County of Orange/Santa Ana Region Priority Project Water Quality Management Plan (WQMP)

Project Name:

AUTONATION, PORSCHE OF NEWPORT BEACH

550 WEST COAST HIGHWAY, NEWPORT BEACH, CA. 92660

GRADING PERMIT No.

Prepared for:

AutoNation

200 S.W. 1st Avenue

Fort Lauderdale, FL 33301

(949) 347-1974

Prepared by:

Stantec

38 Technology Drive, Suite 100

Irvine, CA. 92618

(949) 923-6000

Prepared: 6/01/16

Project Owner's Certification

Planning Application No. (If applicable)		Grading Permit No.	
Tract/Parcel Map and Lot(s) No.		Building Permit No.	
Address of Project Site and APN (If no address, specify Tract/Parcel Map and Lot Numbers)			550 West Coast Hwy, Newport Beach, CA. APN 049-280-86

This Water Quality Management Plan (WQMP) has been prepared for AutoNation by Stantec. The WQMP is intended to comply with the requirements of the County of Orange NPDES Stormwater Program requiring the preparation of the plan.

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

Owner:	**Jeffrey Shupert**		
Title			
Company	AutoNation		
Address	200 S.W. 1st Avenue, 14th Floor, Fort Lauderdale, FL 33301		
Email			
Telephone #			
I understand my responsibility to implement the provisions of this WQMP including the ongoing operation and maintenance of the best management practices (BMPs) described herein.			
Owner Signature		Date	

Preparer (Engineer): Vicky Ito, P.E.			
Title	Project Manager	PE Registration #	73766
Company	Stantec		
Address	38 Technology Drive, Suite 100, Irvine, CA 92618		
Email	Vicky.ito@stantec.com		
Telephone #	949-923-6000		
I hereby certify that this Water Quality Management Plan is in compliance with, and meets the requirements set forth in, Order No. R8-2009-0030/NPDES No. CAS618030, of the Santa Ana Regional Water Quality Control Board.			
Preparer Signature	Vicky Ito	Date	6.1.16
Place Stamp Here	REGISTERED PROFESSIONAL ENGINEER VICKY S.Y. ITO NO. 73766 EXP. 6/30/17 STATE OF CALIFORNIA		

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Section I Permit(s) and Water Quality Conditions of Approval or Issuance

Project Information

Permit/Application No. (If applicable)		Grading or Building Permit No. (If applicable)	Grading Permit No.
Address of Project Site (or Tract Map and Lot Number if no address) and APN	550 West Coast Hwy, Newport Beach, CA. 92660 APN 049-280-86		

Water Quality Conditions of Approval or Issuance

Water Quality Conditions of Approval or Issuance applied to this project. (Please list verbatim.)	No water quality conditions of approval or issuance have been required of this project by the City of Newport Beach. No final resolution of approval or conditional use permit is associated with this project. The project is required to have a WQMP per the new Model WQMP as written by the County of Orange which states for a redevelopment project creating or replacing 5,000 square feet or more of impervious surface, a WQMP is required.

Conceptual WQMP

Was a Conceptual Water Quality Management Plan previously approved for this project?	None previously prepared.

Watershed-Based Plan Conditions

Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	No applicable conditions from 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

<table>
<tr><th colspan="5">Description of Proposed Project</th></tr>
<tr><td>Development Category (From Model WQMP, Table 7.11-2; or -3):</td><td colspan="4">8. Redevelopment of impervious pavement 5,000 square feet or more.</td></tr>
<tr><td>Project Area: 1.79 acres</td><td colspan="2">Number of Dwelling Units:
Not applicable</td><td colspan="2">SIC Code: 5511</td></tr>
<tr><td rowspan="2">Project Area</td><td colspan="2">Pervious</td><td colspan="2">Impervious</td></tr>
<tr><td>Area (acres or sq ft)</td><td>Percentage</td><td>Area (acres or sq ft)</td><td>Percentage</td></tr>
<tr><td>Pre-Project Conditions</td><td>0.60 acres</td><td>37</td><td>1.04 acres</td><td>63</td></tr>
<tr><td>Post-Project Conditions</td><td>0.28 acres</td><td>17</td><td>1.36 acres</td><td>83</td></tr>
<tr><td>Drainage Patterns/Connections</td><td colspan="4">The drainage pattern of the existing site generally surface flows southward out of entrance driveways and into the public street gutter. There are 4 entrance driveways that span over the length of the project site. The stormwater runoff flows in the street gutter before being intercepted by a catch basin located toward the west end of the project site near 600 West Coast Highway. The runoff is then conveyed to an existing Caltrans 36″ reinforced concrete pipe on the north side of West Coast Highway. The 36″ RCP begins on the south side of West Coast Highway where it connects to an existing catch basin. The 36″ RCP then extends to the north and connects an existing catch basin in front of the project site. The 36″ RCP travels eastward and connects to a storm drain system servicing Dover Drive prior to its outlet at the Lower Newport Bay Bridge.
There is no existing storm drain system onsite. There is offsite run-on from the existing slope north of the project site. The slope runoff surface flows in the direction of the project property and either percolates into the ground or surface flows to the public street gutter. There is no drainage facility servicing the slope runoff.</td></tr>
</table>

	The majority of the project site is within DMA #2 (see BMP location map) and will generally maintain the existing drainage pattern of the site. DMA #2 is 1.39 acres. Stormwater runoff will generally drain southward to proposed storm drain inlets. The onsite storm drain system is directed to a diversion structure near the west entry drive where the stormwater treatment flow rate will be diverted to a Modular Wetlands stormwater biofiltration system (MWS-Linear 2.0 unit). The MWS-Linear 2.0 unit contains cartridges and bioretention media for physically and chemically capturing pollutants from the DCV. The DCV will be converted to a flow rate for sizing the MWS-Linear 2.0 unit. The MWS-Linear 2.0 unit is a proprietary bioretention system BMP. The treated stormwater will be connected back to the onsite storm drain system that will ultimately discharge to the 36-inch Caltrans RCP along West Coast Highway. DMA #1 encompasses onsite drainage from behind the proposed building as well as offsite drainage from the existing slope. DMA #1 is 1.26 acres, of which 0.25 acres is within the project property and 1.01 acres is offsite. This offsite slope is vegetated with a combination of trees and shrubs. The onsite portion will be landscaped. The runoff drains to a proposed terrace drain aligned along the back of the proposed retaining wall behind the proposed building. The runoff will be captured by intermediate inlets and conveyed eastward to the terrace drain low point where the storm drain pipe will angle to the south to a diversion structure near the east entry. The treatment flow rate will be diverted to an MWS-Linear 2.0 unit for treatment and connect to the storm drain pipe conveying the peak flow prior to connecting to the 36-inch Caltrans RCP along West Coast Highway.
Narrative Project Description:	The project site is located at 320-600 West Coast Highway which is west of Dover Drive on the inland side of Coast Highway. The site is currently occupied by a series of retail buildings with asphalt paved parking lot and backs up to a steep bluff with residences at the top of the bluff. The property currently consists of 11 narrow lots. A parcel map is proposed to merge the existing lots into a single parcel. The new address for this site is 550 West Coast Highway. The 12-foot strip along the southern property line of the project site will be dedicated to Caltrans for the widening of West Coast Highway. Offsite improvements associated with the street dedication include but

is not limited to: relocation of utility lines, catch basins, street lights, fire hydrant(s), and signage; removal of existing asphalt concrete, curb, gutter and sidewalk; installation of new asphalt concrete, curb, gutter and sidewalk; and adjustment of existing utility covers to match the new elevations.

The project proposes to demolish the existing buildings and improvements and construct a Porsche dealership including a showroom, areas for vehicle display, vehicle storage and service bays. The new building will vary in height and is a maximum of 3 levels. It will cut into the existing slope at the rear of the property. A retaining wall ranging from 9 feet to 35 feet in height will be constructed to support the slope. A terrace drain is proposed along the back of the retaining wall to capture slope runoff.

Landscape areas are proposed along the frontage of West Coast Highway. At the rear of the property, the proposed retaining wall will abut the building to maximize the landscaped slope. Intermediate landscape areas are proposed throughout the site and will consist of trees, shrubs and groundcover.

This auto dealership has maintenance bays, vehicle wash areas and fueling areas that will be located within the proposed building and a trash enclosure and will not be affected by stormwater runoff. These areas are covered and are tributary to the building sewer system.

Based on the Orange County Hydrology Manual, the project site has soil types classified as primarily Type B soils. According to the Geotechnical Investigation Report AutoNation – Newport Porsche for AutoNation, prepared by Stantec dated April 20, 2015, the site soil is composed of sand (SP, SW, SP-SM, and SM USCS soil type), clay and clay with sand (CL and CH USCS soil type), and silt (MH USCS soil type) from the ground surface to the maximum depth of exploration (up to 36 feet). The soil material was found to have low expansion potential with presence of artificial fill and is relatively loose near the surface.

Groundwater was encountered at depths of 6 to 7 feet below ground surface. Therefore, infiltration of stormwater runoff is not possible for this site.

II.2 Potential Stormwater Pollutants

Pollutants of Concern			
Pollutant	Check One for each: 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 Exhibit at the end of this section.

According to Section 7.II-2.3.3 of the 2011 Model WQMP, the North Orange County Permit presumes that projects with "downstream conveyance channels that will receive runoff from the project are engineered, hardened and regularly maintained to ensure design flow capacity, and no sensitive stream habitat areas will be affected" do not have the potential for HCOC's.

The storm drain system conveying the project's stormwater is hard-lined all the way from the project site to the outlet structure at the Lower Newport Bay Bridge. No soft bottom channels or streambeds are encountered as the stormwater is conveyed to the outlet structure. Therefore, there are no hydrologic conditions of concern.

Although the conveyance facilities indicate that HCOC's do not exist, an analysis was conducted to determine and compare the pre and post development volumes and time of concentration. Due to an increase in impervious areas, there is an increase in post development volume and a decrease in post development time of concentration.

	Pre Development	Post Development
Volume (ac-ft)	0.2724	0.2880
Time of Concentration (min)	5.29	5.16

The post development volume increased 1.057 > 1.05

The post-development time of concentration decreased by 1.025 < 1.05

See Attachment I for pre and post development 2 year hydrology and volume calculations

☐ Yes – Describe applicable hydrologic conditions of concern below. *Refer to Section 2.2.3 in the Technical Guidance Document (TGD).*

II.4 Post Development Drainage Characteristics

Refer to Section 2.2.4 in the Technical Guidance Document (TGD).

The majority of the project site is within DMA #2 (see BMP location map) and will maintain the overall drainage pattern of the site. DMA #2 is 1.39 acres. Stormwater runoff will generally drain southward to proposed storm drain inlets. The onsite storm drain system is directed to a diversion structure near the west entry drive where the stormwater treatment flow rate will be diverted to a Modular Wetlands stormwater biofiltration system (MWS-Linear 2.0 unit). The MWS-Linear 2.0 unit contains cartridges and bioretention media for physically and chemically capturing pollutants from the DCV. The DCV will be converted to a flow rate for sizing the MWS-Linear 2.0 unit. The MWS-Linear 2.0 unit is a proprietary bioretention system BMP. The treated stormwater will be connected back to the onsite storm drain system that will ultimately discharge to the 36-inch Caltrans RCP along West Coast Highway.

DMA #1 encompasses onsite landscape area behind the proposed building as well as off-site drainage from the existing slope. DMA #1 is 1.26 acres, of which 0.25 acres is within the project property and 1.01 acres is off-site. This off-site slope is vegetated with a combination of trees and shrubs. The onsite portion will be landscaped. Runoff drains to a proposed terrace drain aligned along the back of the proposed retaining wall behind the proposed building. The runoff will be captured by intermediate inlets and conveyed eastward to the terrace drain low point where the storm drain pipe will angle to the south to a diversion structure near the east entry. The treatment flow rate will be diverted to an MWS-Linear 2.0 unit for treatment and connect to the storm drain pipe conveying the peak flow prior to connecting to the 36-inch Caltrans RCP along West Coast Highway.

II.5 Property Ownership/Management

Refer to Section 2.2.5 in the Technical Guidance Document (TGD).

The property is owned, operated and maintained by AutoNation.

Section III Site Description

III.1 Physical Setting

Refer to Section 2.3.1 in the Technical Guidance Document (TGD).

Name of Planned Community/Planning Area (if applicable)	Porsche of Newport Beach
Location/Address	550 West Coast Highway, Newport Beach , CA.
	(located on the north side of West Coast Highway, approximately 370 feet west of Dover Drive)
General Plan Land Use Designation	General Commercial
Zoning	General Commercial
Acreage of Project Site	1.64 acres
Predominant Soil Type	B

III.2 Site Characteristics

Refer to Section 2.3.2 in the Technical Guidance Document (TGD).

Site Characteristics	
Precipitation Zone	Resides within the 0.66-inch rainfall zone.
Topography	See Section II.1.
Drainage Patterns/Connections	The drainage pattern of the existing site generally surface flows southward out of entrance driveways and into the public street gutter. There are 4 entrance driveways that span over the length of the project site. The stormwater runoff flows in the street gutter before being intercepted by a catch basin located toward the west end of the project site near 600 West Coast Highway. The runoff is then conveyed to an existing Caltrans 36″ reinforced concrete pipe on the north side of West Coast Highway. The 36″ RCP begins on the south side of West Coast Highway where it connects to an existing catch basin. The 36″ RCP then extends to the north and connects an existing catch basin in front of the project site. The 36″ RCP travels eastward and connects to a storm drain system servicing Dover Drive prior to its outlet at the Lower Newport Bay Bridge. There is no existing storm drain system onsite. There is offsite run-on from the existing slope north of the project site. The slope runoff surface flows in the direction of the project property and either percolates into the ground or surface flows to the public street gutter. There is no drainage facility servicing the slope runoff. The majority of the project site is within DMA #2 (see BMP location map) and will maintain the overall drainage pattern of the site. DMA #2 is 1.39 acres. Stormwater runoff will generally drain southward to proposed storm drain inlets. The onsite storm drain system is directed to a diversion structure near the west entry drive where the stormwater treatment flow rate will be diverted to a Modular Wetlands stormwater biofiltration system (MWS-Linear 2.0 unit). The MWS-Linear 2.0 unit contains cartridges and bioretention media for

	physically and chemically capturing pollutants from the DCV. The DCV will be converted to a flow rate for sizing the MWS-Linear 2.0 unit. The MWS-Linear 2.0 unit is a proprietary bioretention system BMP. The treated stormwater will be connected back to the onsite storm drain system that will ultimately discharge to the 36-inch Caltrans RCP along West Coast Highway. DMA #1 encompasses onsite drainage from behind the proposed building as well as off-site drainage from the existing slope. DMA #1 is 1.26 acres, of which 0.25 acres is within the project property and 1.01 acres is off-site. This off-site slope is vegetated with a combination of trees and shrubs. The onsite portion will be landscaped. The runoff drains to a proposed terrace drain aligned along the back of the proposed retaining wall behind the proposed building. The runoff will be captured by intermediate inlets and conveyed eastward to the terrace drain low point where the storm drain pipe will angle to the south to a diversion structure near the east entry. The treatment flow rate will be diverted to an MWS-Linear 2.0 unit for treatment and connect to the storm drain pipe conveying the peak flow prior to connecting to the 36-inch Caltrans RCP along West Coast Highway.
Soil Type, Geology, and Infiltration Properties	According to the Orange County Hydrology Manual, the project site has soil types classified as primarily Type B soils. According to the Geotechnical Investigation Report AutoNation – Newport Porsche, prepared by Stantec dated April 20, 2015, the site soil is composed of sand (SP, SW, SP-SM, and SM USCS soil type), clay and clay with sand (CL and CH USCS soil type), and silt (MH USCS soil type) from the ground surface to the maximum depth of exploration (up to 36 feet). The soil material was found to have low expansion potential with presence of artificial fill and is relatively loose near the surface.
Hydrogeologic (Groundwater) Conditions	According to the Geotechnical Investigation Report AutoNation – Newport Porsche, prepared by Stantec dated April 20, 2015, groundwater was encountered at depths of 6 to 7 feet below ground surface.
Geotechnical Conditions (relevant to infiltration)	According to the Geotechnical Investigation Report AutoNation – Newport Porsche, prepared by Stantec dated April 20, 2015, groundwater was encountered at depths of 6 to 7 feet below ground surface. This would not allow for enough separation required by the Technical Guidance Document (TGD) between the infiltrating surface and the seasonally high mounded groundwater. Therefore,

	infiltration of stormwater runoff is not possible for this site.
Off-Site Drainage	Under existing conditions, there is offsite drainage generated by the vegetated slope at the rear of the property that is directed to the project site. Under proposed conditions, the offsite slope will continue to drain to the project site. The runoff will be captured by a proposed terrace drain and is ultimately conveyed to an MWS -Linear 2.0 unit for treatment prior to discharging to a Caltrans 36″ storm drain pipe. MWS-Linear 2.0 unit is a proprietary bioretention system BMP
Utility and Infrastructure Information	No significant utilities impact the proposed BMP.

III.3 Watershed Description

Refer to Section 2.3.3 in the Technical Guidance Document (TGD).

Receiving Waters	Newport Bay, Lower
303(d) Listed Impairments	Chlordane, Copper, DDT (Dichlorodiphenyltrichloroethane), Indicator Bacteria, Nutrients, PCBs (Polychlorinated biphenyls), Pesticides, and Sediment Toxicity)
Applicable TMDLs	TMDLs approved for Copper, Indicator Bacteria, Nutrients and Pesticides. TMDLs currently being established for Chlordane, DDT, PCBs and Sediment Toxicity. Expected completion of TMDL in 2019.
Pollutants of Concern for the Project	nutrients, pesticides, metals, toxic organic compounds
Environmentally Sensitive and Special Biological Significant Areas	Lower Newport Bay is listed as an environmentally sensitive area. Refer to the Orange County Watershed “G” Map for East Costa Mesa – Newport Beach.

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	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	Not applicable. The storm drain conveying the site's stormwater is hard lined all the way to the outlet structure at the Lower Newport Bay Bridge.
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	DMA #1 is using proprietary bioretention system BMP. DMA #2 is using proprietary bioretention system BMP. Refer to Section IV.3.4 and Attachment F for BMP Fact Sheet, BMP detail and design calculations.

List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	Not applicable. Using proprietary bioretention system BMP.
Calculate LID design storm capture volume for Project.	<u>Design Capture Volume for Project Site:</u> Property Area = **1.64 acres** Impervious area of site = **1.36 acres** (83%)
	DMA #1
	Area = **1.26 acres** Impervious area of site = **0.13 acres** (10%) Design capture storm depth for site: d = 0.66 inches => 0.055 feet *(determined from T.G.D. Figure III.1, Rainfall Zones)* Runoff coefficient: C = (0.75)(0.10)+0.15 = 0.225 Design Capture Volume: V= C x d x A x 43560 sf/ac **DCV= (0.225)(0.055ft) (1.26ac)(43,560ft^2/ac) = 679 ft^3** Stormwater Treatment Flowrate (For Flow-Based BMPs): Q= C x I x A (Tc=5.16, use I=0.26 in/hr, *determined from T.G.D. Figure III.4, Capture Efficiency Nomograph for Off-line Flow-based Systems in Orange County*) **Q= (0.225)(0.26in/hr)(1.26ac) = 0.074 cfs**
	DMA #2
	Area = **1.39 acres** Impervious area of site = **1.29 acres** (93%) Design capture storm depth for site: d = 0.66 inches => 0.055 feet Runoff coefficient: C = (0.75)(0.93)+0.15 = 0.8475 Design Capture Volume: **DCV= (0.8475)(0.055ft)(1.39ac)(43,560ft^2/ac) = 2,822 ft^3**

Stormwater Treatment Flowrate (For Flow-Based BMPs):

Q= C x I x A (Tc=5.16 min, use I=0.26 in/hr, *determined from T.G.D. Figure III.4, Capture Efficiency Nomograph for Off-line Flow-based Systems in Orange County*)

Q= (0.8475)(0.26in/hr)(1.39ac) = 0.306 cfs

The project site is considered to be two (2) DMAs based upon the topography of the site and the proposed design. Both DMA #1 and DMA #2 will be treated by separate Modular Wetlands stormwater biofiltration systems (MWS-Linear 2.0 unit). Refer to the BMP Location Map for the DMA boundaries.

