1.418	0.976	0.441	0.000	0.000	0.000	0.000
13.0	5.20	0.345	0.345	0.000	0.000	0.000	0.000	0.000
6.5	5.40	1.276	0.740	0.536	0.000	0.000	0.000	0.000
13.2	5.40	0.415	0.415	0.000	0.000	0.000	0.000	0.000
6.6	5.60	1.118	0.567	0.551	0.000	0.000	0.000	0.000
13.4	5.60	0.456	0.456	0.000	0.000	0.000	0.000	0.000
6.6	5.80	0.954	0.437	0.517	0.000	0.000	0.000	0.000
13.6	5.80	0.471	0.471	0.000	0.000	0.000	0.000	0.000
7.3	6.02	1.239	0.605	0.634	0.000	0.000	0.000	0.000
14.2	5.99	0.417	0.412	0.005	0.000	0.000	0.000	0.000
22.7	6.01	0.034	0.034	0.000	0.000	0.000	0.000	0.000
7.6	6.20	1.567	0.705	0.862	0.000	0.000	0.000	0.000
14.4	6.20	0.484	0.452	0.032	0.000	0.000	0.000	0.000
23.4	6.21	0.048	0.048	0.000	0.000	0.000	0.000	0.000
7.7	6.40	1.436	0.532	0.901	0.002	0.000	0.000	0.000
14.3	6.40	0.547	0.482	0.065	0.000	0.000	0.000	0.000
23.9	6.41	0.066	0.066	0.000	0.000	0.000	0.000	0.000
5.3	6.61	6.575	0.576	2.693	3.027	0.280	0.000	0.000
12.9	6.60	0.229	0.162	0.067	0.000	0.000	0.000	0.000
24.3	6.61	0.024	0.024	0.000	0.000	0.000	0.000	0.000
5.2	6.79	8.039	0.641	3.225	3.657	0.516	0.000	0.000
13.1	6.79	0.229	0.156	0.073	0.000	0.000	0.000	0.000
24.6	6.79	0.033	0.033	0.000	0.000	0.000	0.000	0.000
5.1	6.96	9.328	0.645	3.461	4.372	0.843	0.007	0.000
13.0	6.98	0.142	0.086	0.055	0.002	0.000	0.000	0.000
24.3	7.03	0.069	0.066	0.003	0.000	0.000	0.000	0.000
5.1	7.15	4.932	0.368	1.911	2.117	0.518	0.018	0.000
12.5	7.16	0.035	0.013	0.019	0.002	0.000	0.000	0.000
23.5	7.20	0.129	0.106	0.022	0.000	0.000	0.000	0.000
35.1	7.18	0.045	0.045	0.000	0.000	0.000	0.000	0.000
4.4	7.39	2.267	0.167	0.874	1.038	0.184	0.003	0.000
23.5	7.35	0.177	0.120	0.057	0.000	0.000	0.000	0.000
35.9	7.36	0.036	0.036	0.000	0.000	0.000	0.000	0.000
4.1	7.55	1.351	0.128	0.653	0.534	0.036	0.000	0.000
23.5	7.56	0.111	0.072	0.040	0.000	0.000	0.000	0.000
35.3	7.57	0.040	0.040	0.000	0.000	0.000	0.000	0.000
4.1	7.71	0.198	0.015	0.079	0.091	0.014	0.000	0.000
23.5	7.74	0.272	0.149	0.123	0.000	0.000	0.000	0.000
35.2	7.76	0.079	0.077	0.002	0.000	0.000	0.000	0.000
23.5	7.91	0.037	0.019	0.018	0.000	0.000	0.000	0.000

Summary statistics for above PSHA PGA deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%): 47.7
Mean src-site R= 6.7 km; M= 6.63; eps0= 0.56. Mean calculated for all sources.
Modal src-site R= 5.1 km; M= 6.96; eps0= 0.12 from peak (R,M) bin
MODE R*= 5.2km; M*= 6.96; EPS.INTERVAL: 1 to 2 sigma % CONTRIB.= 4.372

Principal sources (faults, subduction, random seismicity having > 3% contribution)
Source Category: % contr. R(km) M epsilon0 (mean values).

California B-faults Char	20.50	5.6	7.06	0.29	
California B-faults GR	12.86	5.8	6.79	0.19	
CA Compr. crustal gridded	14.11	8.8	5.84	1.26	

Individual fault hazard details if its contribution to mean hazard > 2%:

Fault ID	% contr.	Rcd(km)	M	epsilon0	Site-to-src azimuth(d)
Newport-Inglewood (Offshore) Cha	6.15	4.1	6.88	0.69	-139.3
Newport-Inglewood, alt 1 Char	1.15	5.4	7.15	0.61	-85.1
Newport-Inglewood, alt 2 Char	1.32	4.6	7.15	0.52	-98.2
San Joaquin Hills Char	8.34	5.4	6.97	-0.26	4.3
Newport Inglewood Connected alt	1.37	4.1	7.50	0.35	-139.3
Newport Inglewood Connected alt	1.37	4.1	7.50	0.35	-139.3
Newport-Inglewood (Offshore) GR	1.31	6.9	6.70	1.00	-176.7
San Joaquin Hills GR	8.92	5.5	6.73	-0.11	5.6

#*********End of deaggregation corresponding to Chiou-Youngs 2008 *********#

********** Southern California **********

APPENDIX E

APPENDIX E

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 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.