Water Quality Management Plan (Conceptual Priority WQMP)

Project Name:

3303 & 3355 Via Lido

Prepared for:

Shubin + Donaldson Architects, Inc.

Contact: Sieglinde Pukke

403 E. Montecito Street #2A

Santa Barbara, CA 93101

(805) 682-7000

Prepared by:

C&V Consulting, Inc.

Engineer: Dane P. McDougall Registration No.: 80705

27156 Burbank

Foothill Ranch, CA 92610

(949) 916-3800

February 2013

Project Owner's Certification			
Permit/Application No.		Grading Permit No.	
Tract/Parcel Map No.	Tract No. 17555	Building Permit No.	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract)			423-112-02 423-112-03

This Water Quality Management Plan (WQMP) has been prepared for Shubin + Donaldson Architects, Inc. by C&V Consulting, Inc. The WQMP is intended to comply with the requirements of the local NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan 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: New Port Beach Townhouse LLLP, a Nevada limited liability limited Pprtnership			
Title	Manager		
Company	New Port Beach Townhouse LLLP		
Address	3120 Sovereign Drive, Suite 4B, Lansing MI 48911		
Email	Steve.Mills@dart.biz		
Telephone #	517-525-4900		
Signature	[signature]	Date	3-22-13

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Attachments

Section I Discretionary Permit(s) and Water Quality Conditions

Project Infomation			
Permit/Application No.		Tract/Parcel Map No.	
Additional Information/ Comments:	Coastal Development Permits – approval TBD		
Water Quality Conditions			
Water Quality Conditions (list verbatim)	No formal conditions of approval have been issued at this time.		
Watershed-Based Plan Conditions			
Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	Watershed Infiltration and Hydromodification Management Plan (WIHMP) for the Newport Bay-Newport Coast area has not been approved at this time.		

Section II Project Description

II.1 Project Description

Description of Proposed Project				
Development Category (Verbatim from WQMP):	New development projects that create 10,000 square feet or more of impervious surface. This category includes commercial, industrial, residential housing subdivisions, mixed-use, and public projects on private or public property that falls under the planning and building authority or the Permittees. The WQMP development category is "Priority".			
Project Area (ft^2): 50,099	Number of Dwelling Units: 24		SIC Code: 236116	
Narrative Project Description:	The project site consists of approximately 1.196 acres located at 3303 Via Lido and 3355 Via Lido in the City of Newport Beach. The project site is currently developed with an existing office building, a church building, and a parking lot that will require demolition. Site improvements are to include construction of 24 new townhomes with landscaping and on site parking and on site guest parking.			
Project Area	Pervious		Impervious	
	Area (acres / sq ft)	Percentage	Area (acres / sq ft)	Percentage
Pre-Project Conditions	0	0	1.196 / 52,099	100%
Post-Project Conditions	0.132/5,756	11%	1.064/46,343	89%
Drainage Patterns/Connections	Underground storm drain facilities do not exist adjacent to the site. Storm water runoff presently surface flows off the site to the adjacent public streets (Via Lido, Via Oporto and Via Malaga) where they are collecting in surface gutters and conveyed to the north. From there flows are collecting in an off-site catch basin where they empty into the adjacent Newport Bay.			

II.2 Potential Stormwater Pollutants

Pollutants of Concern			
Pollutant	Circle One: E=Expected to be of concern N=Not Expected to be of concern		Additional Information and Comments
Suspended-Solid/ Sediment	E	N	
Nutrients	E	N	
Heavy Metals	E	N	
Pathogens (Bacteria/Virus)	E	N	
Pesticides	E	N	
Oil and Grease	E	N	
Toxic Organic Compounds	E	N	
Trash and Debris	E	N	

II.3 Hydrologic Conditions of Concern

☒ No – See map (Figure XVI-3d in Attachment D)

☐ Yes – Describe applicable hydrologic conditions of concern below. *Refer to Section 2.2.3 in the TGD.*

II.4 Post Development Drainage Characteristics

Describe post development drainage characteristics. *Refer to Section 2.2.4 in the TGD.*

Existing land use consists of multiple structures and a parking lot. The existing property is considered to be nearly all impervious. The proposed development will improve this situation by providing some landscaped features in common areas and the front of the proposed homes. Overall peak flows from the property are anticipated to be less than or equal to pre development flows.

In landscaped areas, the use of area drain inlets will be employed to reduce storm water from transporting sediments over flatwork improvements. Area drains will curb core to adjacent public streets per public standards.

II.5 Property Ownership/Management

Describe property ownership/management. *Refer to Section 2.2.5 in the TGD.*

Parcel A of the project site (APN 423-112-02) located at 3303 Via Lido is owned by First Church of Christ, Scientist as to Parcel A. Parcel B of the project site (APN 423-112-03) located at 3355 Via Lido is own by Newport Beach Townhouse LLP, A Nevada Limited Liability Partnership. A homeowners association will be formed to be responsible for the long term maintenance of the project's stormwater facilities.

Section III Site Description

III.1 Physical Setting

Planning Area/ Community Name	Lido Village
Location/Address	3303 & 3355 Via Lido
	Newport Beach, CA
Land Use	APN: 423-112-02 → PI (Private Institution) APN: 423-112-03 → Commercial
Zoning	RM-20
Acreage	1.196
Predominant Soil Type	Soil Type D

III.2 Site Characteristics

Precipitation Zone	0.67" per Orange County Rainfall Zones Map, Figure XVI.1 of the Technical Guidance Document
Topography	The topography of the site slopes gently in a northwest direction, at a rate of no more than a third of a percent, with elevations above sea level from 10 feet at the southerly portion of the project site and 7 feet throughout the remainder of the project site.
Drainage Patterns/Connections	Underground storm drain facilities do not exist adjacent to the site. Storm water runoff presently surface flows off the site to the adjacent public streets (Via Lido, Via Oporto and Via Malaga) where they are collecting in surface gutters and conveyed to the north. From there flows are collecting in an off-site catch basin where they empty into the adjacent Newport Bay.

Site Characteristics (continued)	
Soil Type, Geology, and Infiltration Properties	Per the Geotechnical Engineering Services Report, prepared by Professional Service Industries, Inc. dated August 24, 2012, the following soil conditions were encountered: "As indicated on our boring logs, the existing pavement section generally consists of approximately 3 inches of asphalt underlain by a silty sand with gravel (apparent base course) that was estimated to be about 6 inches thick. The pavement section was underlain by native soil consisting of medium dense silty gravely sand with trace organics that extend to a depth of approximately 5-feet below existing grade, very soft to soft clayey silt that extends to a depth of approximately 7½-feet below existing grade, and loose to very dense slightly silty sand to the maximum depth explored of approximately 50-feet below the existing ground surface elevation."
Hydrogeologic (Groundwater) Conditions	Per the Geotechnical Engineering Services Report, prepared by Professional Service Industries, Inc. dated August 24, 2012: "Groundwater was measured at approximately 5-feet below existing grade in all four borings at the time of drilling. Based on a review of the California Geological Survey (CGS) Seismic Hazard Zone Report for the Newport Quadrangle, the historic high groundwater depth for the site area is noted to be about 5 feet below grade. It is possible that seasonal variations (temperature, rainfall, tide conditions etc) will cause fluctuations in the groundwater level. Additionally, perched water may be encountered in discontinuous zones within the overburden. The groundwater levels presented in this report are the levels that were measured at the time of our field activities. It is recommended that the contractor determine the actual groundwater levels at the site at the time of the construction activities to determine the impact, if any, on the construction procedures."
Geotechnical Conditions (relevant to infiltration)	Per the Geotechnical Engineering Services Report, prepared by Professional Service Industries, Inc. dated August 24, 2012, the following information was provided in regards to infiltration: "Note that the upper soils are sensitive to disturbances caused by construction traffic and to changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. Furthermore, perched groundwater conditions can develop during periods of heavy rainfall as a result of less permeable

	layers impeding infiltration. In these instances, overlying subgrade soils may become unstable and require remedial measures. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather."
Off-Site Drainage	No off-site drainage was accounted for within this report.
Utility and Infrastructure Information	No underground storm drain exists directly adjacent to the site. The proposed development is designed to convey storm water flows through surface drainage to adjacent public streets or by collection into small area drain systems on-site which curb core to the adjacent public streets. There is a proposed water feature/fountain near the corner of Via Lido and Via Malaga. There is a common open space with enhanced paving, seating, and landscape area located at the northern section of the project site, between Units 4-5, between Units 9-10, near Unit 11 at the southeast corner of the project site with total of approximately 2,380 square feet of open space.

III.3 Watershed Description

Receiving Waters	Lower Newport Bay
303(d) Listed Impairments	Chlordane, Copper, DDT, Indicator Bacteria, Nutrients, PCBs, Pesticides, Sediment Toxicity
Applicable TMDLs	Copper, Indicator Bacteria, Nutrients, Pesticides, Turbidity/Siltation
Pollutants of Concern for the Project	Copper, Indicator Bacteria, Nutrients, Pesticides, Suspended Soils, Heavy Metals, Pathogens, Oil and Grease, Toxic Organic Compounds, Trash and Debris
Environmentally Sensitive and Special Biological Significant Areas	Lower Newport Bay

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

(NOC Permit Area only) 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 ☒
If yes, describe WIHMP feasibility criteria or regional/sub-regional LID opportunities.		

Project Performance Criteria (continued)	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	For the purpose of the proposed project, HCOCs do not exist since the existing condition of the site is 100% impervious.
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	Per 7.II-2.4.2.3 of the Model WQMP, the available LID Treatment BMPs to be utilized in reducing the post-development impacts include shallow infiltration, harvest and use, evapotranspiration, or biotreat/biofilter, of the 85th percentile of a 24-hour storm event.
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	Per 7.II-3.2.2 of the Model WQMP, if the LID performance criteria is not feasibly met by retention and/or biotreatment, then sizing of onsite treatment control BMPs are required. Sizing of these treatment control BMPs will include, if applicable, any Water Quality credits as calculated per the Technical Guidance Document. If the additional required volume cannot be met, however has a medium to high effectiveness for reducing the primary POCs, the project is considered to be in compliance, then a waiver application and participation in an alternative program may be not required. If the cost of providing treatment control BMPs greatly outweighs the pollution control benefits, a waiver of treatment control and LID requirements can be requested.
Calculate LID design storm capture volume for Project.	(Simple Method) DCV_{EX} = (0.75 x 1+ 0.15) x 0.67 x 1.196 AC x 43560 sf/ac x (1/12) in/ft =2,620 cf DCV_{PROP} = (0.75 x 0.89 + 0.15) x 0.67 x 1.196 AC x 43560 sf/ac x (1/12) in/ft = 2,380 cf (Worksheet A & B – Reference Attachment C)

IV.2. SITE DESIGN AND DRAINAGE PLAN

The proposed development is located on the Balboa Peninsula, in the City of Newport Beach. The Pacific Ocean is located about 2,000 feet to the west of the site, and the Newport Bay is located about 170 feet to the east of the site. The topography of the site slopes gently in a northwest direction, at a rate of no more than a third of a percent.

Underground storm drain facilities do not exist adjacent to the site. Storm water runoff presently surface flows off the site to the adjacent public streets (Via Lido, Via Oporto and Via Malaga) where they are collecting in surface gutters and conveyed to the north. From there flows are collecting in an off-site catch basin where they empty into the adjacent Newport Bay.

The property is designated in FEMA Flood Zone "X" shaded, areas considered to be outside of the 100-year floodplain, but inside the 500-year floodplain.

Typical to the Balboa Peninsula area, groundwater was found at shallow depths (up to five feet from the surface).

Existing land use consists of multiple structures and a parking lot. The existing property is considered to be nearly all impervious. The proposed development will improve this situation by providing some landscaped features in common areas and the front of the proposed homes. Overall peak flows from the property are anticipated to be less than or equal to pre development flows.

In landscaped areas, the use of area drain inlets will be employed to reduce storm water from transporting sediments over flatwork improvements. Area drains will curb core to adjacent public streets per public standards.

Water quality BMPs will be employed per City of Newport Beach Model WQMP requirements. Hydraulic Conditions of Concern are not anticipated because the proposed development will not be increasing overall storm water runoff volumes.

Due to the historic groundwater levels, deep infiltration BMPs would not be a feasible on this site. However, considering the site layout, Hydrologic Source Control (HSC) BMPs were utilized to reduce the overall design capture volume.

Drainage Management Areas (DMA) Table:

Drainage Area No. (DMA)	Area (ac)	DCV (cf)	Design Flow Rate (cfs) *	Proposed BMPs
A-1	0.173	318	0.017	HSC-2 Impervious Dispersion HSC-3 Street Trees INF-6 Permeable Pavement
A-2	0.373	787	0.050	HSC-2 Impervious Dispersion HSC-3 Street Trees INF-6 Permeable Pavement
A-3	0.321	614	0.034	HSC-2 Impervious Dispersion HSC-3 Street Trees INF-6 Permeable Pavement
A-4	0.330	658	0.039	HSC-2 Impervious Dispersion HSC-3 Street Trees INF-6 Permeable Pavement

IV.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS

IV.3.1 Hydrologic Source Controls

Name	Included?
Localized on-lot infiltration	☐
Impervious area dispersion (e.g. roof top disconnection)	☒
Street trees (canopy interception)	☒
Residential rain barrels (not actively managed)	☐
Green roofs/Brown roofs	☐
Blue roofs	☐
Impervious area reduction (e.g. permeable pavers, site design)	☒

Impervious Area Dispersion: Impervious area dispersion refers to the practice of routing runoff from pervious areas, such as rooftops, walkways, and patios onto the surface of adjacent pervious areas. Runoff is dispersed uniformly via splash block and soaks into the ground as it moves slowly across the surface of pervious areas. Minor ponding may occur, but it is not the intent of this practice to actively promote on-lot storage or infiltration. Standing water is not allowed. Impervious Area Dispersion is ranked second in the preferred method of treatment.

Street Trees: By intercepting rainfall, trees can provide several aesthetic and storm water benefits including peak flow control, increased infiltration and evapotranspiration, and runoff temperature reduction. The volume of precipitation intercepted by the canopy reduces the treatment volume required for downstream treatment BMPs. Shading reduces heat island effect as well as the temperature of adjacent impervious surfaces, over which storm water flows, and thus reduces the heat transferred to downstream receiving waters. Tree routes also strengthen the soil structure and provided infiltration pathways, simultaneously reducing erosion potential and enhancing infiltration. Street Trees are provided along the private street and near the guest parking areas. Street Trees are ranked third in the preferred method of treatment.

Impervious Area Reduction: Impervious Area Reduction such as permeable concrete pavements contain small voids that allow water to pass through to a gravel base. They come in a variety of forms; they may be modular paving system (concrete pavers, grass-pave, or gravel-pave) or poured in place pavement (pourous concrete, permeable asphalt). All permeable pavements treat stormwater and remove sediments and metals to some degree within the pavement pore space and

gravel base. While conventional pavement result in increased rates and volumes of surface runoff, properly constructed and maintained porous pavements, allow stormwater to percolate through the pavement and enter the soil below. This facilitates groundwater recharge while providing the structural and functional features needed for the roadway, parking lot, or sidewalk. The paving surface, subgrade and installation requirements of permeable pavements are more complex than those for conventional asphalt or concrete surfaces. For porous pavements to function properly over an expected life span of 15-20 years, they must be properly sited and carefully designed an installed, as well as periodically maintained. Failure to protect paved areas from construction-related sediment loads can result in their premature clogging and failure.

IV.3.2 Infiltration BMPs

Name	Included?
Bioretention without underdrains	☐
Rain gardens	☐
Porous landscaping	☐
Infiltration planters	☐
Retention swales	☐
Infiltration trenches	☐
Infiltration basins	☐
Drywells	☐
Subsurface infiltration galleries	☐
French drains	☐
Permeable asphalt	☐
Permeable concrete	☐
Permeable concrete pavers	☐

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

Name	Included?
All HSCs; *See Section IV.3.1*	☐
Surface-based infiltration BMPs	☐
Biotreatment BMPs	☐
Above-ground cisterns and basins	☐
Underground detention	☐
Other:	☐
Other:	☐
Other:	☐

IV.3.4 Biotreatment BMPs

Name	Included?
Bioretention with underdrains	☐
Stormwater planter boxes with underdrains	☐
Rain gardens with underdrains	☐
Constructed wetlands	☐
Vegetated swales	☐
Vegetated filter strips	☐
Proprietary vegetated biotreatment systems	☐
Wet extended detention basin	☐
Dry extended detention basins	☐
Other:	☐
Other:	☐

IV.3.5 Hydromodification Control BMPs

Hydromodification Control BMPs	
BMP Name	**BMP Description**
N/A	N/A

IV.3.6 Regional/Sub-Regional LID BMPs

Regional/Sub-Regional LID BMPs
N/A

IV.3.7 Treatment Control BMPs

Treatment Control BMPs	
BMP Name	**BMP Description**
Impervious Dispersion	By diverting the roof top and hardscape runoff to yard areas for natural infiltration for volume reduction. Reference Worksheet A located in Attachment C.
Street Trees	Provided street trees along the private roadway and parking areas will reduce the volume of runoff from impervious areas by evapotranspiration and infiltration to the root system for volume reduction. Reference Worksheet A located in Attachment C.
Impervious Area Reduction	Permeable concrete pavers, planters and landscape areas will reduce the volume of runoff from impervious areas for volume reduction. Reference Worksheet A located in Attachment C.

IV.3.8 Non-structural Source Control BMPs

Fill out non-structural source control check box forms or provide a brief narrative explaining if non-structural source controls were not used.

Non-Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**If not applicable, state brief reason**
		Included	**Not Applicable**	
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)	☒	☐	
N6	Local Industrial Permit Compliance	☐	☒	Residential Project
N7	Spill Contingency Plan	☒	☐	
N8	Underground Storage Tank Compliance	☐	☒	
N9	Hazardous Materials Disclosure Compliance	☒	☐	
N10	Uniform Fire Code Implementation	☒	☐	
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	No proposed loading docks
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	Residential Project

IV.3.9 Structural Source Control BMPs

Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**If not applicable, state brief reason**
		Included	**Not Applicable**	
S1	Provide storm drain system stenciling and signage	☐	☒	No proposed storm drain.
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	No proposed outdoor storage areas.
S3	Design and construct trash and waste storage areas to reduce pollution introduction	☐	☒	
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	
S5	Protect slopes and channels and provide energy dissipation	☐	☒	No proposed slopes
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☒	☐	
S6	Dock areas	☐	☒	No proposed docks.
S7	Maintenance bays	☐	☒	No proposed maintenance bays.
S8	Vehicle wash areas	☐	☒	No proposed vehicle wash areas.
S9	Outdoor processing areas	☐	☒	No proposed outdoor processing areas.
S10	Equipment wash areas	☐	☒	No proposed equipment wash areas.
S11	Fueling areas	☐	☒	No proposed fueling areas.
S12	Hillside landscaping	☐	☒	Project not located within hillside areas.
S13	Wash water control for food preparation areas	☐	☒	No proposed food preparation areas.
S14	Community car wash racks	☐	☒	No proposed community car wash racks.

IV.4 ALTERNATIVE COMPLIANCE PLAN (IF APPLICABLE)

IV.4.1 Water Quality Credits

Description of Proposed Project				
Project Types that Qualify for Water Quality Credits (Select all that apply):				
☐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 WQ 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.
Calculation of Water Quality Credits (if applicable)	High Density = 5% DCV_{PROP}= 2,080 cf $DCV_{WaterCredit}$= 2,080x 0.05 = 104 cf			

IV.4.2 Alternative Compliance Plan Information

N/A

Section V Inspection/Maintenance Responsibility for BMPs

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
Education for Property Owners, Tenants, & Occupants (N1)	HOA and individual homeowners	WQMP to be a part of Title Documents as part of purchase. HOA to give yearly report to residents.	As needed for property sales and once a year for reporting to residents.
Activity Restrictions (N2)	HOA	CC&Rs provided at time of sale and will identify activity restrictions for property and the neighborhood.	CC&Rs provided with property sales. Issue letters of non-compliance, as needed by HOA.
Common Area Landscape Management (N3)	HOA	HOA or appointed Property management company to provide maintenance of landscaping to meet current water efficiency and keep plants healthy and bio areas maintained with proper soil amendments.	Regular maintenance once a week and monthly inspections to determine deficiencies.
BMP Maintenance (N4)	HOA	HOA or appointed Property management company to provide maintenance of BMPs per the requirements of the	Regular maintenance once a week and monthly inspections to determine deficiencies.

		WQMP. Bioswales must be maintained with proper soil amendments and densely populated with vegetation.	
Common Area Litter Control (N11)	HOA	HOA or appointed Property Management Company to provide maintenance and to empty common area trash cans.	Regular maintenance once a week.
Street Sweeping Private Streets and Parking Lots (N15)	HOA	HOA or appointed Property Management Company to provide maintenance of Private Streets.	Regular street sweeping once a month.
Efficient Irrigation Systems & Landscape Design (S4)	HOA	HOA or appointed Property Management Company to provide maintenance of landscaping to meet current water efficiency standards, and keep plants healthy.	Regular maintenance once a week and monthly inspection to determine deficiencies.

Section VI Site Plan and Drainage Plan

VI.1 SITE PLAN AND DRAINAGE PLAN

Include a site plan and drainage plan sheet set containing the following minimum information:

- Project location
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural BMP locations
- Drainage delineations and flow information
- Drainage connections
- BMP details

See Attachment B for BMP Exhibit

VI.2 ELECTRONIC DATA SUBMITTAL

The minimum requirement is to provide submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open.

If the local jurisdiction requires specialized electronic document formats (CAD, GIS) to be submitted, this section will be used to describe the contents (e.g., layering, nomenclature, georeferencing, etc.) of these documents so that they may be interpreted efficiently and accurately.

Section VII Educational Materials

Education Materials			
Residential Material (http://www.ocwatersheds.com)	**Check If Applicable**	**Business Material (http://www.ocwatersheds.com)**	**Check If Applicable**
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 Material**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☒		
Recycle at Your Local Used Oil Collection Center (North County)	☒		☐
Recycle at Your Local Used Oil Collection Center (Central County)	☐		☐
Recycle at Your Local Used Oil Collection Center (South County)	☐		☐
Tips for Maintaining a Septic Tank System	☐		☐
Responsible Pest Control	☒		☐
Sewer Spill	☐		☐
Tips for the Home Improvement Projects	☒		☐
Tips for Horse Care	☐		☐
Tips for Landscaping and Gardening	☒		☐
Tips for Pet Care	☒		☐
Tips for Pool Maintenance	☒		☐
Tips for Residential Pool, Landscape and Hardscape Drains	☐		☐
Tips for Projects Using Paint	☒		☐

ATTACHMENT A

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities such as painting can lead to water pollution if you're not careful. Paint must be used, stored and disposed of properly to ensure that it does 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 paint 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 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 while using, storing and disposing of paint. 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 Projects Using Paint

Tips for Projects Using Paint

Paint can cause significant damage to our environment. Whether you hire a contractor or do it yourself, it is important to follow these simple tips when purchasing, using, cleaning, storing and disposing of paint.

Purchasing Paint

- Measure the room or object to be painted, then buy only the amount needed.
- Whenever possible, use water-based paint since it usually does not require hazardous solvents such as paint thinner for cleanup.

Painting

- Use only one brush or roller per color of paint to reduce the amount of water needed for cleaning.
- Place open paint containers or trays on a stable surface and in a position that is unlikely to spill.
- Always use a tarp under the area or object being painted to collect paint drips and contain spills.

Cleaning

- Never clean brushes or rinse paint containers in the street, gutter or storm drain.
- For oil-based products, use as much of the paint on the brushes as possible. Clean brushes with thinner. To reuse thinner, pour it through a fine filter (e.g. nylon, metal gauze or filter paper) to remove solids such as leftover traces of paint.
- For water-based products, use as much of the paint on the brushes as possible, then rinse in the sink.
- Collect all paint chips and dust. Chips and dust from marine paints or paints containing lead, mercury or tributyl tin are hazardous waste. Sweep up and dispose of at a Household Hazardous Waste Collection Center (HHWCC).

Storing Paint

- Store paint in a dry location away from the elements.
- Store leftover water-based paint, oil-based paint and solvents separately in original or clearly marked containers.
- Avoid storing paint cans directly on cement floors. The bottom of the can will rust much faster on cement.
- Place the lid on firmly and store the paint can upside-down to prevent air from entering. This will keep the paint usable longer. Oil-based paint is usable for up to 15 years. Water-based paint remains usable for up to 10 years.

Alternatives to Disposal

- Use excess paint to apply another coat, for touch-ups, or to paint a closet, garage, basement or attic.
- Give extra paint to friends or family. Extra paint can also be donated to a local theatre group, low-income housing program or school.
- Take extra paint to an exchange program such as the **"Stop & Swap"** that allows you to drop off or pick up partially used home care products free of charge. **"Stop & Swap"** programs are available at most HHWCCs.
- For HHWCC locations and hours, call **(714) 834-6752** or visit **www.oclandfills.com**.

Disposing of Paint

- Never put wet paint in the trash.

For water-based paint:

- If possible, brush the leftover paint on cardboard or newspaper. Otherwise, allow the paint to dry in the can with the lid off in a well-ventilated area protected from the elements, children and pets. Stirring the paint every few days will speed up the drying.
- Large quantities of extra paint should be taken to a HHWCC.
- Once dried, paint and painted surfaces may be disposed of in the trash. When setting a dried paint can out for trash collection, leave the lid off so the collector will see that the paint has dried.

For oil-based paint:

- Oil-based paint is a household hazardous waste. All leftover paint should be taken to a HHWCC.

Aerosol paint:

- Dispose of aerosol paint cans at a HHWCC.

Spills

- Never hose down pavement or other impermeable surfaces where paint has spilled.
- Clean up spills immediately by using an absorbent material such as cat litter. Cat litter used to clean water-based paint spills can be disposed of in the trash. When cleaning oil-based paint spills with cat litter, it must be taken to a HHWCC.
- Immediately report spills that have entered the street, gutter or storm drain to the County's 24-Hour Water Pollution Problem Reporting Hotline at **(714) 567-6363** or visit **www.ocwatersheds.com** to fill out an incident reporting form.

PROJECT Pollution PREVENTION

The Pollution Solution

Several residential activities can result in water pollution. Among these activities are car washing and hosing off driveways and sidewalks. Both activities can waste water and result in excess runoff. Water conservation methods described in this pamphlet can prevent considerable amounts of runoff and conserve water. By taking your car to a commercial car wash and by sweeping driveways and sidewalks, you can further prevent the transport of pollutants to Orange County waterways. Here are some of the common pollutants for which you can be part of the solution:

1 Pesticides and Fertilizer

- **Pollution:** The same pesticides that are designed to be toxic to pests can have an equally lethal impact on our marine life. The same fertilizer that promotes plant growth in lawns and gardens can also create nuisance algae blooms, which remove oxygen from the water and clog waterways when it decomposes.
- **Solution:** Never use pesticides or fertilizer within 48 hours of an anticipated rainstorm. Use only as much as is directed on the label and keep it off driveways and sidewalks.

2 Dirt and Sediment

- **Pollution:** Dirt or sediment can impede the flow of the stormwater and negatively impact stream habitat as it travels through waterways and deposits downstream. Pollutants can attach to sediment, which can then be transported through our waterways.
- **Solution:** Protect dirt stockpiles by covering them with tarps or secure plastic sheets to prevent wind or rain from allowing dirt or sediment to enter the storm drain system.

3 Metals

- **Pollution:** Metals and other toxins present in car wash water can harm important plankton, which forms the base of the aquatic food chain.
- **Solution:** Take your car to a commercial car wash where the wash water is captured and treated at a local wastewater treatment plant.

DID YOU KNOW?

Did you know that most of the pollution found in our waterways is not from a single source, but from a "non-point" source meaning the accumulation of pollution from residents and businesses throughout the community

4 Pet Waste

- **Pollution:** Pet waste carries bacteria through our watersheds and eventually will be washed out to the ocean. This can pose a health risk to swimmers and surfers.
- **Solution:** Pick up after your pets!

5 Trash and Debris

- **Pollution:** Trash and debris can enter waterways by wind, littering and careless maintenance of trash receptacles. Street sweeping collects some of this trash; however, much of what isn't captured ends up in our storm drain system where it flows untreated out to the ocean.
- **Solution:** Don't litter and make sure trash containers are properly covered. It is far more expensive to clean up the litter and trash that ends up in our waterways than it is to prevent it in the first place. Come out to one of Orange County's many locations for Coastal and Inner-Coastal Cleanup Day, which is held in September.

6 Motor Oil / Vehicle Fluids

- **Pollution:** Oil and petroleum products from our vehicles are toxic to people, wildlife and plants.
- **Solution:** Fix any leaks from your vehicle and keep the maintenance up on your car. Use absorbent material such as cat litter on oil spills, then sweep it up and dispose of it in the trash. Recycle used motor oil at a local Household Hazardous Waste Collection Center.

A TEAM EFFORT

The Orange County Stormwater Program has teamed with the Municipal Water District of Orange County (MWDOC) and the University of California Cooperative Extension Program (UCCE) to develop this pamphlet.

Low Impact Development (LID) and sustainable water use prevents water pollution and conserves water for drinking and reuse. Reducing your water use and the amount of water flowing from your home protects the environment and saves you money.

Thank you for making water protection a priority!

For more information, please visit
www.ocwatersheds.com/publiced/

www.mwdoc.com

www.uccemg.com

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

Special Thanks to
The City of Los Angeles Stormwater Program for the use of its artwork

The Metropolitan Water District of Southern California for the use of the California-Friendly Plant and Native Habitat photos

Homeowners Guide for Sustainable Water Use

Low Impact Development, Water Conservation & Pollution Prevention

The Ocean Begins at Your Front Door

RUNOFF, RAINWATER AND REUSE

Where Does Water Runoff Go?

Stormwater, or water from rainfall events, and runoff from outdoor water use such as sprinklers and hoses flows from homes directly into catch basins and the storm drain system. After entering the storm drain, the water flows untreated into streams, rivers, bays and ultimately the Pacific Ocean. Runoff can come from lawns, gardens, driveways, sidewalks and roofs. As it flows over hard, impervious surfaces, it picks up pollutants. Some pollutants carried by the water runoff include trash, pet waste, pesticides, fertilizer, motor oil and more.

Water Conservation

Pollution not only impairs the water quality for habitat and recreation, it can also reduce the water available for reuse. Runoff allowed to soak into the ground is cleaned as it percolates through the soil, replenishing depleted groundwater supplies. Groundwater provides approximately 50% of the total water for drinking and other indoor household activities in north and central Orange County. When land is covered with roads, parking lots, homes, etc., there is less land to take in the water and more hard surfaces over which the water can flow.

In Orange County, 60-70% of water used by residents and businesses goes to irrigation and other outdoor uses. Reusing rainwater to irrigate our lawn not only reduces the impact of water pollution from runoff, but it also is a great way to conserve our precious water resources and replenish our groundwater basin.

What is Low Impact Development (LID)?

Low Impact Development (LID) is a method of development that seeks to maintain the natural hydrologic character of an area. LID provides a more sustainable and pollution-preventative approach to water management.

New water quality regulations require implementation of LID in larger new developments and encourage implementation of LID and other sustainable practices in existing residential areas. Implementing modifications to your lawn or garden can reduce pollution in our environment, conserve water and reduce your water bill.

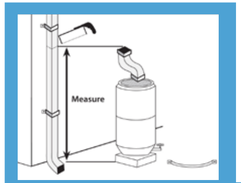
Permeable pavement allows water runoff to infiltrate through the soil and prevents most pollutants from reaching the storm drain system.