IV.2. Site Design and Drainage

Refer to Section 2.4.2 in the Technical Guidance Document (TGD).

The site design is driven by the design of spaces/amenities that accompany an auto dealership while maximizing landscape areas where possible.

The proposed site design preserves a portion of the existing vegetated slope. New landscape areas are proposed along the frontage of West Coast Highway and where achievable throughout the site.

Due to constraints explained in Sections IV.3.2 through IV.3.4, the site could not accommodate infiltration and evapotranspiration BMPs to the MEP.

IV.3 LID BMP Selection and Project Conformance Analysis

Refer to Section 2.4.2.3 in the Technical Guidance Document (TGD) for selecting LID BMPs and Section 2.4.3 in the Technical Guidance Document (TGD) for conducting conformance analysis with project performance criteria.

See next page for LID BMP Selection and Project Conformance Analysis discussion.

IV.3.1 Hydrologic Source Controls (HSCs)

If required HSCs are included, fill out applicable check box forms. If the retention criteria are otherwise met with other LID BMPs, include a statement indicating HSCs not required.

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)	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐

HSCs not required. Site will be designed with a proprietary bioretention system BMP. See Section IV.1.

IV.3.2 Infiltration BMPs

Identify infiltration BMPs to be used in project. If design volume cannot be met, state why.

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	☐
Other:	☐
Other:	☐

According to the Geotechnical Investigation Report AutoNation – Newport Porsche, prepared by Stantec dated April 20, 2015, groundwater was encountered at depths of 6 to 7 feet below ground surface. This would not allow for enough separation required by the Technical Guidance Document (TGD) between the infiltrating surface and the seasonally high mounded groundwater. Therefore, infiltration of stormwater runoff is not possible for this site.

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

If the full Design Storm Capture Volume cannot be met with infiltration BMPs, describe any evapotranspiration and/or rainwater harvesting BMPs included.

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:	☐

Evapotranspiration BMPs are not feasible due to the fact that the loading from the stormwater collection would be too significant.

Rainwater harvesting BMPs are not feasible due to insufficient toilet flushing and indoor demand per Table X.6 Harvested Water Demand Thresholds for Minimum Partial Capture. See Attachment H for harvest and reuse analysis.

IV.3.4 Biotreatment BMPs

If the full Design Storm Capture Volume cannot be met with infiltration BMPs, and/or evapotranspiration and rainwater harvesting BMPs, describe biotreatment BMPs included. Include sections for selection, suitability, sizing, and infeasibility, as applicable.

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

Proprietary bioretention system BMPs (Modular Wetlands MWS-Linear 2.0 unit) are proposed near the east entry for DMA #1 and west entry drive for DMA #2. The Modular Wetlands unit will treat surface runoff intercepted by the proposed storm drain inlets. The treated stormwater will be conveyed to the onsite storm drain system prior to the connection with the Caltrans 36″ RCP.

Due to the existing site layout and existing topography across the site, vegetated swales are infeasible due to required minimum swale lengths that cannot be met. Vegetated filter strips are infeasible due to the need for conveying stormwater away from structures as soon as possible per geotechnical recommendations. Wet and dry extended detention basins and constructed wetlands are infeasible due to large open space requirements. Stormwater planter boxes and rain gardens with underdrains may require excessive irrigation and so are not suitable for dry climates such as is found in Newport Beach.

The Modular Wetlands System chosen is a bioretention BMP. Although this particular vault is underground without exposed plant life, it contains biofiltration media and provides removal of pollutants as required. The vault has been located underground for the following reasons: 1) the vault needs to be in close proximity to the existing shallow storm drain system in order for the vault to drain by gravity, 2) the vault will not fit in the proposed planters, and it would disrupt the planting scheme desired by the owner.

IV.3.5 Hydromodification Control BMPs

See Section 5 of the Technical Guidance Document (TGD).

Hydromodification Control BMPs	
BMP Name	**BMP Description**
Not applicable.	

IV.3.6 Regional/Sub-Regional LID BMPs

Refer to Section 7.II-2.4.3.2 of the Model WQMP.

Regional/Sub-Regional LID BMPs
Not applicable.

IV.3.7 Treatment Control BMPs

Treatment control BMPs can only be considered if the project conformance analysis indicates that it is not feasible to retain the full design capture volume with LID BMPs. Describe treatment control BMPs including sections for selection, sizing, and infeasibility, as applicable.

Treatment Control BMPs	
BMP Name	**BMP Description**
Not applicable.	

IV.3.8 Non-structural Source Control BMPs

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)	☐	☒	No hazardous waste to be handled onsite.
N6	Local Industrial Permit Compliance	☐	☒	No fueling areas onsite and no effect on public properties.
N7	Spill Contingency Plan	☐	☒	No hazardous material to be handled onsite.
N8	Underground Storage Tank Compliance	☐	☒	No underground storage tanks onsite.
N9	Hazardous Materials Disclosure Compliance	☐	☒	No hazardous material to be handled onsite.
N10	Uniform Fire Code Implementation	☐	☒	No hazardous material to be handled onsite.
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	No loading docks onsite.
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	No gasoline outlets onsite.

N1 Education for Property Owners, Tenants and Occupants

Practical information material will be provided to tenants by the Property Manager on general good housekeeping practices for each type of site occupancy that contribute to protection of storm water quality. Such information will include, but not be limited to the attachments provided at the end of this report. In addition to the attachments, the following resource can be contacted to obtain updated educational information free of charge *http://www.ocwatersheds.com/PublicEd/resources/default.aspx*.

N2 Activity Restrictions

The following is a list of activity restrictions for the project site:

- No unauthorized car washing will be permitted on the premises.
- No changing of oil or other auto repairs will be permitted on the premises.
- On-site cleaning of trash dumpsters with water is prohibited.
- Do not sweep grass clippings, dead leaves into catch basins, or other landscaping related debris into catch basins.
- Do not perform paint cleanup activities in paved areas or allow rinse water from these activities to enter the storm drain system. Clean brushes containing water-based paint in a sink that is connected to the sanitary sewer system.
- Do not use detergents or other chemical additives when washing concrete sidewalks or building exteriors, use potable water only and collect wash water runoff using a vacuum truck, for proper offsite disposal.
- Do not allow wash-water from concrete, mortar or other construction activities to enter the storm drain system.
- Keep premises, as well as trash container areas, free of litter.

N3 Common Area Landscape Management

Management of landscaped areas shall be performed consistent with the following:

- “County Water Conservation Resolution”.
- “Model Integrated Pesticide Management, Pesticides and Fertilizer Guidelines” (Attachment D);
- The inspection and maintenance activities outlined in this WQMP and in the Maintenance and Responsibility Tables provided in Section V.

N4 BMP Maintenance

Section V discusses responsibilities for implementation of the BMPs listed herein. This section contains tables which detail BMPs, description of inspection and maintenance activity, frequency of inspection, and responsible party information.

N11 Common Area Litter Control

In order to reduce the likelihood of polluting storm water runoff, regular maintenance will be conducted. This will consist of, at a minimum, site-wide litter control, emptying of trash receptacles in common areas, sweeping of dumpster enclosure areas, and reporting trash disposal violations to the owner or property management for investigation. The landscape maintenance may be contracted for common area litter control as well.

N12 Employee Training

The developer or property management will prepare an educational manual for future employees of individual businesses. Manual should contain, but not be limited to, copies of the educational information listed in Section VII shall be provided to individual business owners to educate them in the protection of storm water quality (see N1). Business owners shall be responsible for training their personnel in the importance of maintaining the on-site storm drain system free of debris and other pollutants. Personnel shall be reminded on a regular basis that storm drains are intended to be for storm water only, and that employees are discouraged from discharging anything into the storm drain system.

N14 Common Area Catch Basin Inspection

Privately maintained drainage systems will be inspected, cleaned and maintained prior to the storm season and no later than October 15 of each year. Of the facilities, 80% should be inspected, cleaned, and maintained annually and 100% should be cleaned biennially (every two years). Drainage facilities include catch basins (storm drain inlets), detention basins, retention basins, sediment basins, open drainage channels, and lift stations. Records should be kept to document the annual maintenance.

N15 Street Sweeping Private Streets and Parking Lots

Streets and parking lots are required to be swept prior to the storm season, in late summer or early fall, prior to the start of the rainy season or equivalent as required by the governing jurisdiction.

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	☒	☐	
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	No outside material storage to be utilized onsite.
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 concentrated flows on slopes or barren surfaces onsite.
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☒	Not within jurisdiction of SDRWQCB.
S6	Dock areas	☐	☒	No dock areas onsite.
S7	Maintenance bays	☒	☐	
S8	Vehicle wash areas	☒	☐	
S9	Outdoor processing areas	☐	☒	No outdoor processing areas onsite.
S10	Equipment wash areas	☐	☒	No equipment wash areas onsite.
S11	Fueling areas	☒	☐	
S12	Hillside landscaping	☐	☒	No extensive hillside grading onsite.
S13	Wash water control for food preparation areas	☐	☒	No food preparation onsite.
S14	Community car wash racks	☐	☒	No community car wash racks onsite.

S1 Storm Drain System Stenciling and Signage

Storm drain stenciling will be used to alert the public and employees to the destination of pollutants discharged into the storm drain system. The phrase "NO DUMPING – DRAINS TO OCEAN" or an equally effective phrase and/or graphic icon shall be stenciled on all catch basins and storm drain inlets on the site. Refer to the BMP Location Map in Section VI for locations of the stenciling. Maintain legibility of stencils.

S3 Trash Storage Areas

The trash storage areas will be located indoors and will not have potential to come in contact with stormwater runoff.

S4 Efficient Irrigation Systems and Landscape Design

Irrigation systems shall be installed and programmed to apply proper volume of water and avoid excess runoff. A Landscape Plan shall be implemented to verify the following at a minimum:

- Water sensors are functioning properly (make adjustments as necessary);
- Irrigation heads are adjusted properly to eliminate over-spray to hardscape areas;
- Irrigation timing and cycle lengths are adjusted in accordance with water demands, time of year, weather, and day or nighttime temperatures;
- Flow reducers or shutoff valves are utilized, in the likelihood of sprinkler heads or lines breaking;
- Plants with similar water requirements are grouped together;
- Mulch shall be used to minimize the amount of sediment in the runoff;
- Use of fertilizers and pesticides are minimized;
- Vegetative barriers will be placed along the property boundary to filter out pollutants;

These systems will be designed and operated based on the requirements of the following documents:
Model Water Efficient Landscape Ordinance, dated June 15, 1992 (Attachment E).

S7 Maintenance Bays

The maintenance bays will be located indoors and will not have potential to come in contact with stormwater runoff.

S8 Vehicle Wash Areas

The vehicle wash areas will be located indoors and will not have potential to come in contact with stormwater runoff.

S11 Fueling Areas

The fueling areas will be located indoors and will not have potential to come in contact with stormwater runoff.

IV.4 Alternative Compliance Plan (If Applicable)

Refer to Section 7.II 3.0 in the WQMP

See Section IV.4.2 on next page.

IV.4.1 Water Quality Credits

Refer to Section 3.1 of the Model WQMP for description of credits and Appendix VI of the Technical Guidance Document (TGD) for calculation methods for applying water quality credits.

No water quality credits applicable.

<table>
<tr><th colspan="6">Description of Proposed Project</th></tr>
<tr><td colspan="6">Project Types that Qualify for Water Quality Credits (Select all that apply):</td></tr>
<tr><td>☐Redevelopment projects that reduce the overall impervious footprint of the project site.</td><td colspan="3">☐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.</td><td colspan="2">☐ 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).</td></tr>
<tr><td colspan="2">☐ 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).</td><td colspan="3">☐ 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</td><td>☐ 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).</td></tr>
<tr><td>☐Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.</td><td>☐ Developments in a city center area.</td><td>☐ Developments in historic districts or historic preservation areas.</td><td colspan="2">☐ 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.</td><td>☐In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.</td></tr>
</table>

Calculation of Water Quality Credits (if applicable)	Not applicable.

IV.4.2 Alternative Compliance Plan Information

Refer to Section 7.II 3.0 in the Model WQMP.

Not applicable.

Section V Inspection/Maintenance Responsibility for BMPs

The following tables indicate BMP inspection and maintenance responsibility. These tables identify the party responsible for inspection and maintenance, a description of the inspection and/or maintenance activity, and a frequency for the inspection and/or maintenance activity. Records of maintenance and inspections shall be kept for a period of five years and shall be made available for review by government agencies.

Responsible party details as indicated in the table are as follows:

Owner/Property Management Company
Name: Lorenzo Festa
Title: Construction and Development Manager
Company: AutoNation
Address: 200 S.W. 1st Avenue, 14th Floor, Fort Lauderdale, FL 33301
Phone number: (954) 769-3944

A Site Inspection Report is provided in the appendices for use by the responsible party.

Table V-1: BMP Inspection and Maintenance Responsibility for Non-Structural Source Control BMPs

BMP Designation	Responsible Party	Description of Inspection and Maintenance Activity	Frequency of Maintenance
N1 Education for Property Owners, Tenants and Occupants	Developer or Property Owner	Provide all members with environmental awareness education materials (made available by municipalities).	Upon initial leasing or sale of property to residents, occupants, and/or tenants, and annually thereafter
N2 Activity Restrictions	Developer or Property Owner	Provide all members with conditions, covenants and restrictions for surface water quality protection.	Upon initial leasing or sale of property to residents, occupants, and/or tenants, and annually thereafter
N3 Common Area Landscape Management	Property Management Company or Property Owner	Manage landscaping in accordance with applicable ordinances and with management guidelines for use of fertilizers and pesticides.	Bi-weekly
N11 Common Area Litter Control	Property Management Company	Inspect for, remove and properly dispose of litter.	Weekly
N12 Employee Training	Property Management Company	Consisting at a minimum of the distribution of educational materials contained herein and material made available by municipalities.	Bi-annual training
N14 Common Area Catch Basin Inspection	During construction, General Contractor Post construction, Property Management Company and/or tenants	Drainage facilities, including catch basins, area drains, open drainage channels and lift stations, must be cleaned and maintained. Drainage facilities, including catch basins, area drains, open drainage channels and lift stations, must be cleaned and maintained.	During construction, inspect weekly and after every rain event. Post construction, monthly during regular maintenance and more frequently during the rainy season (October 15 – April 15).

N15 Street Sweeping Private Streets and Parking Lots	Property Management Company	Sweep/vacuum streets and parking lots.	Concurrent with the ongoing sweeping program for the greater Fashion Island area. Currently, Fashion Island has a daily (nightly) sweeping program.

Table V-2: BMP Inspection and Maintenance Responsibility for Structural Source Control BMPs

BMP Designation	Responsible Party	Description of Inspection and Maintenance Activity	Frequency of Maintenance
S1 Storm Drain System Stenciling and Signage	Property Management Company	Assure that stenciling is legible.	Bi-annually
S4 Efficient Irrigation Systems and Landscape Design	Property Management Company	Verify that runoff minimizing landscape design continues to function by checking that water sensors are functioning properly, that irrigation heads are adjusted properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather and day or night time temperatures.	Weekly maintenance.

Table V-3: Inspection and Maintenance Responsibility for Biotreatment BMP and LID Stormwater Measures

BMP/LID Designation	Responsible Party	Description of Inspection and Maintenance Activity	Frequency of Maintenance
1A/1B - Bioretention with Underdrain (Modular Wetlands unit)	Property Management Company	Refer to Attachment F	Refer to Attachment F

Section VI BMP Exhibit (Site Plan)

VI.1 BMP Exhibit (Site Plan)

See BMP Location Map (Water Quality Exhibit) included in this section.

VI.2 Submittal and Recordation of Water Quality Management Plan

LEGEND / PROJECT SITE INFORMATION:

PROPERTY AREA - POST STREET DEDICATION = 1.64 ACRES
(PRE STREET DEDICATION = 1.79 ACRES)

DESIGN CAPTURE STORM DEPTH (D) = 0.66 IN.=0.055 FEET

DMA #1
A = 1.26 ACRES (1.01 AC OFFSITE, 0.25 AC ONSITE)
IMPERVIOUS AREA = 0.13 ACRES (10%)
DCV = C x D x A x 43560
= 0.225 x 0.055 x 1.26 x 43560 = **679 CF**
TOTAL MITIGATED FLOW RATE = **0.074 CFS**
(C=0.75 x 0.10 + 0.15 = 0.225, I= 0.26 IN/HR)

DMA #2
A = 1.39 ACRES
PROPERTY AREA – ONSITE AREA FROM DMA #1
= (1.64 AC – 0.25 AC)
IMPERVIOUS AREA = 1.29 ACRES (93%)
DCV = C x D x A x 43560
= 0.8475 x 0.055 x 1.39 x 43560 = **2,822 CF**
TOTAL MITIGATED FLOW RATE = **0.306 CFS**
(C=0.75 x 0.93 + 0.15 = 0.8475, I= 0.26 IN/HR)

STATE PLANE - NAD 83 ZONE 6 (FT)

(1A)	N 2171874.3086	E 6056401.9841	⑪	N 2171878.3028	E 6056715.9875
(1B)	N 2171902.5989	E 6056741.1367	⑫	N 2171893.8037	E 6056715.4981
②	N 2171863.9182	E 6056264.8150	⑬	N 2171961.5402	E 6056728.3405
③	N 2171868.1781	E 6056284.9218	⑭	N 2171996.5465	E 6056735.3754
④	N 2171868.2590	E 6056322.4105	⑮	N 2171989.0483	E 6056653.1917
⑤	N 2171879.3623	E 6056336.3856	⑯	N 2171985.2142	E 6056441.2264
⑥	N 2171867.7376	E 6056385.8781	⑰	N 2171959.0538	E 6056377.3095
⑦	N 2171870.8547	E 6056485.5794	⑱	N 2171957.0283	E 6056265.3278
⑧	N 2171872.7059	E 6056544.8005	⑲	N 2171956.0566	E 6056212.3548
⑨	N 2171875.9898	E 6056643.7461	⑳	N 2171852.9081	E 6056339.2225
⑩	N 2171872.0269	E 6056676.3541	(21)	N 2171853.1671	E 6056347.3705

LEGEND

▬	PROPOSED SITE BOUNDARY
▬ ▬ ▬	DRAINAGE BOUNDARY
═══	EXISTING STORM DRAIN
▬ ▬ ▬	PROPOSED STORM DRAIN
←	DRAINAGE DIRECTION
⊛	CONNECT TO EXISTING STORM DRAIN
DMA#2	DRAINAGE AREA NUMBER
1.39	ACREAGE FOR CONTRIBUTING AREA

STRUCTURAL BMP LEGEND

🟪	(S1)	STORM DRAIN SYSTEM STENCILING AND SIGNAGE
🟩	(S4)	EFFICIENT IRRIGATION SYSTEMS AND LANDSCAPE DESIGN
🟥		PROPRIETARY BIORETENTION

IV.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS

IV.3.2 INFILTRATION BMPs

INFILTRATION BMPs ARE NOT FEASIBLE DUE TO THE GROUNDWATER LEVEL ENCOUNTERED AT THE SITE, APPROXIMATELY 6 TO 7 FEET BELOW GROUND SURFACE. SEE GEOTECHNICAL INVESTIGATION REPORT PREPARED BY STANTEC.

IV.3.3 EVAPOTRANSPIRATION, RAINWATER HARVESTING BMPs

EVAPOTRANSPIRATION BMPs ARE NOT FEASIBLE DUE TO THE FACT THAT THE LOADING FROM THE STORMWATER COLLECTION WOULD BE TOO SIGNIFICANT. RAINWATER HARVESTING BMPs ARE NOT FEASIBLE DUE TO INSUFFICIENT IRRIGATION DEMAND PER TABLE X.6 IN TGD.

IV.3.4 BIOTREATMENT BMPs

USING PROPRIETARY BIORETENTION BMP TO TREAT THE MITIGATED STORMWATER FLOW RATE.

IV.3.7 TREATMENT CONTROL BMPs

NOT APPLICABLE. USING PROPRIETARY BIORETENTION BMP TO TREAT THE MITIGATED STORMWATER FLOW RATE.

NOTE: STRUCTURAL BMP NUMBERING IS TAKEN FROM THE WQMP REPORT.

PREPARED BY:
Stantec
38 TECHNOLOGY DRIVE, SUITE 100
IRVINE, CA 92618
949.923.6000 stantec.com

PREPARED FOR:
AutoNation
200 SW 1ST AVE., 14TH FLOOR
FORT LAUDERDALE, FL 33301

PORSCHE OF NEWPORT BEACH
550 WEST COAST HIGHWAY
NEWPORT BEACH, CA
BMP LOCATION MAP

DATE: 5/31/2016
SHEET 1
OF 1
JOB NO. 2007 105003

DRAWING: v:\2007\active\2007105003\civil\design\drawing\exhibits\105003c-ex7001_bmp_location_map.dwg PLOTTED: 6/1/2016 10:34 AM BY: Ito, Vicky

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)	☐	Tips for Protecting Your Watershed	☒
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	☒		☐

SITE INSPECTION REPORT

SITE INSPECTION REPORT

Property Owner:	**AutoNation**	Project Name:	**Porsche of Newport Beach**
Property Management Company:	**AutoNation**	Project Address:	**550 West Coast Highway Newport Beach, CA 92660**

I. Type of Inspection:

☐ N1 Education for Property Owners, Tenants, & Occupants
☐ N2 Activity Restrictions
☐ N3 Common Area Landscape Management
☐ N4 BMP Maintenance
☐ N11 Common Area Litter Control
☐ N12 Employee Training
☐ N14 Common Area Catch Basin Inspection
☐ N15 Street Sweeping Private Streets & Parking Lots

☐ S1 Storm Drain System Stenciling & Signage
☐ S4 Efficient Irrigation Systems & Landscape Design
☐ 1A/1B Modular Wetlands unit
☐ Other

II. Check the observed status of all appropriate items:

Item #	WQMP Items	Inspected	Follow-Up Required	Date Follow-Up Completed
N1	• Has educational information been provided to tenants upon their occupancy? • Has educational information been provided to tenants annually thereafter? • Other?_________________________	☐ ☐ ☐	☐ ☐ ☐	
N2	• Are there activity restrictions in place? • Are these restrictions being observed? • Other?________________________________	☐ ☐ ☐	☐ ☐ ☐	
N3 S4	• Is there an Irrigation Management Plan in place? • Is the Irrigation Management Plan being implemented? • Are irrigation head adjusted properly? • Is the irrigation timing and cycle length adjusted appropriately for time of year? • Has new or additional landscaping been added to site since last inspection? • Are plants new & existing grouped according to fertilizer needs? • Are plants new & existing grouped according to water needs? • Other?_______________________________________	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	
N11	• Is the site free of litter? • Other?________________________________	☐ ☐	☐ ☐	

Item #	WQMP Items	Inspected	Follow-Up Required	Date Follow-Up Completed
N12	• Is there an employee training program in place? • Does the training program include discussion of maintaining storm drain system free of debris and other pollutants? • Have employees received this training? • Other?______________________________	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	
N14 S1	• Are catch basins (both in landscaped and paved areas) free of debris and sediment? • Is stenciling legible? • Are filters free of trash and debris? • Are filters in working condition? • Other?______________________________	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	
N15	• Have paved areas been swept clean? • Other?______________________________	☐ ☐	☐ ☐	
1A 1B	• Is media filter free of sediment, trash and debris? • Is media filter in working condition? • Other?______________________________	☐ ☐ ☐	☐ ☐ ☐	
Other		☐	☐	

III. As appropriate, please describe the follow-up work required based upon evaluation in Section II above (if necessary, attach additional sheets to this report):

Item #	Description of Condition	Proposed Action
________	____	____________________________________
________	____	____________________________________
________	____	____________________________________

IV. After all inspections, do you believe that any of the BMPs need modification?

Yes No
☐ ☐ If "yes" please describe the proposed actions and the implementation date.

____

____ Date _______________

Inspection Performed By: ____ Date _______________

Printed Name and Title: ____ Date _______________

NOTICE OF TRANSFER OF RESPONSIBILITY

Water Quality Management Plan
Notice of Transfer of Responsibility

Tracking No. Assigned by the City of Newport Beach: ___________________

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

1. I. Previous Owner/Previous Responsible Party Information

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

2. II. Information about Site Transferred

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

3. III. New Owner/New Responsible Party Information

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

4. IV. Ownership Transfer Information

General Description of Site Transferred to New Owner	General Description of Portion of Project/Parcel Subject to WQMP Retained by Owner (if any)
Lot/Tract Numbers of Site Transferred to New Owner	
Remaining Lot/Tract Numbers Subject to WQMP Still Held by Owner (if any)	
Date of Ownership Transfer	

Note: When the Previous Owner is transferring a Site that is a portion of a larger project/parcel addressed by the WQMP, as opposed to the entire project/parcel addressed by the WQMP, the General Description of the Site transferred and the remainder of the project/parcel not transferred shall be set forth as maps attached to this notice. These maps shall show those portions of a project/parcel addressed by the WQMP that are transferred to the New Owner (the Transferred Site), those portions retained by the Previous Owner, and those portions previously transferred by Previous Owner. Those portions retained by Previous Owner shall be labeled “Previous Owner,” and those portions previously transferred by Previous Owner shall be labeled as “Previously Transferred.”

V. Purpose of Notice of Transfer

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

5. VI. Certifications

A. Previous Owner

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

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

B. New Owner

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

Printed Name of New Owner Representative	Title
Signature	Date

EDUCATIONAL MATERIALS

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

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

Did You Know?

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

Where Does It Go?

- Anything we use outside homes, vehicles and businesses – like motor oil, paint, pesticides, fertilizers and cleaners – can be blown or washed into s[illegible]m drains.
- A litt[illegible]ater 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.

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

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

Printed on Recycled Paper

The Ocean Begins at Your Front Door

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

Follow these simple steps to help reduce water pollution:

Household Activities

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

Automotive

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

Pool Maintenance

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

Landscape and Gardening

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

Trash

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

Pet Care

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

Common Pollutants

Home Maintenance

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

Lawn and Garden

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

Automobile

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

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

ORANGE COUNTY OC PublicWorks
Our Community. Our Commitment.
Jess A. Carbajal, Executive Director
Search
Contact The County
OCGOV | Services | Government | Residents | Business | Visitor | Health | Law | Emergency | Info OC | Departments & Agencies
The Ocean Begins at Your Front Door
www.ocwatersheds.com | Report a spill 1.877.89.SPILL
Stormwater 101 | Residents | Kid's Corner | Business | Schools | News/Events | Resources | STORMWATER IQ QUIZ | USED OIL LOCATIONS | CONTACTS

The Public Education section of the Orange County Stormwater Program website is filled with information, interactive games, video and radio public service announcements and issue-specific brochures for you to learn more about water pollution prevention.

Click here to find out about Earth Day events in your community.

It's easy to protect our waterways from pollution. Click here to learn how!

OC WATERSHEDS CLICK HERE FOR MORE INFORMATION
KID'S CORNER Click. Play. Learn.
ESPAÑOL/NGUOI VIET Multi-Cultural Resources Click Here
STAY INFORMED Fill out our form to get news and events
Jump To Our Contact Form

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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

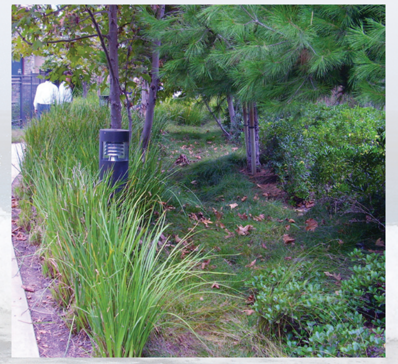
The Metropolitan Water District of Southern California for the use of the California-Friendly Plant and Native Habitat photos

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

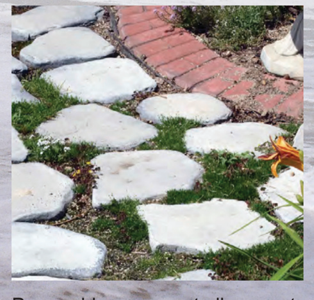
Pollution not only impairs the water quality for habitat and recreation, it can also reduce the water available for reuse. Runoff allowed to soak into the ground is cleaned as it percolates through the soil, replenishing depleted groundwater supplies. Groundwater provides at least 50% of the total water 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.



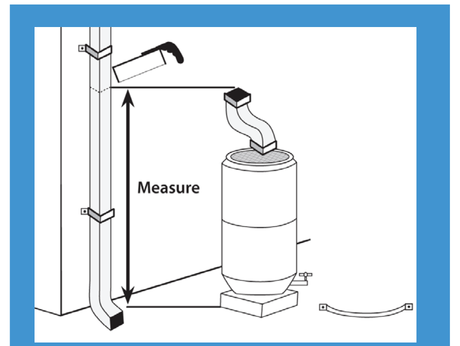
Permeable pavement allows water runoff to infiltrate through the soil and prevents most pollutants from reaching the storm drain system.

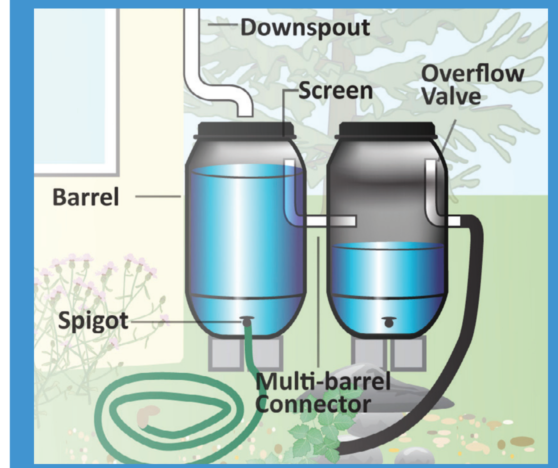
OPTIONS FOR RAINWATER HARVESTING AND REUSE

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

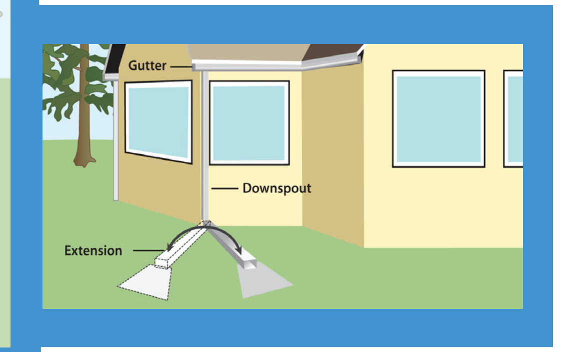
Rain barrels capture rainwater flow from roofs for reuse in landscape irrigation. Capacity of rain barrels needed for your home will depend on the amount of roof area and rainfall received. When purchasing your rain barrel, make sure it includes a screen, a spigot to siphon water for use, an overflow 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.

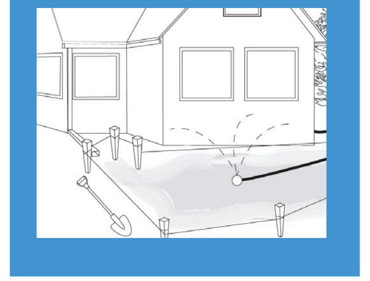
Mosquito growth prevention is very important when installing a rain barrel. The best way to prevent mosquito breeding is to eliminate entry points by ensuring all openings are sealed tightly. If these methods are unsuccessful, products are available to kill mosquito larvae, but that are harmless to animals 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.

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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♻

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Help Prevent Ocean Pollution:

Responsible Pest Control

The Ocean Begins at Your Front Door

PROJECT
Pollution
PREVENTION

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.

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

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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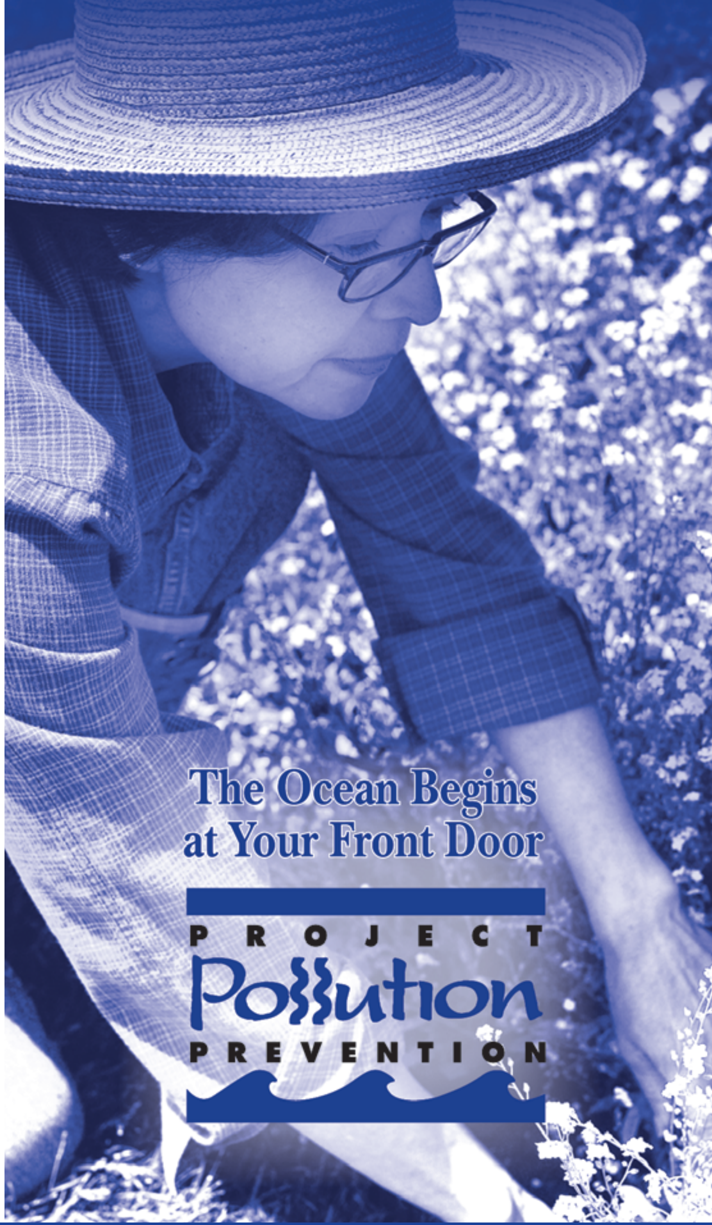


Help Prevent Ocean Pollution:

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 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).

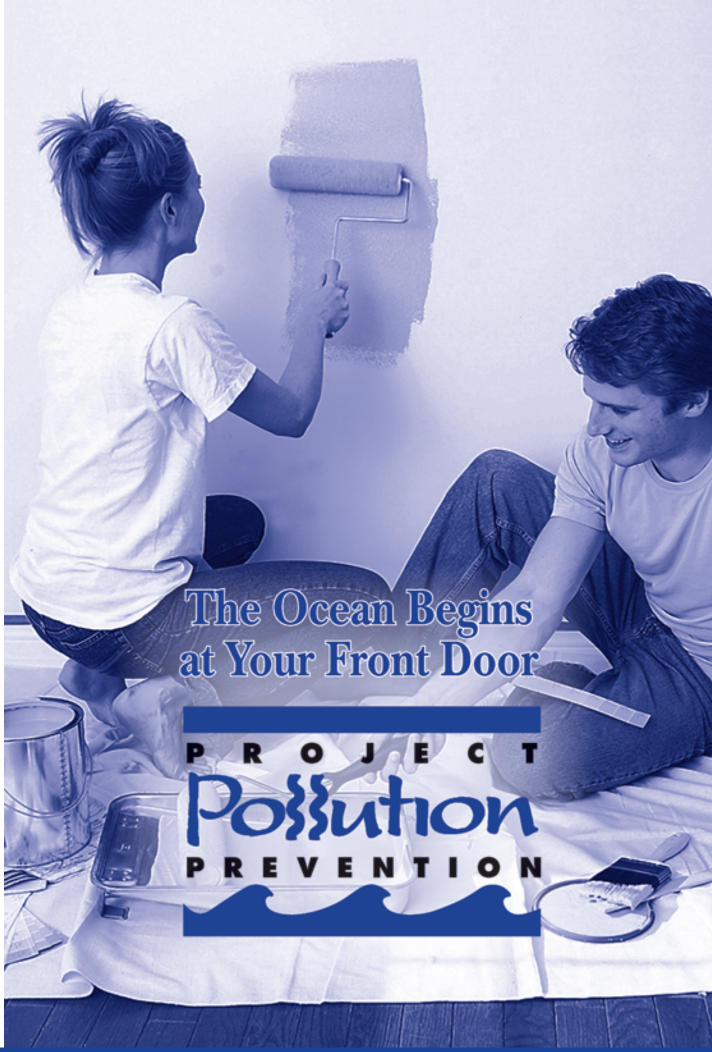
For emergencies, dial 911.

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



The Ocean Begins at Your Front Door

PROJECT
Pollution
PREVENTION

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

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

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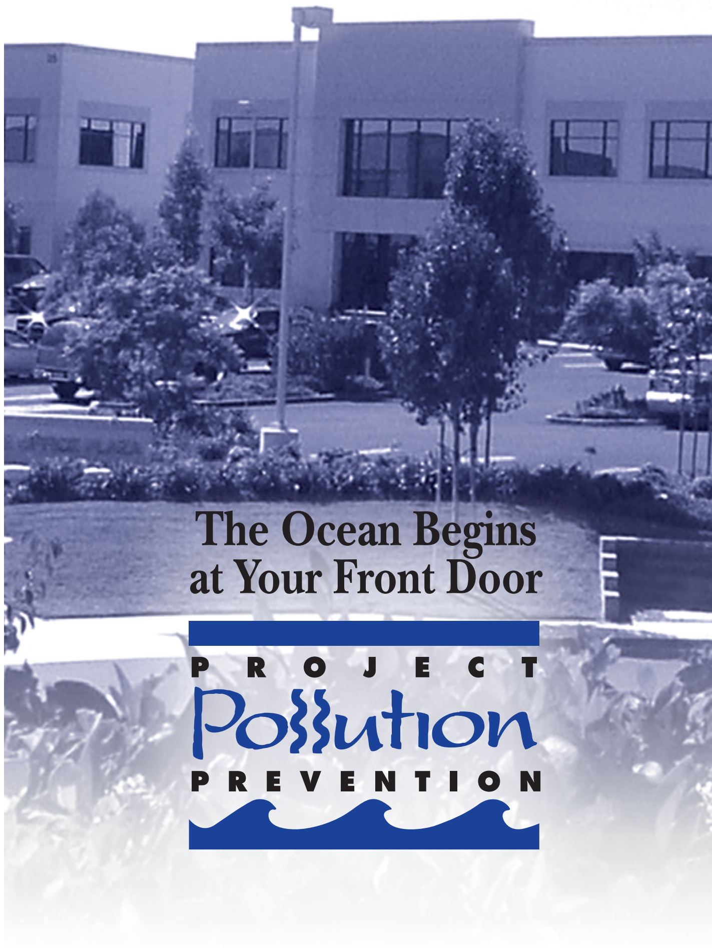
Help Prevent Ocean Pollution:

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

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

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

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

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

For emergencies, dial 911.