OPTIONS FOR RAINWATER HARVESTING AND REUSE

Rainwater harvesting is a great way to save money, prevent pollution and reduce potable water use. To harvest your rainwater, simply redirect the runoff from roofs and downspouts to rain barrels. Rain gardens are another option; these reduce runoff as well as encourage infiltration.

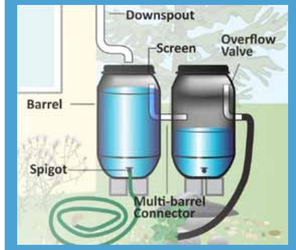
Downspout Disconnection/Redirection

Disconnecting downspouts from pipes running to the gutter prevents runoff from transporting pollutants to the storm drain. Once disconnected, downspouts can be redirected to rain gardens or other vegetated areas, or be connected to a rain barrel.

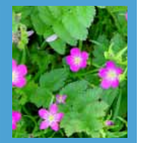


Rain Barrels

Rain barrels capture rainwater flow from roofs for reuse in landscape irrigation. Capacity of rain barrels needed for your home will depend on the amount of roof area and rainfall received. When purchasing your rain barrel, make sure it includes a screen, a spigot to siphon water for use, an overflow tube to allow for excess water to run out and a connector if you wish to connect multiple barrels to add capacity of water storage.



Mosquito growth prevention is very important when installing a rain barrel. The best way to prevent mosquito breeding is to eliminate entry points by ensuring all openings are sealed tightly. If these methods are unsuccessful, products are available to kill mosquito larvae, but that are harmless to animals and humans. Regular application of these products is essential. Please visit the Orange County Vector Control website for more information at www.ocvcd.org/mosquitoes3.php.



Rain Gardens

Rain gardens allow runoff to be directed from your roof downspout into a landscaped area. Vegetation and rocks in the garden will slow the flow of water to allow for infiltration into the soil. Plants and soil particles will absorb pollutants from the roof runoff. By utilizing a native plant palate, rain gardens can be maintained all year with minimal additional irrigation. These plants are adapted to the semi-arid climate of Southern California, require less water and can reduce your water bill.

Before modifying your yard to install a rain garden, please consult your local building and/or planning departments to ensure your garden plan follows pertinent building codes and ordinances. Besides codes and ordinances, some home owner associations also have guidelines for yard modifications. If your property is in hill areas or includes engineered slopes, please seek professional advice before proceeding with changes.

For information on how to disconnect a downspout or to install and maintain a rain barrel or rain garden at your home, please see the Los Angeles Rainwater Harvesting Program, A Homeowner's "How-To" Guide, November 2009 at www.larainwaterharvesting.org/

OTHER WATER CONSERVATION AND POLLUTION PREVENTION TECHNIQUES

Native Vegetation and Maintenance

"California Friendly" plants or native vegetation can significantly reduce water use. These plants often require far less fertilizers and pesticides, which are two significant pollutants found in Orange County waterways. Replacing water "thirsty" plants and grass types with water efficient natives is a great way to save water and reduce the need for potentially harmful pesticides and fertilizer.

Please see the California Friendly Garden Guide produced by the Metropolitan Water District of Southern California and associated Southern California Water Agencies for a catalog of California friendly plants and other garden resources at www.bewaterwise.com/Gardensoft.

Weed Free Yards

Weeds are water thieves. They often reproduce quickly and rob your yard of both water and nutrients. Weed your yard by hand if possible. If you use herbicides to control the weeds, use only the amount recommended on the label and never use it if rain is forecast within the next 48 hours.

Soil Amendments

Soil amendments such as green waste (e.g. grass clippings, compost, etc.) can be a significant source of nutrients and can help keep the soil near the roots of plants moist. However, they can cause algal booms if they get into our waterways, which reduces the amount of oxygen in the water and impacts most aquatic organisms. It is important to apply soil amendments more than 48 hours prior to predicted rainfall.

IRRIGATE EFFICIENTLY

Water runoff from sprinklers left on too long will carry pollutants into our waterways.

Smart Irrigation Controllers

Smart Irrigation Controllers have internal clocks as well as sensors that will turn off the sprinklers in response to environmental changes. If it is raining, too windy or too cold, the smart irrigation control sprinklers will automatically shut off.

Check with your local water agency for available rebates on irrigation controllers and smart timers.

- Aim your sprinklers at your lawn, not the sidewalk – By simply adjusting the direction of your sprinklers you can save water, prevent water pollution from runoff, keep your lawn healthy and save money.
- **Set a timer for your sprinklers** – lawns absorb the water they need to stay healthy within a few minutes of turning on the sprinklers. Time your sprinklers; when water begins running off your lawn, you can turn them off. Your timer can be set to water your lawn for this duration every time.
- **Water at Sunrise** – Watering early in the morning will reduce water loss due to evaporation. Additionally, winds tend to die down in the early morning so the water will get to the lawn as intended.
- **Water by hand** – Instead of using sprinklers, consider watering your yard by hand. Hand-watering ensures that all plants get the proper amount of water and you will prevent any water runoff, which wastes water and carries pollutants into our waterways.
- **Fix leaks** - Nationwide, households waste one trillion gallons of water a year to leaks – that is enough water to serve the entire state of Texas for a year. If your garden hose is leaking, replace the nylon or rubber hose washer and ensure a tight connection. Fix broken sprinklers immediately.

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.

Preventing water pollution at your commercial/industrial site

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

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

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

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

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

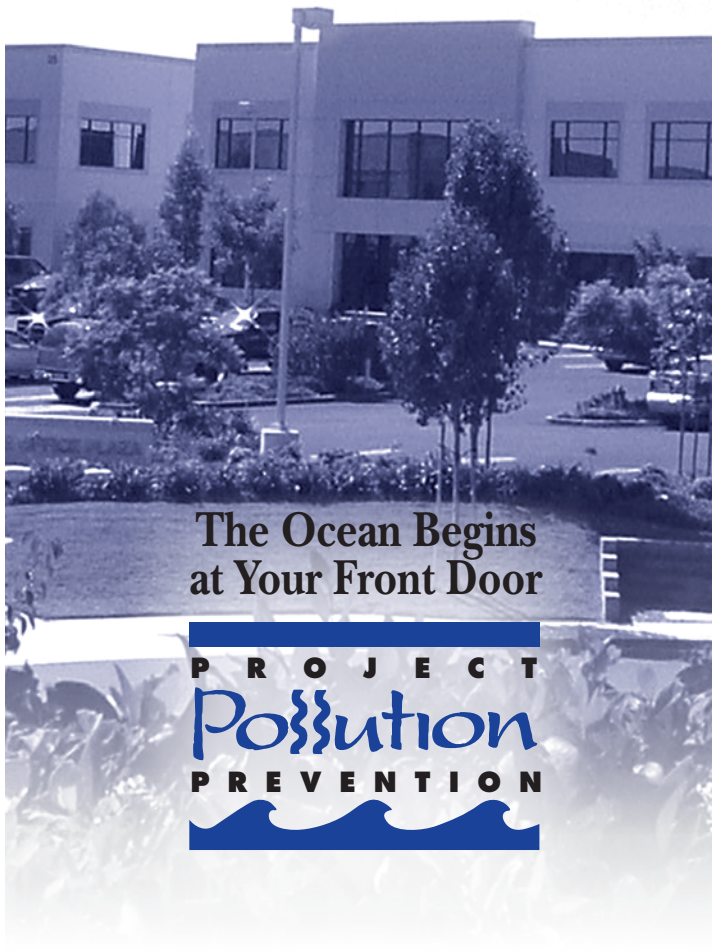
For emergencies, dial 911.

RECYCLE USED OIL

Printed on Recycled Paper

Help Prevent Ocean Pollution:

Proper Maintenance Practices for Your Business



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Proper Maintenance Practices for your Business

Landscape Maintenance

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

Building Maintenance

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

Never Dispose of Anything in the Storm Drain.

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

PROJECT Pollution PREVENTION

HOMEOWNER TIPS
PROTECTING WATER

Before Buying Pest Control Products

- Identify the pest.
- Decide if pest control products are the best control measure or if there are alternatives available.
- Are integrated pest management guidelines available for this pest?
- Read the product label:
  - Is the pest listed on the label?
  - Is it the best product for the pest?

Before Mixing Your Sprayer

- Read the label carefully.
- Buy only enough pesticide to treat the area affected by the pest.
- Check the weather and don't apply if it's windy or about to rain
- Measure the area you're treating.
- Calculate how much spray to mix.
- Wear long sleeve shirt, long pants, shoes and any other protective equipment listed on the label and follow all the label precautions.
- Be prepared for spills and know how to clean them up.

When You're Ready To Spray

- Mix and load spray in an area where any spilled pesticide will not be able to drain or be washed away into storm drains, ditches, streams, ponds or other bodies of water.
- Mix sprayer on grass, not the sidewalk or driveway.
- Mix only as much as needed.

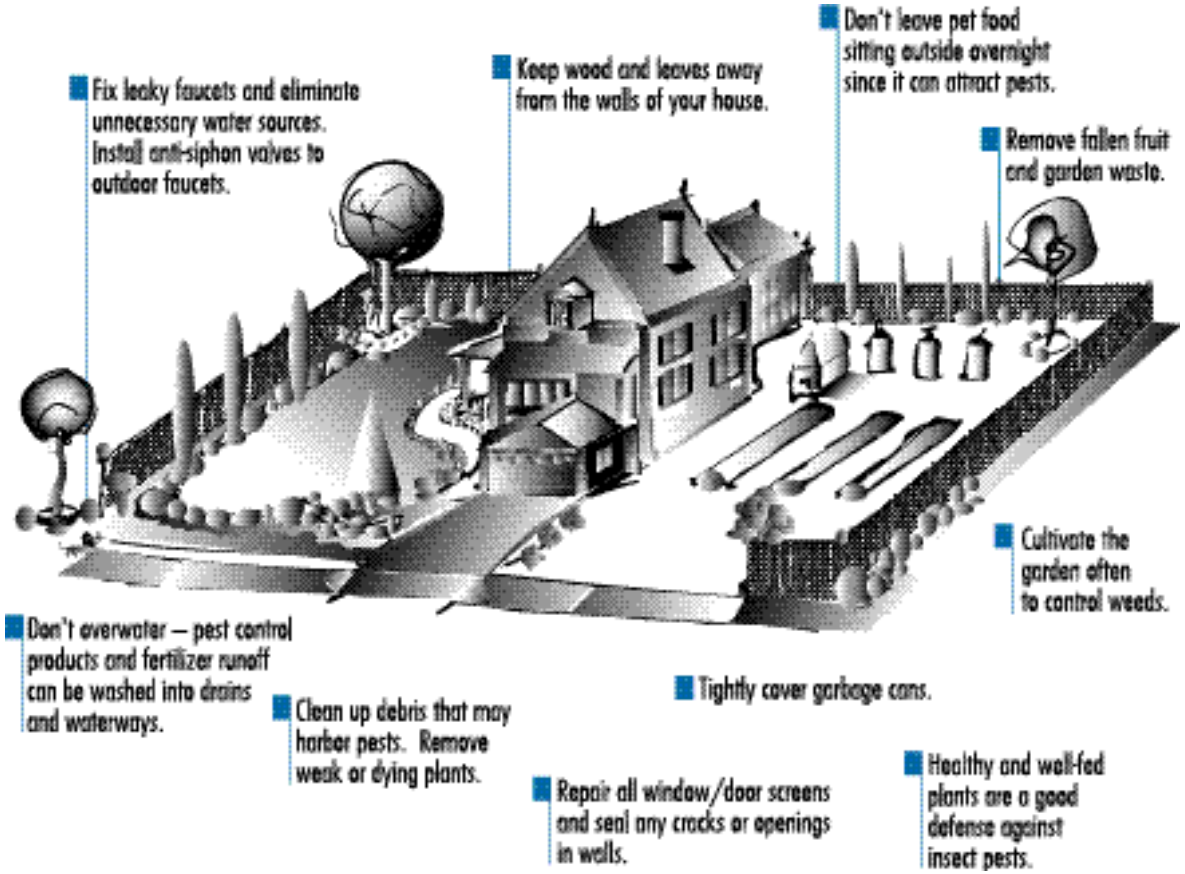
When You're Spraying

- AVOID spraying in or near storm drains, ditches, streams, and ponds!
- Leave an untreated strip around these areas to protect the water.

When You're done

- Never dump leftovers down any drain; Save for a future application.
- Triple-rinse sprayer and apply rinsewater to treated area.
- Take any old or unwanted pesticides to a Household Hazardous Waste Collection Center (714) 834-6752.

Using Pest Control Products. It's Your Responsibility To Do It Right!



IPM... Outsmarting Pests While Protecting Water

With Integrated Pest Management (IPM), homeowners use common sense and nature to make it difficult for pests to survive. IPM techniques include cultural practices (such as mulching to prevent weeds), encouraging natural enemies (good bugs), and judicious use of pest control products.

- First, identify your pest problem. To find the best solution, you need to pin down the problem. Consult gardening books, your county cooperative extension office or your local nursery.
- Decide how much pest control is necessary. If you can live with some pest damage, you can avoid intensive pest control product treatments.
- Choose an effective option. Try various types of controls first: washing bugs off plants, pruning diseased parts of plants. If you need to use pest control products, choose one that targets the problem and poses the least hazard.
- Finally, it's easier to prevent pests than to control them.

Think ahead.

This brochure is being distributed in order to reduce the impacts of pesticides on water quality. It was produced with support from the Orange County Storm Water Program, the Coalition for Urban/Rural Environmental Stewardship (CURES) and a 319(h) grant from the State Water Resources Control Board.

Orange County Storm Water Program Participants:

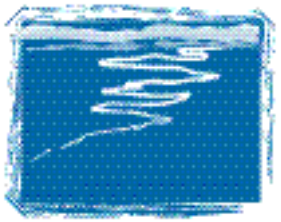
Anaheim Public Works/Engineering	(714) 765-5176
Brea Engineering	(714) 990-7666
Buena Park Public Works	(714) 562-3655
Costa Mesa Public Services	(714) 754-5248
Cypress Engineering	(714) 229-6752
Dana Point Public Works	(949) 248-3562
Fountain Valley Public Works	(714) 593-4400 x347
Fullerton Engineering Dept	(714) 738-6853
Garden Grove Development Services	(714) 741-5554
Huntington Beach Public Works	(714) 536-5432
Irvine Public Works	(949)724-6515
La Habra Public Services	(562) 905-9792
La Palma Public Works	(714) 523-1140 x102
Laguna Beach Municipal Services	(949) 497-0711
Laguna Hills Engineering	(949) 707-2600
Laguna Niguel Public Works	(949) 362-4337
Lake Forest Public Works	(949) 461-3480
Los Alamitos Community Dev	(562) 431-3538 x301
Mission Viejo Public Works	(949) 470-3095
Newport Beach Public works	(949) 644-3311
Orange Public Works	(714) 744-5551
Placentia Engineering	(714) 993-8131
San Clemente Engineering	(949) 361-6100
San Juan Capistrano Engineering	(949) 493-1171
Santa Ana Public Works	(714) 647-3380
Seal Beach Engineering	(562) 431-2527 x318
Stanton Public Works	(714) 379-9222 x204
Tustin Public Works Engineering	(714) 573-3150
Villa Park Engineering	(714) 998-1500
Westminster Public Works Eng.	(714) 898-3311 x215
Yorba Linda Engineering	(714) 961-7170 x174
O.C. Storm Water Program	1-877-89-SPILL (1-877-897-7455)
24 Hour Water Pollution Hotline	(714) 567-6363 or ashbyk@pfrd.co.orange.ca.us
Chemical and Hazardous Material Spill Emergencies	911

Other Important Phone Numbers:

For Additional Brochures	1-877-89-SPILL (1-877-897-7455)
UC Masters & Coop Extension	(714) 708-1646 ucmastergardeners@yahoo.com
O.C. Household Hazardous Waste Information	(714) 834-6752 or www.oc.ca.gov/IWMD
Information on agriculture chemicals, pesticides and possible alternatives, O.C. Agriculture Commissioner	(714) 447-7115

Original graphics developed with support from:
Coalition For Urban/Rural Environmental Stewardship (CURES)
Western Crop Protection Association (WCPA)
Responsible Industry for a Sound Environment (RISE)

Keeping Pest Control Products Out of Creeks, Rivers and The Ocean



HOMEOWNER TIPS

PROTECTING WATER

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

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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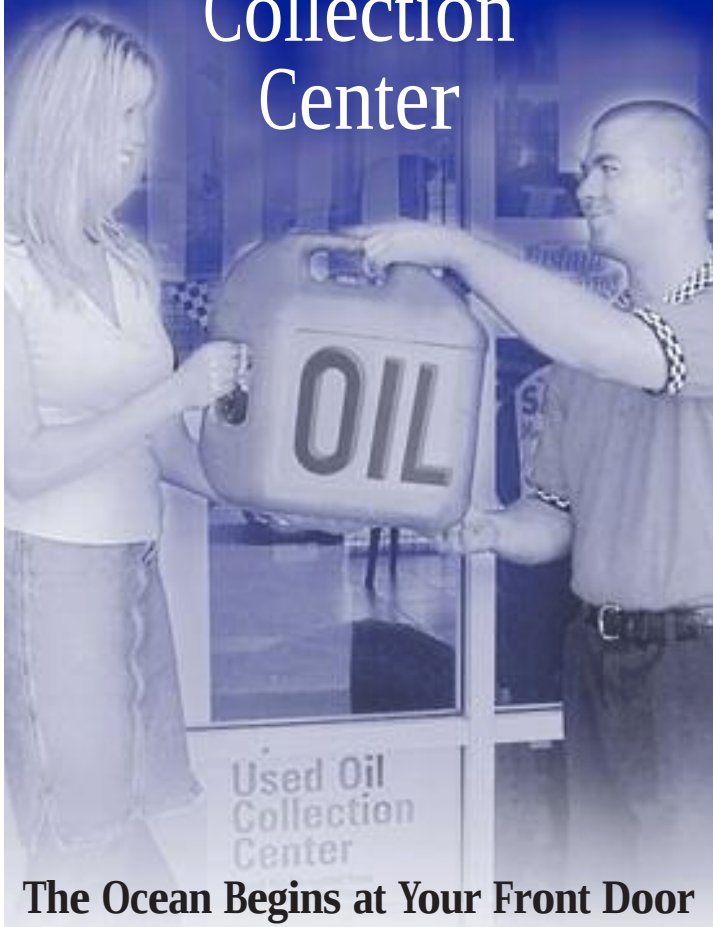
Help Prevent Ocean Pollution:

Recycle at Your Local Used Oil Collection Center



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

NORTH COUNTY

Used Oil Collection Centers

Anaheim

All Seasons Tire and Auto Center, Inc.
817 S Brookhurst St., Anaheim, CA 92804
(714)772-6090( )
CIWMB#: 30-C-03177

AutoZone #3317
423 N Anaheim Blvd., Anaheim, CA 92805
(714)776-0787( )
CIWMB#: 30-C-05263

AutoZone #5226
2145 W Lincoln Ave., Anaheim, CA 92801
(714)533-6599( )
CIWMB#: 30-C-04604

Bedard Automotive
3601 E Miraloma Ave., Anaheim, CA 92806
(714)528-1380( )
CIWMB#: 30-C-02205

Classic Chevrolet
1001 Weir Canyon Rd., Anaheim, CA 92807
(714)283-5400( )
CIWMB#: 30-C-05223

Econo Lube N' Tune #4
3201 W Lincoln Ave., Anaheim, CA 92801
(714)821-0128( )
CIWMB#: 30-C-01485

EZ Lube Inc - Savi Ranch #43
985 N Weir Canyon Rd., Anaheim, CA 92807
(714)556-1312( )
CIWMB#: 30-C-06011

Firestone Store #71C7
1200 S Magnolia Ave., Anaheim, CA 92804
(949)598-5520( )
CIWMB#: 30-C-05743

Great Western Lube Express
125 N Brookhurst St., Anaheim, CA 92801
(714)254-1300( )
CIWMB#: 30-C-05542

HR Pro Auto Service Center
3180 W Lincoln Ave., Anaheim, CA 92801
(714)761-4343( )
CIWMB#: 30-C-05927

Ira Newman Automotive Services
1507 N State College Blvd., Anaheim, CA 92806
(714)635-2392( )
CIWMB#: 30-C-01482

Jiffy Lube #1028
2400 W Ball Rd., Anaheim, CA 92804
(714)761-5211( )
CIWMB#: 30-C-00870

Jiffy Lube #1903
2505 E Lincoln Ave., Anaheim, CA 92806
(714)772-4000( )
CIWMB#: 30-C-05511

Jiffy Lube #2340
2181 W Lincoln Ave., Anaheim, CA 92801
(714)533-1000( )
CIWMB#: 30-C-04647

Kragen Auto Parts #1303
1088 N State College Blvd., Anaheim, CA 92806
(714)956-7351( )
CIWMB#: 30-C-03438

Kragen Auto Parts #1399
2245 W Ball Rd., Anaheim, CA 92804
(714)490-1274( )
CIWMB#: 30-C-04094

Kragen Auto Parts #1565
2072 Lincoln Ave., Anaheim, CA 92806
(714)502-6992( )
CIWMB#: 30-C-04078

Kragen Auto Parts #1582
3420 W Lincoln Ave., Anaheim, CA 92801
(714)828-7977( )
CIWMB#: 30-C-04103

Pep Boys #613
10912 Katella Ave., Anaheim, CA 92804
(714)638-0863( )
CIWMB#: 30-C-01756

Pep Boys #663
3030 W Lincoln Anaheim, CA 92801
(714)826-4810( )
CIWMB#: 30-C-03417

Pep Boys #809
8205 E Santa Ana Cyn Rd., Anaheim, CA 92808
(714)974-0105( )
CIWMB#: 30-C-03443

Pick Your Part
1235 S Beach Blvd., Anaheim, CA 92804
(714)527-1645( )
CIWMB#: 30-C-03744

PK Auto Performance
3106 W. Lincoln Ave., Anaheim, CA 92801
(714)826-2141( )
CIWMB#: 30-C-05628

Quick Change Lube and Oil
2731 W Lincoln Ave., Anaheim, CA 92801
(714)821-4464( )
CIWMB#: 30-C-04363

Saturn of Anaheim
1380 S Auto Center Dr., Anaheim, CA 92806
(714)648-2444( )
CIWMB#: 30-C-06332

Sun Tech Auto Service
105 S State College Blvd., Anaheim, CA 92806
(714)956-1389( )
CIWMB#: 30-C-06455

Vonic Truck Services
515 S Rose St., Anaheim, CA 92805
(714)533-3333( )
CIWMB#: 30-C-01142

Anaheim Hills

Anaheim Hills Car Wash & Lube
5810 E La Palma Ave., Anaheim Hills, CA 92807
(714)777-6605( )
CIWMB#: 30-C-01387

Brea

Firestone Store #27A9
891 E Imperial Hwy., Brea, CA 92821
(714)529-8404( )
CIWMB#: 30-C-01221

Oil Can Henry's
230 N Brea Blvd., Brea, CA 92821
(714)990-1900( )
CIWMB#: 30-C-04273

Buena Park

Firestone Store #71F7
6011 Orangethorpe Buena Park, CA 90620
(714)670-7912( )
CIWMB#: 30-C-01218

Firestone Store #71T8
8600 Beach Blvd., Buena Park, CA 90620
(714)827-5300( )
CIWMB#: 30-C-02121

Kragen Auto Parts #1204
5303 Beach Blvd., Buena Park, CA 90621
(714)994-1320( )
CIWMB#: 30-C-02623

Cypress

AutoZone #5521
5471 Lincoln Ave., Cypress, CA 90630
(714)995-4644( )
CIWMB#: 30-C-00836

Big O Tires
6052 Cerritos Ave., Cypress, CA 90630
(714)826-6334( )
CIWMB#: 30-C-04245

Econo Lube N' Tune #213
5497 Cerritos Ave., Cypress, CA 90630
(714)761-0456( )
CIWMB#: 30-C-06240

Jiffy Lube #851
4942 Lincoln Ave., Cypress, CA 90630
(626)965-9689( )
CIWMB#: 30-C-06182

M & N Coastline Auto & Tire Service
4005 Ball Rd., Cypress, CA 90630
(714)826-1001( )
CIWMB#: 30-C-04387

Masterlube #103
5904 Lincoln Cypress, CA 90630
(714)826-2323( )
CIWMB#: 30-C-01071

Masterlube #104
5971 Ball Rd., Cypress, CA 90630
(714)220-1555( )
CIWMB#: 30-C-04682

Metric Motors of Cypress
6042 Cerritos Ave., Cypress, CA 90630
(714)821-4702( )
CIWMB#: 30-C-05157

Fullerton

AutoZone #2898
146 N. Raymond Ave., Fullerton, CA 92831
(714)870-9772( )
CIWMB#: 30-C-04488

AutoZone #5522
1801 Orangethorpe W. Fullerton, CA 92833
(714)870-8286( )
CIWMB#: 30-C-06062

AutoZone #5523
102 N Euclid Fullerton, CA 92832
(714)870-8286( )
CIWMB#: 30-C-04755

EZ Lube #17
4002 N Harbor Blvd., Fullerton, CA 92835
(714)871-9980( )
CIWMB#: 30-C-03741

Firestone Store #27EH
1933 N Placentia Ave., Fullerton, CA 92831
(714)993-7100( )
CIWMB#: 30-C-02122

Fox Service Center
1018 W Orangethorpe Fullerton, CA 92833
(714)879-1430( )
CIWMB#: 30-C-02318

Fullerton College Automotive Technology
321 E Chapman Ave., Fullerton, CA 92832
(714)992-7275( )
CIWMB#: 30-C-03165

Kragen Auto Parts #0731
2978 Yorba Linda Fullerton, CA 92831
(714)996-4780( )
CIWMB#: 30-C-02628

Kragen Auto Parts #4133
904 W Orangethorpe Ave., Fullerton, CA 92832
(714)526-3570( )
CIWMB#: 30-C-06256

Pep Boys #642
1530 S Harbor Blvd., Fullerton, CA 92832
(714)870-0700( )
CIWMB#: 30-C-01755

Sunnyside 76 Car Care Center
2701 N Brea Blvd., Fullerton, CA 92835
(714)256-0773( )
CIWMB#: 30-C-01381

Garden Grove

76 Pro Lube Plus
9001 Trask Ave., Garden Grove, CA 92844
(714)393-0590( )
CIWMB#: 30-C-05276

AutoZone #5527
13190 Harbor Blvd., Garden Grove, CA 92843
(714)636-5665( )
CIWMB#: 30-C-04760

David Murray Shell
12571 Vly View St., Garden Grove, CA 92845
(714)898-0170( )
CIWMB#: 30-C-00547

Express Lube & Wash
8100 Lampson Ave., Garden Grove, CA 92841
(909)316-8261( )
CIWMB#: 30-C-06544

Firestone Store #7180
10081 Chapman Ave., Garden Grove, CA 92840
(714)530-4630( )
CIWMB#: 30-C-01224

Firestone Store #71W3
13961 Brookhurst St., Garden Grove, CA 92843
(714)590-2741( )
CIWMB#: 30-C-03690

Jiffy Lube #1991
13970 Harbor Blvd., Garden Grove, CA 92843
(714)554-0610( )
CIWMB#: 30-C-05400

Kragen Auto Parts #1251
13933 N Harbor Blvd., Garden Grove, CA 92843
(714)554-3780( )
CIWMB#: 30-C-02663

Kragen Auto Parts #1555
9851 Chapman Ave., Garden Grove, CA 92841
(714)741-8030( )
CIWMB#: 30-C-04079

Nissan of Grarden Grove
9670 Trask Ave., Garden Grove, CA 92884
(714)537-0900( )
CIWMB#: 30-C-06553

Toyota of Garden Grove
9444 Trask Ave., Garden Grove, CA 92844
(714)895-5595( )
CIWMB#: 30-C-06555

La Habra

AutoZone #5532
1200 W Imperial Hwy., La Habra, CA 90631
(562)694-5337( )
CIWMB#: 30-C-04784

Burch Ford
201 N Harbor Blvd., La Habra, CA 90631
(562)691-3225( )
CIWMB#: 30-C-05179

Firestone Store #2736
1071 S Beach Blvd., La Habra, CA 90631
(562)691-1731( )
CIWMB#: 30-C-01169

Kragen Auto Parts #1569
1621 W Whittier Blvd., La Habra, CA 90631
(562)905-2538( )
CIWMB#: 30-C-04076

Pep Boys #997
125 W Imperial Hwy., La Habra, CA 90631
(714)447-0601( )
CIWMB#: 30-C-04026

SpeeDee Oil Change & Tune-Up
1580 W Imperial Hwy., La Habra, CA 90631
(562)697-3513( )

Los Alamitos

Jiffy Lube #1740
3311 Katella Ave., Los Alamitos, CA 90720
(562)596-1827( )
CIWMB#: 30-C-03529

Midway City

Bolsa Transmission
8331 Bolsa Ave., Midway City, CA 92655
(714)799-6158( )
CIWMB#: 30-C-05768

Placentia

Advanced Auto & Diesel
144 S Bradford Placentia, CA 92870
(714)996-8222( )
CIWMB#: 30-C-06242

Castner's Auto Service
214 S. Bradford Ave., Placentia, CA 92870
(714)528-1311( )
CIWMB#: 30-C-06452

Econo Lube N' Tune
100 W Chapman Ave., Placentia, CA 92870
(714)524-0424( )
CIWMB#: 30-C-06454

Fairway Ford
1350 E Yorba Linda Blvd., Placentia, CA 92870
(714)524-1200( )
CIWMB#: 30-C-01863

Seal Beach

M & N Coastline Auto & Tire Service
12239 Seal Beach Blvd., Seal Beach, CA 90740
(714)826-1001( )
CIWMB#: 30-C-04433

Seal Beach Chevron
12541 Seal Beach Blvd., Seal Beach, CA 90740
(949)495-0774(14)
CIWMB#: 30-C-06425

Stanton

AutoZone #2806
11320 Beach Blvd., Stanton, CA 90680
(714)895-7665( )
CIWMB#: 30-C-04563

Joe's Auto Clinic
11763 Beach Blvd., Stanton, CA 90680
(714)891-7715( )
CIWMB#: 30-C-03253

Kragen Auto Parts #1742
11951 Beach Blvd., Stanton, CA 90680
(714)799-7574( )
CIWMB#: 30-C-05231

Scher Tire #20
7000 Katella Ave., Stanton, CA 90680
(714)892-9924( )
CIWMB#: 30-C-05907

USA 10 Minute Oil Change
8100 Lampson Ave., Stanton, CA 92841
(714)373-4432( )
CIWMB#: 30-C-05909

Westminster

AutoZone #5543
6611 Westminster Blvd., Westminster, CA 92683
(714)898-2898( )
CIWMB#: 30-C-04964

AutoZone #5544
8481 Westminster Blvd., Westminster, CA 92683
(714)891-3511( )
CIWMB#: 30-C-04966

City of Westminster Corporate Yard
14381 Olive St., Westminster, CA 92683
(714)895-2876(292)
CIWMB#: 30-C-02008

Honda World
13600 Beach Blvd., Westminster, CA 92683
(714)890-8900( )
CIWMB#: 30-C-03639

Jiffy Lube #1579
6011 Westminster Blvd., Westminster, CA 92683
(714)899-2727( )
CIWMB#: 30-C-02745

John's Brake & Auto Repair
13050 Hoover St., Westminster, CA 92683
(714)379-2088( )
CIWMB#: 30-C-05617

Kragen Auto Parts #0762
6562 Westminster Blvd., Westminster, CA 92683
(714)898-0810( )
CIWMB#: 30-C-02590

Midway City Sanitary District
14451 Cedarwood St., Westminster, CA 92683
(714)893-3553( )
CIWMB#: 30-C-01626

Pep Boys #653
15221 Beach Blvd., Westminster, CA 92683
(714)893-8544( )
CIWMB#: 30-C-03415

Yorba Linda

AutoZone #5545
18528 Yorba Linda Blvd., Yorba Linda, CA 92886
(714)970-8933( )
CIWMB#: 30-C-04971

Econo Lube N' Tune
22270 La Palma Ave., Yorba Linda, CA 92887
(714)692-8394( )
CIWMB#: 30-C-06513

EZ Lube Inc. #41
17511 Yorba Linda Blvd., Yorba Linda, CA 92886
(714)556-1312( )
CIWMB#: 30-C-05739

Firestone Store #27T3
18500 Yorba Linda Blvd., Yorba Linda, CA 92886
(714)779-1966( )
CIWMB#: 30-C-01222

Jiffy Lube #1532
16751 Yorba Linda Blvd., Yorba Linda, CA 92886
(714)528-2800( )
CIWMB#: 30-C-03777

Mike Schultz Import Service
4832 Eureka Ave., Yorba Linda, CA 92886
(714)528-4411( )
CIWMB#: 30-C-04313

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

Sewage Spill Regulatory Requirements

Allowing sewage to discharge to a gutter or storm drain may subject you to penalties and/or out-of-pocket costs to reimburse cities or public agencies for clean-up efforts.