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

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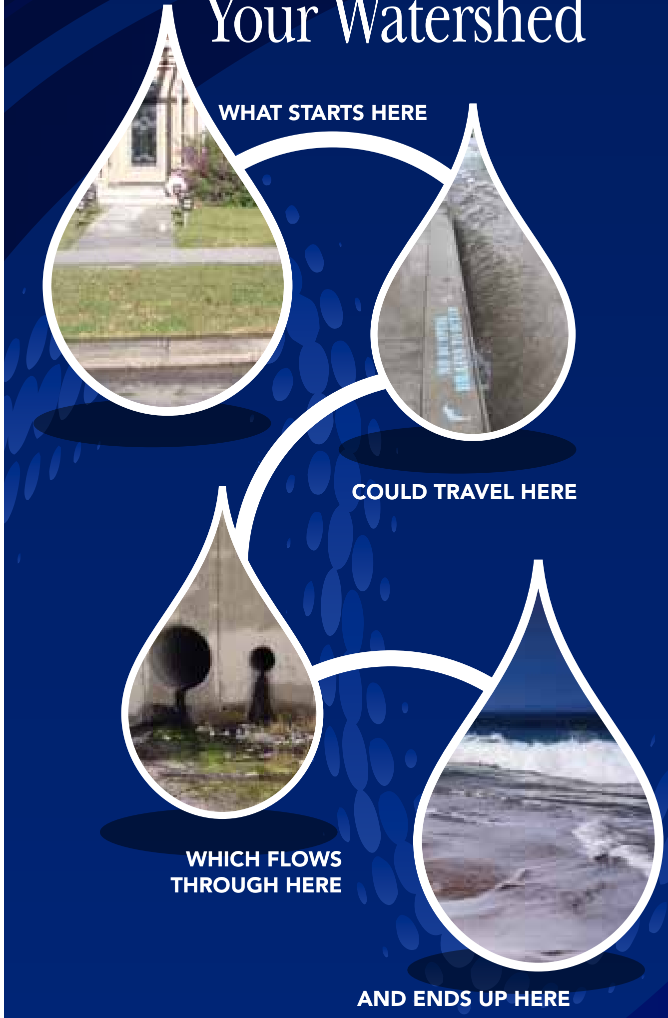
Help Prevent Ocean Pollution:
Tips For Protecting Your Watershed



The Ocean Begins at Your Front Door

PROJECT
Pollution
PREVENTION

Tips for Protecting Your Watershed

My Watershed. Our Ocean.

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

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

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

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

There are many opportunities to get involved:

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

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

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

MODEL INTEGRATED PESTICIDE MANAGEMENT, PESTICIDES AND FERTILIZER GUIDELINES

5.0 MUNICIPAL ACTIVITIES

5.1 Introduction

The DAMP recognizes that the Permittees own and operate facilities and, as a consequence, perform municipal activities over a large portion of their respective jurisdictions, which may constitute up to 20% to 30% of the land area. Many existing and enhanced municipal activities can therefore significantly contribute to the control of urban stormwater pollution. In order to manage these activities and monitor progress, the Permittees have instituted regular documentation of such activities for the purpose of non-conventional BMP effectiveness monitoring. During the Second Term Permit period, this data yielded information on the extent of BMP implementation and the volume of specific pollutants that are being diverted from the storm drain system.

With the adoption of the Third Term Permits, the Permittees were required to begin to re-evaluate and revise the municipal activities program. This has been accomplished through the development of a Model Municipal Activities Program and Model Integrated Pest Management, Pesticide and Fertilizer Guidelines.

The objectives of these model programs are to provide the Permittees with:

- A program framework for reducing the adverse impacts that municipal activities may have on water quality;
- An iterative process by which they can effectively monitor and respond to problems as they are discovered; and
- Methodologies to meet NPDES permit requirements.

The Model Program is intended to be implemented as described in Section A-5 of each Permittee's Local Implementation Plan. In developing its Local Implementation Plan, the Permittee may modify the Model Program in response to local conditions. It is not the intent for this Model Program to restrict city or county governing bodies from imposing additional stormwater management requirements on their municipal activities, facilities, lessors and contracts.

5.2 Regulatory Requirements

The federal regulations require, as part of the DAMP, a description of municipal maintenance activities and schedules for structural controls, practices for operating and maintaining public streets, and programs to reduce to the MEP pollutants in discharges from MS4s associated with the application of fertilizers, herbicides and pesticides. The Third Term Permits similarly specify that the Permittees continue to implement the existing municipal activities, BMPs and stormwater programs and modify them as necessary to reduce the discharge of pollutants from the municipal separate storm sewer system.

The Model Municipal Activities Program and the Model Integrated Pest Management, Pesticide and Fertilizer Guidelines were developed in order to fulfill the municipal activity commitments and requirements of:

- ☒ Section XIV of the Santa Ana Regional Water Quality Control Board Municipal NPDES Stormwater permit, Order No. R8-2002-0010; and
- ☒ Section F.3.a of the San Diego Regional Water Quality Control Board Municipal NPDES Stormwater permit, Order No. R9-2002-0001.

5.3 Program Development and History

During the First and Second Term Permit periods, the Permittees continued to implement existing municipal activities, BMPs and stormwater programs and modified them as necessary in order to reduce the discharge of pollutants into receiving waters that may be associated with the various activities that were conducted. Over the second permit term, this data yielded information on the extent of BMP implementation and the volume of specific pollutants that are being diverted from the storm drain system.

The activities that were addressed within the municipal program during the first two permit terms and that formed the foundation of the subsequent program that is described within Section 5.4 are as follows:

Trash and Debris Controls (formerly Litter Control)

Trash and debris controls were an important element in the diversion of trash and other materials from the storm drain system. Although most Permittees historically viewed litter control as a public service program (i.e., preventing visual blight, etc.), rather than as a pollution control problem, it is also considered important as a visual indicator of water quality. In order to proactively reduce the amount of trash and debris from entering the receiving waters, the Permittees implemented a number of structural BMPs

Solid Waste Collection/Recycling

The Permittees have solid waste collection programs for public, residential, commercial and industrial areas. The Permittees recognized that the public must be encouraged to properly dispose of their trash and educated in order to understand that the storm drain is not a waste receptacle.

Drainage Facility Maintenance

The Permittees developed and implemented drainage facility inspection and maintenance procedures and created inspection logsheets in order to document the total volume of material removed from their facilities and the percentages of each type of material. Through their routine inspections, the Permittees also notified the appropriate Authorized Inspectors under the Water Quality Ordinance of any evidence of chemical contamination or suspected illegal discharges

Catch Basin Stenciling

The goal of the stenciling program was to label and subsequently maintain those labels on over 37,000 storm drain catch basins located throughout Orange County. Initially the label was comprised of "No Dumping - Drains To Ocean" written in 3" black letters on either the top of the curb or the curb face adjacent to the inlet. This format was later revised to 3" blue letters on a white background.

Street Sweeping

All Permittees maintain street sweeping programs in residential, commercial and/or industrial areas. In 1993 the Permittees compiled information regarding their existing street sweeping schedules and practices and subsequently changed elements of their programs such as the types of sweepers purchased, the frequency of sweeping, and the use of parking restrictions in order for the street sweeping program to more effectively aid in water quality improvements.

During the Second Term Permit period, the Principal Permittee, with support of the TAC, recommended that the Permittees apply a standard of pollutant control removal effectiveness in the purchase of new street sweeper equipment.

Program Effectiveness Assessment (PEA)

Prior to 1997, the Permittees annually reviewed their hazardous materials management practices. Specific information was submitted in the annual reports regarding product substitution, structural modifications to storage areas, elimination of hazardous waste streams, installation of a clarifier for site drainage, the use of off-site facilities for vehicle cleaning, employee training, and site audits.

The Second Term Permit required the Permittees to prepare a Program Effectiveness Assessment (PEA) Program (formerly referred to as the Environmental Performance Report) and include in subsequent Annual Progress Reports a discussion of the actions taken by the Permittees to eliminate the discharge of pollutants from municipal facilities into receiving waters. This program was implemented in 1997 and was applied to municipal facilities whose operations include hazardous materials storage, waste storage, and vehicle and equipment maintenance.

Household Hazardous Waste (HHW) Collection

Orange County has an effective household hazardous waste collection program administered by the Integrated Waste Management Department (IWMD). The program comprises four sites (Anaheim, Huntington Beach, San Juan Capistrano, and Irvine) that operate 5 days per week for a total of 259 days per year per center (excluding partial or full day closures due to rainy weather). The Permittees direct residents to use these IWMD facilities for disposal of their household hazardous waste. In addition to the countywide collection, many Permittees also conduct their own HHW collections.

Fertilizer and Pesticide Management

During the First Term Permit period, a model plan entitled "*Management Guidelines for Use of Fertilizer and Pesticides*" was developed to provide guidelines for application methods for fertilizers and pesticides, surface runoff minimization, accident mitigation and Integrated Pest Management. The model was subsequently implemented by the Permittees during the Second Term Permit period.

5.4 Model Municipal Activities Program

With the adoption of the Third Term Permits, the Permittees were required to begin to re-evaluate and revise the municipal activities program. This has been accomplished through the development of a Model Municipal Activities Program Manual and Model Integrated Pest Management, Pesticide and Fertilizer Guidelines.

Use of the programs as presented promotes countywide consistency among the Permittees, which provides for uniform receiving water quality protection and program effectiveness assessment. This section is also structured in order assist the Permittees with the development of jurisdictional implementation plans.

5.4.1 Introduction

The Municipal Activities Program provides the framework and a process for conducting the following NPDES permit compliance activities at municipal fixed facilities, field programs and drainage facilities:

- Inventorying;
- Prioritization, based upon stet water quality threat;
- Identification of Model Maintenance Procedures and Best Management Practices (BMPs) to be implemented;
- Inspections and enforcement;
- Assessments of program effectiveness through implementation of an Program Effectiveness Assessment program; and
- Annual training for municipal staff, contractors, lessors and emergency fire service personnel.

For the purposes of the program, the following definitions are provided:

> *Fixed Facility* - a stationary site that is municipally owned and operated and at which municipal activities may occur. These types of facilities may also be municipally owned but privately leased. Examples of fixed facility types include municipal waste facilities and corporation yards.

Field Program - a set of related municipally performed activities that take place throughout the municipality instead of at stationary locations. These types of activities may also be privately contracted. Examples of municipal field programs include roads, streets, and highways maintenance, as well as drainage system maintenance.

Drainage Facility – structures that are designed to collect or temporarily store or convey urban dry weather and/or stormwater runoff which may and may include catch basins (storm drain inlets), detention basins, retention basins, sediment basins, open drainage channels, and lift stations. Although the street curbs and gutters and the underground channels/piping are not included within the definition, they are addressed within the Program though the field program Model Maintenance Procedures. For example, the maintenance of street curbs/gutters is addressed through the Model Maintenance Procedure for street maintenance.
Catch Basin – a box-like underground concrete structure with openings in curbs and gutters designed to collect runoff from streets and pavements; may also be referred to as a drain inlet.

Detention Basin – an excavated basin used for the temporary detention of stormwater and/or urban dry weather runoff, to delay and attenuate flow, with release usually by measured but uncontrolled outlet.

Retention Basin – a basin or depression designed to provide storage of stormwater and/or urban dry weather runoff without a positive outlet, or with a specially regulated outlet, where all or a portion of the inflow is stored for a prolonged period.

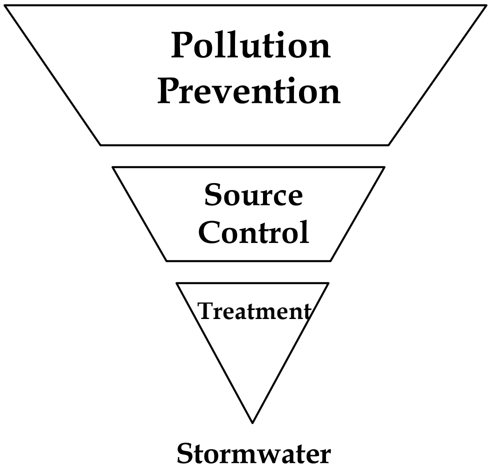
Sediment Basin – a basin with controlled stormwater release structure, formed by constructing an embankment across a drainage way that temporarily retains stormwater and/or urban dry weather runoff in order to allow sediment to settle out.

Open Drainage Channel – an above ground channel used for collecting and conveying stormwater and/or urban dry weather runoff.

Lift Station – a below grade structure designed to collect, store, and periodically transfer stormwater and/or urban dry weather runoff to flood control channels.

These procedures are based upon a three-tiered philosophy for reducing the potential impact of the Permittees' activities on water quality. The three tiers are Pollution Prevention, Source Control, and Treatment, as shown below in **Figure 5-1**.

Figure 5-1 Program Philosophy



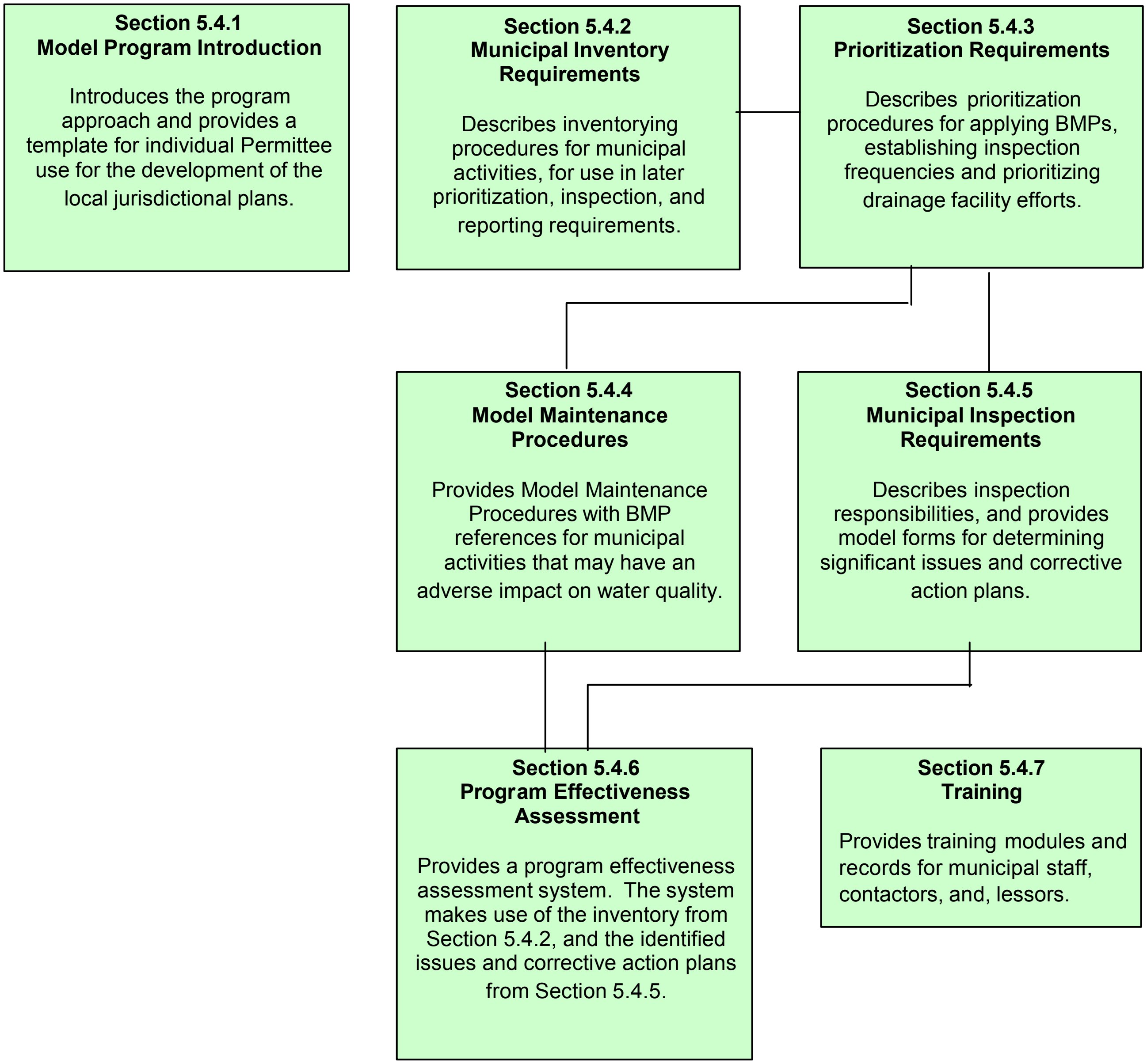
Pollution prevention controls are emphasized and will be used as the first line of defense and include measures such as ongoing staff training and public education.
Source controls will be implemented as necessary to further reduce the discharge of pollutants into receiving waters and treatment controls will be implemented as necessary to further supplement the pollution prevention and source controls by actually treating the water to remove pollutants.

For the purposes of this section of the DAMP, the following definitions apply:

> *Pollution Prevention* - any practice that reduces or eliminates the creation of pollutants. One example would be reducing the amount of litter originally generated by training public employees to not create litter while performing tasks.
>
> *Source Controls* – any practice that prevents pollution by reducing pollutants at their source. Street sweeping is an example of litter source control. Litter is removed from the street, which reduces the amount of litter that enters the storm water conveyance system.
>
> *Treatment Controls* – any practice that removes pollutants from water. Trash booms that remove litter from the water as it flows within a flood control channel is an example of a treatment control.

Figure 5-2 represents the flow of the program with a brief description of each section. Information gathered for each section of the program supports subsequent sections. The flow of the sections eliminates duplication and improves the efficiency of overall program efforts. Arrows represent the flow of information from each section.

Figure 5-2 – Model Program Flow



Section 5.4.1
Model Program Introduction

Introduces the program approach and provides a template for individual Permittee use for the development of the local jurisdictional plans.

Section 5.4.2
Municipal Inventory Requirements

Describes inventorying procedures for municipal activities, for use in later prioritization, inspection, and reporting requirements.

Section 5.4.3
Prioritization Requirements

Describes prioritization procedures for applying BMPs, establishing inspection frequencies and prioritizing drainage facility efforts.

Section 5.4.4
Model Maintenance Procedures

Provides Model Maintenance Procedures with BMP references for municipal activities that may have an adverse impact on water quality.

Section 5.4.5
Municipal Inspection Requirements

Describes inspection responsibilities, and provides model forms for determining significant issues and corrective action plans.

Section 5.4.6
Program Effectiveness Assessment

Provides a program effectiveness assessment system. The system makes use of the inventory from Section 5.4.2, and the identified issues and corrective action plans from Section 5.4.5.

Section 5.4.7
Training

Provides training modules and records for municipal staff, contactors, and, lessors.

Local Program Administration and Implementation

Although the Municipal Activities Program provides the framework and approach for complying with the NPDES permit requirements, the program is structured to assist the Permittees in the development of their local implementation plans (**Appendix A-5**). This is a requirement for the San Diego Region Permittees and an optional task for the Santa Ana Region Permittees.

5.4.2 Municipal Inventories

This section describes the procedures that are used to generate and maintain comprehensive inventories of the following elements that a city owns and operates/leases or conducts/contracts within its jurisdiction:

☒ Fixed Facilities

☒ Field Programs

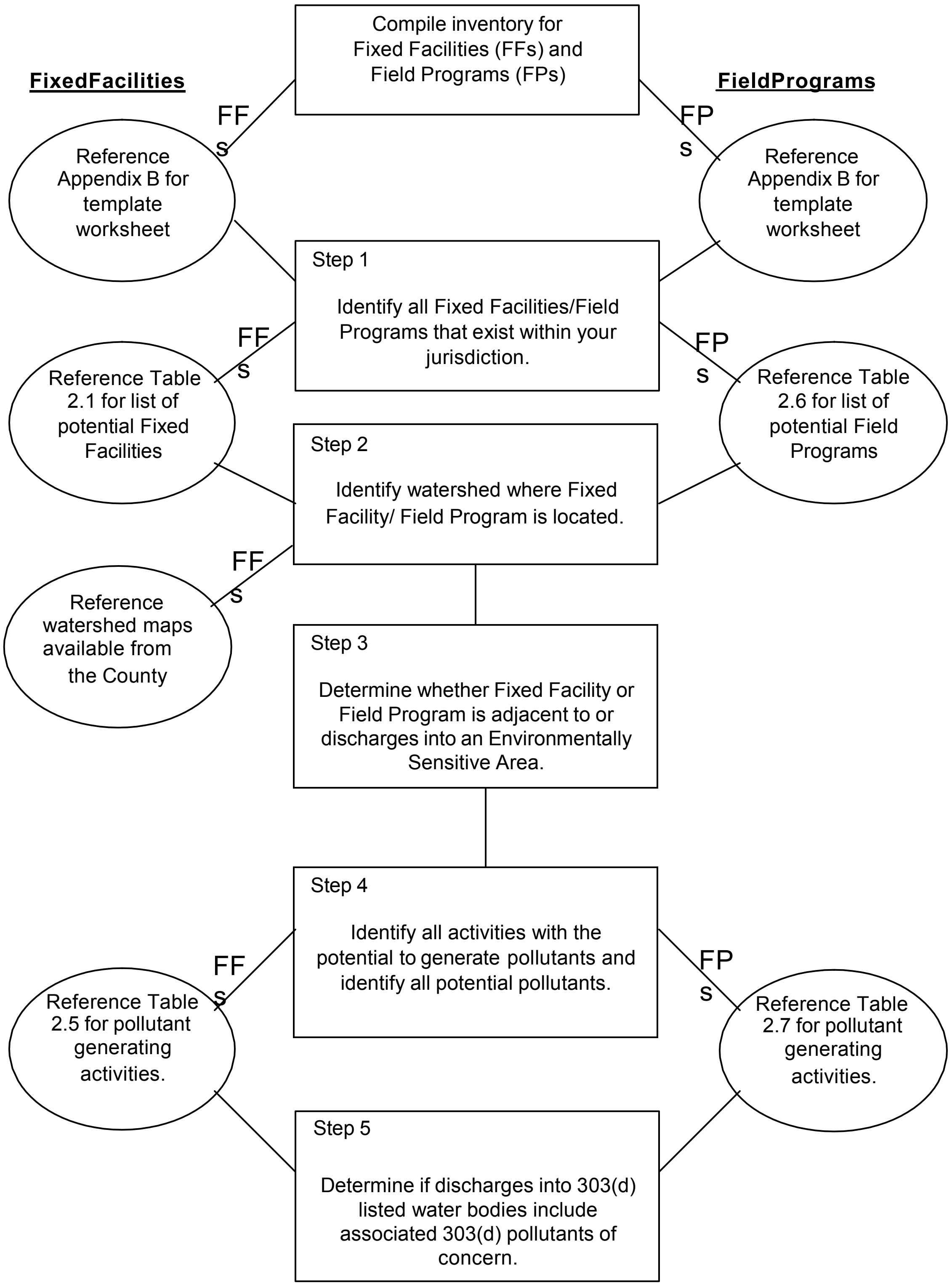
☒ Drainage Facilities

The inventories serve as the basis for the prioritization, inspection, enforcement, and reporting elements of the program, and assist the municipalities in identifying which model procedures and strategies should be implemented in order to reduce the discharge of pollutants from the storm drain system.

The flow chart presented in **Figure 5-3** illustrates the five steps involved in compiling the necessary inventory information for Fixed Facilities and Field Programs. This section provides the necessary guidelines for fully completing the inventories and provides a flow chart and guidance for compiling an inventory of Drainage Facilities.

Figure 5-3

Inventory Process for Fixed Facilities and Field Programs



5.4.2.1 Fixed Facility Inventory Procedures

Step 1 - Fixed Facilities Type Identification

The first step in the inventory process is to identify all those Fixed Facilities that are owned and operated or owned and leased by the municipality. Once those are identified, baseline information about the Fixed Facility needs to be entered into the inventory such as the name, address and type of facility.

Each Fixed Facility will be identified with a main and sub-category type within the inventory. **Table 5.1** below lists the main and sub-categories that have the greatest potential for generating pollutants that may be discharged into receiving waters. The list of fixed facilities will also include those facilities owned by a city and leased to another party.

Table 5.1
Types of Municipal Fixed Facilities

Main Facility Types	Sub-Category Facility Types
Municipal Waste Facilities	Active or Closed Municipal Landfills
	Publicly Owned Treatment Facilities
	Incinerators
	Solid Waste Transfer Facilities
	Land Application Sites
	Sites for Disposing and Treating Sewage Sludge
	Hazardous Waste Treatment, Disposal, and Recovery Facilities
	Uncontrolled Sanitary Landfills
Corporation Yards	Corporation Yards
	Maintenance Yards
	Storage Yards for Materials
Other Municipal Owned and/or Operated Facilities	Airfields (Landside Operations)
	Parks and Cemeteries
	Public Buildings (Police, Fire, Libraries, etc.)
	Stadiums
	Stables
	Boat/Shipping Yards
	Animal Shelters/Services
	Public Parking Facilities
	Fire Stations
	Other Facilities Identified by the Municipality

Step 2 – Watershed Identification

For each Fixed Facility identified above, the watershed(s) in which the Fixed Facility is located is determined and included in the inventory.

Orange County contains thirteen watersheds, which are summarized in **Table 5.2** and provided in maps available from the County. It should also be noted that ocean sections along the shore of a watershed are still considered a part of that watershed.

Table 5.2
Orange County Watersheds

Region	Watershed	Identifier
Region 8 Santa Ana	Coyote Creek	A
	Carbon Canyon	B
	Westminster	C
	Talbert	D
	Santa Ana River	E
	San Diego Creek	F
	Newport Bay	G
	Los Trancos/Muddy Creek	H
Region 9 San Diego	Laguna Canyon	I
	Aliso Creek	J
	Salt Creek	K
	San Juan Creek	L
	Prima Deshecha and Segunda Deshecha	M

Step 3 - Environmentally Sensitive Area (ESA) Impacts

The next step in conducting the inventory is to determine if the Fixed Facilities may potentially impact a water body considered to be an ESA by determining if they are either:

- Within or adjacent to, or
- Discharge pollutants directly to an ESA

For the purposes of these procedures, the following terms are defined:

> *Adjacent* - located within 200 feet of the listed water body
>
> *Discharging directly to* - discharge from a drainage system that is composed entirely of flows from the subject facility or activity, i.e., discharge from an urban area that co-mingles with downstream flows prior to an ESA is not subject to this requirement.

An ESA exists if any of the following designations have been applied to the water body of concern:

- Clean Water Act 303(d) listed impaired water body (current list approved on July 25, 2003)
- Areas designated as Areas of Special Biological Significance by the SWRCB in the Water Quality Control Plan for Ocean Waters of California (California Ocean Plan)
- Water bodies designated with the RARE beneficial use by the SWRCB in the Water Quality Control Plans for the Santa Ana River and San Diego Basins (Region 8 and Region 9 Basin Plans)
- Water bodies located within areas designated under the California Department of Fish and Game's Natural Community Conservation Planning (NCCP) Program as preserves or equivalent in subregional plans (http://www.dfg.ca.gov/nccp/status.htm)
- Areas designated as Critical Aquatic Resources in the Orange County Drainage Area Management Plan (DAMP)
- Any other equivalent Environmentally Sensitive Areas that contain water bodies that have been identified by the local jurisdiction to be of local concern

The maps in **Exhibit 5-I** may be used to assist in the identification and classification of Fixed Facilities in order to determine if they potentially impact an ESA.

Table 5.3
Summary of 1998 303(d) Listed Water Bodies and Associated Pollutants of Concern for Orange County

Region	Water Body	Watershed	Pollutant								
			Pathogens/ Coliforms	Metals	Nutrients	Pesticides	Organic Compounds	Sediment/ Siltation	Salinity	TDS	Chlorides
Region 8 Santa Ana	Anaheim Bay	C		X		X					
	Huntington Harbour	C	X	X		X					
	Santiago Creek, Reach 4	E							X	X	X
	Silverado Creek	E	X						X	X	X
	San Diego Creek, Reach 1	F		X	X	X		X			
	San Diego Creek, Reach 2	F		X	X			X			
	Newport Bay, Upper	G	X	X	X	X		X			
	Newport Bay, Lower	G	X	X	X	X	X				
Region 9 San Diego	Laguna Beach, Pacific Ocean	I	X								
	Aliso, Pacific Ocean	J	X								
	Aliso Creek, Mouth of Orange	J	X								
	Aliso Creek, Lower One Mile	J	X								
	Dana Point, Pacific Ocean	K	X								
	San Juan Creek, Mouth	L	X								
	Lower San Juan, Pacific Ocean	L	X								
	San Juan Creek, Lower	L	X								
	San Clemente, Pacific Ocean	M	X								

Table 5.4
Summary of the 2002 Proposed 303(d) list of Impaired Water Bodies for Orange County

Region	Water Body	Pollutant								
		Bacteria Indicators	Pathogens	Metals	Nutrients	Pesticides	Toxicity	Trash	Salinity/TDS/ Chlorides	Turbidity
Region 8 Santa Ana	Buck Gully Creek	X								
	Huntington Beach State Park	X								
	Huntington Harbour		X							
	Los Trancos Creek (Crystal Cove Creek)	X								
	Newport Bay, Lower			X		X				
	Newport Bay, Upper (Ecological Reserve)			X		X				
	Orange County Beaches							X		
	San Diego Creek, Reach 1	X				X				
	San Diego Creek, Reach 2			X			X			
	Seal Beach	X								
	Silverado Creek		X						X	
Region 9 San Diego	Aliso Creek (Mouth)	X								
	Aliso Creek (20 Miles)	X			X		X			
	Dana Point Harbor	X		X						
	Pacific Ocean Shoreline, Aliso Beach HSA	X								
	Pacific Ocean Shoreline, Dana Point HSA	X								
	Pacific Ocean Shoreline, Laguna Beach and San Joaquin Hills HSAs	X								
	Pacific Ocean Shoreline, Lowe San Juan HSA	X								
	Pacific Ocean Shoreline, San Clemente, San Mateo, and San Onofre HSAs	X								
	Prima Deshecha Creek				X					X
	San Juan Creek	X								
	San Juan Creek (Mouth)	X								
	Segunda Deshecha Creek				X					X

Table 5.5
Potential Pollutants from Fixed Facility Activities

Fixed Facility Activity	Sub-Activities	Potential Pollutants							
		Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Bay / Harbor Activities	On Board Maintenance Disposal of Wastewater and Ballast Water Cleaning, Chipping, and Painting			X	X	X	X	X	X
Building Maintenance & Repair	Building Maintenance Material Storage Building Cleaning Graffiti Cleaning Painting	X		X	X			X	
Equipment Maintenance & Repair	General Maintenance and Repair Vehicle and Machine Repair Waste Handling/Disposal				X		X	X	
Fueling							X	X	
Landscape Maintenance	Mowing, Trimming, and Planting Irrigation Fertilizer and Pesticide Management Managing Landscape Waste Erosion Control	X	X	X		X			X
Material Loading & Unloading			X	X	X		X	X	X
Material Storage, Handling & Disposal	Materials Storage Chemical Material Handling and Disposal Hazardous Material Handling and Disposal	X		X	X		X	X	X
Minor Construction	General Construction Activities Interim Material Storage Concrete Work Building Work	X		X					
Parking Lot Maintenance	Sweeping and Cleaning Surface Repair	X		X	X		X		
Spill Prevention Control	Preparation and Prevention Spill Response Reporting Training		X	X			X	X	X
Vehicle and Equipment Cleaning		X	X	X	X		X	X	
Vehicle and Equipment Storage	Storing Vehicles and Equipment Wrecked Vehicle Storage Cleaning Storage Areas				X		X	X	
Waste Handling and Disposal	Litter Control Waste Collection Spill/Leak Control Run-on/Runoff Prevention		X	X	X	X	X	X	

Step 4 - Potential Pollutant Generating Activities

In addition to the identification of the main and sub-categories of Fixed Facility types in Section 5.4.2, the potential pollutant generating activities and/or potential pollutants for each Fixed Facility will be identified and included in the inventory.

A list of Fixed Facility activities that have the potential to generate pollutant discharges and the potential pollutants that are associated with those activities are presented in **Table 5.5**. The table lists municipal activities that may occur at each Fixed Facility and the potential pollutants that may be associated with those activities.

General Categories of Pollutants of Concern

For the purpose of identifying pollutants of concern, pollutants are grouped in nine general categories:

> ***Pathogens / Coliforms*** – Pathogens and coliforms are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically caused by the transport of animal or human fecal wastes from the watershed. Water containing excessive bacteria and viruses can alter the aquatic habitat and create a harmful environment for humans and aquatic life. Also, the decomposition of excess organic waste causes increased growth of undesirable organisms in the water.
>
> ***Metals*** – Metals are raw material components in non-metal products such as fuels, adhesives, paints, and other coatings. Primary source of metal pollution in stormwater are typically commercially available metals and metal products. Metals of concern include cadmium, chromium, copper, lead, mercury, and zinc. Lead and chromium have been used as corrosion inhibitors in primer coatings and cooling tower systems. At low concentrations naturally occurring in soil, metals are not toxic. However, at higher concentrations, certain metals can be toxic to aquatic life. Humans can be impacted from contaminated groundwater resources, and bioaccumulation of metals in fish and shellfish. Environmental concerns, regarding the potential for release of metals to the environment, have already led to restricted metal usage in certain applications.
>
> ***Nutrients*** – Nutrients are inorganic substances, such as nitrogen and phosphorus. They commonly exist in the form of mineral salts that are either dissolved or suspended in water. Primary sources of nutrients in urban runoff are fertilizers and eroded soils. Excessive discharge of nutrients to water bodies and streams can cause excessive aquatic algae and plant growth. Such excessive production, referred to as cultural eutrophication, may lead to excessive decay of organic matter in the water body, loss of oxygen in the water, release of toxins in sediment, and the eventual death of aquatic organisms.

Pesticides – Pesticides (including herbicides) are chemical compounds commonly used to control nuisance growth or prevalence of organisms. Excessive application of a pesticide may result in runoff containing toxic levels of its active component.

Organic Compounds – Organic compounds are carbon-based. Commercially available or naturally occurring organic compounds are found in pesticides, solvents, and hydrocarbons. Organic compounds can, at certain concentrations, indirectly or directly constitute a hazard to life or health. When rinsing off objects, toxic levels of solvents and cleaning compounds can be discharged to storm drains. Dirt, grease, and grime retained in the cleaning fluid or rinse water may also adsorb levels of organic compounds that are harmful or hazardous to aquatic life.

Sediments – Sediments are soils or other surface materials eroded and then transported or deposited by the action of wind, water, ice, or gravity. Sediments can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smother bottom dwelling organisms, and suppress aquatic vegetation growth.

Trash & Debris – Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste products on the landscape. The presence of trash & debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a stream and thereby lower its water quality. Also, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide.

Oxygen-Demanding Substances – This category includes biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. Proteins, carbohydrates, and fats are examples of biodegradable organic compounds. Compounds such as ammonia and hydrogen sulfide are examples of oxygen- demanding compounds. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions.

Oil and Grease – Oil and grease are characterized as high-molecular weight organic compounds. Primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids. Introduction of these pollutants to the water bodies are very possible due to the wide uses and applications of some of these products in municipal, residential, commercial, industrial, and construction areas. Elevated oil and grease content can decrease the aesthetic value of the water body, as well as the water quality.

Step 5 - Determination of Impaired Water Body Impacts

In order to complete the inventory for Fixed Facilities, it must be determined if any Fixed Facility activities have the potential for discharging pollutants of concern to a water body with a TMDL or a 303(d) listed water body for which the water body is impaired. For example, does the activity discharge nutrients into a nutrient impaired water body?

In Step 3, 303(d) listed water bodies impacted by activities performed at Fixed Facilities were identified. In Step 4, potential pollutants associated with performed activities are identified. Refer to **Table 5.3** to determine if pollutants associated with identified activities have the potential to discharge directly to water bodies with TMDLs or 303(d) listed water bodies for which the pollutant is listed and indicate as such in the inventory.

5.4.2.2 Field Program Inventory Procedures

Step 1 – Field Program Identification

The first step in the inventory process is to identify those Field Programs conducted by the municipality. **Table 5.6** below lists the main and sub-category Field Program types that have the greatest potential for discharging pollutants into receiving waters. Each Field Program will be identified with a main and sub-category type within the inventory. The list of Field Programs must also include those that are contracted out by a city.

Table 5.6
Field Program Activities

Main Field Program Types	Sub-Category Types/Activities
Lake Management	Fertilizer & Pesticide Management
	Mowing, Trimming/Weeding, Planting
	Managing Landscape Waste
	Controlling Litter
	Erosion Control
	Controlling Illegal Dumping
	Bacteria Control
	Monitoring
Landscape Maintenance	Mowing, Trimming/Weeding, Planting
	Irrigation
	Fertilizer & Pesticide Management
	Managing Landscape Waste
	Erosion Control
Roads, Streets, and Highways Operations and Maintenance	Sweeping & Cleaning
	Street Repair & Maintenance
	Bridge & Structure Maintenance
Fountains, Plazas, and Sidewalk Maintenance and Cleaning	Surface Cleaning
	Graffiti Cleaning
	Sidewalk Repair
	Controlling Litter
	Fountain Maintenance
Solid Waste Handling	Solid Waste Collection
	Waste Reduction & Recycling
	Hazardous Waste Collection
	Litter Control
Water and Sewer Utility O&M	Water Line Maintenance
	Sanitary Sewer Maintenance
	Spill/Leak/Overflow Control
Fire Department Activities	Emergency/Post-Emergency Fire Fighting Activities
	Fire Fighting Training
	Fire Station Activities

Step 2 – Watershed Identification

For each Field Program identified above, the watershed(s) in which the Field Program is conducted will be determined and included in the inventory. It should be noted that since most Field Programs are conducted throughout a jurisdiction the inventory will likely reflect those watersheds in which the city is located and be the same for all types of field programs.

Orange County contains thirteen watersheds, which are summarized in **Table 5.2** and provided in maps available from the County. It should also be noted that ocean sections along the shore of a watershed are still considered a part of that watershed.

Step 3 - Environmentally Sensitive Area (ESA) Impacts

The next step in conducting the inventory is to determine if the Field Programs may potentially impact a water body considered to be an ESA by determining if they are:

- ☒ Within or adjacent to, or
- ☒ Discharge pollutants directly to an ESA

For the purposes of this procedure , the following terms are defined:

> Adjacent - located within 200 feet of the listed water body
>
> Discharging directly to - discharge from a drainage system that is composed entirely of flows from the subject facility or activity (i.e. discharge from an urban area that co-mingles with downstream flows prior to an ESA is not subject to this requirement).

An ESA exists if any of the following designations have been applied to the water body of concern:

- ☒ Clean Water Act 303(d) listed impaired water body.
- ☒ Areas designated as Areas of Special Biological Significance by the SWRCB in the Water Quality Control Plan for Ocean Waters of California (California Ocean Plan)
- ☒ Water bodies designated with the RARE beneficial use by the SWRCB in the Water Quality Control Plans for the Santa Ana River and San Diego Basins (Region 8 and Region 9 Basin Plans)
- ☒ Water bodies located within areas designated under the California Department of Fish and Game's Natural Community Conservation Planning (NCCP) Program as preserves or equivalent in sub regional plans (http://www.dfg.ca.gov/nccp/status.htm)
- ☒ Areas designated as Critical Aquatic Resources within this Orange County DAMP

- ☒ Any other equivalent Environmentally Sensitive Areas that contain water bodies that have been identified by the local jurisdiction to be of local concern.

The maps in **Exhibit 5-I** may be used to assist in the identification and classification of Fixed Facilities in order to determine if they potentially impact an ESA.

Step 4 - Potential Pollutant Generating Activities

The potential pollutant generating activities and/or potential pollutants for each Field Program will be identified and included in the inventory. A list of Field Program activities that have the potential to generate pollutant discharges and the potential pollutants that are associated with those activities are presented in **Table 5.7**. The table lists municipal activities that may occur at each Field Program and the potential pollutants that may be associated with those activities.