Here are the pertinent codes, fines, and agency contact information that apply.

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

- County and city water quality ordinances prohibit discharges containing pollutants.

Orange County Health Care Agency Environmental Health
(714) 433-6419

California Health and Safety Code, Sections 5410-5416

- No person shall discharge raw or treated sewage or other waste in a manner that results in contamination, pollution or a nuisance.
- Any person who causes or permits a sewage discharge to any state waters:
  - must immediately notify the local health agency of the discharge.
  - shall reimburse the local health agency for services that protect the public's health and safety (water-contact receiving waters).
  - who fails to provide the required notice to the local health agency is guilty of a misdemeanor and shall be punished by a fine (between $500–$1,000) and/or imprisonment for less than one year.

Regional Water Quality Control Board
Santa Ana Region (951) 782-4130
San Diego Region (858) 467-2952

- Requires the prevention, mitigation, response to and reporting of sewage spills.

California Office of Emergency Services
(800) 852-7550

California Water Code, Article 4, Chapter 4, Sections 13268-13271
California Code of Regulations, Title 23, Division 3, Chapter 9.2, Article 2, Sections 2250-2260

- Any person who causes or permits sewage in excess of 1,000 gallons to be discharged to state waters **shall immediately notify the Office of Emergency Services.**
- Any person who fails to provide the notice required by this section is **guilty of a misdemeanor** and shall be punished by a fine (less than $20,000) and/or imprisonment for not more than one year.

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Sewage Spill
Reference Guide

Your Responsibilities as a Private Property Owner

Residences
Businesses
Homeowner/Condominium Associations
Federal and State Complexes
Military Facilities

Orange County Sanitation District

Health Care Agency
Environmental Health

PROJECT Pollution PREVENTION
www.ocwatersheds.com

This brochure was designed courtesy of the Orange County Sanitation District (OCSD). For additional information, call (714) 962-2411, or visit their website at www.ocsd.com

What is a Sewage Spill?

Sewage spills occur when the wastewater being transported via underground pipes overflows through a manhole, cleanout or broken pipe. Sewage spills can cause health hazards, damage to homes and businesses, and threaten the environment, local waterways and beaches.

Common Causes of Sewage Spills

Grease builds up inside and eventually blocks sewer pipes. Grease gets into the sewer from food establishments, household drains, as well as from poorly maintained commercial grease traps and interceptors.

Structure problems caused by tree roots in the lines, broken/cracked pipes, missing or broken cleanout caps or undersized sewers can cause blockages.

Infiltration and inflow (I/I) impacts pipe capacity and is caused when groundwater or rainwater enters the sewer system through pipe defects and illegal connections.

You Are Responsible for a Sewage Spill Caused by a Blockage or Break in Your Sewer Lines!

Time is of the essence in dealing with sewage spills. You are required to **immediately**:

Control and minimize the spill. Keep spills contained on private property and out of gutters, storm drains and public waterways by shutting off or not using the water.

Use sandbags, dirt and/or plastic sheeting to prevent sewage from entering the storm drain system.

Clear the sewer blockage. Always wear gloves and wash your hands. It is recommended that a plumbing professional be called for clearing blockages and making necessary repairs.

Always notify your city sewer/public works department or public sewer district of sewage spills. If the spill enters the storm drains also notify the Health Care Agency. In addition, if it exceeds 1,000 gallons notify the Office of Emergency Services. Refer to the numbers listed in this brochure.

Overflowing cleanout pipe located on private property

You Could Be Liable

Allowing sewage from your home, business or property to discharge to a gutter or storm drain may subject you to penalties and/or out-of-pocket costs to reimburse cities or public agencies for clean-up and enforcement efforts. See Regulatory Codes & Fines section for pertinent codes and fines that apply.

What to Look For

Sewage spills can be a very noticeable gushing of water from a manhole or a slow water leak that may take time to be noticed. Don't dismiss unaccounted-for wet areas.

Look for:

- Drain backups inside the building.
- Wet ground and water leaking around manhole lids onto your street.
- Leaking water from cleanouts or outside drains.
- Unusual odorous wet areas: sidewalks, external walls or ground/landscape around a building.

Caution

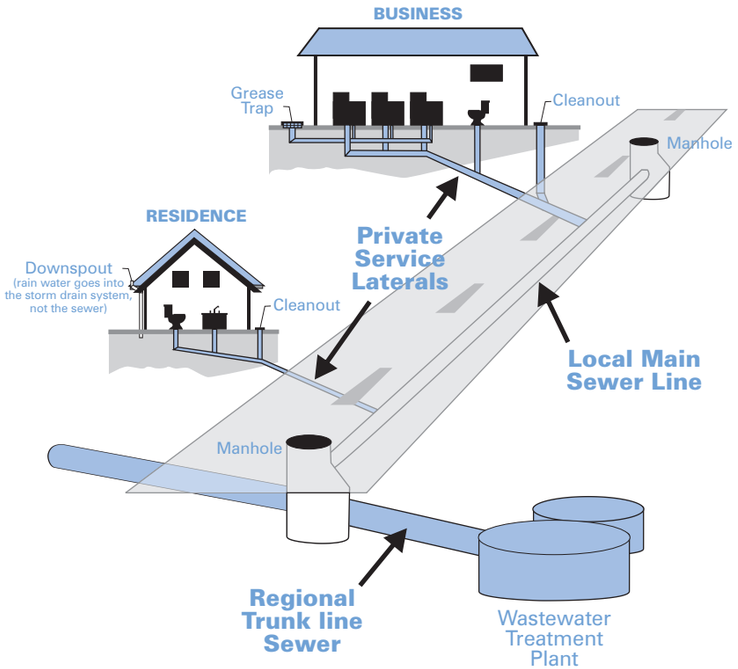
Keep people and pets away from the affected area. Untreated sewage has high levels of disease-causing viruses and bacteria. Call your local health care agency listed on the back for more information.

If You See a Sewage Spill Occurring, Notify Your City Sewer/Public Works Department or Public Sewer District IMMEDIATELY!

How a Sewer System Works

A property owner's sewer pipes are called service laterals and are connected to larger local main and regional trunk lines. Service laterals run from the connection at the home to the connection with the public sewer (including the area under the street). These laterals are the responsibility of the property owner and must be maintained by the property owner. Many city agencies have adopted ordinances requiring maintenance of service laterals. Check with your city sewer/local public works department for more information.

Operation and maintenance of **local and regional sewer lines** are the responsibility of the city sewer/public works departments and public sewer districts.



How You Can Prevent Sewage Spills

1. **Never put grease down garbage disposals, drains or toilets.**
2. **Perform periodic cleaning to eliminate grease, debris and roots in your service laterals.**
3. **Repair any structural problems in your sewer system and eliminate any rainwater infiltration/inflow leaks into your service laterals.**

Preventing Grease Blockages

The drain is not a dump! Recycle or dispose of grease properly and never pour grease down the drain.

Homeowners should mix fats, oils and grease with absorbent waste materials such as paper, coffee grounds, or kitty litter and place it in the trash. Wipe food scraps from plates and pans and dump them in the trash.

Restaurants and commercial food service establishments should always use "Kitchen Best Management Practices." These include:

- Collecting all cooking grease and liquid oil from pots, pans and fryers in covered grease containers for recycling.
- Scraping or dry-wiping excess food and grease from dishes, pots, pans and fryers into the trash.
- Installing drain screens on all kitchen drains.
- Having spill kits readily available for cleaning up spills.
- Properly maintaining grease traps or interceptors by having them serviced regularly. Check your local city codes.

Orange County Agency Responsibilites

- **City Sewer/Public Works Departments—** Responsible for protecting city property and streets, the local storm drain system, sewage collection system and other public areas.
- **Public Sewer/Sanitation District—** Responsible for collecting, treating and disposing of wastewater.
- **County of Orange Health Care Agency—** Responsible for protecting public health by closing ocean/bay waters and may close food-service businesses if a spill poses a threat to public health.
- **Regional Water Quality Control Boards—** Responsible for protecting State waters.
- **Orange County Stormwater Program—** Responsible for preventing harmful pollutants from being discharged or washed by stormwater runoff into the municipal storm drain system, creeks, bays and the ocean.

You Could Be Liable for Not Protecting the Environment

Local and state agencies have legal jurisdiction and enforcement authority to ensure that sewage spills are remedied.

They may respond and assist with containment, relieving pipe blockages, and/or clean-up of the sewage spill, especially if the spill is flowing into storm drains or onto public property.

A property owner may be charged for costs incurred by these agencies responding to spills from private properties.

Report Sewage Spills!

City Sewer/Public Works Departments

Aliso Viejo	(949) 425-2500
Anaheim	(714) 765-6860
Brea	(714) 990-7691
Buena Park	(714) 562-3655
Costa Mesa	(949) 645-8400
Cypress	(714) 229-6760
Dana Point	(949) 248-3562
Fountain Valley	(714) 593-4600
Fullerton	(714) 738-6897
Garden Grove	(714) 741-5375
Huntington Beach	(714) 536-5921
Irvine	(949) 453-5300
Laguna Beach	(949) 497-0765
Laguna Hills	(949) 707-2650
Laguna Niguel	(949) 362-4337
Laguna Woods	(949) 639-0500
La Habra	(562) 905-9792
Lake Forest	(949) 461-3480
La Palma	(714) 690-3310
Los Alamitos	(562) 431-3538
Mission Viejo	(949) 831-2500
Newport Beach	(949) 644-3011
Orange	(714) 532-6480
Orange County	(714) 567-6363
Placentia	(714) 993-8245
Rancho Santa Margarita	(949) 635-1800
San Clemente	(949) 366-1553
San Juan Capistrano	(949) 443-6363
Santa Ana	(714) 647-3380
Seal Beach	(562) 431-2527
Stanton	(714) 379-9222
Tustin	(714) 962-2411
Villa Park	(714) 998-1500
Westminster	(714) 893-3553
Yorba Linda	(714) 961-7170

Public Sewer/Water Districts

Costa Mesa Sanitary District	(714) 393-4433/ (949) 645-8400
El Toro Water District	(949) 837-0660
Emerald Bay Service District	(949) 494-8571
Garden Grove Sanitary District	(714) 741-5375
Irvine Ranch Water District	(949) 453-5300
Los Alamitos/Rossmoor Sewer District	(562) 431-2223
Midway City Sanitary District (Westminster)	(714) 893-3553
Moulton Niguel Water District	(949) 831-2500
Orange County Sanitation District	(714) 962-2411
Santa Margarita Water District	(949) 459-6420
South Coast Water District	(949) 499-4555
South Orange County Wastewater Authority	(949) 234-5400
Sunset Beach Sanitary District	(562) 493-9932
Trabuco Canyon Sanitary District	(949) 858-0277
Yorba Linda Water District	(714) 777-3018

Other Agencies

Orange County Health Care Agency	(714) 433-6419
Office of Emergency Services	(800) 852-7550

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. Home improvement projects and work sites must be maintained to ensure that building materials 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 building materials into the ocean, so don't let them enter the storm drains. Follow these 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
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 while performing home improvement projects. If you have other suggestions, please contact your city's stormwater representatives or call the Orange County Stormwater Program.

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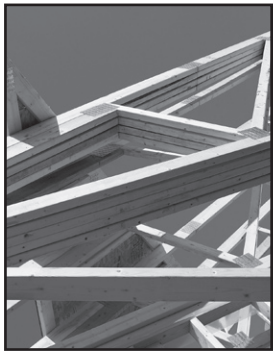
Help Prevent Ocean Pollution:

Tips for Home Improvement Projects

Tips for Home Improvement Projects

Home improvement projects can cause significant damage to the environment. Whether you hire a contractor or work on the house yourself, it is important to follow these simple tips while renovating, remodeling or improving your home:

General Construction



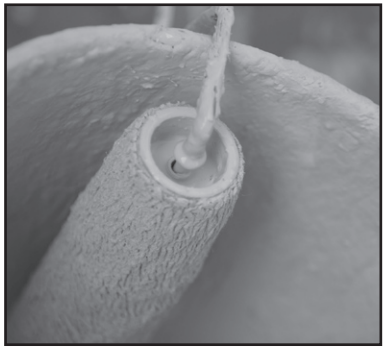
- Schedule projects for dry weather.
- Keep all construction debris away from the street, gutter and storm drain.
- Store materials under cover with temporary roofs or plastic sheets to eliminate or reduce the possibility that rainfall, runoff or wind will carry materials from the project site to the street, storm drain or adjacent properties.

Building Materials

- Never hose materials into a street, gutter or storm drain.
- Exposed piles of construction material should not be stored on the street or sidewalk.
- Minimize waste by ordering only the amount of materials needed to complete the job.
- Do not mix more fresh concrete than is needed for each project.
- Wash concrete mixers and equipment in a designated washout area where the water can flow into a containment area or onto dirt.
- Dispose of small amounts of dry excess materials in the trash. Powdery waste, such as dry concrete, must be properly contained within a box or bag prior to disposal. Call your local trash hauler for weight and size limits.

Paint

- Measure the room or object to be painted, then buy only the amount needed.
- Place the lid on firmly and store the paint can upside-down in a dry location away from the elements.
- Tools such as brushes, buckets and rags should never be washed where excess water can drain into the street, gutter or storm drain. All tools should be rinsed in a sink connected to the sanitary sewer.
- When disposing of paint, never put wet paint in the trash.
- Dispose of water-based paint by removing the lid and letting it dry in the can. Large amounts must be taken to a Household Hazardous Waste Collection Center (HHWCC).



- Oil-based paint is a household hazardous waste. All leftover paint should be taken to a HHWCC.
- For HHWCC locations and hours, call **(714) 834-6752** or visit **www.oclandfills.com**.

Erosion Control

- Schedule grading and excavation projects for dry weather.
- When temporarily removing soil, pile it in a contained, covered area where it cannot spill into the street, or obtain the required temporary encroachment or street closure permit and follow the conditions instructed by the permit.
- When permanently removing large quantities of soil, a disposal location must be found prior to excavation. Numerous businesses are available to handle disposal needs. For disposal options, visit **www.ciwmb.ca.gov/SWIS**.
- Prevent erosion by planting fast-growing annual and perennial grasses. They will shield and bind the soil.

Recycle

- Use a construction and demolition recycling company to recycle lumber, paper, cardboard, metals, masonry (bricks, concrete, etc.), carpet, plastic, pipes (plastic, metal and clay), drywall, rocks, dirt and green waste.

- For a listing of construction and demolition recycling locations in your area, visit **www.ciwmb.ca.gov/recycle.**

Spills

- Clean up spills immediately by using an absorbent material such as cat litter, then sweep it up and dispose of it in the trash.
- Immediately report spills that have entered the street, gutter or storm drain to the County's 24-Hour Water Pollution Problem Reporting Hotline at **(714) 567-6363** or visit **www.ocwatersheds.com** to fill out an incident reporting form.

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. 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.

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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.

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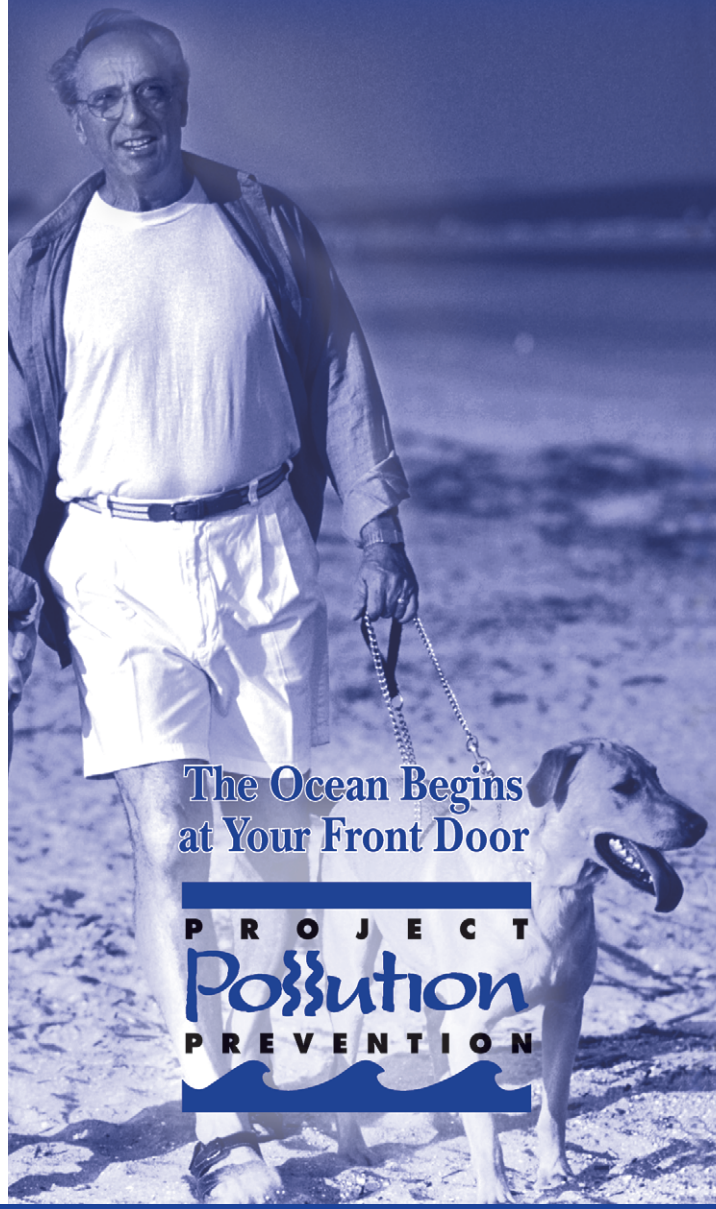
Help Prevent Ocean Pollution:

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

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

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

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

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

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

Orange County Stormwater Program

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

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The Ocean Begins at Your Front Door

ATTACHMENT B

LEGEND:

- DRAINAGE MANAGEMENT AREA (DMA)
- A-# / AC — DMA NUMBER & AREA SIZE (AC)
- FLOW DIRECTION
- PERVIOUS AREA
- IMPERVIOUS AREA

BEST MANAGEMENT PRACTICES:

- IMPERVIOUS AREA REDUCTION
- IMPERVIOUS DISPERSION
- STREET TREES

SCALE: 1" = 20'

0 10 20 40

REV.	DATE	DESCRIPTION	BY	CHK.	APPR.

CITY OF NEWPORT BEACH
BUILDING DEPARTMENT
APPROVAL

DESIGN JC
DWN. JC
CHK. DM

3355 & 3303 VIA LIDO MULTI-FAMILY PROJECT BMP EXHIBIT

_____ CITY ENGINEER DATE
R.C.E _____, EXP. DATE _

SHT. 1 OF 1
DWG. NO.

REGISTERED PROFESSIONAL ENGINEER — VINCENT W. SCARFFI — No. 33520 Exp. 6/30/2014 — CIVIL — STATE OF CALIFORNIA

PLANS PREPARED BY:

C&V CONSULTING, INC.
CIVIL ENGINEERING
LAND PLANNING & SURVEYING
27156 BURBANK
FOOTHILL RANCH, CA 92610
T. 949.916.3600
F. 949.916.3605
CVC-INC.NET

ATTACHMENT C

Worksheets from Orange County Technical Guidance Document (5-19-2011)

Table 2.7: Infiltration BMP Feasibility Worksheet

	Infeasibility Criteria	*Yes*	*No*
1	**Would Infiltration BMPs pose significant risk for groundwater related concerns?** Refer to Appendix VII (Worksheet I) for guidance on groundwater-related infiltration feasibility criteria.	**X**	
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	Would Infiltration BMPs **pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level**? (Yes if the answer to any of the following questions is yes, as established by a geotechnical expert): • The BMP can only be located less than 50 feet away from slopes steeper than 15 percent • The BMP can only be located less than eight feet from building foundations or an alternative setback. • A study prepared by a geotechnical professional or an available watershed study substantiates that stormwater infiltration would potentially result in significantly increased risks of geotechnical hazards that cannot be mitigated to an acceptable level.	**X**	
Provide basis: Geotechnical Engineering Services Report dated 08/24/12 by Professional Service Industries, Inc. indicates that perched groundwater conditions can develop during periods of heavy rainfall as a result of less permeable layers impeding infiltration. Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
3	Would infiltration of the DCV from drainage area **violate downstream water rights**?		**X**
Provide basis: Per TGD, Figure XVI-3d, the project site is not located within a watershed with impaired bodies. Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

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

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

Infiltration Screening Results (check box corresponding to result):		
8	Is there substantial evidence that infiltration from the project would result in a significant increase in I&I to the sanitary sewer that cannot be sufficiently mitigated? (See Appendix XVII) Provide narrative discussion and supporting evidence: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.	**No**
9	If any answer from row 1-3 is yes: infiltration of any volume is **not feasible** within the DMA or equivalent. Provide basis: Summarize findings of infeasibility screening	**Not Feasible**
10	If any answer from row 4-7 is yes, infiltration is **permissible but is not presumed to be feasible for the entire DCV.** Criteria for designing biotreatment BMPs to achieve the maximum feasible infiltration and ET shall apply. Provide basis: Summarize findings of infeasibility screening	**Permissible**
11	If all answers to rows 1 through 11 are no, infiltration of the full DCV is potentially feasible, BMPs must be designed to infiltrate the full DCV to the maximum extent practicable.	**Not Feasible**

Worksheet A: Hydrologic Source Control Calculation Form

		Drainage area ID	A	
		Total drainage area	1.196	acres
		Total drainage area Impervious Area (IA_{total})	1.064	acres
HSC ID	HSC Type/ Description/ Reference BMP Fact Sheet	Effect of individual HSC_i per criteria in BMP Fact Sheets **(**XIV.1**)** (d_{HSCi})[1]	Impervious Area Tributary to HSC_i (IA_i)	$d_i \times IA_i$
A	HSC-2: Impervious Dispersion	0.54	1.064	0.575
A	HSC-3: Street Trees	0.05	0.025	0.001
	Box 1:		$\sum d_i \times IA_i =$	0.576
	Box 2:		$IA_{total} =$	1.089
	[Box 1]/[Box 2]:		$d_{HSC\ total} =$	0.529
			*Percent Capture Provided by HSCs (*Table III.1*)*	66%

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

Worksheet B: Simple Design Capture Volume Sizing Method

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=	0.60	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0.529	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.071	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	1.064	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	0.890	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.817	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	224	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate – N/A				
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (Appendix VII)	$K_{measured}$=	–	In/hr
2	Enter combined safety factor from Worksheet H, S_{final} (unitless)	S_{final}=	–	
3	Calculate design infiltration rate, $K_{design} = K_{measured} / S_{final}$	K_{design}=	–	In/hr
Step 3b: Determine minimum BMP footprint – N/A				
4	Enter drawdown time, *T* (max 48 hours)	T=	–	Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=	–	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	–	sq-ft

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

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=	7.9	
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=	0.23	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0.59	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (Worksheet A)	Y_2=	70	%
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=	0.17	
6	Determine the design intensity that must be provided by BMP, $I_{design}= I_1-I_2$	I_{design}=	0.06	
Step 2: Calculate the design flowrate				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	1.064	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	0.89	
3	Calculate runoff coefficient, $C= (0.75 \times imp) + 0.15$	C=	0.817	
4	Calculate design flowrate, $Q_{design}= (C \times i_{design} \times A)$	Q_{design}=	0.052	cfs
Supporting Calculations				

Describe system:

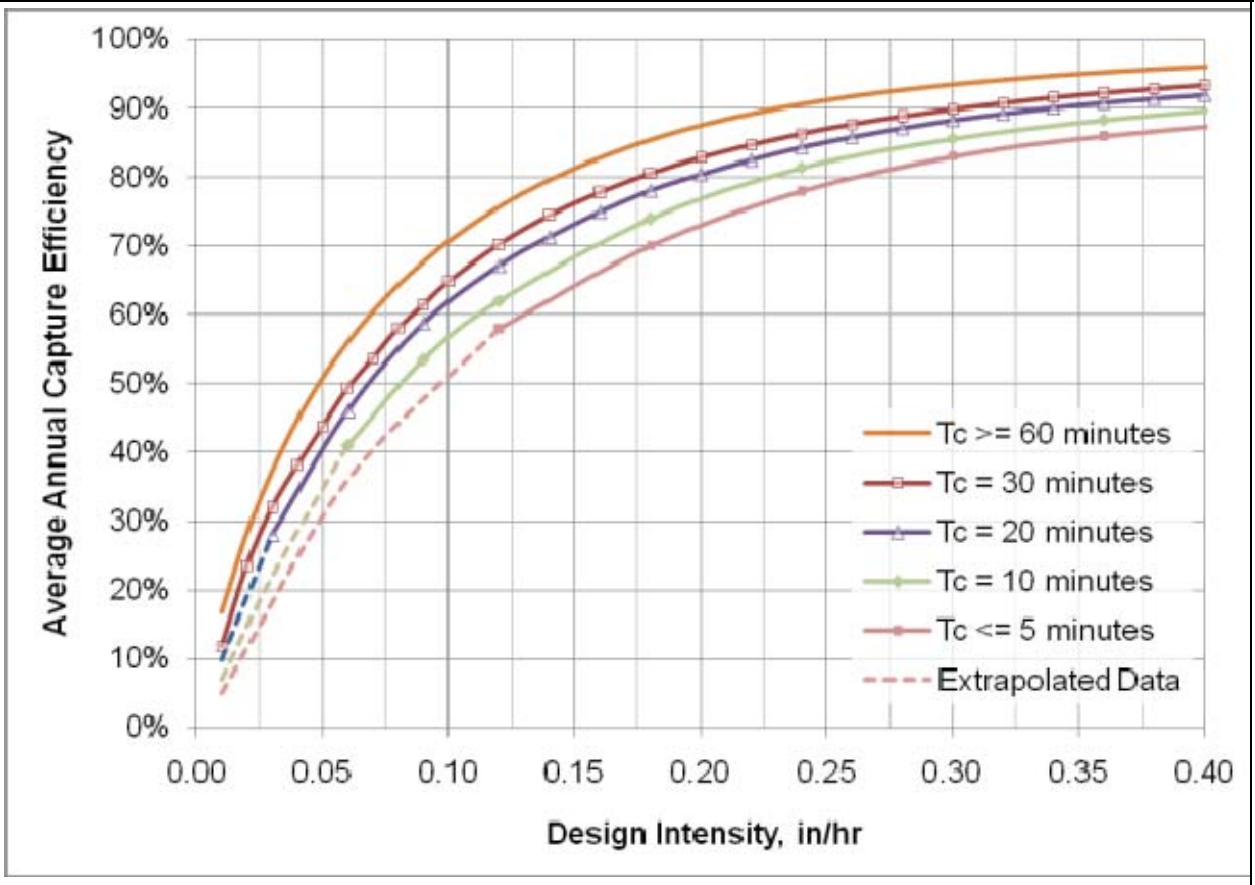
Proposed impervious dispersion, street trees and impervious area reduction. See report for additional information and calculations.

Provide time of concentration assumptions:

Time of concentration was determined using the Orange County Hydrology Manual.

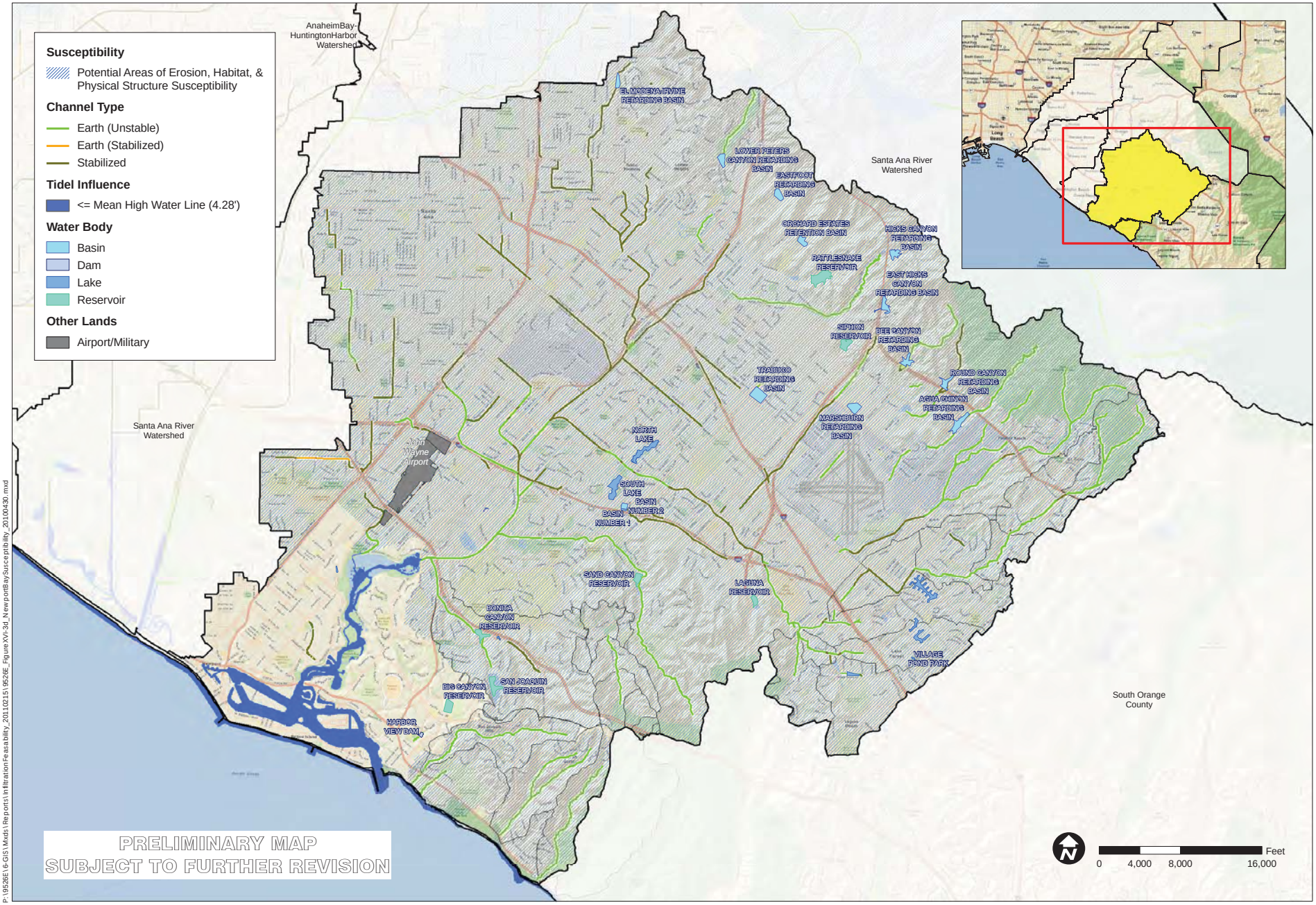
Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Graphical Operations



Provide supporting graphical operations. See Example III.7.