Table 5.7 Field Program Activities and Associated Potential Pollutants

Field Programs	Activities	Potential Pollutants							
		Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Lake Management	Fertilizer & Pesticide Management	X	X						X
	Mowing, Trimming/Weeding, Planting	X	X	X		X			X
	Managing Landscape Waste			X					X
	Controlling Litter	X		X		X	X		
	Erosion Control	X	X						
	Controlling Illegal Dumping		X	X			X	X	X
	Bacteria Control					X			
	Monitoring	X	X		X	X	X	X	X
Landscape Maintenance	Mowing/Trimming/Planting	X	X	X		X			X
	Irrigation	X	X			X	X	X	X
	Fertilizer & Pesticide Management	X	X						X
	Managing Landscape Wastes			X					X
	Erosion Control	X	X						
Roads, Streets, and Highways Operations and Maintenance	Sweeping and Cleaning	X		X	X		X		
	Street Repair and Maintenance	X		X	X		X	X	
	Bridge and Structure Maintenance	X		X	X		X	X	
Fountains, Plazas, and Sidewalk Maintenance and Cleaning	Surface Cleaning	X				X	X		
	Graffiti Cleaning	X			X			X	
	Sidewalk Repair	X		X					
	Controlling Litter	X		X		X	X		
	Fountain Maintenance	X		X		X			
Solid Waste Handling	Solid Waste Collection			X	X	X			
	Waste Reduction and Recycling			X	X				
	Household Hazardous Waste Collection			X	X			X	X
	Litter Control			X	X	X		X	
Water and Sewer Utility O&M	Water Line Maintenance	X							
	Sanitary Sewer Maintenance	X				X			
	Spill/Leak/Overflow Control, Response, and Containment	X	X			X		X	
Fire Department Activities	Emergency/Post-Emergency Fire Fighting Activities			X	X		X	X	
	Fire Fighting Training Activities			X				X	
	Fire Station Activities				X		X		

Step 5 - Determination of Potential Impaired Water Body Impacts

In order to complete the inventory for Field Programs, it must be determined if any Field Program activities have the potential for discharging pollutants of concern to a water body with a TMDL or a 303(d) listed water body for which the water body is impaired. For example, does the activity discharge nutrients into a nutrient impaired water body?

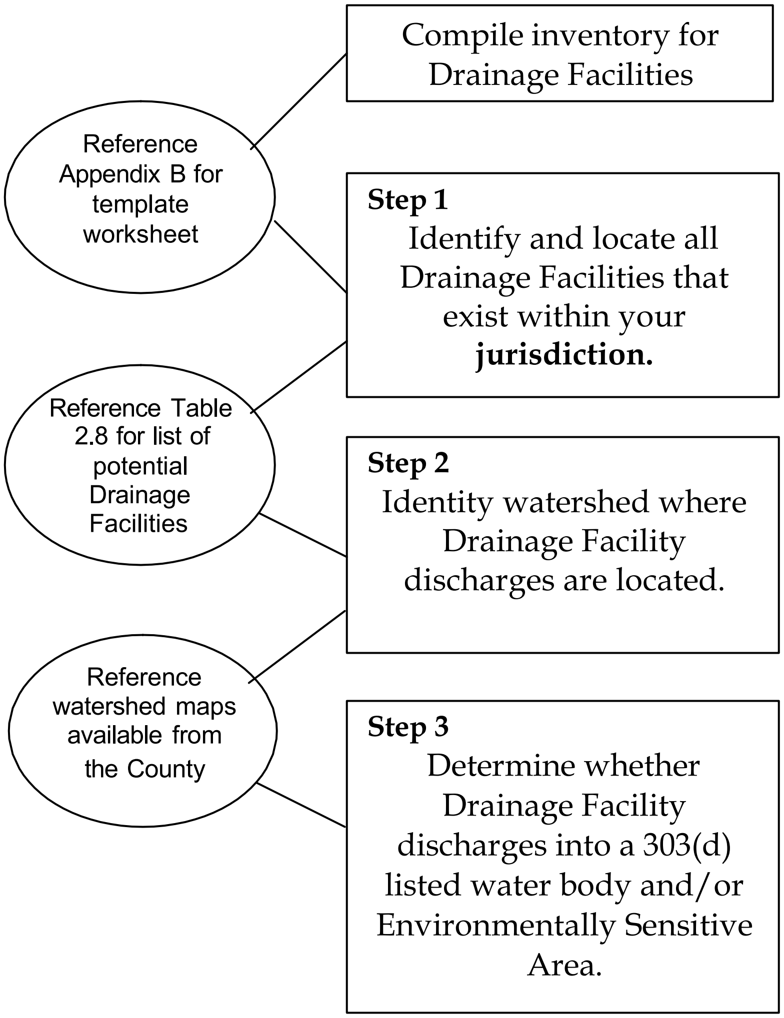
In Step 3, 303(d) listed water bodies impacted by activities performed at Field Programs were identified. In Step 4, potential pollutants associated with performed activities are identified. Refer to **Table 5.3** to determine if pollutants associated with identified activities have the potential to discharge directly to water bodies with TMDLs or to 303(d) listed water bodies for which the pollutant is listed and indicate as such in the inventory.

5.4.2.3 Drainage Facility Inventory Procedures

The flow chart presented in **Figure 5-4** below illustrates the three steps involved in compiling necessary inventory information for Drainage Facilities.

Figure 5-4

Inventory Process for Drainage Facilities



Step 1 - Drainage Facilities Type Identification

The first step in the inventory process will be to identify all those Drainage Facilities that are owned and operated by the municipality. Once they are identified, baseline information needs to be entered into the inventory such as the identification, specifications, location and type of facility (**Appendix A-5**).

Each Drainage Facility will be identified with a main and sub-category type within the inventory. **Table 5.8** below lists the main and sub-categories that have the greatest potential for discharging pollutants into receiving waters. The list of Drainage Facilities must also include those within facilities owned by a city but leased to another party. Drainage Facilities owned by another party within a jurisdiction should only be included within the owner's inventory. For example, an open channel that is owned by the county but flows through a city's jurisdiction should only be included within the county's inventory.

Table 5.8
Types of Drainage Facilities

Main Drainage Facility Types	Sub-Category Drainage Facility Types
Flood Management Projects and Flood Control Devices	Detention/Infiltration Basins
	Sedimentation Basins
	Catch Basins
	Other Inlet Structures
Drainage System	Open Channels
	Pump Stations
	Dry Weather Diversion

The number the catch basins, detention basins, retention basins, sediment basins, lift stations, etc. will be identified, including the length or magnitude of open channels.

A basic inventory of Drainage Facilities, including number or magnitude, is included in **Exhibit A-5-I**.

Step 2 – Watershed Identification

For each Drainage Facility identified above, the watershed(s) in which the Drainage Facility is located will be determined and included in the inventory.

Orange County contains thirteen watersheds, which are summarized in **Table 5.2** and provided in maps available from the County. It should also be noted that ocean sections along the shore of a watershed are still considered a part of that watershed.

Step 3 - Environmentally Sensitive Area (ESA) Impacts

The next step in conducting the inventory is to determine if the Drainage Facilities may potentially impact a water body considered to be an ESA by determining if they are:

Within or adjacent to, or

Discharge pollutants directly to an ESA

For the purposes of these procedures, the following terms are defined:

> *Adjacent* - located within 200 feet of the listed water body
>
> *Discharging directly to* - discharge from a drainage system that is composed entirely of flows from the subject facility or activity (i.e. discharge from an urban area that co-mingles with downstream flows prior to an ESA is not subject to this requirement).

An ESA exists if any of the following designations have been applied to the water body of concern:

☒ Clean Water Act 303(d) listed impaired water body.

☒ Areas designated as Areas of Special Biological Significance by the SWRCB in the Water Quality Control Plan for Ocean Waters of California (California Ocean Plan)

☒ Water bodies designated with the RARE beneficial use by the SWRCB in the Water Quality Control Plans for the Santa Ana River and San Diego Basins (Region 8 and Region 9 Basin Plans)

☒ Water bodies located within areas designated under the California Department of Fish and Game's Natural Community Conservation Planning (NCCP) Program as preserves or equivalent in sub-regional plans (http://www.dfg.ca.gov/nccp/status.htm)

☒ Areas designated as Critical Aquatic Resources within this Orange County DAMP

☒ Any other equivalent Environmentally Sensitive Areas that contain water bodies which have been identified by the local jurisdiction to be of local concern.

The maps in **Exhibit 5-I** may be used to assist in the identification and classification of Fixed Facilities in order to determine if they potentially impact an ESA.

5.4.3 Prioritization

This section outlines the procedures for prioritizing the Fixed Facilities, Field Programs (5.4.3.2), and Drainage Facilities (5.4.3.3) for the inspection frequency, based upon the threat to water quality. The prioritization will result in a high, medium or low threat categorization and corresponding inspection frequency. Inspections will occur within every permit term, or as needed if changes occur on-site within the permit term. Prioritization Checklists and Ranking Worksheets are provided as part of the Local Implementation Plan (**Appendix A-5**).

5.4.3.1 Prioritizing Fixed Facilities

The following Fixed Facility categories are automatically high priority:

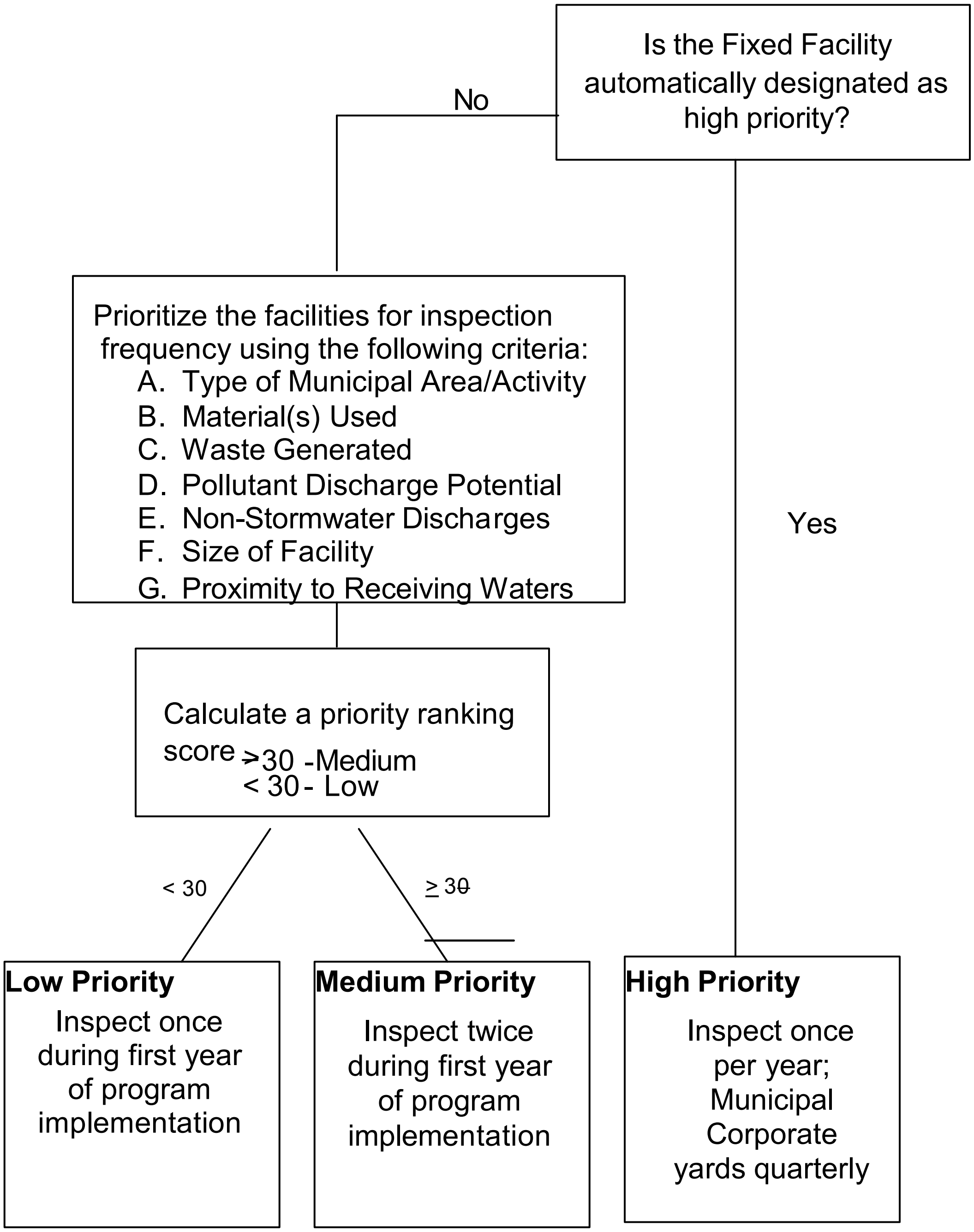
- Active or closed municipal landfills
- Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems
- Municipal separate storm sewer systems (MS4)
- Incinerators
- Solid waste transfer facilities
- Land application sites
- Uncontrolled sanitary landfills
- Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles
- Sites for disposing and treating sewage sludge (city owned sludge storage facilities, land application sites, incinerators, etc.)
- Hazardous waste treatment, disposal, and recovery facilities.
- Municipal airfields (landside operations only – parking garages, terminals, landscaping, etc.)
- Roads, streets, highways and parking facilities
- Fixed Facilities that lie within, discharge directly to or adjacent to an ESA or 303(d) listed impaired water body, and discharge the listed pollutant of concern (see Section 2)
- Other municipal areas and activities that a municipality determines may contribute a significant pollutant load to the MS4

For Fixed Facilities that are not identified as high priority as described above, a priority will be determined using a ranking system. The criteria include:

- Type of municipal area/activity
- Material(s) used
- Wastes generated
- Pollutant discharge potential
- Non-stormwater discharges
- Size of facility or area (impervious)
- Proximity to receiving water bodies

The model system is illustrated in **Figure 5-5** where each step within the ranking system is described in detail.

Figure 5-5
Fixed Facility Inspection
Prioritization



Prioritization is performed by applying steps A through G and assigning a point value (0 - 5), which will be totaled for a final ranking. A ranking worksheet is provided in Appendix C. Suggested point value assignments for each step are provided below. With the exception of Step C, point values assigned at each step are subjective, based upon overall conditions.

A. Area/Activity

Provide a ranking based upon the activities that occur at the facility.
0 = Activities at this municipal Fixed Facility are not likely to generate pollutants. 0% of activities are outdoors.

1 = Activities at this municipal Fixed Facility may generate pollutants. 0 to 25% of activities are outdoors and not covered.

3 = Activities at this municipal Fixed Facility have a likelihood to generate pollutants. >25 to 75% of activities are outdoors and not covered.

5 = Activities at this municipal Fixed Facility have a high likelihood to generate pollutants. >75% of activities conducted are outdoors and not covered.

B. Materials Used

Provide a ranking based upon the raw materials that are used at the facility and their potential to generate pollutants.

0 = No raw materials are used at this municipal Fixed Facility.

1 = Minimal raw materials are used at this municipal Fixed Facility and are not likely to generate pollutants (e.g., Administration Buildings).

3 = Some raw materials are used at this municipal Fixed Facility and may generate pollutants (e.g., pesticides).

5 = A significant amount of raw materials are used at this municipal Fixed Facility and have a high likelihood to generate pollutants (e.g., routine storage of uncovered raw materials).

C. Wastes Generated

Provide a ranking based upon the potential that a facility may have to generate 303(d) listed water body pollutants (refer to the inventory spreadsheets).

0 = No 303(d) listed pollutants were identified

5 = 303(d) listed pollutants were identified (e.g. bacteria/pathogens, pesticides/herbicides, metals, nutrients, organics, and sediment or solids.

D. Pollutant Discharge Potential

Provide a ranking based upon the implementation of current Best Management Practices (BMPs) as identified within the corresponding Model Maintenance Procedures.

1 = All identified BMPs are fully implemented

3 = All identified BMPs are partially implemented

5 = None of the identified BMPs are implemented, or unknown if BMPs are implemented

E. Non-Stormwater Discharges

Provide a ranking based upon observed or known non-stormwater discharges.

1 = No known non-stormwater discharges occurring (BMPs implemented to prevent, to treat or control non-stormwater discharges) Spill and Pollution Prevention Training Program implemented, kits in place, operation and maintenance (O&M) program implemented

3 = It is suspected that non-stormwater discharges may be occurring, but no discharges have been observed

5 = Non-stormwater discharges have been observed or have been verified based on interviews with City staff

F. Size of Facility

Provide a ranking based upon the amount of impervious area including parking lots.

1 = Small (<5,000 square feet)

3 = Medium (>5,000 - <100,000 square feet)

5 = Large (>100,000 square feet)

G. Proximity to Receiving Water Body (303(d) water bodies or ESA)

Provide a ranking based upon the distance from the municipal Fixed Facility to a water body (including tributaries).

1 = Low (>200 feet)

3 = Medium (< 200 feet)

5 = High (direct discharge or adjacent)

Finalize the Ranking
By totaling the scores that were determined using the above criteria, (steps A-G) determine the final ranking.

Ranking = A+B+C+D+E+F+G

Ranking > 30 - A medium priority is assigned if the ranking total is greater than or equal to 30. Medium priority Fixed Facilities must be inspected bi-annually during the first year of program implementation.

Ranking < 30 – A low priority is assigned if the ranking total is less than 30. Low priority Fixed Facilities should be inspected at a minimum of once during the first year of program implementation.

5.4.3.2 Prioritizing Field Programs

Since Field Programs that are conducted by a city occur jurisdiction-wide and it would be impractical to conduct field activities differently based upon location, all Field Programs are prioritized as high priority and should be inspected once per year. Prioritization Checklists and Ranking Worksheets are provided as part of the Local Implementation Plan (**Appendix A-5**).

5.4.3.3 Prioritizing Drainage Facilities

Drainage Facilities are defined in Section 5.1, and include such structures as catch basins (storm drain inlets), detention basins, retention basins, sediment basins, and lift stations. The resulting maintenance of the facilities that may be conducted based upon the results of the inspections includes cleaning and removing accumulated waste materials.

All Drainage Facilities, by Orange County definition, are categorized as high priority. These facilities will receive annual inspection and maintenance once per year prior to the wet season (between May 1 and September 30), and as often as necessary throughout the wet season. Prioritization Checklists and Ranking Worksheets are provided as part of the Local Implementation Plan (**Appendix A-5**).

5.4.4 Model Maintenance Procedures

Staff performing activities at municipal Fixed Facilities (including non-fire fighting activities at fire stations), within Field Programs, and at Drainage Facilities will follow the Model Maintenance Procedures that have been developed and are included in **Appendix A-5**. The Model Maintenance Procedures are summarized below in **Tables 5.9** through **5.11** and contain procedures designed to reduce the potential impact of these activities on water quality. Fertilizer and Pesticide guidance to help prevent misuse of fertilizers and pesticides and to assist in the handling of these materials is discussed in Section 5.5 of the DAMP.

Staff performing operations at Fixed Facilities (including non-fire fighting activities at fire stations), within Field Programs, and at Drainage Facilities will implement the baseline procedures and Best Management Practices (BMPs) as described within the Model Maintenance Procedures. Optional enhanced BMPs described within the Model Maintenance Procedures will be implemented at high priority Fixed Facilities, Field Programs, and Drainage Facilities if operational history, inspection findings, or other special situations warrant implementation.

Table 5.9
Model Maintenance Procedure Fact sheets for Fixed Facilities

Fixed Facility Fact sheets	
Bay / Harbor Activities	Minor Construction
Building Maintenance and Repair	Parking Lot Maintenance
Equipment Maintenance and Repair	Spill Prevention Control
Fueling	Vehicle and Equipment Cleaning
Landscape Maintenance	Vehicle and Equipment Storage
Material Loading and Unloading	Waste Handling and Disposal
Material Storage, Handling and Disposal	

Table 5.10
Model Maintenance Procedure Fact sheets for Field Programs

Field Program Fact sheets
Lake Management
Landscape Maintenance
Roads, Streets, and Highways Operations and Maintenance
Sidewalk, Plaza, and Fountain Maintenance and Cleaning
Solid Waste Handling
Water and Sewer Utility O&M
Fire Department Activities

Table 5.11
Model Maintenance Procedure Fact sheets for Drainage Facilities

Drainage Facility Fact sheets
Drainage Facility Operations and Maintenance

Although some of the model maintenance procedures refer to the disposal of certain types of wastewater to the sanitary sewer system, it should be noted that disposal to these systems should only be done in accordance with district policies and procedures which may include the following:

☒ No person shall discharge groundwater, surface or subsurface runoff directly or indirectly into the sewer without the expressed written authorization of the district for such an activity;

☒ Discharges shall only be authorized if no alternate method for disposal is reasonably available or to mitigate an environmental or health hazard;

☒ Any connections or discharges to the sanitary sewer system without specific authorization and permit are subject to administrative penalties;

☒ No connection for rainwater/stormwater is allowed to the sanitary sewer system; and

☒ Discharges to the sanitary sewer system may have to meet pre-established limits

5.4.4.1 Implementation by Contract Staff

The program approach and procedures presented within this section apply to municipal owned and operated facilities and field programs. It is important that the leased facilities and contracted services are also included within the context of the program. Although municipal employees typically perform most maintenance activities, some cities (especially smaller ones) contract out these activities to other parties. For example, many smaller municipalities contract out services such as street sweeping and road maintenance.

Since measures should be taken to protect water quality while performing such activities, regardless of whether the activity is being performed by a municipality, contractor, or lessor, example contract and lease language is provided below for contractor/lessor responsibility.

Example Lease Language for Fixed Facilities
Following is example language that can be inserted into municipal leases:

> The Santa Ana and San Diego Regional Water Quality Control Boards (RWQCB) have issued permits which govern stormwater and non-stormwater discharges resulting from municipal activities performed by or for the County of Orange, Orange County Flood Control District and incorporated cities of Orange County (collectively referred to as Permittees). The RWQCB Permits are National Pollutant Discharge Elimination System (NPDES) Permits No. R8-2002-0010 and R9-2002-0001, respectively. Copies of the RWQCB Permits are available for review.
>
> In order to comply with the Permit requirements, the Permittees have developed a Drainage Area Management Plan (DAMP) which contains Model Maintenance Procedures with Best Management Practices (BMPs) that parties leasing municipal owned properties must adhere to. These Model Maintenance Procedures contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.
>
> Activities performed at the facility leased under this agreement shall conform to the Permits, the DAMP, and the Model Maintenance Procedures, and must be performed as described within all applicable Model Maintenance Procedures. The holder of this agreement shall fully understand the Model Maintenance Procedures applicable to activities conducted at the facility leased under this agreement prior to conducting them and maintain copies of the Model Maintenance Procedures at the leased facility throughout the agreement duration. The applicable Model Maintenance Procedures are included as Exhibit ___of this agreement.
>
> Evaluation of activities subject to DAMP requirements performed at the facility leased under this agreement will be conducted by the city to verify compliance with DAMP requirements and may be required through lessor self-evaluation as determined by the city.

Example Contract Language for Field Programs
Following is example language that can be inserted into municipal field program contracts:

> The Santa Ana and San Diego Regional Water Quality Control Boards (RWQCB) have issued permits which govern stormwater and non-stormwater discharges resulting from areas owned and operated by the County of Orange, Orange County Flood Control District and incorporated cities of Orange County (collectively referred to as Permittees). The RWQCB Permits are National Pollutant Discharge Elimination System (NPDES) Permits No. R8-2002-0010 and R9-2002-0001, respectively. Copies of the RWQCB Permits are available for review.
>
> In order to comply with the Permit requirements, the Permittees have developed a Drainage Area Management Plan (DAMP) which contains Model Maintenance Procedures with Best Management Practices (BMPs) that parties conducting the municipal activities must adhere to. These Model Maintenance Procedures apply to any party conducting municipal activities and contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.
>
> Work performed under this CONTRACT shall conform to the Permit requirements, the DAMP, and the Model Maintenance Procedures and must be performed as described within all applicable Model Maintenance Procedures. The CONTRACTOR shall fully understand the Model Maintenance Procedures applicable to activities that are being conducted under this CONTRACT prior to conducting them and maintain copies of the Model Maintenance Procedures throughout the CONTRACT duration. The applicable Model Maintenance Procedures are included as Exhibit ___ of this CONTRACT.
>
> Evaluation of activities subject to DAMP requirements performed under this CONTRACT will be conducted to verify compliance with DAMP requirements and may be required through CONTRACTOR self-evaluation as determined by the city.

5.4.5 Municipal Inspection Requirements

Inspections of municipal Fixed Facilities, Field Programs, and Drainage Facilities will be performed in order to verify that the Model Maintenance Procedures are being implemented, that they are appropriate for that facility or program, and that they continue to be protective of water quality.

Inspections generally consist of the following:

- Fixed Facilities – inspections are typically performed by a combination of stormwater program staff and on-site Fixed Facility managers. The inspection of a Fixed Facility may include spot checks of the facility and activities being performed at the facility, or interviews with key line staff.

- Field Programs – inspections are typically performed by a combination of stormwater program staff and Field Program supervisors. The inspection of a Field Program may include spot checks of activities being performed, or interviews with key line staff.

- Drainage Facilities – inspections are typically performed by a combination of stormwater program staff and Drainage Facility maintenance supervisors. Inspections of Drainage Facilities may include routine annual inspections plus spot checks during the wet season.

- Contracted Activities – inspections are typically performed by a combination of municipal staff as well as self-inspections and reporting by the management staff of the contract firm performing the activity. See model contract language in Section 5.4.

- Leased Facilities – inspections are typically performed by a combination of municipal staff as well as self-inspections and reporting by the management staff of the lessor. See model lease language in Section 5.4.

5.4.5.1 Inspection Frequencies

Inspections are based upon the priority of the Fixed Facility or Field Program and their threat to water quality (see Section 5.4). All Drainage Facilities are considered high priority and will be inspected as shown **Table 5.12**. The inspection frequency is consistent whether a facility or program is operated and maintained by municipal staff, contracted staff, or lessors.

Inspection frequencies will be as follows:

Table 5.12
Inspection Frequencies

Facility/Program	Inspection Frequency
Fixed Facilities	
Municipal Corporation Yards	Quarterly
High Priority Fixed Facility	Annually
Medium Priority Fixed Facility	Biannually During First Year of Program Implementation
Low Priority Fixed Facility	Once During First Year of Program Implementation
Field Programs	
High Priority Field Programs	Annually
Drainage Facilities	
Drainage Facilities (San Diego Permittees)	Annually Before the Wet Season, with Additional Inspections as Needed During the Wet Season
Drainage Facilities (Santa Ana Permittees)	Annually (see specific indications below)

Municipal Corporation Yards will be inspected quarterly due to the many activities that take place on the yard that potentially threaten water quality. Drainage Facilities located in the Santa Ana Region will inspect, clean and maintain at least 80 percent of drainage facilities on an annual basis, with 100 percent of the facilities included in a two-year period. Fixed Facilities and Field Programs will be inspected as indicated above, however in the event of an observed problem, such as ineffective maintenance procedures or detected non-stormwater discharges, the inspection frequency will be increased as appropriate to facilitate correction of the problem (see Section 5.4.5.3 Enforcement).

5.4.5.2 Inspection Documentation Procedures

In order to properly document all inspections and gather the necessary information for the Program Effectiveness Assessment program effectiveness assessment (see Section 5.4.6), model inspection forms for Fixed Facilities, Field Programs, and Drainage Facilities have been developed (see **Appendix A-5**)

The inspection forms to be used during inspection consist of the following:

General Inspection Forms – This primary form provides for a general characterization of the Fixed Facility, Field Program, or Drainage Facility being inspected, including the type of facility or program, the reason for inspection, and activities that may take place. A general cover sheet inspection form is required for all inspections.

Activity Specific Inspection Forms – These secondary forms provide a series of questions about specific activities taking place at a Fixed Facility, Field Program or Drainage Facility, as well as a list of suggested corrective action plans that can be implemented should a problem be found.

The activity specific forms for Fixed Facilities include:

- ☒ Bay/Harbor Activities
- ☒ Building Maintenance and Repair
- ☒ Equipment Maintenance and Repair
- ☒ Fueling
- ☒ Landscape Maintenance
- ☒ Material Loading and Unloading
- ☒ Material, Storage, Handling and Disposal
- ☒ Minor Construction
- ☒ Parking Lot Maintenance
- ☒ Spill Prevention Control
- ☒ Vehicle and Equipment Cleaning
- ☒ Vehicle and Equipment Storage
- ☒ Waste Handling and Disposal

Activity specific inspection forms for Field Programs include:

- ☒ Lake Management
- ☒ Landscape Maintenance
- ☒ Roads, Streets, and Highways Operations and Maintenance
- ☒ Sidewalk, Plaza, and Fountain Maintenance and Cleaning
- ☒ Solid Waste Handling
- ☒ Water and Sewer Utility O&M
- ☒ Fire Department Activities

The activity specific form for Drainage Facilities is:

☒ Drainage System Operations and Maintenance

One activity specific form should be filled out for each activity at each Fixed Facility, Field Program, or Drainage Facility.

5.4.5.3 Enforcement

In order to ensure compliance, and in addition to the routine education and training that will take place (see Section 5.4.7), enforcement procedures and mechanisms must be established and implemented by each City for the municipal activities program. The City has many options in developing its policies and procedures and may choose its own disciplinary resources to implement and enforce its program.

Enforcement actions may occur as a result of a problem found during an inspection or in response to a complaint that is received. As such, there are several different types of enforcement mechanisms and penalties that the City may utilize in order to ensure compliance. For example, the City may choose to give a verbal warning as a method of requesting corrective action. If a deficiency that was noted in a prior verbal warning is not corrected, a written warning may be issued and enforcement will continue until the problem is solved. External enforcement action could range from the issuance of a notice of noncompliance to the loss of a contract or lease, or a fine, depending by the City on a case-by-case basis.

5.4.6 Program Effectiveness Assessment

The overall Program Effectiveness Assessment (PEA) serves as the foundation for the submittal of the annual progress report that is submitted each year to the Principal Permittee and subsequently to the Regional Boards and serves as the basis for evaluating each municipality's individual municipal activity efforts (See **DAMP Appendix C**).

By completing the effectiveness assessment, the Permittees will each have a baseline by which they can compare subsequent evaluations and identify trends. This information can then be used to determine where modifications within the program may be necessary and ensures that the iterative evaluation and improvement process is applied to the program component and used as an effective management tool.

5.4.7 Education and Training

Education and training of municipal staff is one of the keys to a successful stormwater program. To assist the responsible municipal and contract/lease staff in understanding the Municipal Activities Program Manual and the Model Maintenance Procedures, several different annual training sessions have been or are being developed.

In order to adequately address the different areas of the Municipal Activities Program element, four training modules have been developed and are included in the Final Model Municipal Activities Program Manual (**Appendix B-5**).

In order to ensure that the program is being implemented properly, each municipality should have the appropriate number and type of personnel at each of the training sessions. In addition to Permittee sponsored training, staff is also encouraged to attend training seminars or workshops related to stormwater management and water quality conducted by other organizations.

5.4.7.1 Training Modules

In order to adequately address the different areas of the Municipal Activities Program element, five training modules have been developed and are included in **Appendix B-5.**

The following sections describe the five modules.

- The General Program Management training module is generally targeted for stormwater program managers and addresses the overall program framework, objectives and approach so that they may gain a broad understanding of how the program is developed and implemented at a local level. The training will be in a classroom setting, provided annually, and approximately 2-3 hours in length.

- The Fixed Facility training module is generally targeted for facility managers and field level staff and addresses the implementation and inspection of the actual procedures. This training is tailored to municipal staff supervising the performance of municipal activities, in a "train the trainer" style format for formal or tailgate-style use. The training will be both classroom and field settings, provided annually, and approximately 2-3 hours in length.

- The Field Program training module is generally targeted for facility managers and field level staff and addresses the general techniques municipal staff may implement to prevent pollution problems, how to respond to spills once they have occurred and how to recognize potential problems. The training will be in a classroom setting, provided annually, and approximately 2-3 hours in length.

- The Municipal IPM Fertilizer/Pesticide Guidelines training module is generally targeted for stormwater program managers and addresses the overall program framework, objectives and approach so that they may gain a broader understanding of how the program was developed and should be implemented at a local level. The training generally focuses on the proper application and handling of fertilizers and pesticides for management and municipal staff performing application activities. The training will be in a classroom setting, provided annually, and approximately 2-3 hours in length.

- The Municipal IPM Approaches training module is generally targeted for Permittee field staff and applicators. The training is specific regarding the different types of techniques and technologies are available for municipal staff to implement while managing and applying pesticides and fertilizers.

5.5 Model Integrated Pest Management, Pesticides and Fertilizer Guidelines

5.5.1 Introduction

Fertilizers and pesticides are a primary tool of plant health and pest management. Used properly, fertilizers provide important nutrients for plants, and pesticides help to protect plants from potential harm due to insects, mites, plant diseases, nematodes, vertebrates (such as gophers and rats) and weeds.

Used improperly, fertilizers and pesticides may, among other things, impair surface and groundwater supplies. Careless management activities such as application, mixing, transportation, storage and disposal can allow these chemicals to enter surface and groundwater through runoff and infiltration. These practices may also endanger human and/or environmental health through the exposure to these potentially toxic chemicals.

Due to these inherent risks even under ideal conditions, and the importance of professional planning and management, the Management Guidelines for the Use of Fertilizers and Pesticides that were originally developed in 1993 were re-evaluated and significantly revised to provide the public agencies in Orange County with:

- A process by which they can effectively re-evaluate their approach to using fertilizers and pesticides as needed and begin to move toward reducing their dependence on them by developing a comprehensive Integrated Pest Management Program;
- A program framework for reducing the adverse impacts that the use of fertilizers and pesticides may have on water quality; and
- General guidelines that can be used in conjunction with the *Landscape Model Maintenance Procedures (Municipal Activities Program Manual)* in order to minimize the potential threat to human health and environmental resources.

The overall objective of the manual is to provide the municipalities within Orange County with general guidelines for the management activities associated with integrated pest management, pesticide and fertilizer applications. If desired, the guidelines may also be used to develop a comprehensive Integrated Pest Management (IPM) Program.

Ultimately, the guidelines may be used and encouraged on a broader scale. They are based on the laws, management guidelines, research-based recommendations and "management measures and practices" established by other federal, state and local agencies and universities and they recognize that the safe management of fertilizers and pesticides is a shared responsibility between applicators, handlers and management.

In addition, general training for this program element will be conducted annually as a part of the overall Municipal Activities Program Manual. The Management Guidelines for Integrated Pest Management, Pesticides, and Fertilizers training module is generally targeted for stormwater program managers and addresses the overall program framework, objectives and approach so that they may gain a broader understanding of how the program was developed and should be implemented at a local level.

The training generally focuses on the proper application and handling of fertilizers and pesticides and the implementation of integrated pest management practices for management and municipal staff performing these activities. The training will be in a classroom setting, provided annually and approximately 2-3 hours in length. Additional training modules will be developed as needed. Additional details on the overall framework and approach of the training modules are included in the Municipal Activities Program Manual.

For the purpose of these guidelines:

- Fertilizers may be referred to as "nutrients" or "soil nutrients";
- "Pesticides" will encompass all herbicides, insecticides, fungicides and rodenticides;
- The California Food and Agricultural Code (FAC) and the California Code of Regulations, Title 3 (3 CCR), constitute the laws and regulations referred to in these guidelines. They are referenced often and usually referred to as the "State Laws";
- The Permittees are referred to as "public agencies", and employees working for these public agencies and responsible for the handling and/or application of fertilizers and pesticides will be referred to as "public employees".

5.5.2 Integrated Pest Management

5.5.2.1 Background on Pesticide Use and Integrated Pest Management

For most of the last 55 years, the trend in pest management has been toward a greater reliance on chemical pesticides. The result has been not only a tremendous increase in the use of many dangerous chemicals, but also an increase in the number of pests that are resistant to the pesticides or new organisms becoming pests. Additionally, some pesticides used for terrestrial pest management have been found in waterways causing additional problems in the environment.

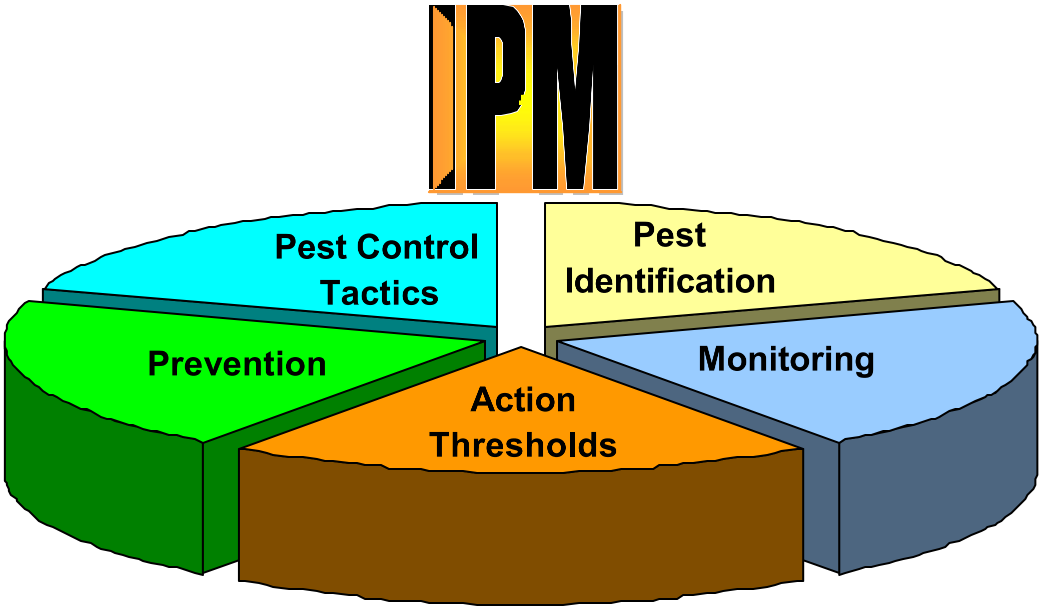
Pest control managers are now moving away from their reliance on pesticides alone toward an integrated approach that combines limited pesticide use with more environmentally friendly pest control techniques. This system is know as integrated pest management (IPM), a strategy that focuses on the long-term prevention of pests or their damage through a combination of techniques, including preventative, cultural, mechanical, environmental, biological, and chemical control tactics (**Figure 5.7**). The techniques are utilized simultaneously to control pest populations in the most effective manner possible.

Developing a comprehensive Integrated Pest Management (IPM) Program and approach allows the primary efforts to focus on pollution prevention by monitoring and preventing pests as well as minimizing heavy pest infestations which reduces the need for chemicals and/or multiple applications.

IPM programs utilize monitoring techniques and economic thresholds to determine when to implement control strategies which are then used according to established guidelines only after monitoring indicates that such treatment is appropriate. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms and the environment.

The use of pesticides is often a last resort measure. Because of this, the management guidelines for pesticide use are presented in a separate section immediately following the IPM guidelines.

Figure 5.7
Components of an Integrated Pest Management Program



5.5.2.2 Scope of IPM Guidelines

IPM practices are encouraged over the sole use of pesticides as the primary means of pest management (**Table 5.14**). As a part of the Municipal Activities Program Manual, the public agencies and their contractors should evaluate the non-chemical components of IPM before intensive use of pesticides.

The goal of IPM is not to eliminate all pests, but to keep their populations at tolerable levels. Pesticides may be part of an IPM program, but they should only be used after the pests exceed established thresholds and only applied in the affected area. In general, pest control strategies should be those that are least disruptive to biological control organisms (natural enemies), least hazardous to humans and the environment (including non-target organisms), and have the best likelihood of long-term effectiveness.

Pesticides should not be applied until pests are approaching damaging levels. Because this requires early detection of the pests, monitoring on a regular basis is extremely important and should be used to determine if natural enemies are present and adequately controlling the pest. If possible, a person should be trained and designated to scout the sites on a regular basis.

Table 5.14
Advantages and Disadvantages of a Pesticide-Based Program Versus. an IPM-Based Pest Control Program.

Pesticide Based Pest Control		**IPM Based Pest Control**	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
Quick suppression of pests.	Loss of natural controls.	Long-term control.	Training is required to identify pests and natural enemies.
Labor is only for spraying.	Not long-term	Safer to the environment.	Must have knowledge of pesticides and their effects on other organisms.
Not much preparation or follow-up needed.	More pesticides in environment.	Pesticides can be used (only used as last resort).	Must maintain a record-keeping system.
	Contamination of water bodies from runoff.	Reduces disruption of natural enemies.	Must scout regularly.
	Pesticide safety for applicators, public, animals.	Reduces contamination from runoff.	Labor is required for monitoring.
	Often get outbreaks of other pests.	Less exposure to pesticides	
		Can be proactive in pest control actions.	

5.5.2.3 Components of an IPM Program

An IPM program is a long-term, multi-faceted system to manage pests (**Figure 5.7**). Use of pesticides is a short-term solution to pest problems and should be used only when the other components fail to maintain the pests or their damage below an acceptable level. Successful IPM practitioners are knowledgeable about the biology of the plants and pests and successful IPM programs primarily use combinations of cultural practices as well as a combination of physical, mechanical and biological controls.