ATTACHMENT D



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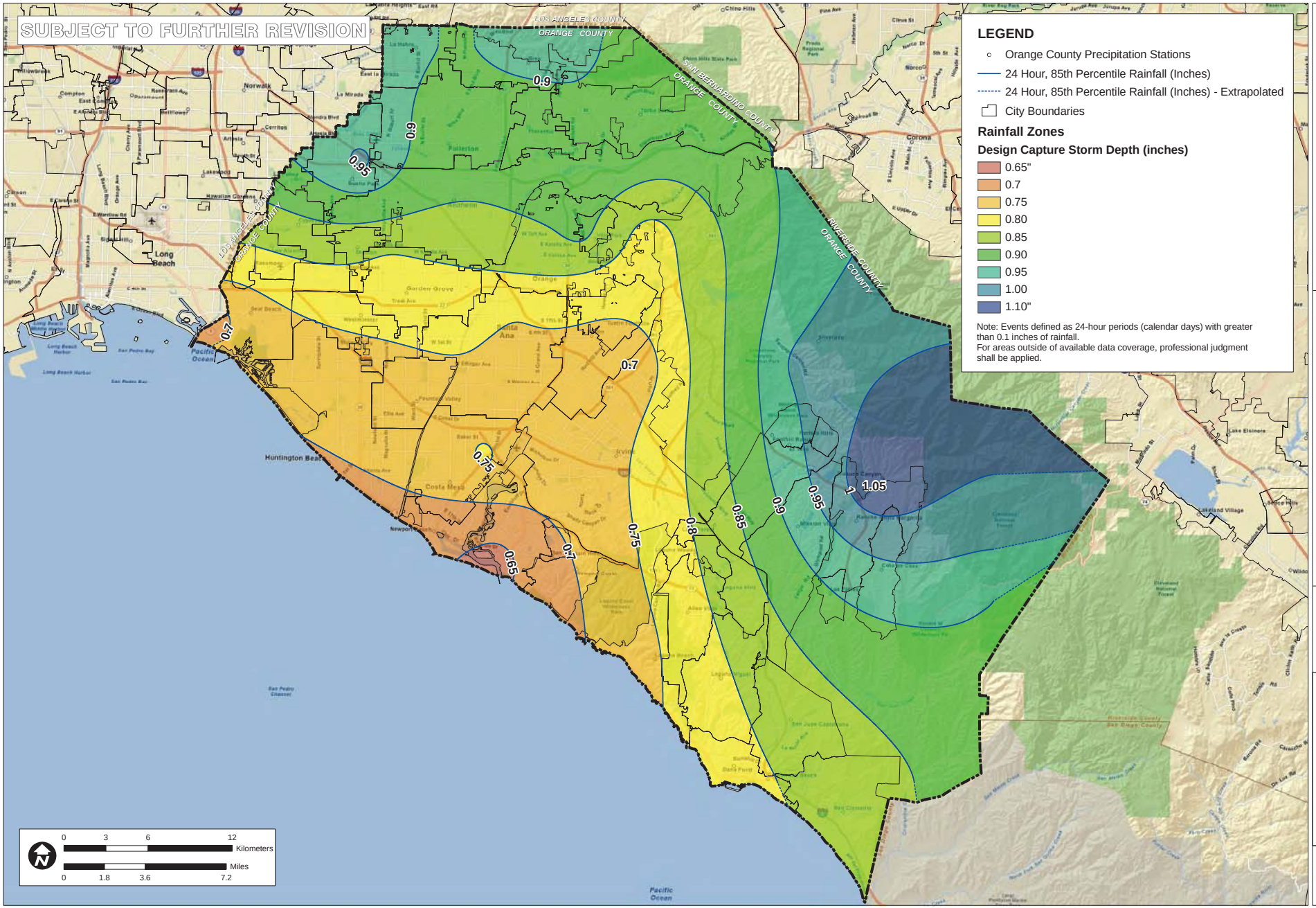
TITLE
SUSCEPTIBILITY ANALYIS
NEWPORT BAY-
NEWPORT COASTAL STREAMS

JOB
ORANGE COUNTY
WATERSHED
MASTER PLANNING
ORANGE CO. CA

SCALE	1" = 4000'
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/30/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-3d



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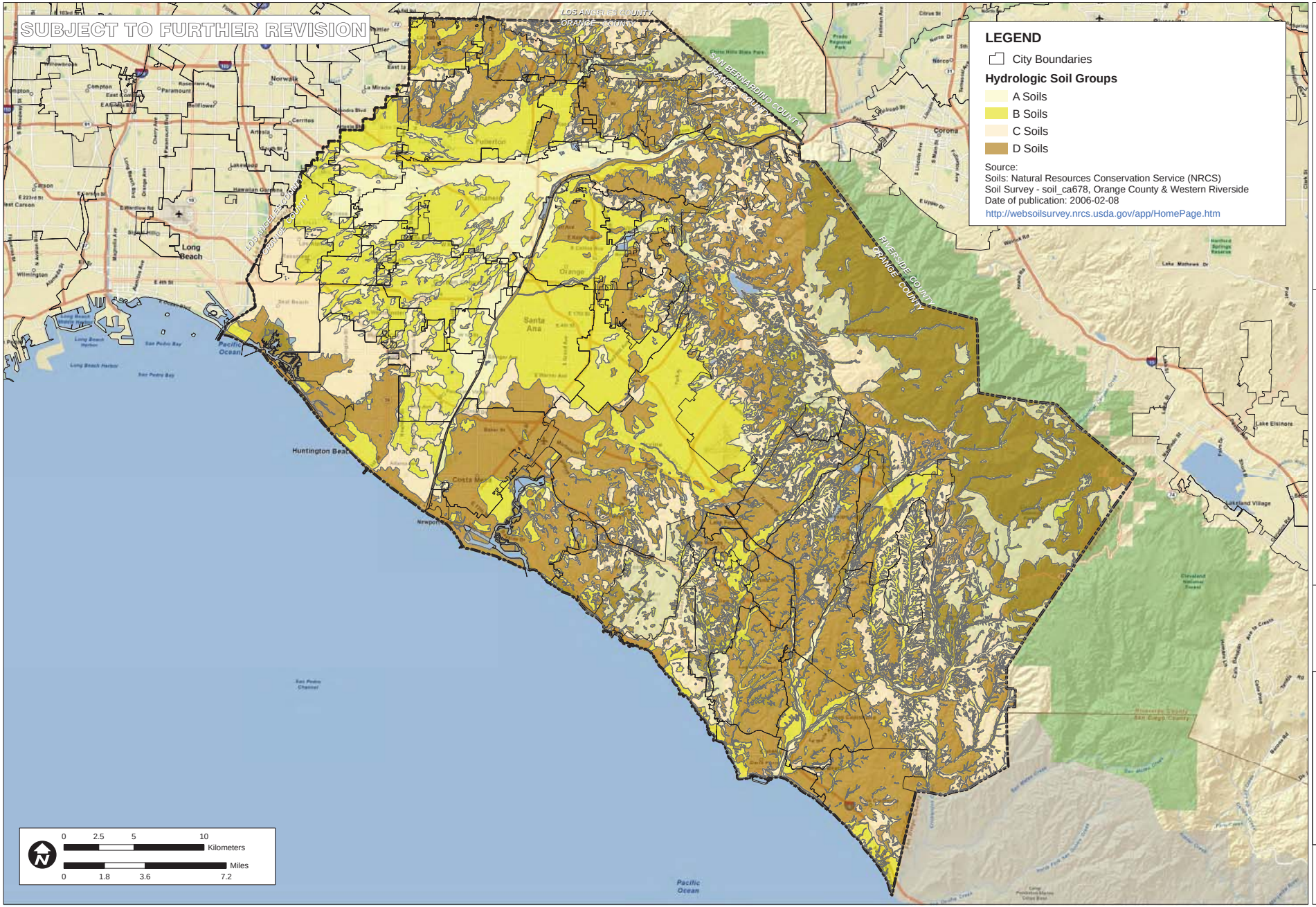
TITLE
RAINFALL ZONES

JOB
ORANGE COUNTY
TECHNICAL GUIDANCE
DOCUMENT
ORANGE CO. CA

SCALE	1" = 1.6 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-1



TITLE
NRCS HYDROLOGIC SOILS GROUPS

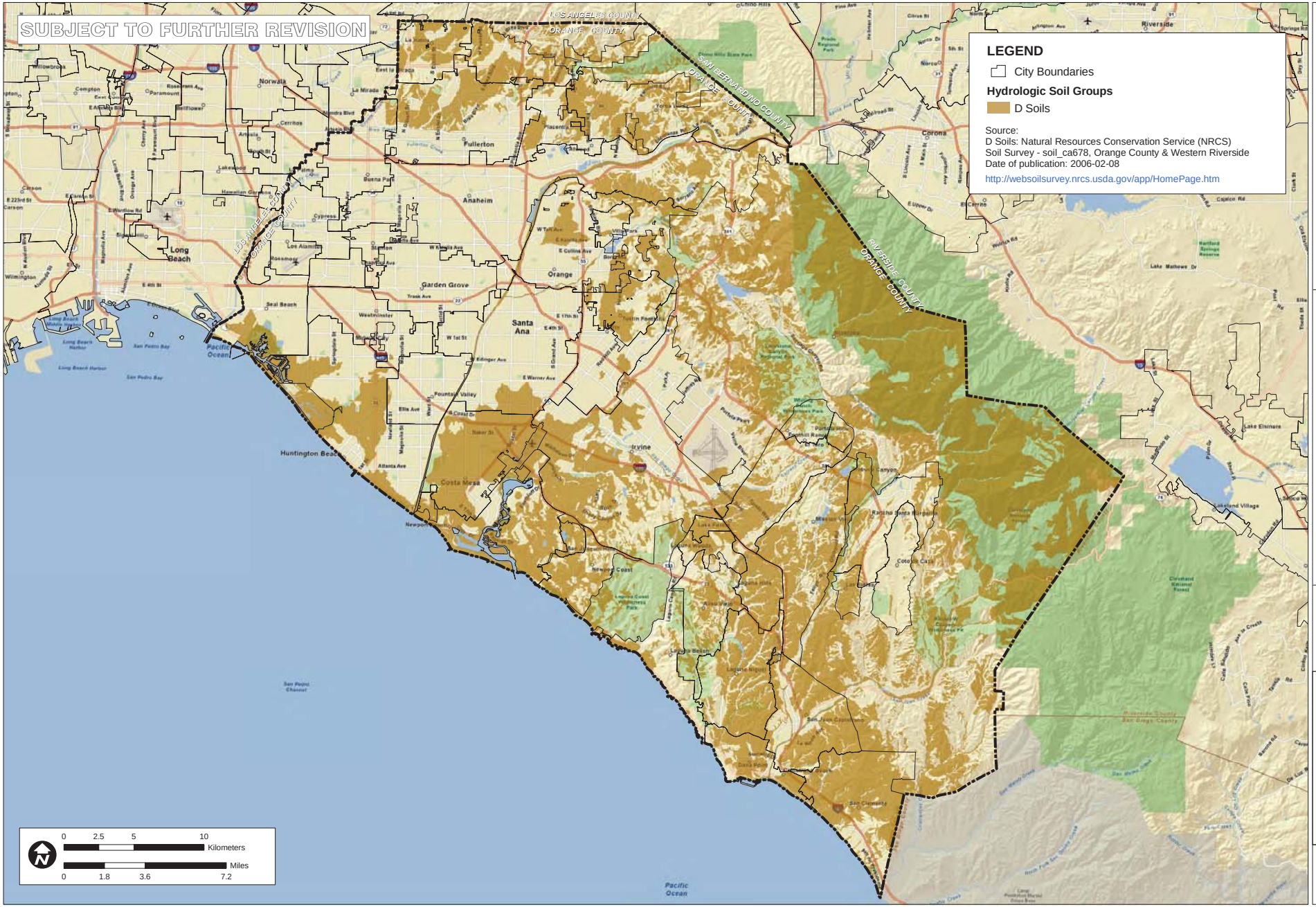
JOB
ORANGE COUNTY INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.6 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2a

P:\9526E16-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2a_HydroSols_20110215.mxd



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TITLE
HYDROLOGIC SOIL GROUP
TYPE D NRCS SOIL SURVEY

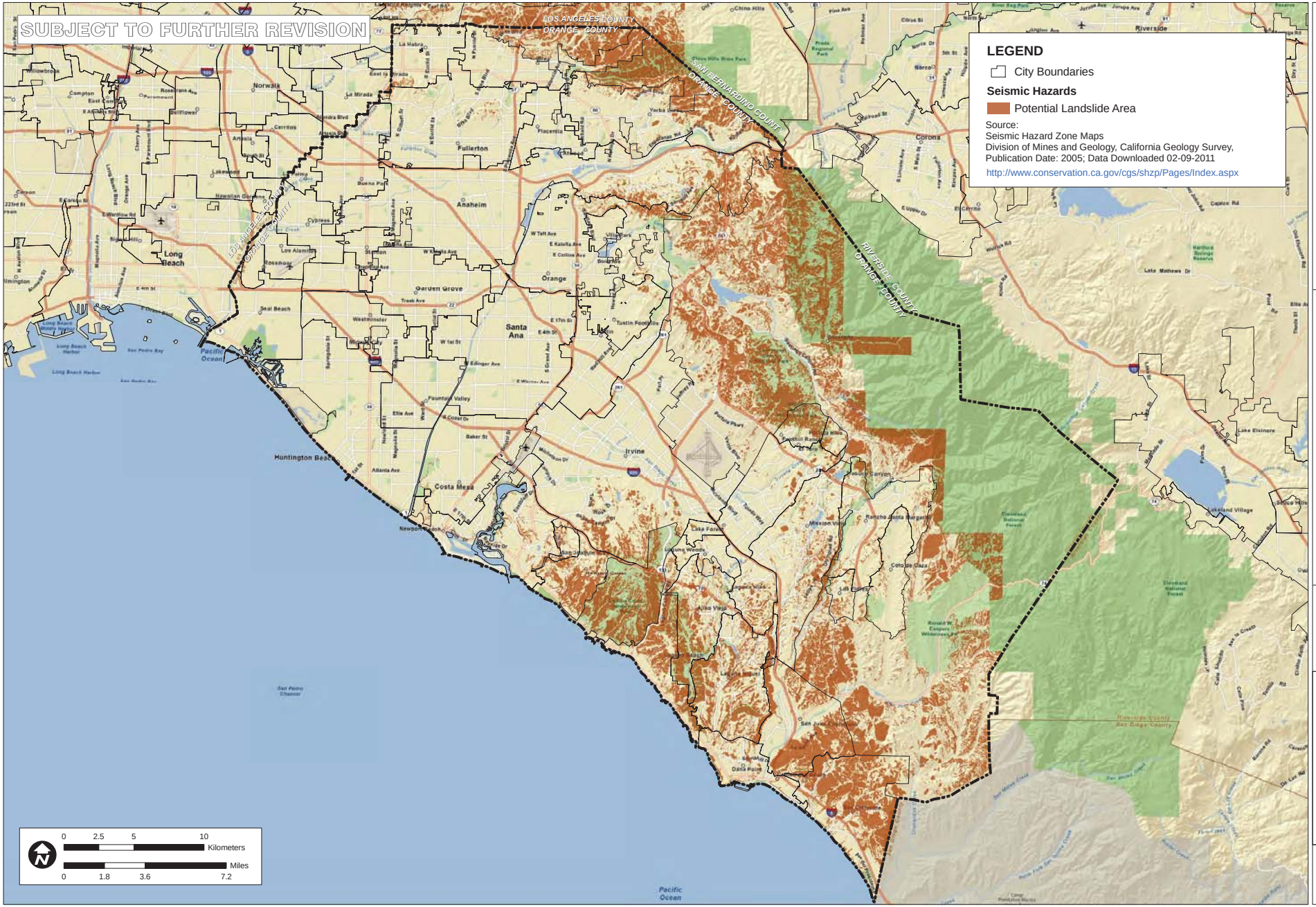
ORANGE COUNTY
INFILTRATION STUDY

JOB
ORANGE CO. CA

SCALE	1" = 1.6 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2b



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TITLE
HYDROLOGIC SOIL GROUP
TYPE D NRCS SOIL SURVEY

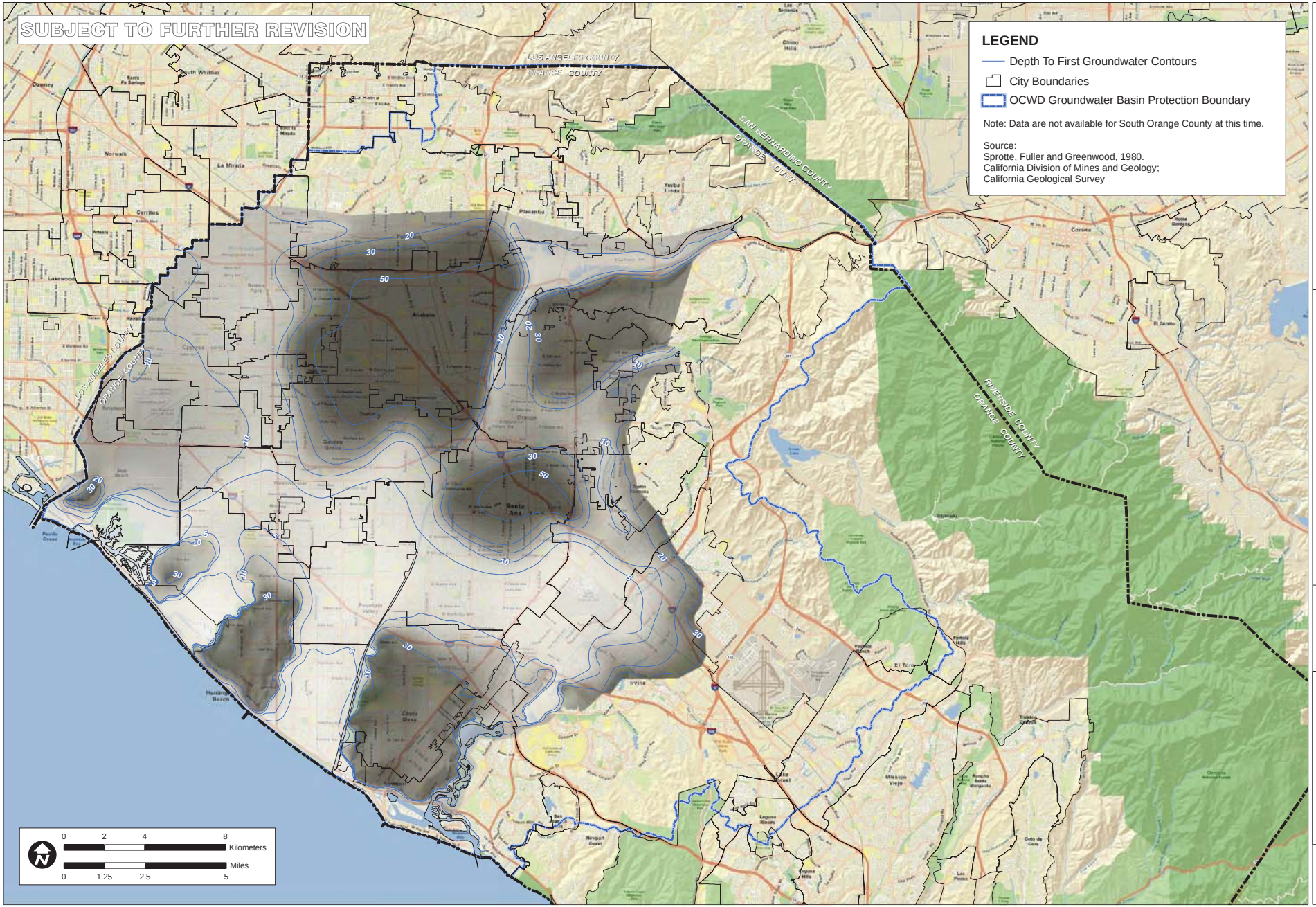
ORANGE COUNTY
INFILTRATION STUDY

JOB
ORANGE CO. CA

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2c



TITLE
NORTH ORANGE COUNTY
MAPPED DEPTH TO FIRST
GROUNDWATER

JOB
ORANGE COUNTY
INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2d

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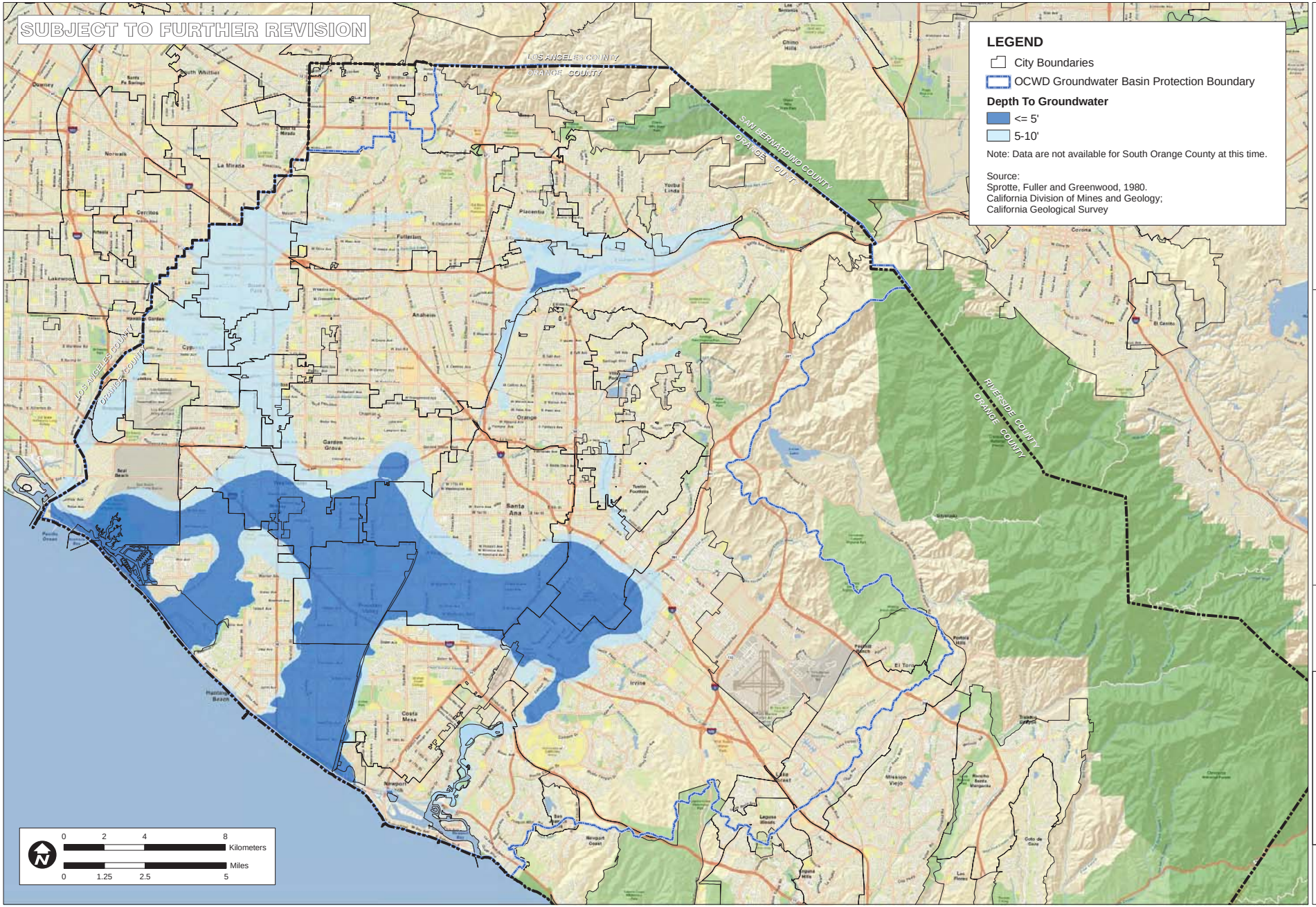

TITLE
NORTH ORANGE COUNTY
MAPPED SHALLOW GROUNDWATER

JOB
ORANGE COUNTY
INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2e

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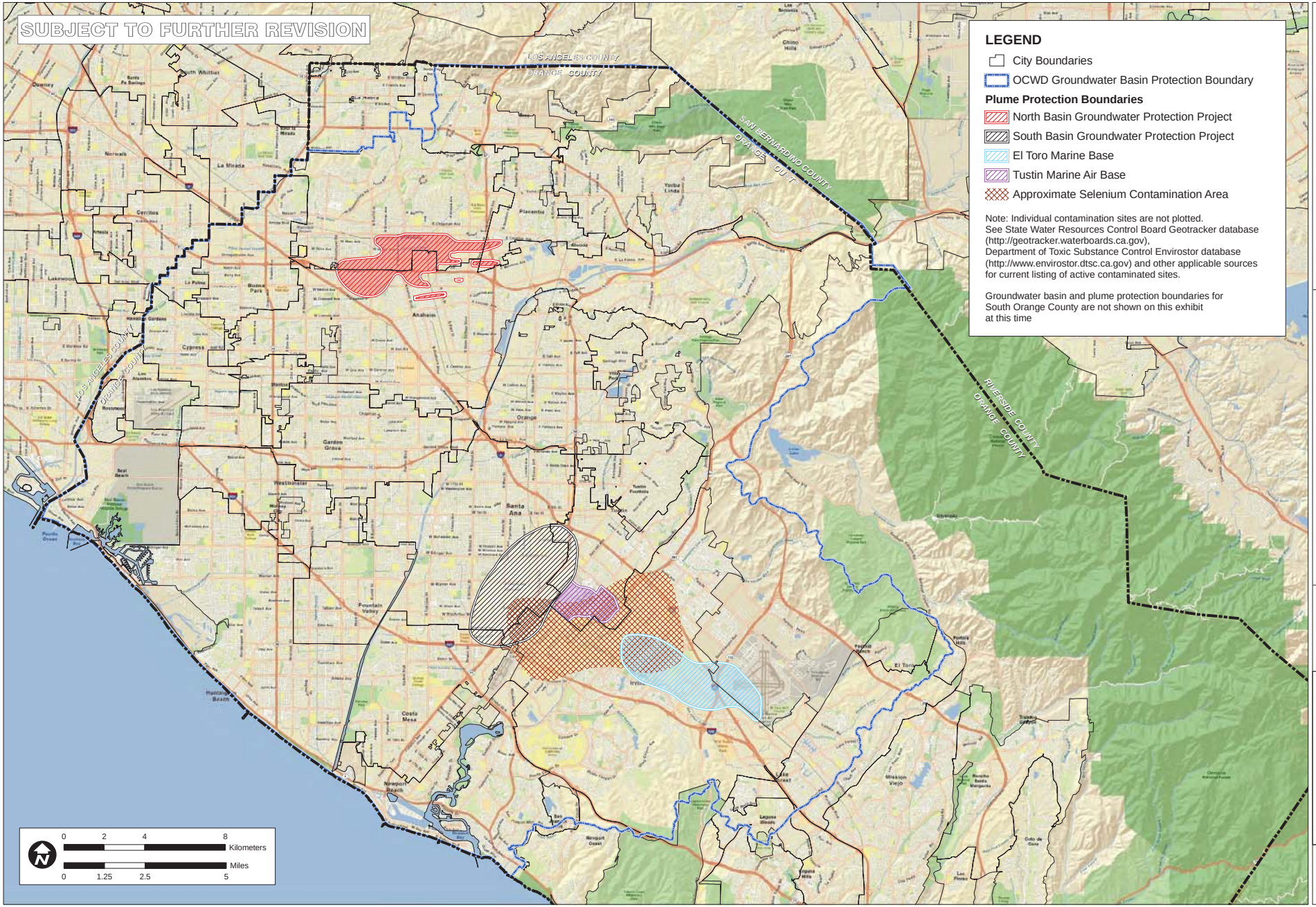

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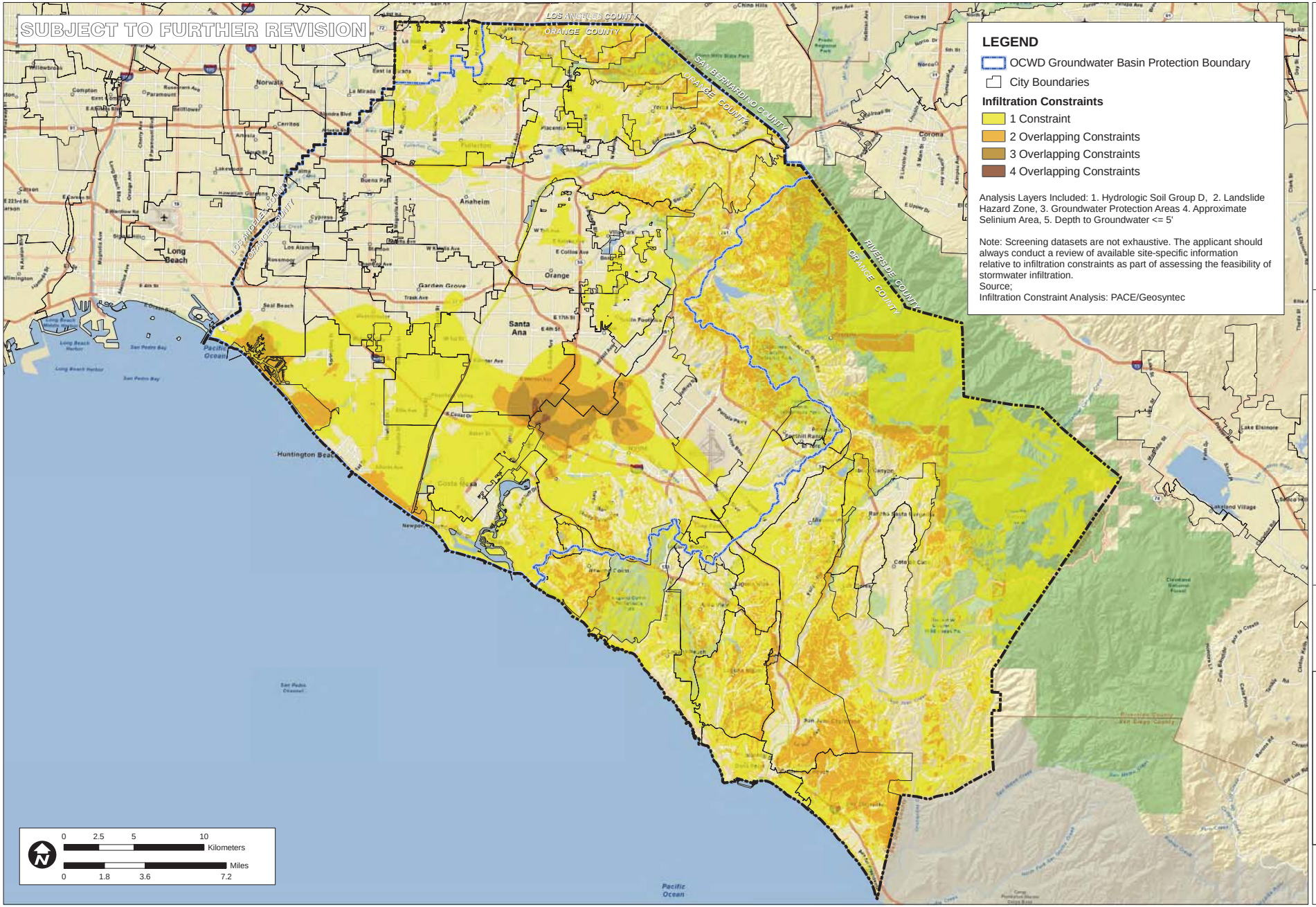
TITLE
NORTH ORANGE COUNTY GROUNDWATER PROTECTION AREAS

JOB
ORANGE COUNTY INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.25 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/23/10
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE
XVI-2f



TITLE
INFILTRATION ANALYSIS
OVERLAPPING CONSTRAINT
LOCATIONS

JOB
ORANGE COUNTY
INFILTRATION STUDY
CA
ORANGE CO.

SCALE	1" = 1.6 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/23/10
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2g

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2g_InfiltrationFinal_20110215.mxd


NEWPORT BEACH
A
B
C
KEY
0 2000 4000 6000 8000
FEET
LEGEND
A B C D HYDROLOGIC SOIL GROUPS
HYDROLOGIC SOIL GROUP BOUNDARY
COUNTY BOUNDARY
ORANGE COUNTY - HYDROLOGY MANUAL
SOURCES:
BASE MAP -QUADRANGLE MAPS,GEOLOGICAL SURVEY, U.S.DEPT. OF THE INTERIOR, 1980 PHOTO UPDATE
SOIL GROUPS -SOIL SURVEY OF ORANGE COUNTY AND WESTERN PART OF RIVERSIDE COUNTY, CALIFORNIA, USDA, SOIL CONSERVATION SERVICE 1978.
HYDROLOGIC CLASSIFICATION OF SOILS
ORANGE COUNTY, CALIFORNIA
MAY 1986 PLATE B

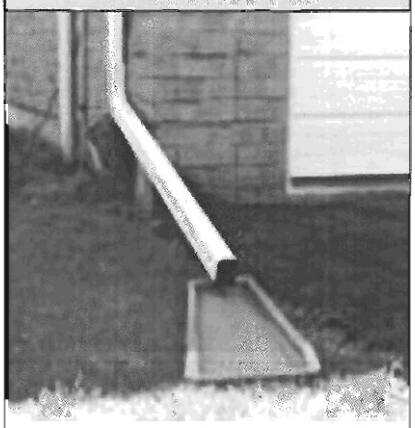
ATTACHMENT E

HSC-2: Impervious Area Dispersion

Impervious area dispersion refers to the practice of routing runoff from impervious areas, such as rooftops, walkways, and patios onto the surface of adjacent pervious areas. Runoff is dispersed uniformly via splash block or dispersion trench and soaks into the ground as it move slowly across the surface of pervious areas. Minor ponding may occur, but it is not the intent of this practice to actively promote localized on-lot storage (See HSC-1: Localized On-Lot Infiltration).

Also known as:

- *Downspout disconnection*
- *Impervious area disconnection*
- *Sheet flow dispersion*



Simple Downspout Dispersion
Source: toronto.ca/environment/water.htm

Feasibility Screening Considerations

- Impervious area dispersion can be used where infiltration would otherwise be infeasible, however dispersion depth over landscaped areas should be limited by site-specific conditions to prevent standing water or geotechnical issues.

Opportunity Criteria

- Rooftops and other low traffic impervious surface present in drainage area.
- Soils are adequate for infiltration. If not, soils can be amended to improve capacity to absorb dispersed water (see MISC-2: Amended Soils).
- Significant pervious area present in drainage area with shallow slope
- Overflow from pervious area can be safely managed.

OC-Specific Design Criteria and Considerations

- ☐ Soils should be preserved from their natural condition or restored via soil amendments to meet minimum criteria described in Section .
- ☐ A minimum of 1 part pervious area capable of receiving flow should be provided for every 2 parts of impervious area disconnected.
- ☐ The pervious area receiving flow should have a slope ≤ 2 percent and path lengths of ≥ 20 feet per 1000 sf of impervious area.
- ☐ Dispersion areas should be maintained to remove trash and debris, loose vegetation, and protect any areas of bare soil from erosion.
- ☐ Velocity of dispersed flow should not be greater than 0.5 ft per second to avoid scour.

Calculating HSC Retention Volume

- The retention volume provided by downspout dispersion is a function of the ratio of impervious to pervious area and the condition of soils in the pervious area.
- Determine flow patterns in pervious area and estimate footprint of pervious area receiving dispersed flow. Calculate the ratio of pervious to impervious area.
- Check soil conditions using the soil condition design criteria below; amend if necessary.
- Look up the storm retention depth, d_{HSC} from the chart below.

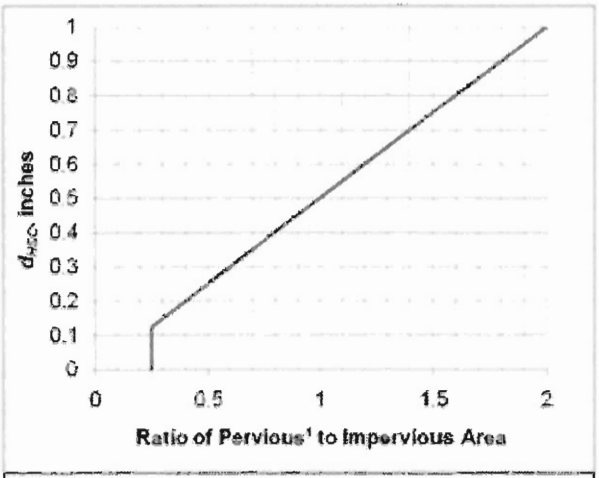
- The max d_{HSC} is equal to the design storm depth for the project site.

Soil Condition Design Criteria

- ☐ Maximum slope of 2 percent
- ☐ Well-established lawn or landscaping
- ☐ Minimum soil amendments per criteria in MISC-2: Amended Soils.

Configuration for Use in a Treatment Train

- Impervious area disconnection is an HSC that may be used as the first element in any treatment train
- The use of impervious area disconnection reduces the sizing requirement for downstream LID and/or treatment control BMPs



[1] Pervious area used in calculation should only include the pervious area receiving flow, not pervious area receiving only direct rainfall or upslope pervious drainage.

Additional References for Design Guidance

- SMC LID Manual (pp 131) http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf
- City of Portland Bureau of Environmental Services. 2010. How to manage stormwater – Disconnect Downspouts. http://www.portlandonline.com/bes/index.cfm?c=43081&a=177702
- Seattle Public Utility: http://www.cityofseattle.org/util/stellent/groups/public/@spu/@usm/documents/webcontent/spu01_006395.pdf
- Thurston County, Washington State (pp 10): http://www.co.thurston.wa.us/stormwater/manual/docs-faqs/DG-5-Roof-Runoff-Control_Rev11Jan24.pdf

HSC-3: Street Trees

By intercepting rainfall, trees can provide several aesthetic and stormwater benefits including peak flow control, increased infiltration and ET, and runoff temperature reduction. The volume of precipitation intercepted by the canopy reduces the treatment volume required for downstream treatment BMPs. Shading reduces the heat island effect as well as the temperature of adjacent impervious surfaces, over which stormwater flows, and thus reduces the heat transferred to downstream receiving waters. Tree roots also strengthen the soil structure and provide infiltrative pathways, simultaneously reducing erosion potential and enhancing infiltration.

Also known as:

- *Canopy interception*

Street trees
Source: Geosyntec Consultants

Feasibility Screening Considerations

- Not applicable

Opportunity Criteria

- Street trees can be incorporated in green streets designs along sidewalks, streets, parking lots, or driveways.
- Street trees can be used in combination with bioretention systems along medians or in traffic calming bays.
- There must be sufficient space available to accommodate both the tree canopy and root system.

OC-Specific Design Criteria and Considerations

- ☐ Mature tree canopy, height, and root system should not interfere with subsurface utilities, suspended powerlines, buildings and foundations, or other existing or planned structures. Required setbacks should be adhered to.
- ☐ Depending on space constarints, a 20 to 30 foot diameter canopy (at maturity) is recommended for stormwater mitigation.
- ☐ Native, drought-tolerant species should be selected in order to minimize irrigation requirements and improve the long-term viability of trees.
- ☐ Trees should not impede pedstrian or vehicle sight lines.
- ☐ Planting locations should receive adequate sunlight and wind protection; other environmental factors should be considered prior to planting.
- ☐ Frequency and degree of vegetation management and maintenance should be considered with respect to owner capabilities (e.g., staffing, funding, etc.).
- ☐ Soils should be preserved in their natural condition (if appropriate for planting) or restored via soil amendments to meet minimum criteria described in MISC-2: Amended Soils. If necessary, a landscape architect or plant biologist should be consulted.
- ☐ A street tree selection guide, such as that specific to the City of Los Angeles, may need to be consulted to select species appropriate for the site design constraints (e.g., parkway size, tree height, canopy spread, etc.)
- ☐ Infiltration should not cause geotechnical hazards related to adjacent structures (buildings,

roadways, sidewalks, utilities, etc.)

Calculating HSC Retention Volume

- The retention volume provided by streets trees via canopy interception is dependent on the tree species, time of the year, and maturity.
- To compute the retention depth, the expected impervious area covered by the full tree canopy after 4 years of growth must be computed (IA_{HSC}). The maximum retention depth credit for canopy interception (d_{HSC}) is 0.05 inches over the area covered by the canopy at 4 years of growth.

Configuration for Use in a Treatment Train

- As a HSC, street trees would serve as the first step in a treatment train by reducing the treatment volume and flow rate of a downstream treatment BMP.

Additional References for Design Guidance

- California Stormwater BMP Handbook.
  http://www.cabmphandbooks.com/Documents/Development/Section_3.pdf
- City of Los Angeles, Street Tree Division - Street Tree Selection Guide.
  http://bss.lacity.org/UrbanForestryDivision/StreetTreeSelectionGuide.htm
- Portland Stormwater Management Manual.
  http://www.portlandonline.com/bes/index.cfm?c=35122&a=55791
- San Diego County – Low Impact Development Fact Sheets.
  http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf

MISC-2: Amended Soils

Soil amendments alter the soil characteristics to allow it to absorb, infiltrate, and retain more water to help reduce runoff volume and velocity, filter pollutants, increase the quality and quantity of vegetation, and reduce erosion potential more effectively than soils without soil amendments. Mulch is an amendment that is added on the top of the soil, rather than mixed into the soil, which reduces evaporation and adds to the aesthetics of a site. Compost and fertilizers are common soil amendments that must be completely mixed into the soil to function properly.

Soil amended area at U.S. EPA Ariel Rios building.
Source: http://www.epa.gov/oaintrnt/stormwater/hq_projects.htm

General Criteria

- Compost, soil conditioners, and fertilizers should be roto-tilled into the native soil to a minimum depth of 6" (12 inches preferred). Mulch at grade should be spread over all planting areas to a depth of 3".
- Sand can be used as an amendment to improve the drainage rates of amended soils. Sand should be free of stones, stumps, roots or other similar objects larger than 5 mm
- Incorporating compost and other organics into the root zone results in enhanced biological activity, attenuation of envrionemntal contaminants, increased moisture holding capacity, and improved soil structure. Compost shall meet the specifications below.
- All soil amendments should be free of stones, stumps, roots or other similar objects larger than 2 inches.
- All soil amendments should be free of glass, plastic, metal, and other deleterious materials.

Accounting for Soil Amendments in Sizing Calculations

No retention credit is given for amended soils alone. Amended soils should be used as part of HSC-2 Impervious Area Dispersion, and to increase the retention volume of Infiltration and Biotreatment BMPs.

Additional References

Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 3:
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

Santa Barbara BMP Guidance Manual, Chapter 5:
http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf

- San Diego County LID Handbook Appendix 4 (Factsheet 30):
http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf

INF-6: Permeable Pavement (concrete, asphalt, and pavers)

Permeable pavements contain small voids that allow water to pass through to a gravel base. They come in a variety of forms; they may be a modular paving system (concrete pavers, grass-pave, or gravel-pave) or poured in place pavement (porous concrete, permeable asphalt). All permeable pavements treat stormwater and remove sediments and metals to some degree within the pavement pore space and gravel base. While conventional pavement result in increased rates and volumes of surface runoff, properly constructed and maintained porous pavements, allow stormwater to percolate through the pavement and enter the soil below. This facilitates groundwater recharge while providing the structural and functional features needed for the roadway, parking lot, or sidewalk. The paving surface, subgrade, and installation requirements of permeable pavements are more complex than those for conventional asphalt or concrete surfaces. For porous pavements to function properly over an expected life span of 15 to 20 years, they must be properly sited and carefully designed and installed, as well as periodically maintained. Failure to protect paved areas from construction-related sediment loads can result in their premature clogging and failure.

Also known as:

- *Pervious pavement*
- *Porous concrete*
- *Pavers*
- *Permeable asphalt*

Permeable Pavement
Source: Geosyntec Consultants

Feasibility Screening Considerations

- Permeable pavement shall pass infiltration infeasibility screening to be considered for use.
- Permeable pavements pose a potential risk of groundwater contamination; they may not provide significant attenuation of stormwater pollutants if underlying soils have high permeability.

Opportunity Criteria

- Permeable pavement areas can be applied to individual lot driveways, walkways, parking lots, low-traffic roads, high-traffic (with low speeds) roads/lots, golf cart paths, within road right-of-ways, and in parks and along open space edges. Impervious surfaces draining to the BMP are limited to surfaces immediately adjacent to the permeable pavement, rooftop runoff, and other nearby surfaces that do not contain significant sediment loads.
- Soils are adequate for infiltration or can be amended to provide an adequate infiltration rate.
- Infiltration is into native soil, or depth of engineered fill is ≤ 5 feet from the bottom of the facility to native material and infiltration into fill is approved by a geotechnical professional.

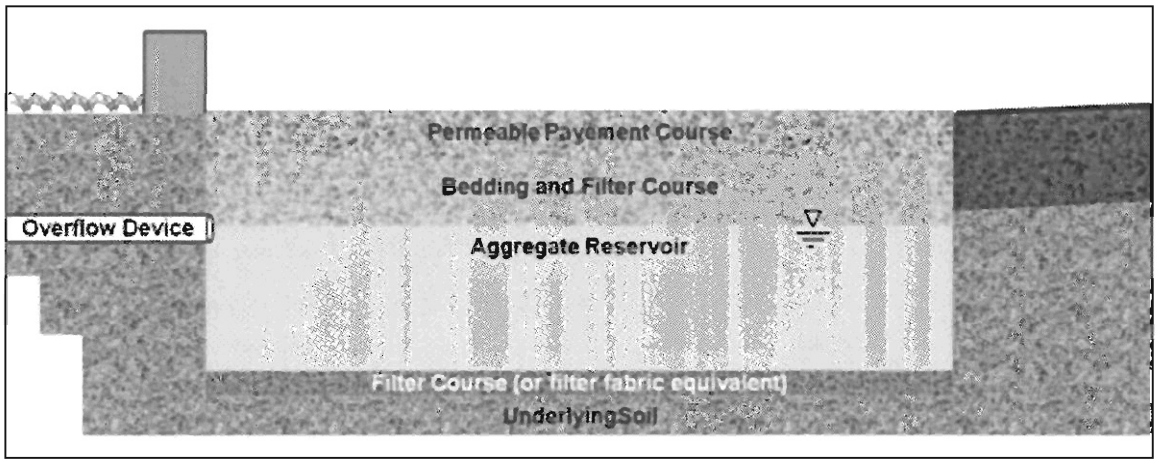
OC-Specific Design Criteria and Considerations

☐ Placement of BMPs should observe geotechnical recommendations with respect to geological hazards (e.g. landslides, liquefaction zones, erosion, etc.) and set-backs (e.g., foundations, utilities, roadways, etc)

☐ Minimum separation to mounded seasonally high groundwater of 5 feet shall be observed.

- ☐ A biotreatment BMP should be provided for all runoff from off-site sources that are not directly adjacent to the permeable pavement, with the exception of rooftops.
- ☐ Permeable pavement should not be used for drainage areas with high sediment production potential (e.g., landscape areas) unless preceded by full treatment control with a BMP effective for sediment removal
- ☐ All aggregate used to construct permeable pavement shall be thoroughly washed before being delivered to the construction site.
- ☐ The top or wearing layer course (permeable pavement course) should consist of asphalt or concrete with greater than normal percentage of voids, or paving stones.
- ☐ A layer of washed fine aggregate (e.g., No. 8) just under the permeable pavement course may be installed to provide a level surface for installing the permeable pavement and also acts as a filter to trap particles and help prevent the reservoir layer from clogging. This layer can also act as interstitial media between pavers.
- ☐ Below this layer, the bedding and filter course course should be 1.5 to 3 inches deep and may be underlain by choking stone to prevent the smaller sized aggregate from migrating into the large aggregate base layer.
- ☐ The bedding, filter, and choke stone layers, as applicable, are referred to collectively as the bedding and filter course.
- ☐ The aggregate reservoir layer should be designed to function as a support layer as well as a reservoir layer the reservoir layer should be washed, open-graded No. 57 aggregate without any fine sands.
- ☐ The type of pedestrian traffic should be considered when determining which type of permeable pavement to use in particular locations (e.g., pavers may not be a good option for locations where people wearing high heels will be walking).
- ☐ An overflow device is required in the form of perimeter control or overflow pipes. This should generally be set at an elevation to prevent ponding of water into the bedding and filter course.

Figure XIV.1: Schematic Diagram of Permeable Pavement without Underdrains



Simple Sizing Method for Permeable Pavement

Permeable pavement that manages only direct rainfall and runoff from adjacent impermeable surfaces less than 50 percent the size of the permeable pavement are are not required to conduct sizing calculations. These areas are assumed to be self-retaining for the purpose of drainage planning.For permeable pavement with larger tributary area ratios, sizing calculations must be performed.

If the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** is used to size permeable pavement, the user calculates the DCV, designs the geometry required to draw down the DCV in 48 hours, then determines the area that is needed for the BMP. The area of the porous pavement itself as well as the area of the tributary areas should be considered in calculating the DCV. The sizing steps are as follows:

Step 1: Determine Permeable Pavement DCV

Calculate the DCV using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1**.

Step 2: Determine the 48-hour Effective Depth

The depth of water that can be drawn down in 48 hours can be calculated using the following equation:

$d_{48} = K_{DESIGN} \times 48 \text{ hours} \times 1 \text{ ft}/12 \text{ inches}$

Where:

d_{48} = pavement effective 48-hour drawdown depth, ft

K_{DESIGN} = basin design infiltration rate, in/hr (See **Appendix VII**)

This is the maximum effective depth of water storage in the aggregate reservoir to achieve drawdown in 48 hours.

Step 3: Determine the Aggregate Reservoir Depth

The depth of water stored in the gravel reservoir should be equal or less than d_{48}. Determine the reservoir depth such that:

$d_{48} \geq (n_R \times d_R)$

Where:

d_{48} = trench effective 48-hour depth, ft (from Step 2)

n_R = porosity of aggregate reservoir fill; 0.35 may be assumed where other information is not available

d_R = depth of trench fill, ft

Step 4: Calculate the Required Infiltrating Area

The required infiltrating area can be calculated using the following equation:

$A = DCV / (n_R \times d_R)$

Where:

A = required footprint area, sq-ft

DCV = design capture volume, cu-ft (see Step 1)

n_R = porosity of trench fill; 0.35 may be assumed where other information is not available

d_R = depth of trench fill, ft

This area is equal to the required pavement area.

The ratio total tributary area (including the porous pavement) to the area of the porous pavement should not exceed 4:1.

Capture Efficiency Method for Permeable Pavement

If BMP geometry has already been defined and deviates from the 48 hour drawdown time, the designer can use the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) to determine the fraction of the DCV that must be provided to manage 80 percent of average annual runoff volume. This method accounts for drawdown time different than 48 hours.

Option 1: Pavement Geometry is Predefined

Step 1: Determine the Drawdown Time Associated with the Selected Pavement Geometry

$DD = ((n_R \times d_R) / K_{DESIGN}) \times 12$ in/ft

Where:

DD = time to completely drain pavement, hours

n_R = porosity of reservoir fill; 0.35 may be assumed where other information is not available

d_R = depth of reservoir, ft

K_{DESIGN} = basin design infiltration rate, in/hr (See **Appendix VII**)

Step 2: Determine the Required Adjusted DCV for this Drawdown Time

Use the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) to calculate the draw-down adjusted DCV that the basin must hold to achieve 80 percent capture of average annual stormwater runoff volume based on the pavement drawdown time calculated above.

Step 3: Determine the Pavement Infiltrating Area Needed

The required infiltrating area can be calculated using the following equation:

$A = DCV/ (n_R \times d_R)$

Where:

A = required footprint area, sq-ft

DCV = design capture volume, cu-ft (see Step 1)

n_R = porosity of reservoir fill; 0.35 may be assumed where other information is not available

d_R = depth of reservoir, ft

If the area required is greater than the selected pavement area, adjust reservoir depth and recalculate required area until the required area is achieved.

Configuration for Use in a Treatment Train

- Permeable pavement may be preceded in a treatment train by HSCs in the drainage area, which would reduce the runoff volume to be infiltrated by the permeable pavement
- Permeable pavement areas can be designed to be self-retaining to lessen the pollutant and volume load on downstream BMPs.

Additional References for Design Guidance

- SMC LID Manual (pp 84): http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf

- Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 5: 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
- City of Portland Stormwater Management Manual (Pervious Pavement, page 2-40) http://www.portlandonline.com/bes/index.cfm?c=47954&a=202883

  San Diego County LID Handbook Appendix 4 (Factsheets 8, 9 & 10): http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf

  City of Santa Barbara Storm Water BMP Guidance Manual, Chapter 6: http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf

  County of Los Angeles Low Impact Development Standards Manual, Chapter 5: http://dpw.lacounty.gov/wmd/LA_County_LID_Manual.pdf

ATTACHMENT F

Water Quality Management Plan
Notice of Transfer of Responsibility

Submission of this Notice of Transfer of Responsibility constitutes notice to the City of Garden Grove 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 Responsibility Party Information

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

II. Information about Site Transferred

Name of Project	
Title of WQMP Applicable to Site:	
Street Address of Site	
Tract Number(s) for Site	Lot Numbers
Date WQMP Prepared (or Revised)	

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 Number(s) of Site Transferred to New Owner	
Remaining Lot/ Tract Number(s) 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 the 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 the Previous Owner. Those portions retained by the Previous Owner shall be labeled "Previous Owner," and those portions previously transferred by the 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 Owner is now the Responsible Party of record for the WQMP for this 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 New Owner.

Print 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.

Print Name of New Owner Representative	Title
Signature of New Owner Representative	Date

ATTACHMENT G

Information To Build On
Engineering • Consulting • Testing

August 24, 2012

Justin Park
Project Manager
The Wieland-Davco Corp.
3355 Via Lido, Suite A
Newport Beach, California 92663

Phone: (517 723-0279 E-mail: justin.park@wieland-davco.com

Re: Geotechnical Engineering Services Report
Proposed Townhome / Condominium Development
NWC Via Lido & Via Malaga
Newport Beach, California
PSI Report No. 0559771

Dear Mr. Park:

Professional Service Industries, Inc. (PSI) is pleased to transmit our Geotechnical Engineering Services Report for the referenced project. This report includes the results of field and laboratory testing, and recommendations pertaining to site preparation, foundation design and construction for the proposed improvements.

We appreciate the opportunity to have performed this Geotechnical Study and look forward to our continued participation during the design and construction phases of this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Respectfully submitted,
PROFESSIONAL SERVICE INDUSTRIES, INC.

Zach McClellan, EIT
Project Engineer

Robert R. Russell, GE
Chief Engineer

REGISTERED PROFESSIONAL ENGINEER
ROBERT R. RUSSELL
No. 2042
GEOTECHNICAL
STATE OF CALIFORNIA

GEOTECHNICAL ENGINEERING SERVICES REPORT

PROPOSED TOWNHOME / CONDOMINIUM DEVELOPMENT
NWC VIA LIDO & VIA MALAGA
NEWPORT BEACH, CALIFORNIA

PSI REPORT NO. 0559771

PREPARED FOR

THE WIELAND-DAVCO CORP.
3355 VIA LIDO, SUITE A
NEWPORT BEACH, CA

ATTENTION: MR. JUSTIN PARK

AUGUST 24, 2012

BY

PROFESSIONAL SERVICE INDUSTRIES, INC.
6330 GATEWAY DRIVE, SUITE B, CYPRESS, CALIFORNIA 90630 PH. 714-484-8600 FAX. 714-484-8601

Zach McClellan, EIT
Project Engineer

Robert R. Russell, PE, GE
Chief Engineer

REGISTERED PROFESSIONAL ENGINEER
ROBERT R. RUSSELL
No. 2042
GEOTECHNICAL
STATE OF CALIFORNIA

Professional Service Industries, Inc,
DBA PSI, Inc
Registered Engineering Firm: F-3307
1901 S. Meyers Rd, Ste 400 Oakbrook Terrace, IL 60191

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PROJECT INFORMATION

PROJECT AUTHORIZATION

Professional Service Industries, Inc. (PSI) has completed a geotechnical exploration for the proposed townhome/condominium development to be located at the NWC of Via Lido and Via Malaga in Newport Beach, California. The Wieland-Davco Corp. authorized our services on August 7, 2012 by signing PSI proposal 0559-75353 dated August 1, 2012.

PROJECT DESCRIPTION

Mr. Justin Park of the Wieland-Davco Corp. provided the project information as described herein to PSI. Based on our discussions with Mr. Park and a review of the site plan prepared by Shusin + Donaldson Architects, Inc. for 3355 & 3388 Via Lido, we understand that new at-grade two to three story townhome/condominium buildings and associated improvements are planned to be constructed at the above mentioned addresses in Newport Beach, California. The site is presently occupied by commercial retail buildings along Via Lido (to the east) and a parking lot (to the west). The existing commercial/retail buildings and paving will be demolished to make way for the planned townhomes/condos to be constructed along the property lines and driveways and parking to be constructed between the proposed townhomes/condos. A Site Vicinity Map showing the site location is included as Figure 1 in the Appendix.

Detailed structural loading has not been provided to us, however we were informed that loads for a 3-story wood-framed residential structure on the order of 3 kips per foot for wall footings and 50 kips for columns would be reasonable assumptions. Detailed grading information has also not been provided, however, PSI has assumed that the site grading will consist of cuts and fills of less than 3 feet, not including any remedial grading.

The geotechnical recommendations presented in this report are based on the available project information, site location, laboratory testing, and the subsurface materials. If any of the noted information is incorrect, please inform PSI in writing so that we may amend the recommendations presented in this report if appropriate and if desired by the client. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

PURPOSE AND SCOPE OF SERVICES

The purpose of this geotechnical study was to explore the subsurface conditions and provide suitable foundation recommendations for the proposed construction. The geotechnical exploration for this project involved drilling four test borings, laboratory testing, and geotechnical analyses. This report briefly outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and presents recommendations for the following:

- Site preparation and grading.
- Findings pertaining to potentially expansive, deleterious or corrosive materials.
- An assessment of the liquefaction potential and an estimate of seismic-induced settlements

- Recommendations pertaining to design and construction of foundations for support of the proposed construction, including allowable soil bearing pressure, anticipated bearing depths and estimated settlements.
- Pavement recommendations including subgrade preparation and construction control of groundwater.
- Comments regarding factors that may impact construction and performance of the proposed construction.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater, or air on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes. PSI is concurrently performing a Phase I Environmental Site Assessment (ESA) at the subject site and a separate report will be issued to address environmental concerns.

A geologic fault study to evaluate the possibility of surface faulting at this site was beyond the scope of this investigation. Should you desire a detailed fault study, please contact us; however, active faults are not known to exist on or in the immediate vicinity of the site.

Services that investigate or detect the presence of moisture, mold, or other biological contaminants in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence of the amplification of the same, were not provided. Mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. Site conditions are outside of PSI's control, and mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, PSI cannot be held responsible for the occurrence or recurrence of mold amplification.

SITE AND SUBSURFACE CONDITIONS

SITE LOCATION AND DESCRIPTION

The project site is located adjacent to the NWC of Via Lido and Via Malaga in Newport Beach, California. Furnished information indicates the approximate site GPS coordinates are latitude: 34.6167°N and longitude: -117.9281°W. The subject site is currently developed with existing commercial/retail buildings along Via Lido (to the east) and a parking lot (to the west. The site is relatively level with a maximum elevation differential of about 2 feet, sloping down to the west (Google Earth, 2011). The site is triangular in shape and bounded by Via Lido to the northeast, Via Malaga to the south and Via Oporto to the west.

REGIONAL GEOLOGY

The subject site is located at elevations between approximately 6 to 8 feet above mean sea level (Google Earth). Based on a review of the *CGS Seismic Hazard Report, Newport Quadrangle*, the site is located within the Orange County coastal plain and underlain by Quaternary alluvial and fluvial sedimentary deposits.

REGIONAL SEISMICITY

The project site is located in Southern California, which has undergone a complex multiphase structural history and remains an active tectonic region with documented historic earthquakes. Generally, the seismicity within California can be attributed to faulting due to regional tectonic movement. This includes the San Andreas Fault and other sub-parallel strike-slip faults, as well as normal and thrust faulting within the State. The area of the subject site is considered seismically active. Seismic hazards within the site can be attributed to potential ground shaking resulting from earthquake events along nearby or more distant faulting.

The primary causes of damage in this general area during seismic events include ground shaking and liquefaction of the subsurface strata. Liquefaction occurs when loose granular and low plastic materials below the groundwater table are subjected to cyclic shear forces resulting from seismic events. During seismic shaking the porewater pressure increases with a corresponding decrease in the soils effective stress. Excess pore pressures ultimately dissipate and the soil consolidates, often resulting in significant total and differential settlement of the ground surface.

SUBSURFACE CONDITIONS

The boring locations were marked in the field by a PSI representative by referencing existing landmarks based on the information provided by the client. A truck-mounted CME-75 drill rig using mud rotary drilling methods was used to advance the borings. Soil samples were routinely obtained during the drilling process. Drilling and sampling techniques were accomplished general in accordance with ASTM procedures (ASTM D1586 and D3550).

The subsurface conditions were explored by drilling four soil borings at this site. Soil borings B1 through B4, were drilled within the existing parking lot to depths ranging from approximately 20 to 50-feet below the existing ground surface elevation. The locations of our test borings were restricted due to the existing on-site improvements. Figure 2 in the Appendix shows the approximate boring locations. The soil types encountered at the specific boring locations are presented on the attached Boring Logs in the Appendix.

As indicated on our boring logs, the existing pavement section generally consists of approximately 3 inches of asphalt underlain by a silty sand with gravel (apparent base course) that was estimated to be about 6 inches thick. The pavement section was underlain by native soil consisting of medium dense silty gravely sand with trace organics that extend to a depth of approximately 5-feet below existing grade, very soft to soft clayey silt that extends to a depth of approximately 7½-feet below existing grade, and loose to very dense slightly silty sand to the maximum depth explored of approximately 50-feet below the existing ground surface elevation.

During the sampling procedure, Standard Penetration Tests (SPT) were performed in accordance with ASTM D1586 and relatively undisturbed samples were obtained in general accordance with ASTM D3550. The SPT for soil borings is performed by driving a 2-inch diameter split-spoon sampler into the undisturbed formation located at the bottom of the advanced borehole with repeated blows of a 140-pound hammer falling a vertical distance of 30-inches. The number of blows required to drive the sampler the last 12-inches of an 18-inch penetration depth is a measure of the soil consistency. For ASTM D-3550 (California Modified

Sampler), the split barrel sampler possesses a 3-inch O.D. and is driven in the same manner as the SPT. The blow count obtained from the California Modified sampler should be reduced by approximately 40 percent to obtain a rough correlation to SPT blow counts (N-value). Samples were identified in the field, placed in sealed containers and transported to the laboratory for further classification and testing.

The stratification presented on the Boring Logs is based on a visual examination of the recovered soil samples and the interpretation of field logs by a geotechnical professional. Included on the Boring Logs are the standard penetration resistances (SPT N-values and California Modified sampler blows) recorded in the individual borings at standard testing intervals to the boring termination depths.

The above subsurface information is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The Boring Logs, included in the Appendix, should be reviewed for specific information at the boring locations. These records include soil descriptions, stratification, penetration resistance, locations of the samples and laboratory test data. The stratification shown on the logs represent the conditions only at the actual location at the time of our exploration. Variations may occur and should be expected between locations. The stratification that represents the approximate boundary between subsurface materials and the actual transition may be gradual. Lines of demarcation represent the approximate boundary between subsurface materials, and the transition may be gradual. It should be noted that, although the test borings are drilled and sampled by experienced professionals, it is sometimes difficult to record changes in stratification within narrow limits, especially at great depths. In the absence of foreign substances, it is also sometimes difficult to distinguish between discolored soils and clean fill soil.

GROUNDWATER INFORMATION

Groundwater was measured at approximately 5-feet below existing grade in all four borings at the time of drilling. Based on a review of the California Geological Survey (CGS) Seismic Hazard Zone Report for the Newport Quadrangle, the historic high groundwater depth for the site area is noted to be about 5 feet below grade.

It is possible that seasonal variations (temperature, rainfall, tide conditions etc) will cause fluctuations in the groundwater level. Additionally, perched water may be encountered in discontinuous zones within the overburden. The groundwater levels presented in this report are the levels that were measured at the time of our field activities. It is recommended that the contractor determine the actual groundwater levels at the site at the time of the construction activities to determine the impact, if any, on the construction procedures.

LABORATORY TESTING

The soil samples obtained during the field exploration were transported to our laboratory and selected soil samples were tested in the laboratory to determine the material properties for evaluation. Laboratory testing on selected samples included Moisture Content (ASTM D2216), Unit Weight, Sieve Analysis (ASTM D422 and D1140), Expansion Index testing (ASTM D4829), Corrosion testing (CTM 643, CTM 417 and CMT 422), Atterberg Limit testing (ASTM D4318), and Consolidation (ASTM D2435). Laboratory testing was performed in general accordance

with ASTM and/or California Test procedures. Unless otherwise informed, the soil samples will be discarded 60 days from the issuance of the report.

Results of our laboratory testing indicate the tested materials have moisture contents between approximately 3 percent to 54 percent. Consolidation tests were performed on samples at depths of 7½ feet, 5 feet, and 10 feet below existing grade at Test Boring Nos. 1, 2, and 3, respectively, and these tests indicated the soils at 7½ feet and 10 feet in Test Borings Nos. 1 and 3, respectively possess a relatively low compressibility. However the consolidation test performed on the soil sample at 5-feet in Test Boring No. 2 indicated a high level of compressibility. The corrosion test results indicated the near surface soils are nearly neutral, have a low chloride content, possess a *negligible sulfate exposure* and resistivity results indicates the materials possess a *progressively less corrosive* environment for ferrous metals. The results of our Expansion Index testing indicate the near surface soils have a very low expansion potential (EI=0). Laboratory test data along with detailed descriptions of the soils can be found on the Boring Logs in the Appendix.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

The following geotechnical design recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions encountered. If there are any changes in these project criteria, including building location on the site, PSI should be contacted to determine if modifications to the recommendations are warranted.

EARTHQUAKE AND SEISMIC DESIGN CONSIDERATIONS

The project site is located within a municipality that employs the 2010 California Building Code (CBC), the locally adopted version of the International Building Code, 2009 edition. As part of this code, the design of structures must consider dynamic forces resulting from seismic events. These forces are dependent upon the magnitude of the earthquake event as well as the properties of the soils that underlie the site. As part of the procedure to evaluate seismic forces, the code requires the evaluation of the Seismic Site Class, which categorizes the site based upon the characteristics of the subsurface profile within the upper 100 feet of the ground surface. To define the Site Class for this project, we have interpreted the results of soil test borings drilled within the project site and estimated appropriate soil properties below the base of the borings to a depth of 100 feet as permitted by the code. The estimated soil properties were based upon our experience with subsurface conditions in the general site area.

Based upon our evaluation, the subsurface conditions within the site are consistent with the characteristics of a Site Class “D” as defined in Table 1613.5.2 of the CBC. The associated USGS-NEHRP (2002) probabilistic ground acceleration values and site coefficients for the general site area were obtained from the USGS geohazards web page: http://earthquake.usgs.gov/research/hazmaps/design

Which is presented in Table 1.

Table 1: Ground Motion Values*

Period (sec)	Mapped MCE Spectral Response Acceleration** (g)		Site Coefficients		Adjusted MCE Spectral Response Acceleration (g)		Design Spectral Response Acceleration (g)	
0.2	S_S	1.847	F_a	1.0	S_{MS}	1.847	S_{DS}	1.231
1.0	S_1	0.695	F_v	1.5	S_{M1}	1.042	S_{D1}	0.695

**2% Probability of Exceedence in 50 years for Latitude 33.6167°N and Longitude -117.9281°W*
***At B-C interface (i.e. top of bedrock).*
MCE = Maximum Considered Earthquake

The Site Coefficients, F_a and F_v presented in the above table were also obtained from the noted USGS webpage, as a function of the site classification and mapped spectral response acceleration at the short (S_s) and 1-second (S_1) periods, but can also be interpolated from CBC Tables 1613.5.3(1) and 1613.5.3(2).

Hazard Assessment

Alquist-Priolo Fault Zone - The seismicity of the site was evaluated utilizing deterministic methods for active faults within the regional vicinity. According to the Alquist-Priolo Special Studies Zones Act of 1972 (revised 1994) faults have been classified as active faults which show apparent movement during the last 11,000 years (i.e., Holocene time). The site is not located within a currently designated Earthquake Fault Zone per the Alquist-Priolo Special Studies Zone Map produced by the California Geological Survey (CGS). The nearest zoned active fault is the Newport – Inglewood (L.A. Basin) Fault Zone, mapped 0.4 mile to the northwest of the subject site.

Lurching and Shallow Ground Rupture – Breaking of the ground because of active faulting is not likely due to the absence of known active fault traces within the project limits.

Liquefaction Induced Settlement - Liquefaction and seismically induced settlement typically occur in loose granular and low-plastic silt and clay soils with groundwater near the ground surface. During an earthquake, ground shaking causes the soil to consolidate and an increase in the pore pressures in saturated soils. After dissipation of the excess pore pressures, the saturated soils tend to settle. Fine-grained plastic soils are generally not susceptible to liquefaction or to short-term settlement due to seismic loads.

According to the California Geological Survey (CGS) Newport 7.5' Quadrangle hazard map, the subject site is located within an area that is classified as being susceptible to liquefaction and has a historic high groundwater depth of approximately 5 feet below existing ground surface elevation. Our borings indicate depth to groundwater was measured to be at an approximate depth of 5 feet after drilling was completed.

In order to evaluate the potential for soil liquefaction at this site, we performed an analysis utilizing the LIQUEFYPRO computer software program. For this analysis, we used a groundwater depth of

5 feet (historic high), the soil profile identified in Boring B-1 and a ground acceleration of 0.5g (S_{DS}/2.5, as per the CBC).The results of our analysis indicates that localized zones of the silty sand soils are potentially susceptible to liquefaction upon application of the design site acceleration. Our analysis indicates that the sandy soils between about 7½ to 10 feet, 26 to 28 feet, and 29 to 30 feet below grade are potentially susceptible to liquefaction upon application of the design earthquake. The most significant effect of soil liquefaction is expected to be ground surface settlement resulting from volumetric strain within the liquefiable soils. Based on our analysis, we estimate a maximum total seismic induced settlement of approximately 1-¼ inches with an estimated ⅔ inch of differential settlement across a 40 foot span. Based on this magnitude of estimated settlement, it is our opinion that mitigation of the liquefaction potential is not warranted. The output file from the analysis is provided within the Appendix.

Landsliding – Due to the generally flat nature of the site and surrounding properties, it is our opinion that the site has a low susceptibility to landslides.

Tsunamis and Seiches – Based on our review of the Tsunami Inundation Map for Emergency Planning, Newport Beach Quadrangle, dated March 15, 2009, issued by the State of California-Orange County, the site is located within a designated tsunami inundation area. As such the potential does exist for tsunami inundation to impact the site.

For Seismic Design Category designations of C, D, E or F, which are contingent on the structures "Seismic Use Group", the code requires an assessment of slope stability, liquefaction potential and surface rupture due to faulting or lateral spreading. Detailed evaluations of these factors were beyond the scope of this study. However, the following table presents a qualitative assessment of these issues considering the site class, the subsurface soil properties, the groundwater elevation and probabilistic ground motions.

Table 2: Qualitative Seismic Site Assessments

Hazard	Relative Risk	Comments
Liquefaction	Moderate	Differential seismic induced settlement of about ⅔ inch is estimated across a 40 foot span.
Slope Stability	Low	Based on the presumed grading plans, significant cut or fill slopes are not planned for construction.
Surface Rupture	Low	Active faults are not known to underlie the site.

SITE PREPARATION & GRADING

The current geotechnical issues at the site that will affect the construction of the proposed development include the following:

1. Surface and subsurface disturbance during clearing and demolition operations.
2. Shallow groundwater.
3. Potentially liquefiable soils.
4. Soft soil deposits which will require the use of a deep foundation system.

Site Preparation

Initial site preparation should include stripping of any vegetation, demolition of the existing buildings and removal of the existing pavement that is present within the planned new development areas. Demolition of the existing buildings should include removal of all shallow foundations, floor slabs and underground construction. Existing underground utilities should either be properly capped off at the property boundaries and removed or be re-routed around the new development. Utilities should be removed and properly abandoned in accordance with local regulatory requirements. All soils disturbed by the clearing and demolition operations should be removed, cleaned of deleterious materials and stockpiled on-site for future use as Engineered Fill. All debris and deleterious materials generated by the site stripping and demolition operations should be legally disposed off-site. If the existing buildings are supported by deep foundations, we recommend that the deep foundations be cut-off at least 3 feet below finished grade and to a depth where they will not impact construction of the new foundations.

If grading occurs in the winter rainy season, unstable subgrade conditions may be present. These conditions may require stabilizing the subgrade with admixtures, such as cement kiln dust or a coarse aggregate. Isolated areas may be stabilized using a geogrid, such as Tensar TX160 or equal, with one foot compacted Class II aggregate base over the geogrid. Additional recommendations can be provided, as required, during construction.

Remedial Grading

Following site clearing, demolition and lowering of site grades where needed, we recommend that the soils beneath the new buildings be over-excavated to a depth of at least two feet below existing or finished grade, whichever is deeper. The exposed soils should then be scarified to a depth of approximately 12 inches, be moisture conditioned to about 0 to 3 percent above the soil's optimum moisture content and then be compacted to at least 90 percent of the soil's maximum dry density, per ASTM D-1557.

The subgrade within all other development areas of site should be proof rolled with a heavy rubber-tired piece of construction equipment approved by and in the presence of the Geotechnical Engineer. Any soil that ruts or excessively deflects during proof rolling should be removed or stabilized as recommended by the Geotechnical Engineer. Due to the presence of shallow groundwater, some unstable soil requiring removal or stabilization should be expected. The soils exposed at the base of all excavations should be scarified to a depth of at least 12 inches, be moisture conditioned to about 0 to 3 percent above the soil's optimum moisture and compacted to at least 90 percent of the soil's maximum dry density, per ASTM D-1557. However, the top 12-inches of the pavement subgrade should be compacted to at least 95 percent of the modified Proctor value (ASTM D-1557).

Site grades may then be raised with low expansive Engineered Fill to achieve the design elevations at the site. A PSI representative should be on-site during site grading to evaluate the degree of compaction obtained by the contractor.

Engineered Fill

Engineered Fill material beneath the proposed exterior slabs to support the generators should

not contain rocks greater than 3-inches in diameter or greater than 30 percent retained on the ¾-inch sieve, and should not contain more than 3 percent (by weight) of organic matter or other unsuitable material. The Expansion Index (EI) for the material should not exceed 40. Based on our subsurface investigation, existing on-site sandy soils are generally suitable for use as Engineered Fill; however, this should be confirmed by a PSI representative during grading. Import materials meeting the above requirements should be approved by the Geotechnical Engineer prior to use as Engineered Fill. The on-site clayey silt soils are not considered suitable for use as Engineered Fill beneath surface improvements.

Engineered Fill should be compacted to at least 90 percent of the maximum dry density as determined by the modified Proctor (ASTM D1557). The moisture content of Engineered Fill should be maintained at approximately 0 to 3 percent above the material's optimum moisture content as determined by the same index during compaction. If the Engineered Fill is too dry, water should be uniformly applied across the affected fill area. If the Engineered Fill is too wet, it must be dried. In either event, the Engineered Fill should be thoroughly mixed by disking to obtain relatively uniform moisture content throughout the lift immediately prior to compaction.

Engineered Fill should be placed in maximum lifts of 8-inches of loose material. Each lift of Engineered Fill should be tested by a PSI soils technician, working under the direction of our Project Geotechnical Engineer, prior to placement of subsequent lifts.

Compaction of the backfill should be checked with a sufficient number of density tests by a representative of the Geotechnical Engineer to determine if adequate compaction is being achieved by the contractor. The properly compacted Engineered Fill should extend horizontally outward beyond the exterior perimeter of the foundations a distance equal to the height of fill or 5-feet, whichever is greater, prior to significant sloping.

TEMPORARY EXCAVATION CONSIDERATIONS

In Federal Register Volume 54, No. 209 (October, 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P." This document was issued to insure better the safety of workers entering trenches or excavations. It is mandated by this federal regulation that all excavations, whether they be utility trenches, basement excavations, or footing excavations, be construction in accordance with the reviewed OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. PSI is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not

being implied and should not be inferred.

DEEP FOUNDATIONS

Due to the presence of the soft and compressible soils at a depth of about 5 feet below grade and the shallow water table, it is our opinion that the proposed buildings should be supported by a deep foundation system that extends through the soft soil deposits and the potentially liquefiable soils and be supported within the underlying medium dense to dense sandy soil deposits. The deep foundation system may consist of cast in-place drilled piers (CIDH), driven pile, auger-cast piles or other propriety systems. We are providing recommendations for CIDH but other systems can be used and PSI can provide supplemental recommendations as needed. CIDH should possess a minimum diameter of 24 inches.

Our analysis included a factor of safety of 2 for skin friction and 3 for end bearing. In our analysis, we conservatively assumed that the soils to a depth of 10 feet had no load-carrying capacity (skin friction of zero). Additionally, drag load (negative skin friction) resulting from potential soil liquefaction has been included in the CIDH capacities provided below.

Based on our analysis, we anticipate that the drilled piers will have the allowable axial capacities as indicated on the following Table 3 for the various pile lengths noted.

Table 3: Allowable CIDH Axial Capacities Versus Depth*

CIDH Tip Depth	24 In. Diam.- CIDH
15 Feet	25 Kips
25 Feet	60 Kips
35 Feet	100 Kips

*Minimum depth of 15 feet recommended

CIDH may be installed on a spacing of 3 pier diameters (center to center) with no reduction in capacity for group effects. CIDH capacities for compressive and uplift loading may be increased by ⅓ for temporary wind and/or seismic loading conditions.

For uplift resistance, we recommend the capacity be based on an average allowable unit skin friction value of 500 psf within the soils below a depth of 10 feet. The upper 10 feet of soil should be neglected in calculating the uplift resistance.

We estimate settlement at the base of the CIDH for the design load will be less than ⅔ inch.

Detailed inspection of CIDH construction should be made to verify that the CIDHs are vertical and founded in the proper bearing stratum, and to verify that all loose materials have been removed prior to concrete placement. Due to the presence of shallow groundwater and sandy soils, temporary casing is recommended to limit sloughing of soil and groundwater intrusion into the drilled shafts. Any accumulated water must be removed prior to the placement of concrete. A hopper and tremie should be utilized during concrete placement to control the maximum free fall of the wet concrete to less than five feet unless the mix is designed so that it does not segregate during free fall and provided the pier excavation is dry. Temporary casing may be removed as the concrete is placed into the drilled shaft keeping a concrete head of at least two feet above the bottom of the casing as it is being removed.

Shafts should be clean and be free of all loose materials prior to placement of concrete. The drilled shafts should be installed in accordance with the guidelines provided in FHWA-IF-99-025. A PSI representative should verify the bearing stratum, bearing depth, bearing soil condition, and bearing area and that the pier installation procedures meet the specifications.

LATERAL CAPACITIES

To assess the deflection, moment and shear capacity of the CIDH piers, the computer software program L-Pile by Ensoft, Inc. was utilized. The analyses were performed for a 24 inch diameter CIDH pier for varying lengths. For the analyses, the bottom of the pile cap was assumed to be at finished grade (no pile cap). Lateral capacities were developed for both free and fixed-head pile conditions. In our analysis, we assumed the soil within the upper 10 feet of grade will have no lateral support capacity. The computer output files for those analyses are included within the Appendix. Once the specific foundation type, dimensions and structural detailing is known, the lateral pile capacities can be re-evaluated.

INTERIOR FLOOR SLABS

The proposed structures may incorporate a conventional slab-on-grade provided the subgrade is prepared as previously recommended. The on-grade floor slabs should be supported on Engineered Fill. Soft or otherwise unsuitable areas observed should be addressed on a case-by-case basis by our Geotechnical Engineer. Although the slab thickness and steel reinforcement should be determined by the structural engineer, we recommend the floor slab possess a minimum thickness of 5 inches.

Where concrete slabs are designed as beams on an elastic foundation, the subgrade should be assumed to have a modulus of subgrade reaction (k-value) of 150 pounds per cubic inch (pci), based on a one foot square plate bearing test. Dependent on how the floor slab load is applied, the above subgrade modulus value may need to be geometrically adjusted.

If reducing moisture vapor transmission is a design consideration, we would recommend a vapor retarding membrane be included in the design. Membrane specification should be provided by manufacturer. Vapor retarders should be installed in accordance with ACI 302.1, Chapter 3. A capillary break material (sand) should be provided beneath the vapor retarder.

The precautions listed below should be followed closely for construction of all slabs-on-grade. These details will not reduce the amount of movement, but are intended to reduce potential

damage should some settlement of the supporting subgrade take place.

- Cracking of slabs-on-grade is normal and should be expected. Cracking can occur not only because of heaving or compression of the supporting soil, but also because of concrete curing stresses. The occurrence of concrete shrinkage cracks, and problems associated with concrete curing may be reduced and/or controlled by limiting the water/cement ratio of the concrete, proper concrete placement, finishing, and curing, and by the placement of crack control joints at frequent intervals, particularly, where re-entrant slab corners occur. The American Concrete Institute (ACI) recommends a maximum panel size (in feet) equal to approximately three times the thickness of the slab (in inches) in both directions. For example, joints are recommended at a maximum spacing of 12 feet, assuming a four-inch thick slab. We recommend also that control joints be scored three feet in from, and parallel to, the foundation walls. Using fiber reinforcement in the concrete can also control shrinkage cracking.

- Some increase in moisture content is inevitable because of development and associated landscaping. However, extreme moisture content increases can be largely controlled by proper and responsible site drainage, building maintenance and irrigation practices.

- Exterior slabs should be isolated from the building. These slabs should be reinforced to function as independent units. Movement of these slabs should not be transmitted to the building foundation or superstructure.

PAVEMENT DESIGN

The recommended thicknesses presented below are considered typical and minimum for the assumed parameters. We understand that budgetary considerations sometimes warrant thinner pavement sections than those presented. However, the client, the owner, and the project principals should be aware that thinner pavement sections might result in increased maintenance costs and lower than anticipated pavement life.

In designing the proposed paved areas, the existing subgrade conditions must be considered together with the expected traffic use and loading conditions.

The conditions that will influence the pavement design can be summarized as follows:

1) Subgrade support characteristics of the subgrade. This is typically represented by a R-Value for the design of flexible pavements in this region.

2) Vehicular traffic, in terms of the number and frequency of vehicles and their range of axle loads.

3) Probable increase in vehicular use over the life of the pavement.

We recommend that the exposed subgrade be prepared in accordance with the site preparation requirements specified previously in this report. The upper one foot of pavement subgrade should be compacted to at least 95 percent of the maximum dry density as determined by the modified Proctor (ASTM D1557). The fill moisture content at the time of compaction should be within 1 to 3 percent above the optimum moisture content value. Undercut soil should be

replaced by Engineered Fill.

The appropriate pavement section depends primarily upon the type of subgrade soil, shear strength, traffic load, and planned pavement life. For preliminary purposes, we have assumed Traffic Indices of TI=5.0 for parking areas and TI=6.5 for those driveway and truck lanes subject to relatively heavy traffic. These assumed traffic indices should be verified by the project civil engineer prior to construction. Based on the soils encountered within our test borings, we have assumed an R-value of 30 for the near-surface soils within pavement areas. Since an evaluation of the characteristics of the actual soils at pavement subgrade can only be provided at the completion of grading, the following pavement sections should be used for planning purposes only. Final pavement designs should be evaluated after R-value tests have been performed on the actual subgrade material.

It should be noted that additional earthwork and/or ground improvement efforts may be required during grading on the actual subgrade material, in order to achieve the aforementioned design parameters and assumptions. These design thicknesses assume that a properly prepared subgrade has been achieved.

Table 4: Flexible Pavement Recommendations

Pavement Loading Conditions	Assumed Traffic Index	Recommended Pavement Section
Standard Duty (Parking Areas)	5.0	3 inches AC over 6-inches Class II Aggregate Base
Heavy Duty (Drive Aisles)	6.5	4 inches AC over 8-inches Class II Aggregate Base

Concrete pavement is recommended in areas that receive continuous repetitive traffic such as loading areas and parking lot entrances. Due to heavy wheel loads and impact loads, concrete approach aprons and dumpster pads, should have a minimum thickness of 6 inches, with an underlying 4-inch thick section of Class II Aggregate Base (AB). Portland Cement Concrete pavement sections should incorporate appropriate steel reinforcement and crack control joints as designed by the project structural engineer. We recommend that sections be as nearly squared as possible and no more than 15-feet on a side. A minimum 3,500 psi mix is recommended. The actual design should also be in accordance with design criteria specified by the governing jurisdiction.

Asphalt Concrete (AC), Portland Cement Concrete, and Class II aggregate base should conform to and be placed in accordance with the latest revision of the California Department of Transportation Standard Specifications and American Concrete Institute (ACI) codes. Aggregate base should be compacted to a minimum of 95 percent of the maximum dry density as determined by the modified Proctor (ASTM D1557) prior to placement of AC. Subgrade preparation for pavement areas is included in the Site Preparation section of this report.

CONSTRUCTION CONSIDERATIONS

Moisture Sensitive Soils/Weather Related Concerns

Note that the upper soils are sensitive to disturbances caused by construction traffic and to changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. Furthermore, perched groundwater conditions can develop during periods of heavy rainfall as a result of less permeable layers impeding infiltration. In these instances, overlying subgrade soils may become unstable and require remedial measures. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather.

Groundwater was measured to be approximately 5-feet below existing ground surface elevation. It should be noted, however, that variations in the groundwater table may result from fluctuation in the ground surface topography, subsurface stratification, precipitation, irrigation, and other factors that may not have evident at the time of our exploration. This sometimes occurs where relatively impermeable and/or cemented materials are overlain by fill soils. We recommend that a representative of PSI be present during grading operations to evaluate areas of seepage. Drainage devices for reduction of water accumulation can be recommended if these conditions occur.

Water should not be allowed to collect in the foundation excavation, on floor slab areas, or on prepared subgrades of the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff. Positive site drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slabs. The grades should be sloped away from the building and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill and floor slab areas of the building.

Corrosive Soil Concerns

The corrosive testing on a representative sample of the site soils indicates that the soils possess a negligible sulfate exposure. Based on this result, it is our opinion that special sulfate-resistant concrete mix designs are not warranted and Type II cement may be used. Additional testing should be performed during site grading to assess the sulfate content of the as-graded soils.

The resistivity results indicate a progressively less corrosive environment for metal pipes. We suggest that a corrosion engineer be consulted to determine what corrosion protection may be warranted at this site.

PLAN REVIEW

Once final design plans and specifications are available, a review of grading and foundation plans by PSI is recommended as a means to check that the evaluations made in preparation of this report are correct and that earthwork and foundation recommendations have been properly interpreted and implemented.

OBSERVATION AND TESTING DURING CONSTRUCTION

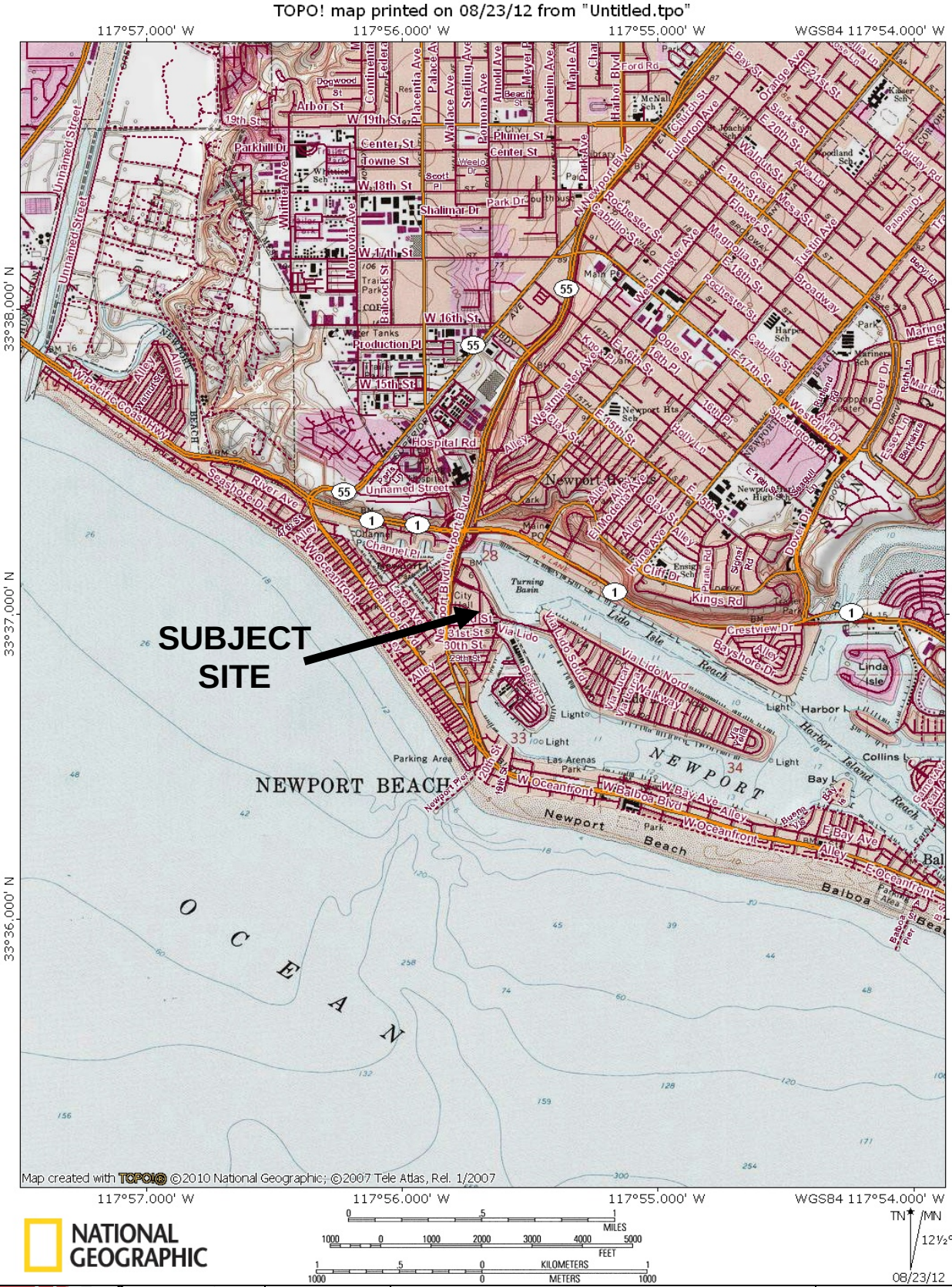
It is recommended that PSI be retained to provide observation and testing services during for newly proposed construction. This is to observe compliance with the design concepts, specifications and recommendations, and to allow for possible changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

REPORT LIMITATIONS

The proposed professional services have been performed, findings obtained, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices at the time of this report. PSI is not responsible for the conclusions, opinions, or recommendations made by others based on this data. No other warranties are implied or expressed. The Wieland-Davco Corp., its subsidiaries and affiliates can rely upon the report under the same terms as if it was originally prepared for them.

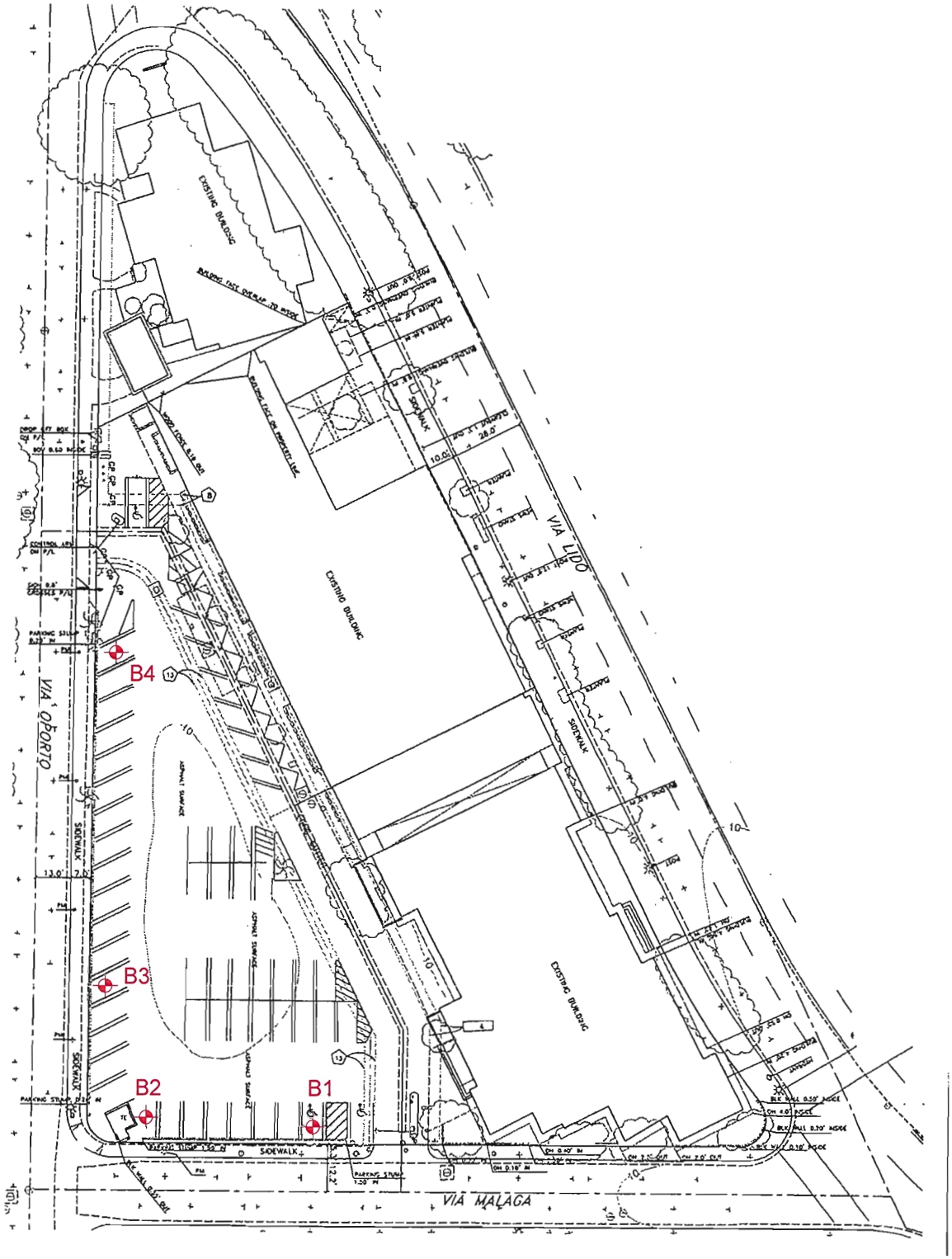
The scope of exploration was intended to evaluate soil conditions within the influence of the proposed foundations. The analyses and recommendations submitted in this report are based upon the data obtained from the soil borings performed at the locations indicated. If any subsoil variations become evident during the course of this project, a re-evaluation of the recommendations contained in this report will be necessary after we have had an opportunity to observe the characteristics of the conditions encountered. The applicability of the report should also be reviewed in the event significant changes occur in the design, nature, or location of the proposed improvements.

APPENDIX



NATIONAL GEOGRAPHIC

psi Information To Build On Engineering • Consulting • Testing	DATE: 8/23/12	**PROPOSED TOWNHOMES/CONDOS NWC OF VIA LIDO & VIA MALAGA IRVINE, CA**	PSI PROJECT NUMBER: 0559771	N
PSI, INC. 6330 GATEWAY DRIVE, SUITE B CYPRESS, CALIFORNIA	DRAWN BY: ZM	**SITE VICINITY MAP**	**FIGURE 1**	



LEGEND:

APPROXIMATE BORING LOCATION

B4

0 60 120

APPROXIMATE SCALE IN FEET

psi Information To Build On *Engineering • Consulting • Testing* *6330 Gateway Drive, Suite B* *Cypress, California 90630* *(714) 484-8600*	DATE: 8/13/2012	PROPOSED NEWPORT BEACH TOWNHOMES 3303-3315 VIA LIDO NEWPORT BEACH, CALIFORNIA	PROJECT No.: 0559771
	DRAWN BY: EFD	BORING LOCATION MAP	FIGURE: 2

N

Professional Service Industries, Inc.
6330 Gateway Drive, Suite B
Cypress, CA 90630
Telephone: (714) 484-8600
Fax: (714) 484-8601

LOG OF BORING B1

PSI Job No.: 0559771
Project: Proposed Townhome/Condo Development
Location: NWC Via Malaga & Via Lido
Newport Beach, CA

Drilling Method: Mud Rotary
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS
While Drilling feet
Upon Completion 5 feet
Delay N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft / Moisture / PL / LL (0, 25, 50); STRENGTH, tsf Qu / Qp (0, 2.0, 4.0)	Additional Remarks
	0					**ASPHALT**, 3 inches	AC				
						Silty SAND, light brown, damp	SM				
						Apparent Base					
						Silty SAND with Gravel, trace organics, light to dark brown, wet, medium dense					
				1	18		SM	14/15/22 N=37	9		DD = 128 pcf
	5			2	6	**Sandy GRAVEL**, light to dark brown, subangular gravel sand mixture, trace organics	GW	5/7/12 N=19			
				3	18	**Silty SAND**, trace gravel, trace organics, grey-brown, wet, loose		1/3/6 N=9	30		DD = 93 pcf
	10			4	18	medium dense		7/13/18 N=31			
	15			5	18			6/8/9 N=17			Fines=6.0%
	20			6	18			8/12/15 N=27			
	25			7	18			7/7/11 N=18			Fines=5.1%
	30						SM/SP				

Continued Next Page

Completion Depth: 51.5 ft
Date Boring Started: 8/13/12
Date Boring Completed: 8/13/12
Logged By: ZM
Drilling Contractor: Cal-Pac

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 33.616706°
Longitude: -117.928053°
Drill Rig: CME 75
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
6330 Gateway Drive, Suite B
Cypress, CA 90630
Telephone: (714) 484-8600
Fax: (714) 484-8601

LOG OF BORING B1

PSI Job No.: 0559771
Project: Proposed Townhome/Condo Development
Location: NWC Via Malaga & Via Lido
Newport Beach, CA

Drilling Method: Mud Rotary
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS
While Drilling feet
Upon Completion 5 feet
Delay N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	30			8	18	**Silty SAND**, trace gravel, trace organics, grey-brown, wet, loose		13/19/26 N=45		
	35			9	18	dense		14/18/23 N=41		
	40			10	18			10/15/20 N=35		Fines=5.0%
	45			11	18	very dense		17/26/36 N=62		>>
	50			12	18	dense		16/22/16 N=38		
						Boring Terminated at 51.5 feet Groundwatermeasured at approximately 5 ft after drilling Boring backfilled with bentonite and capped with asphalt				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Completion Depth: 51.5 ft
Date Boring Started: 8/13/12
Date Boring Completed: 8/13/12
Logged By: ZM
Drilling Contractor: Cal-Pac

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 33.616706°
Longitude: -117.928053°
Drill Rig: CME 75
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

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6330 Gateway Drive, Suite B
Cypress, CA 90630
Telephone: (714) 484-8600
Fax: (714) 484-8601

LOG OF BORING B2

PSI Job No.: 0559771
Project: Proposed Townhome/Condo Development
Location: NWC Via Malaga & Via Lido
Newport Beach, CA

Drilling Method: Mud Rotary
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS

While Drilling	feet
Upon Completion	5 feet
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					**ASPHALT**, 3 inches	AC			
						Silty SAND, trace gravels, light brown, moist	SM			
						Apparent Base				
						Silty SAND, trace organics, light to dark brown, wet, medium dense	SM		9	DD = 99 pcf
				1	18			7/8/9 N=17		
	5					**Clayey SILT**, trace organics, grey-brown, wet, very soft	MH		54	>> DD = 61 pcf
				2	18			2/1/1 N=2		
						Silty SAND, trace organics, grey-brown, wet, medium dense				Fines=8.8%
				3	18			3/5/10 N=15		
	10								25	DD = 102 pcf
				4	18			5/10/16 N=26		Fines=10.1%
	15									
				5	18			6/7/9 N=16		
							SM/SP			
	20			6	18			8/8/11 N=19		
	25									
				7	18			7/12/16 N=28		
	30									

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Continued Next Page

Completion Depth: 31.5 ft
Date Boring Started: 8/13/12
Date Boring Completed: 8/13/12
Logged By: ZM
Drilling Contractor: Cal-Pac

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 33.616706°
Longitude: -117.928053°
Drill Rig: CME 75
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
6330 Gateway Drive, Suite B
Cypress, CA 90630
Telephone: (714) 484-8600
Fax: (714) 484-8601

LOG OF BORING B2

PSI Job No.: 0559771
Project: Proposed Townhome/Condo Development
Location: NWC Via Malaga & Via Lido
Newport Beach, CA

Drilling Method: Mud Rotary
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS
While Drilling feet
Upon Completion 5 feet
Delay N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / Moisture × / PL ◪ / LL ✚ (0, 25, 50) / STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	30			8	18	**Silty SAND**, trace organics, grey-brown, wet, medium dense dense		13/16/16 N=32		◎	
						Boring Terminated at 31.5 ft Groundwater measured at approximately 5 ft after drilling Boring backfilled with bentonite and capped with ashpalt					

Completion Depth: 31.5 ft
Date Boring Started: 8/13/12
Date Boring Completed: 8/13/12
Logged By: ZM
Drilling Contractor: Cal-Pac

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 33.616706°
Longitude: -117.928053°
Drill Rig: CME 75
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
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Cypress, CA 90630
Telephone: (714) 484-8600
Fax: (714) 484-8601

LOG OF BORING B3

PSI Job No.: 0559771
Project: Proposed Townhome/Condo Development
Location: NWC Via Malaga & Via Lido
Newport Beach, CA

Drilling Method: Mud Rotary
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS

While Drilling	feet
Upon Completion	5 feet
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ Moisture × PL ◪ LL ✚ (0, 25, 50) STRENGTH, tsf Qu ▲ Qp ✳ (0, 2.0, 4.0)	Additional Remarks
	0					**ASPHALT**, 3 inches	AC				
						Silty SAND, trace gravels, light brown, moist	SM				
						Apparent Base					
						Silty SAND, trace organics, light to dark brown, wet, loose	SM		3		DD = 105 pcf
				1	18			5/5/6 N=11			
	5					**Clayey SILT**, trace organics, grey-brown, very soft	MH		85		DD = 68 pcf LL = 66 PL = 34
				2	18			1/1/1 N=2			
						Silty SAND, trace organics, grey-brown, wet, medium dense			32		DD = 93 pcf
				3	18			3/8/10 N=18			
	10								20		DD = 109 pcf
				4	18			4/9/15 N=24			
	15			5	18			6/8/10 N=18			
	20						SM/SP				
				6	18			7/8/15 N=23			
	25			7	18			8/13/14 N=27			
	30										

Continued Next Page

Completion Depth: 31.5 ft
Date Boring Started: 8/13/12
Date Boring Completed: 8/13/12
Logged By: ZM
Drilling Contractor: Cal-Pac

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 33.616706°
Longitude: -117.928053°
Drill Rig: CME 75
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
6330 Gateway Drive, Suite B
Cypress, CA 90630
Telephone: (714) 484-8600
Fax: (714) 484-8601

LOG OF BORING B3

PSI Job No.: 0559771
Project: Proposed Townhome/Condo Development
Location: NWC Via Malaga & Via Lido
Newport Beach, CA

Drilling Method: Mud Rotary
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS
While Drilling feet
Upon Completion 5 feet
Delay N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	30			8	18	**Silty SAND**, trace organics, grey-brown, wet, medium dense dense		11/16/17 N=33		◎	
						Boring Terminated at 31.5 ft Groundwater measured at approximately 5 ft after drilling Boring backfilled with bentonite and capped with asphalt					

Completion Depth: 31.5 ft
Date Boring Started: 8/13/12
Date Boring Completed: 8/13/12
Logged By: ZM
Drilling Contractor: Cal-Pac

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 33.616706°
Longitude: -117.928053°
Drill Rig: CME 75
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
6330 Gateway Drive, Suite B
Cypress, CA 90630
Telephone: (714) 484-8600
Fax: (714) 484-8601

LOG OF BORING B4

PSI Job No.: 0559771
Project: Proposed Townhome/Condo Development
Location: NWC Via Malaga & Via Lido
Newport Beach, CA

Drilling Method: Mud Rotary
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location:

WATER LEVELS

While Drilling		feet
Upon Completion	5	feet
Delay		N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft / STRENGTH, tsf	Additional Remarks
	0					**ASPHALT**, 3 inches	AC				
						Silty SAND, trace gravels, light brown, moist	SM				
						Apparent Base					
						Silty SAND, trace organics, light to dark brown, wet, loose	SM		16		DD = 93 pcf
				1	18			6/7/8 N=15			
	5					**Clayey SILT**, trace organics, grey-brown, wet, soft	MH		87	>>	DD = 59 pcf
				2	18			1/2/3 N=5			
						Silty SAND, trace organics, grey-brown, wet, loose			31		DD = 92 pcf
				3	18			4/5/5 N=10			
	10					medium dense					
				4	18			11/18/20 N=38			
							SM/SP				
	15					loose					
				5	18			4/4/5 N=9			
	20					medium dense					
				6	18			6/11/13 N=24			
						Boring Terminated at 21.5 ft					
						Groundwater measured at approximately 5 ft after drilling					
						Boring backfilled with bentonite and capped with asphalt					

Moisture
PL
LL
0 25 50
STRENGTH, tsf
Qu
Qp
0 2.0 4.0

Completion Depth: 21.5 ft
Date Boring Started: 8/13/12
Date Boring Completed: 8/13/12
Logged By: ZM
Drilling Contractor: Cal-Pac

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 33.616706°
Longitude: -117.928053°
Drill Rig: CME 75
Remarks:

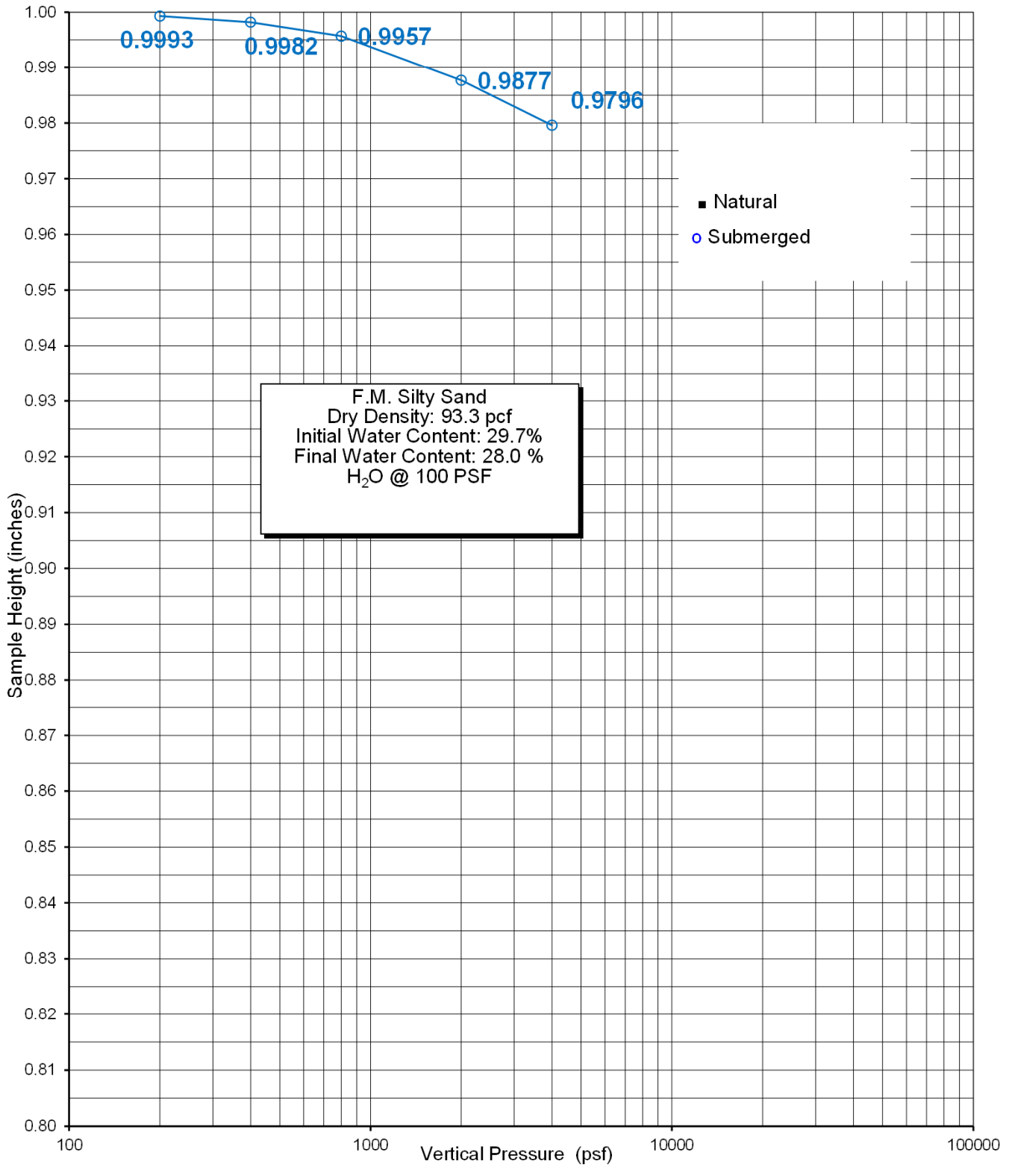
The stratification lines represent approximate boundaries. The transition may be gradual.

PSI # 559-771

CONSOLIDATION TEST - ASTM D2435

Job No. 2008-026

Boring / Sample No.	B-1	Depth:	7.5'	Date	08-15-12



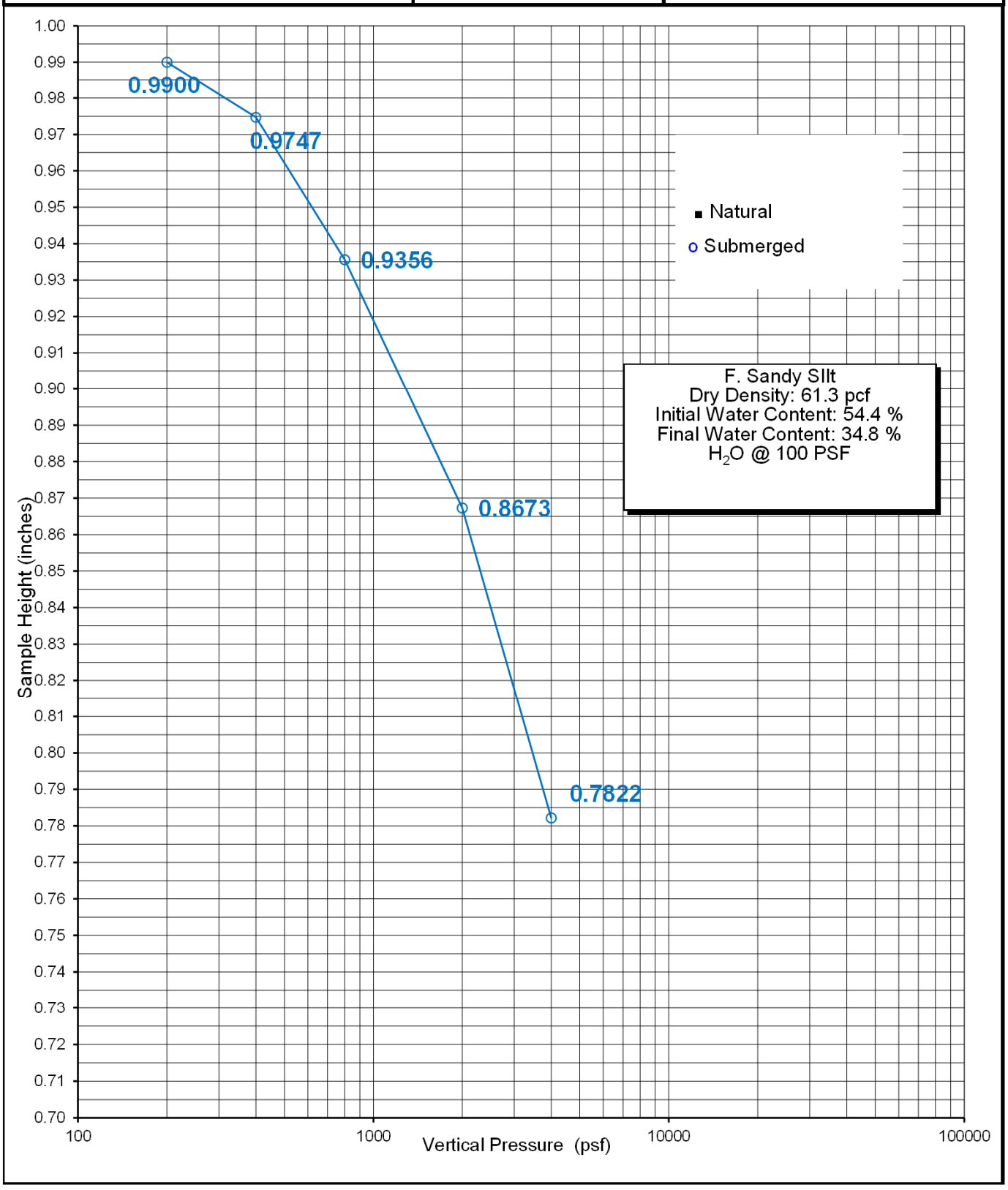
Geo-Logic ASSOCIATES

PSI # 559-771

CONSOLIDATION TEST - ASTM D2435

Job No. 2008-026

Boring / Sample No.	B-2	Depth:	5.0'	Date	08-15-12



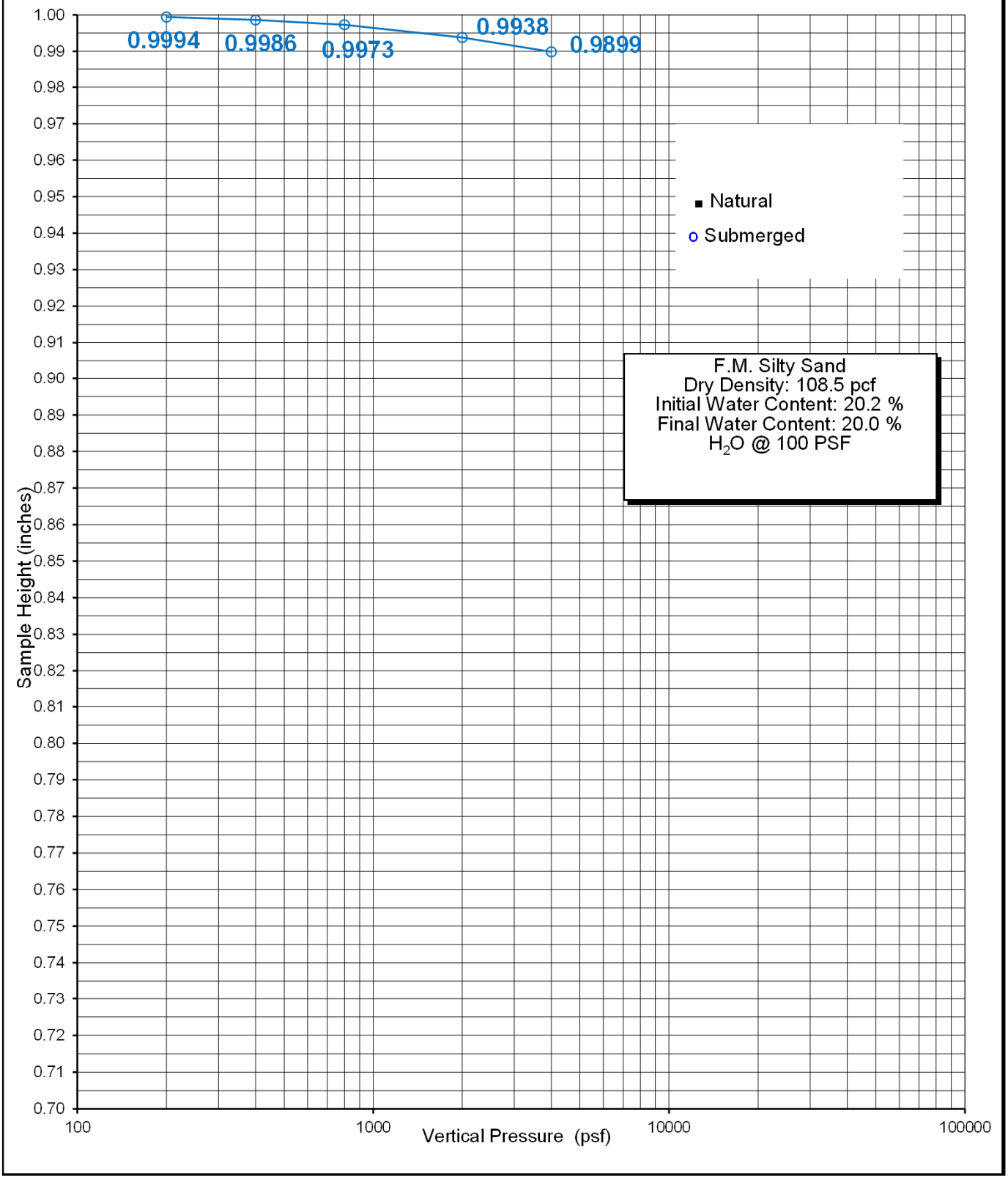
Geo-Logic ASSOCIATES

PSI # 559-771

CONSOLIDATION TEST - ASTM D2435

Job No. 2008-026

Boring / Sample No.	B-3	Depth:	10.0'	Date	08-15-12



Geo-Logic ASSOCIATES

SAMPLE NO.:		B-4 @ 0-3'			
DESCRIPTION		F.M. Sand			
DIRECT SHEAR TEST (type)					
Initial Moisture Content %					
Dry Density (pcf)					
Normal Stress (psf)					
Peak Shear Stress (psf)					
Ultimate Shear Stress (psf)					
Cohesion (psf)					
Internal Friction Angle (degrees)					
EXPANSION TEST UBC STD 18-2					
Initial Dry Density (pcf)					
Initial Moisture Content %					
Final Moisture Content %					
Pressure (psf)					
Expansion Index / Swell %					
CORROSIVITY TEST					
Resistivity (CTM643) (ohm-cm)		11150			
pH (CTM643)		7.8			
CHEMICAL TESTS					
Soluble Sulfate (CTM 417) (ppm)		156			
Chloride Content (CTM 422) (ppm)		99			
Wash #200 Sieve (ASTM-1140) %					
Sand Equivalent (ASTM D2419)					

Geo-Logic ASSOCIATES

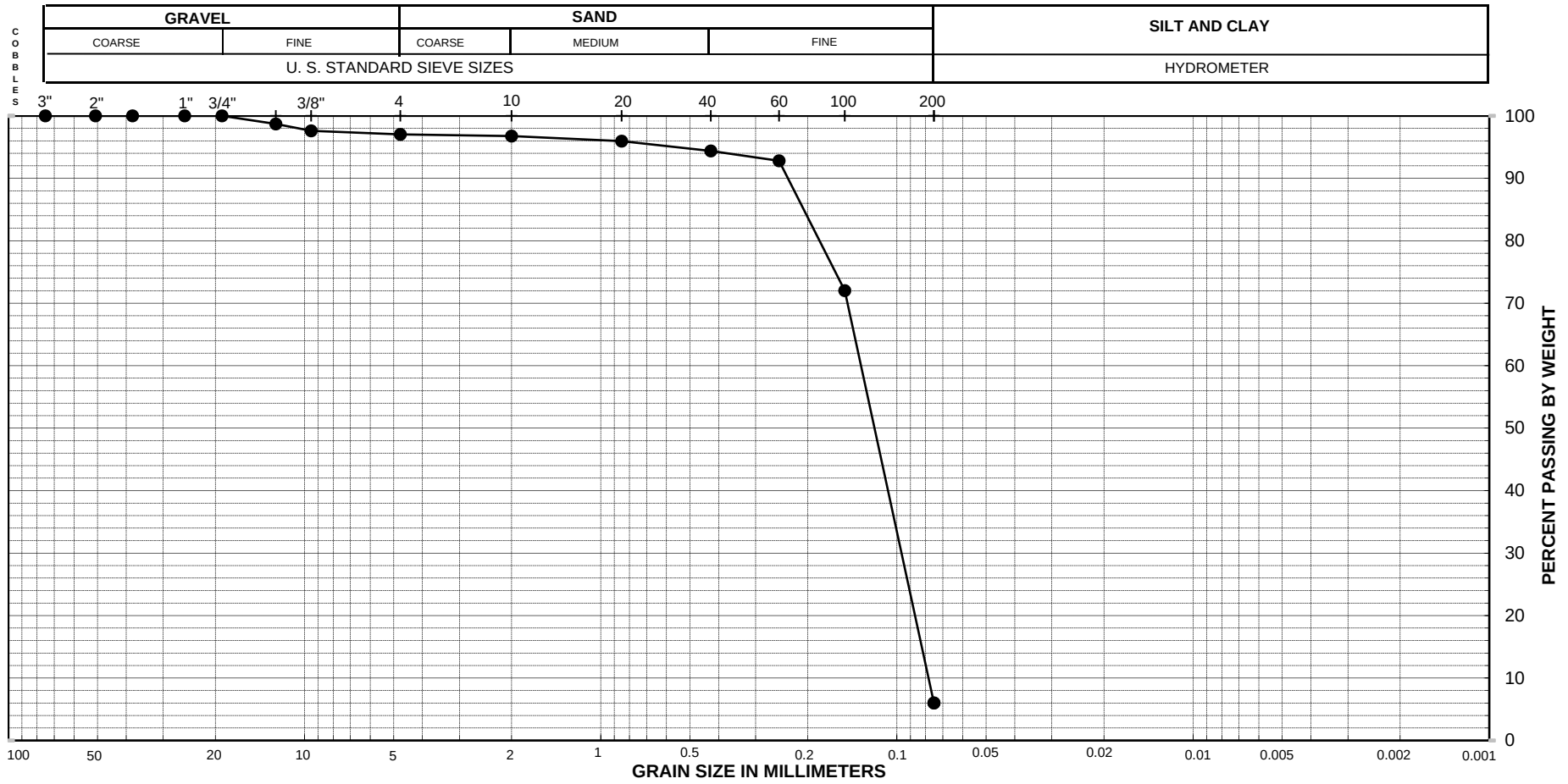
EXPANSION INDEX - UBC 18-2 & ASTM D 4829-88

PROJECT PSI # 559-771 JOB NO. 2008-026

Sample	B-4 @ 0-3.0'	By	LD		Sample		By	
Sta. No.					Sta. No.			
Soil Type	Brown, F.M. Sand				Soil Type			
Date	Time	Dial Reading	Wet+Tare	595.4	Date		Dial Reading	Wet+Tare	
8/20/2012	15:00	0.1253	Tare	219.6				Tare	
		H2O	Net Weight	375.8				Net Weight	
8/21/2012	10:30	0.1259	% Water	12.5				% Water	
				101.2				Dry Dens.	
			% Max					% Max	
			Wet+Tare	619.5				Wet+Tare	
			Tare	219.6				Tare	
			Net Weight	399.9				Net Weight	
INDEX	-1	-0.1%	% Water	19.7	**INDEX**			% Water	

Sample		By			Sample		By	
Sta. No.					Sta. No.			
Soil Type					Soil Type			
Date		Dial Reading	Wet+Tare		Date		Dial Reading	Wet+Tare	
			Tare					Tare	
			Net Weight					Net Weight	
			% Water					% Water	
			Dry Dens.					Dry Dens.	
			% Max					% Max	
			Wet+Tare					Wet+Tare	
			Tare					Tare	
			Net Weight					Net Weight	
INDEX			% Water		**INDEX**			% Water	

UNIFIED SOIL CLASSIFICATION



Exploration No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% Clay	Description and Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
B1		15.0	●					**Silty Sand with trace organics**	0.14	0.09	0.08	1.8	0.7
			◆										
			■										
			❍										
			□										

PROJECT NAME: **Newport Beach, CA Townhomes/Condos**

PROJECT NUMBER: **0559771**

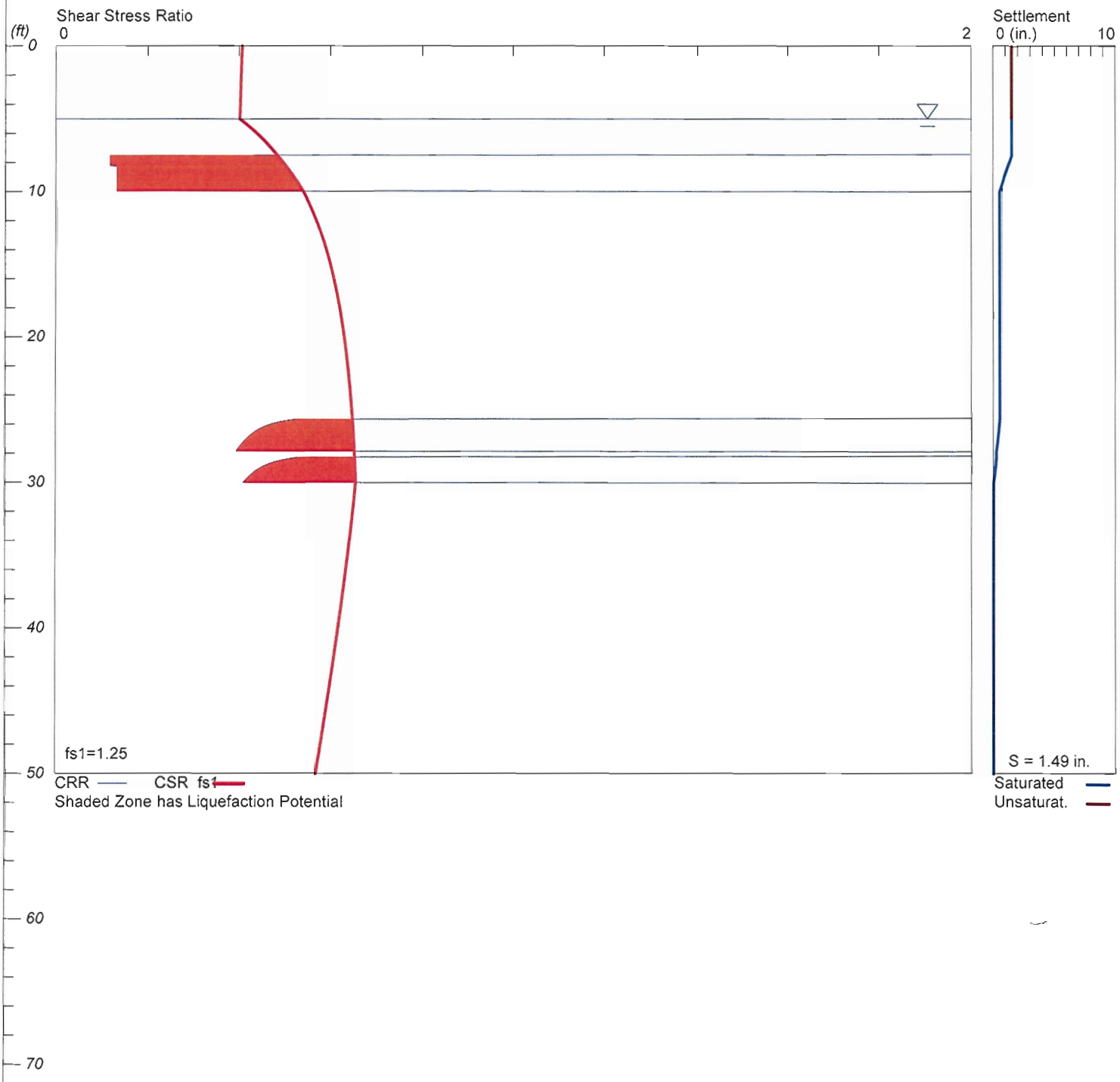
PARTICLE-SIZE DISTRIBUTION CURVES

LIQUEFACTION ANALYSIS

Newport Beach - Townhomes/Condos

Hole No.= ***Water Depth=5 ft***

Magnitude=7.3
Acceleration=0.5g



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LIQUEFACTION ANALYSIS SUMMARY

****

Font: Courier New, Regular, Size 8 is recommended for this report.
Licensed to , 8/23/2012 4:16:10 PM

Input File Name: P:\056\2012 Projects\0559771 Newport Beach Townhomes\liquefy.liq
Title: Newport Beach - Townhomes/Condos
Subtitle: 0559771

Surface Elev.=
Hole No.=
Depth of Hole= 50.00 ft
Water Table during Earthquake= 5.00 ft
Water Table during In-Situ Testing= 0.00 ft
Max. Acceleration= 0.5 g
Earthquake Magnitude= 7.30

Input Data:
Surface Elev.=
Hole No.=
Depth of Hole=50.00 ft
Water Table during Earthquake= 5.00 ft
Water Table during In-Situ Testing= 0.00 ft
Max. Acceleration=0.5 g
Earthquake Magnitude=7.30
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Ishihara / Yoshimine
3. Fines Correction for Liquefaction: Idriss/Seed
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1
8. Sampling Method, Cs= 1.2
9. User request factor of safety (apply to CSR) , User= 1.25
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: No
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	20.00	116.00	NoLiq
5.00	19.00	126.00	5.00
7.50	5.00	110.00	8.80
10.00	19.00	126.00	10.10
15.00	17.00	126.00	6.00
20.00	27.00	126.00	6.00
25.00	18.00	126.00	5.10
30.00	45.00	126.00	5.10
35.00	41.00	126.00	5.10

40.00	35.00	126.00	5.00
45.00	62.00	126.00	5.00
50.00	38.00	126.00	5.00

Output Results:

Settlement of Saturated Sands=1.49 in.
Settlement of Unsaturated Sands=0.00 in.
Total Settlement of Saturated and Unsaturated Sands=1.49 in.
Differential Settlement=0.746 to 0.985 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	2.00	0.41	5.00	1.49	0.00	1.49
1.00	2.00	0.41	5.00	1.49	0.00	1.49
2.00	2.00	0.40	5.00	1.49	0.00	1.49
3.00	2.00	0.40	5.00	1.49	0.00	1.49
4.00	2.00	0.40	5.00	1.49	0.00	1.49
5.00	2.14	0.40	5.00	1.49	0.00	1.49
6.00	2.14	0.44	4.88	1.49	0.00	1.49
7.00	2.14	0.47	4.56	1.49	0.00	1.49
8.00	0.12	0.50	0.24*	1.29	0.00	1.29
9.00	0.13	0.52	0.26*	0.89	0.00	0.89
10.00	2.14	0.54	3.96	0.50	0.00	0.50
11.00	2.14	0.56	3.85	0.50	0.00	0.50
12.00	2.14	0.57	3.76	0.50	0.00	0.50
13.00	2.14	0.58	3.68	0.50	0.00	0.50
14.00	2.14	0.59	3.62	0.50	0.00	0.50
15.00	2.14	0.60	3.57	0.50	0.00	0.50
16.00	2.14	0.61	3.53	0.50	0.00	0.50
17.00	2.14	0.61	3.49	0.50	0.00	0.50
18.00	2.14	0.62	3.45	0.50	0.00	0.50
19.00	2.14	0.63	3.43	0.50	0.00	0.50
20.00	2.14	0.63	3.40	0.50	0.00	0.50
21.00	2.14	0.63	3.38	0.50	0.00	0.50
22.00	2.14	0.64	3.36	0.50	0.00	0.50
23.00	2.14	0.64	3.34	0.50	0.00	0.50
24.00	2.14	0.64	3.33	0.50	0.00	0.50
25.00	2.14	0.65	3.32	0.50	0.00	0.50
26.00	0.47	0.65	0.72*	0.47	0.00	0.47
27.00	0.42	0.65	0.64*	0.35	0.00	0.35
28.00	2.14	0.65	3.29	0.22	0.00	0.22
29.00	0.45	0.65	0.68*	0.14	0.00	0.14
30.00	0.41	0.65	0.63*	0.01	0.00	0.01
31.00	2.14	0.65	3.29	0.00	0.00	0.00
32.00	2.14	0.65	3.31	0.00	0.00	0.00
33.00	2.14	0.64	3.32	0.00	0.00	0.00
34.00	2.14	0.64	3.34	0.00	0.00	0.00
35.00	2.14	0.64	3.36	0.00	0.00	0.00
36.00	2.14	0.63	3.38	0.00	0.00	0.00
37.00	2.14	0.63	3.40	0.00	0.00	0.00
38.00	2.14	0.63	3.43	0.00	0.00	0.00
39.00	2.14	0.62	3.45	0.00	0.00	0.00
40.00	2.14	0.62	3.47	0.00	0.00	0.00
41.00	2.14	0.61	3.50	0.00	0.00	0.00
42.00	2.14	0.61	3.52	0.00	0.00	0.00
43.00	2.14	0.60	3.55	0.00	0.00	0.00
44.00	2.14	0.60	3.58	0.00	0.00	0.00
45.00	2.14	0.59	3.61	0.00	0.00	0.00
46.00	2.14	0.59	3.64	0.00	0.00	0.00
47.00	2.14	0.58	3.67	0.00	0.00	0.00
48.00	2.14	0.58	3.70	0.00	0.00	0.00

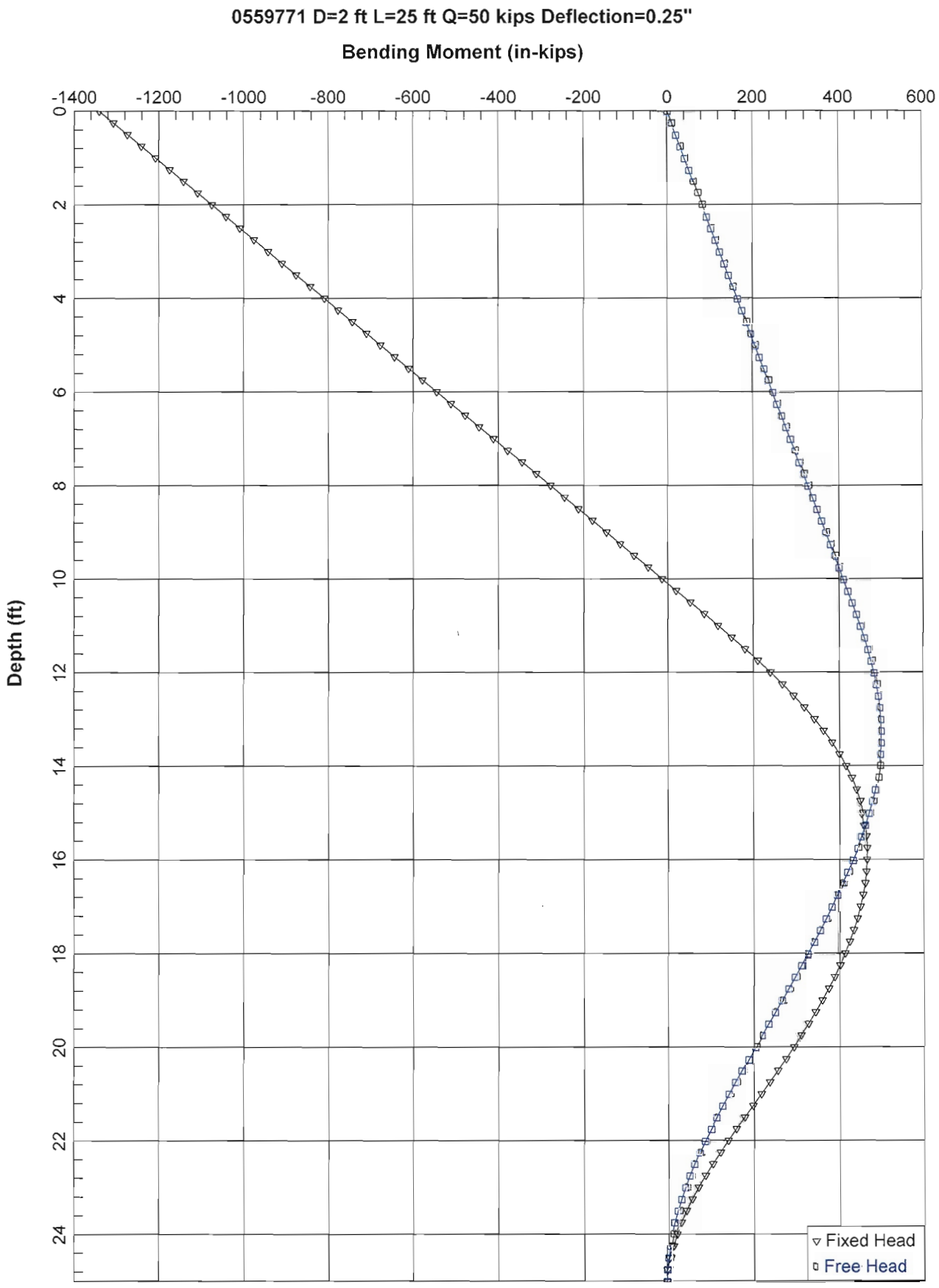
49.00	2.14	0.57	3.73	0.00	0.00	0.00
50.00	2.14	0.57	3.77	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

---

1 atm (atmosphere) = 1 tsf (ton/ft2)
CRRm Cyclic resistance ratio from soils
CSRsf Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat Settlement from saturated sands
S_dry Settlement from Unsaturated Sands
S_all Total Settlement from Saturated and Unsaturated Sands
NoLiq No-Liquefy Soils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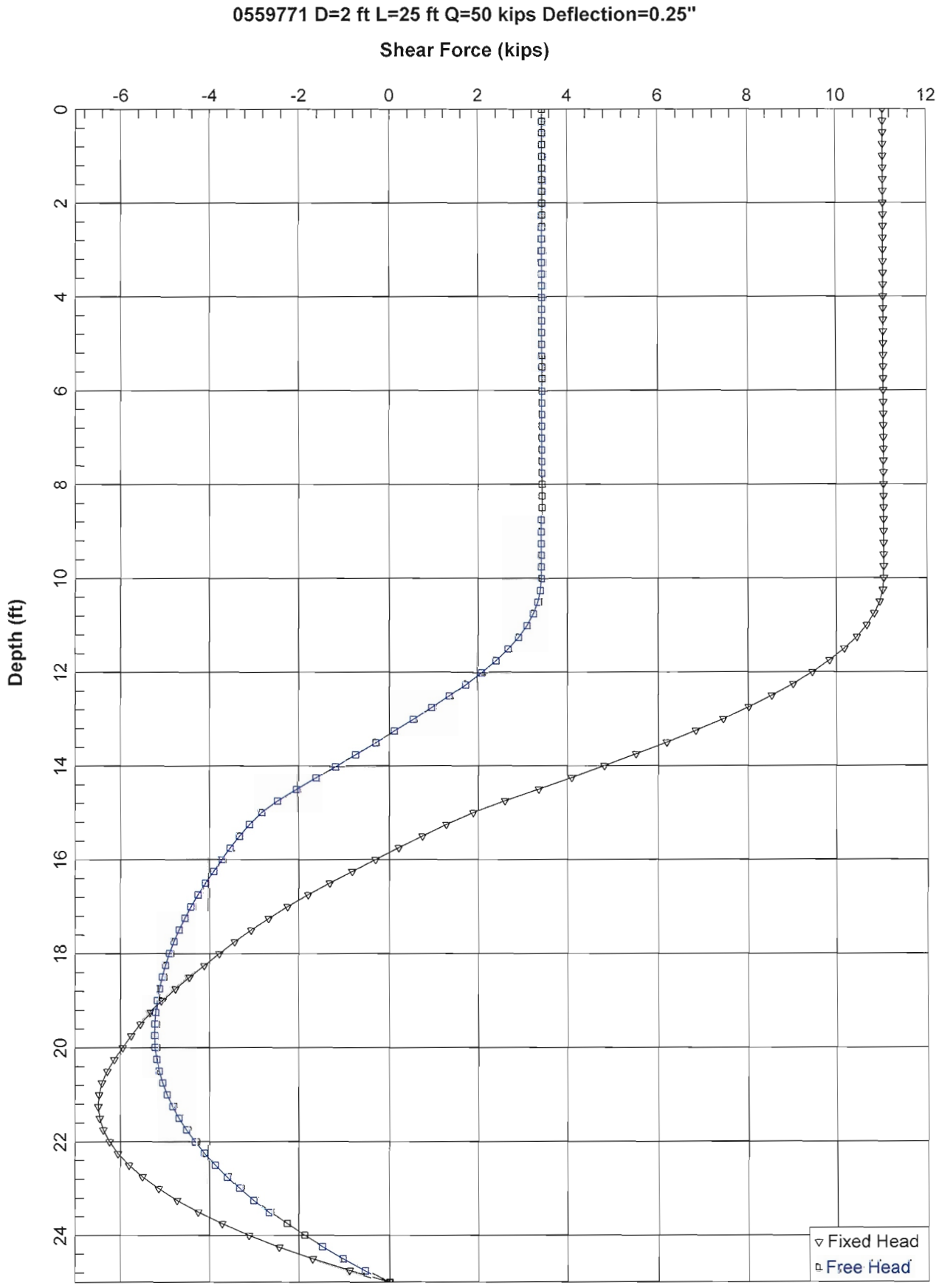
Bending Moment (in-kips)
-1400
-1200
-1000
-800
-600
-400
-200
0
200
400
600
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Fixed Head
Free Head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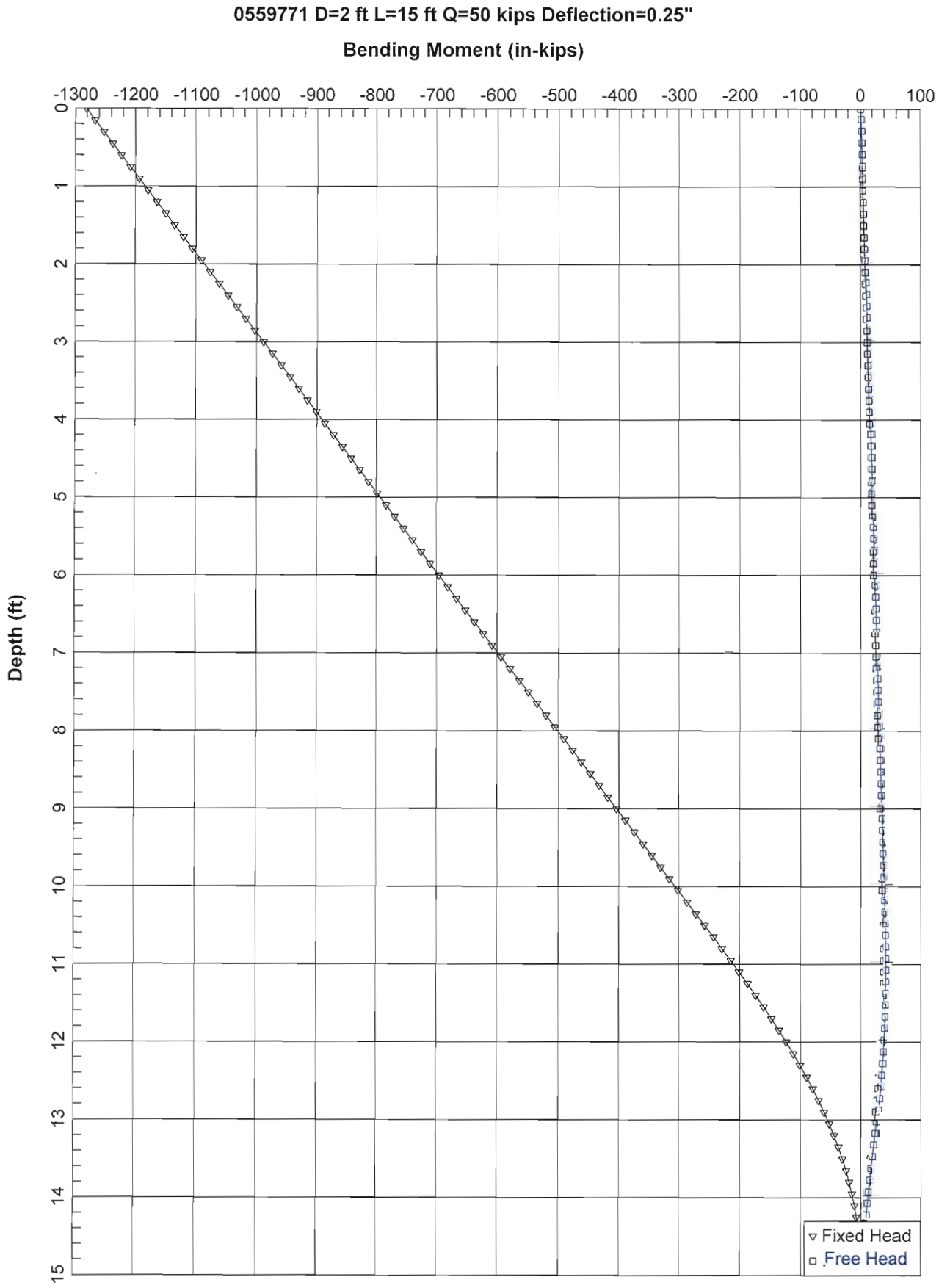
Shear Force (kips)
-6
-4
-2
0
2
4
6
8
10
12
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Fixed Head
Free Head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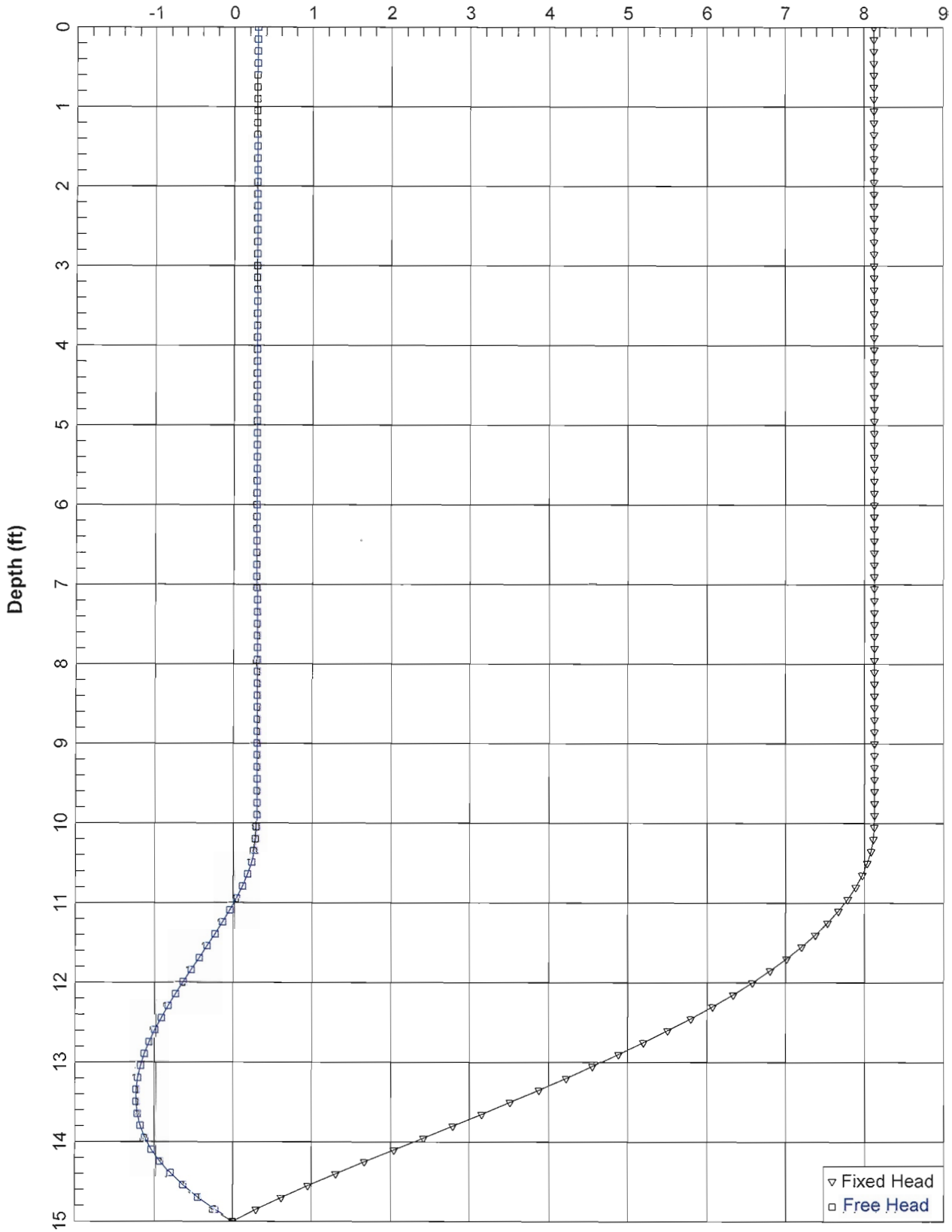
Bending Moment (in-kips)
-1300 -1200 -1100 -1000 -900 -800 -700 -600 -500 -400 -300 -200 -100 0 100
Depth (ft)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Fixed Head
Free Head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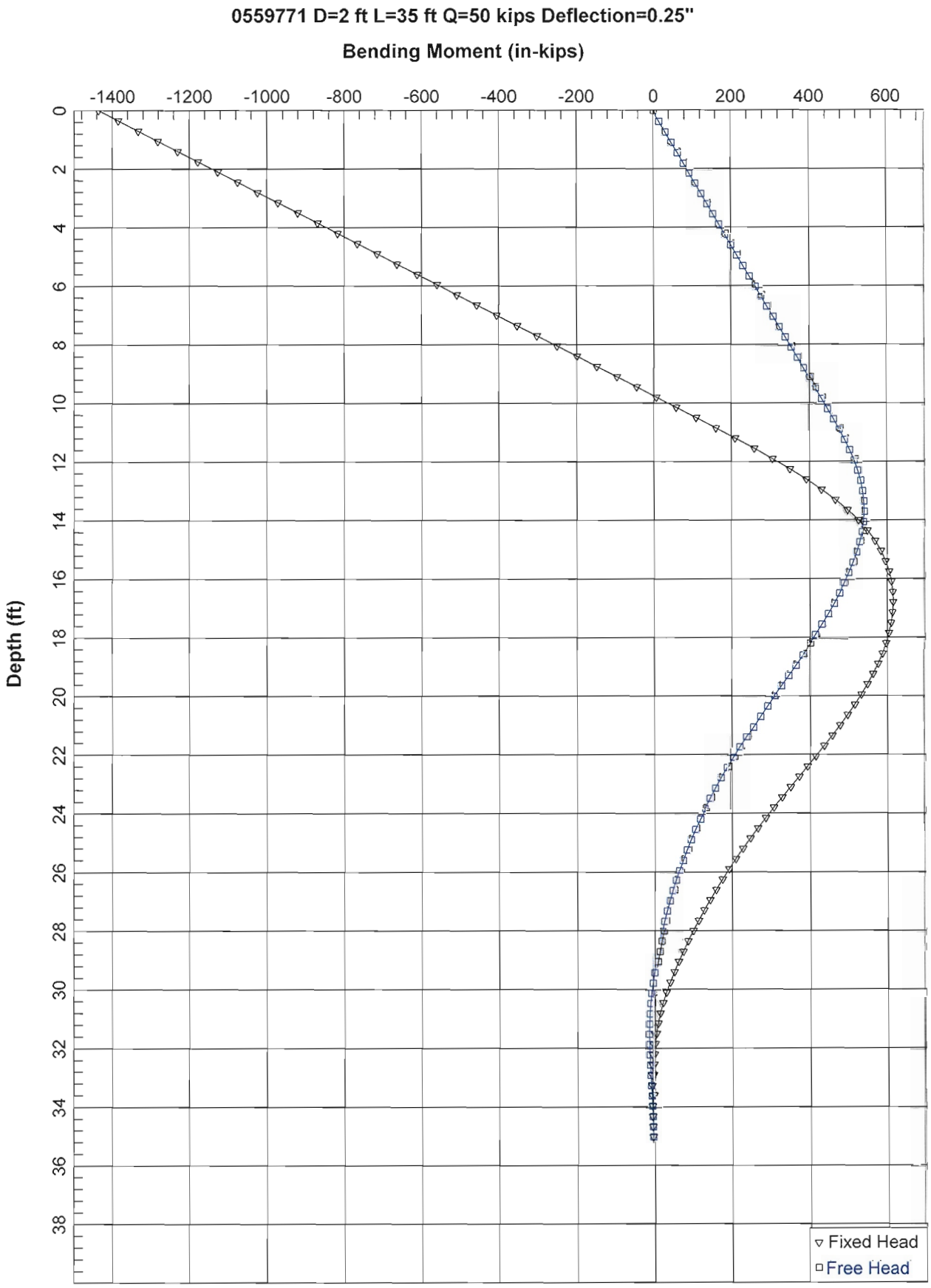
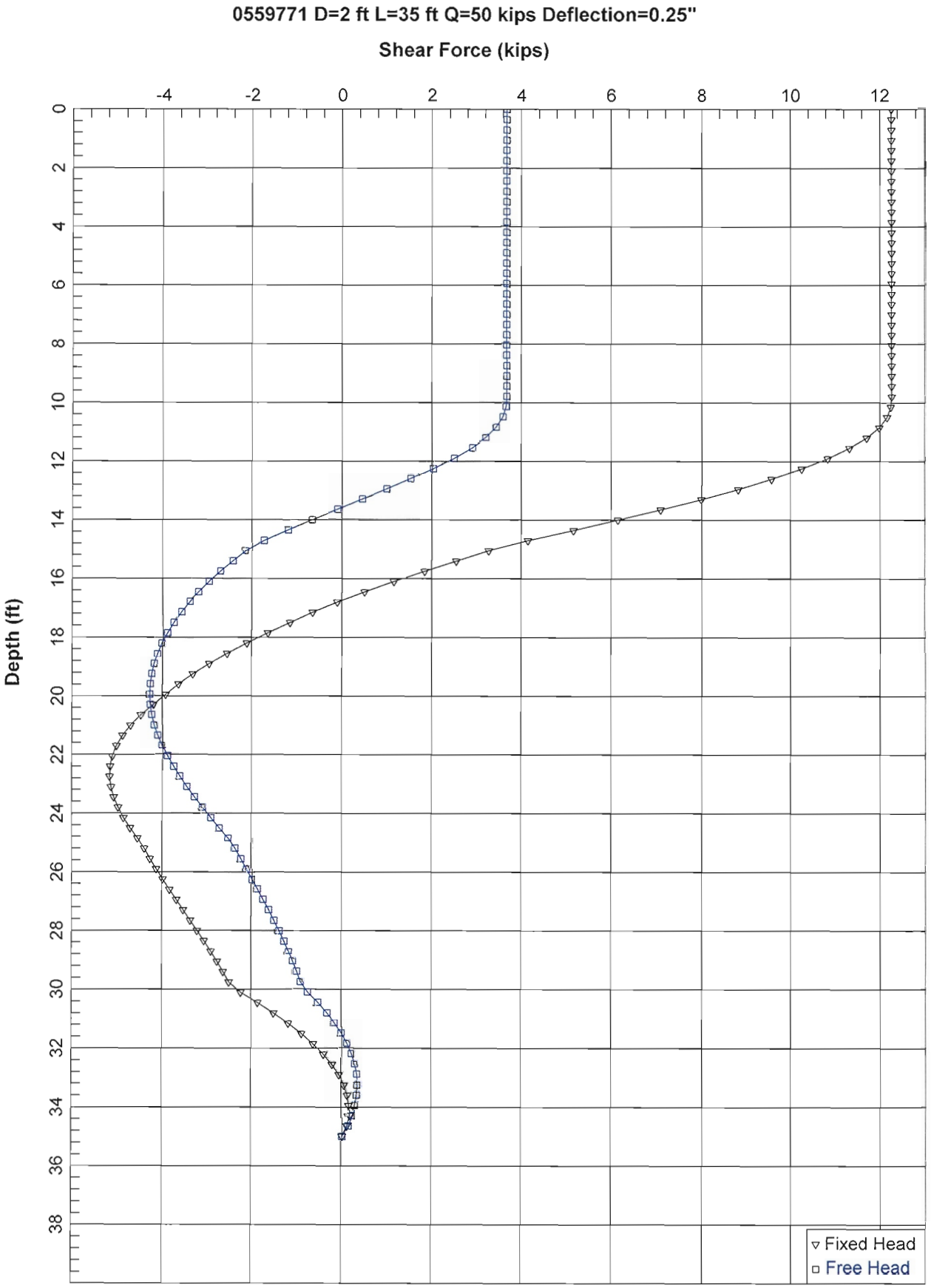
Shear Force (kips)
-1
0
1
2
3
4
5
6
7
8
9
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Fixed Head
Free Head


0559771 D=2 ft L=35 ft Q=50 kips Deflection=0.25"
Bending Moment (in-kips)
-1400
-1200
-1000
-800
-600
-400
-200
0
200
400
600
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Fixed Head
Free Head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Shear Force (kips)
-4
-2
0
2
4
6
8
10
12
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Fixed Head
Free Head