5.5.2.4 Pest Identification

It is important to learn to identify all stages of common pests at each site. For example, if you can identify weed seedlings, you can control them before they become larger and more difficult to control and before they flower, disseminating seeds throughout the site. It is also important to be sure that a pest is actually causing the problem. Often damage such as wilting is attributed to root disease but may actually be caused by under watering or wind damage.

5.5.2.5 Prevention

Good pest prevention practices are critical to any IPM program, and can be very effective in reducing pest incidence. Numerous practices can be used to prevent pest incidence and reduce pest population buildup such as the use of resistant varieties, good sanitary practices and proper plant culture. Examples of prevention include choosing an appropriate location for planting, making sure the root system is able to grow adequately and selecting plants that are compatible with the site's environment.

5.5.2.6 Monitoring

The basis of IPM is the development and use of a regular monitoring or scouting program. Monitoring involves examining plants and surrounding areas for pests, examining tools such as sticky traps for insect pests and quantitatively or qualitatively measuring the pest population size or injury. This information can be used to determine if pest populations are increasing, decreasing, or staying the same and to determine when to use a control tactic.

It is important to use a systematic approach. For example you should examine the same section of a plant each time you check for pests, rather than looking at the lower leaves on some plants and the upper ones on others. Otherwise, randomly looking at a plant or a section of a growing area does not allow you to track changes in pest population or damage over time. **Figure 5.8** illustrates an example of a form used to record monitoring or scouting information collected in the field.

It is important to establish and maintain a record-keeping system to evaluate and improve your IPM program. Records should include information such as date of examination, pests found, size and extent of the infestation, location of the infestation, control options utilized, effectiveness of the control options, labor and material costs.

Figure 5.8
Example of a Scouting Form for Monitoring Pests and Control Activities.

City:

Reported by: ______________________ Date: ______

Location: ______________________

______ Initial report ______ Follow-up Report ______ 2nd Follow-up Report

Date reported to IPM Coordinator or Supervisor: ______________

Arthropods

Pest name	Growth stages	Host	Count or estimate	Damage	Recommended action

Weeds

Pest name	Growth stages		Count or estimate	Damage	Recommended action

Diseases

Pest name	Growth stages	Host	Count or estimate	Damage	Recommended action

Comments (include labor and materials cost or used):

5.5.2.6 Injury Levels and Action Thresholds

In order to have a way to determine when a control measure should be taken, injury levels and action thresholds must be set for each pest. An injury level is the pest population size where unacceptable damage occurs. Action thresholds are the set of conditions required to trigger a control action.

5.5.2.7 Pest Control Tactics

Integrated pest management programs use a variety of pest control tactics in a compatible manner that minimizes adverse effects to the environment. A combination of several control tactics is usually more effective in minimizing pest damage than any single control method. The type of control that an agency selects will likely vary on a case-by-case basis due to the varying site conditions.

The primary pest control tactics to choose from include:

- Cultural
- Mechanical
- Environmental/Physical
- Biological
- Pesticide

5.5.2.8 Cultural Controls

Cultural controls are modifications of normal plant care activities that reduce or prevent pests. In addition to those methods used in the pest preventions, other cultural control methods include adjusting the frequency and amount of irrigation, fertilization, and mowing height. For example, spider mite infestations are worse on water-stressed plants, over-fertilization may cause succulent growth which then encourages aphids, too low of a mowing height may thin turf and allow weeds to become established.

5.5.2.9 Mechanical Controls

Mechanical control tactics involve the use of manual labor and machinery to reduce or eliminate pest problems using methods such as handpicking, physical barriers, or machinery to reduce pest abundance indirectly. Examples include hand-pulling or hoeing and applying mulch to control weeds, using trap boards for snails and slugs, and use of traps for gophers.

5.5.2.10 Environmental/Physical Controls

The use of environmental manipulations that indirectly control or prevent pests by altering temperature, light, and humidity can be effective in controlling pests. Although in outdoor situations these tactics are difficult to use for most pests, they can be effective in controlling birds and mammals if their habitat can be modified such that they do not choose to live or roost in the area. Examples include removing garbage in a timely manner and using netting or wire to prevent bird from roosting.

5.5.2.11 Biological Controls

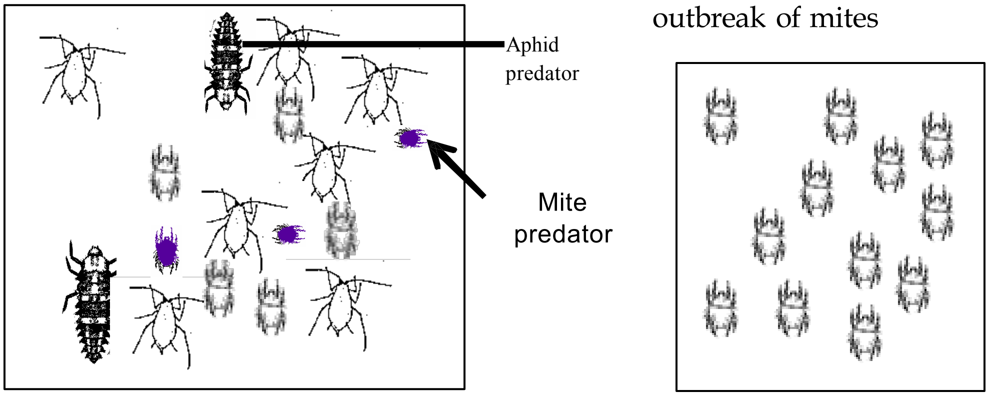
Biological control practices use living organisms to reduce pest populations. These organisms are often also referred to as beneficials, natural enemies or biocontrols. They act to keep pest populations low enough to prevent significant economic damage. Biocontrols include pathogens, parasites, predators, competitive species, and antagonistic organisms. Beneficial organisms can occur naturally or can be purchased and released.

The most common organisms used for biological control in landscapes are predators, parasites, pathogens and herbivores.

- Predators are organisms that eat their prey (e.g. Ladybugs).
- Parasites spend part or all of their life cycle associated with their host. Common parasites lay their eggs in or on their host and then the eggs hatch, the larvae feed on the host, killing it (e.g. Tiny stingless wasps for aphids and whiteflies).
- Pathogens are microscopic organisms, such as bacteria, viruses, and fungi that cause diseases in pest insects, mites, nematodes, or weeds (e.g. *Bacillus thuringiensis* or BT).
- Herbivores are insects or animals that feed on plants. These are effective for weed control. Biocontrols for weeds eat seeds, leaves, or tunnel into plant stems (e.g. goats and some seed and stem borers).

In order to conserve naturally occurring beneficials, broad-spectrum pesticides should not be used since the use of these types of pesticides may result in secondary pest outbreak due to the mortality of natural enemies that may be keeping other pests under control (**Figure 5.9**).

Figure 5.9
Example of Secondary Pest Outbreak
Caused By Use of a Broad Spectrum Insecticide



A. Aphids and mites controlled by predators

B. After a broad spectrum spray for aphids, predators for mites and aphids are also killed, resulting in an outbreak of mites

5.5.2.12 Pesticide Controls

Any substance used for defoliating plants, regulating plant growth or preventing, destroying, repelling or mitigating any pest, is a pesticide. Insecticides, herbicides, fungicides are all pesticides.

Pesticides should only be used when other methods fail to provide adequate control of pests and just before pest populations cause unacceptable damage since the overuse of pesticides can cause beneficial organisms to be killed and pest resistance to develop. When pesticides must be used, considerations should be made for how to use them most successfully. Avoid pesticides that are broad-spectrum and relatively persistent since these are the ones that can cause the most environmental damage and increase the likelihood of pesticide resistance. Always choose the least toxic effective method.

In addition, considerations should be given to the proximity to water bodies, irrigation schedules, weather (rain or wind) the loss of use of an area (application in a park may result in the area being sectioned off) etc. that are all secondary factors that may result in the pesticide being moved off-site into the environment.

5.5.3 Pesticide Management - Planning

Pesticides are defined as any substance or mixture of substances designed to prevent, destroy, repel, or mitigate any pest. Used incorrectly or carelessly they are potentially dangerous. A heightened public awareness about pesticides and their use has created an increased concern that they be used according to the directions on the label. This ensures that the pesticides are used correctly and safely. When products are used illegally, i.e. against label directions, it is more likely that regulatory activity on a federal and state level will increase.

Although safety concerns and the cost of complying with new regulations have encouraged some public agencies to reduce the use of pesticides, they are still used in certain situations, therefore guidelines for their proper use, handling, and storage are essential. In certain situations pesticides may be the most appropriate method. For example, pesticide use by public agencies often involves herbicide applications to keep flood control channels and roadways clear or to minimize health and safety hazards of disease-bearing rodents and insects. In landscape and turf maintenance, pesticides may be used to control pests that can reduce the aesthetic value of the site.

5.5.3.1 General Considerations

There are extensive federal and state laws and regulations that all public agencies must be in compliance with at all times.

The California Food and Agricultural Code (FAC) and the California Code of Regulations, Title 3 (3 CCR), constitute the laws and regulations referred to in these guidelines. They are referenced often and usually referred to as the "State Laws".

5.5.3.2 Pesticide Labels and Material Safety Data Sheets (MSDS)

Without exception, pesticide labels provided by the manufacturer of each pesticide are the first source of recommendations and instructions for chemical use. The label is the law. Whenever a pesticide is to be used by a worker or a contractor of a public agency, the user must read the label instructions and requirements. If the worker does not understand the label, they cannot handle or apply the pesticide until the information is explained.

As described in the 3CCR, section 6242, the label must appear on the immediate container of the pesticide and include, in prominent, bold type, the appropriate statement according to its toxicity classification: **Danger** or **Poison**, **Warning**, or **Caution**. If a chemical is transferred to another container, a copy of the label must be transferred with it. **Figure 5.10** depicts a portion of a typical pesticide label.

The section of the label entitled 'Precautionary Statements' contains information on the environmental hazards associated with use of the pesticide, such as toxicity to wildlife and aquatic organisms. Particular attention should be given to the application of pesticides near surface waters or inlets to surface waters, especially if the hazard is listed on the label.

Workers should never handle a container that does not have a label attached, and the supervisor in charge should be immediately advised of the situation. If a label is badly damaged and cannot be read, the supervisor must replace it.

Figure5.10
Sample Pesticide Label

Specimen Label

flnowAgroSciences s

Turflon* Ester

Specialty Herbicide

OT-oiOCM LLC

For the controlof annual andperennialbroadleaf weeds and klkuyugrass In ornamentalturf.

Ing-N:
3,5,6-llictlloro-2·
wttnytoxy&<:etlcac:ld.

Inen Ingredients ....!""6!.6%

Contains peWieum distlloles

36A%

Tolal...... ......l00.0%

lridopyr . 44.3%. 4lb/gal

EPA Res. No. 62719-258

Precautionary Statements

Hazards to Humansand Domestic Animals

Keep Out of Reach of Children

CAUTION **PRECAUCION**

Slusted no Mtiende lo bosque a olguien para-sola axplque a usted ..,-le .(W}'QU do not und..-.d1M lobemd """"""""to explain ft to 'I'W in d -.)

Ha-mfullf —d. Inha..d, Or Ab....tJed Througll The Skin

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PersonalProtective Equipment (PPE}

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Material Data Safety Sheets (MSDS)

Workers using pesticides must have the Material Safety Data Sheets (MSDSs) for each chemical they are using readily available. Although the MSDS is a form that may vary in appearance for different chemicals, the information is the same, as required by law. Similar to the chemical labels, these sheets contain information necessary to handle each chemical safely, and all workers should be familiar with the information.

MSDS sheets include chemical identifications, hazardous ingredients, physical data, fire and explosion data, health hazards, reactivity data, spill or leak cleanup procedures, special protection and special precautions. The MSDS also contains information on the toxicity (LD_{50} and LC_{50}) of the pesticide to various test animals, providing the user with the pesticide's toxicity to off-target organisms, especially those in aquatic environments. It is recommended that MSDSs be kept in a notebook or file in a location readily accessible.

General Requirements

Following is a list of general requirements that should be followed when storing, using and transporting pesticides.

1. Thoroughly investigate and consider all least toxic pest management practices.
2. Maintain a complete list of all pesticides used and the use sites. (3CCR, section 6624 – unless exempt under FAC, section 11408).
3. Use pesticides only according to label instructions. (FAC, section 12973).
4. Consider weather conditions that could affect application. For example, wind conditions affect spray drift; rain may wash pesticide off of leaves. (3CCR, section 6614)
5. Do not apply pesticides where there is a high chance of movement into water bodies; for example, they shouldn't apply near wetlands, streams, lakes, ponds or storm drains unless it is for an approved maintenance activity. (3CCR, section 6614).
6. In most cases, triple-rinse empty pesticide containers before disposal. Particular information on the proper disposal of the pesticide and its container can be found on the label. For specific requirements see 3CCR, section 6684.
7. Never clean or rinse pesticide equipment and containers in the vicinity of storm drains or other open water areas.
8. Store pesticides in areas with cement floors and in areas insulated from temperature extremes.

9. Secure chemicals and equipment during transportation to prevent tipping or excess jarring. (3CCR, section 6682).

10. Pesticides must be transported completely isolated from people, food and clothing, for example, in the bed of the truck rather than in the passenger compartment. (3CCR, section 6682).

11. Inspect pesticide equipment, storage containers and transportation vehicles frequently. (3CCR, sections 6702 & 6742).

12. Develop a plan for dealing with pesticide spills and accidents.

13. Unless their safety is compromised, workers must immediately clean up any chemical spills according to label instructions and notify the appropriate supervisors and agencies.

14. Pesticide applications on public property, which take place on school grounds, parks, or other public rights-of-way where public exposure is possible, shall be posted with warning signs. The specific criteria for the signage can be found in FAC, section 12978. Pesticide applications by the Department of Transportation on public highway rights-of-way are exempt.

5.5.3.3 Selection of Appropriate Pesticides

When selecting pesticides, public agencies should rely on recommendations from a state-licensed pest control advisor (PCA) in order to ensure that the most appropriate pesticide is selected. Additional advice for pest identification and control strategies are also available from the Orange County Agricultural Commissioner (714) 447-7100, University of California Cooperative Extension (714) 708-1606 from other professionals and/or through professional publications.

The use of restricted pesticides and all other Category I pesticides should only be used under special circumstances and where other treatment options did not or could not work well.

5.5.3.4 Certification, Licensing and Permitting

Restricted use pesticides should only be applied by or under the direct supervision of an individual with a qualified applicators certificate (QAC). To receive a QAC, a person must take a test administered by DPR. To obtain test materials, test schedules, and an application, see http://www.cdpr.ca.gov/docs/license/liccert.htm.

Pesticides listed as "restricted" in the State of California may be used only under a restricted materials permit (3CCR, section 6142) issued by the Orange County Agricultural Commissioner. The permit must be renewed annually for continued use. For more information, contact the Commissioner's office at (714) 447-7100.

All other guidelines concerning permits, licensing and certification requirements to be followed before pesticide application are detailed in FAC, sections 12971-12988 and 3CCR, sections 6500-6636.

5.5.3.5 Employee Training

Employees must know the information on the chemical label and its MSDS before using or handling pesticides. In addition they should be trained annually or whenever a new pesticide is to be used.

The applicators should know:

- The immediate and long-term health hazards posed by chemicals to be used, the common symptoms of chemical poisoning and the ways poisoning could occur; and

- The safe work practices to be followed, including the appropriate protective clothing, equipment, mixing, transportation, storage, disposal and spill cleanup procedures that apply to the specific chemicals being used.

In addition to the training and annual continuing education required for licensing and certification as specified in 3CCR, section 6511, public employees are encouraged to participate in the annual Municipal Activities Program training (see *Municipal Activities Program Manual*) and continuing pesticide education programs whenever the programs are available. Supervisors are encouraged to conduct or schedule pesticide education programs for their workers more frequently than required by law.

5.5.3.6 Accident and Spill Mitigation

Public agencies using pesticides should have plans for dealing with potential accidents before they happen. These plans should consider:

1. Labels and MSDS Sheets -- All workers handling pesticides must be familiar with these instructions. The steps for accident mitigation are spelled out on chemical labels and MSDS sheets.

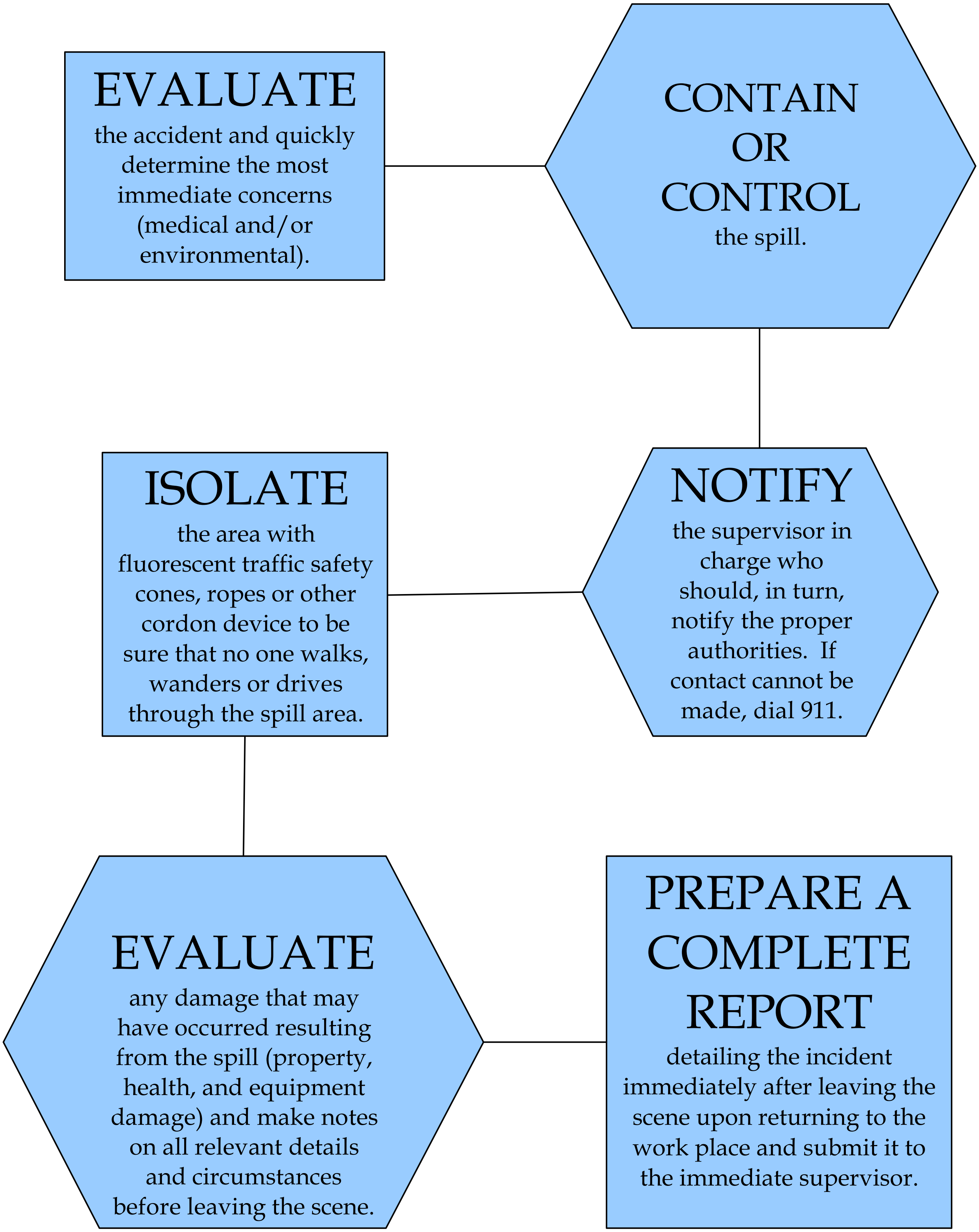
2. Spill Cleanup Kits -- Any time pesticides are being handled, there must be a cleanup kit on hand in case of an accident. This means there should always be a cleanup kit located in pesticide storage areas, on vehicles used to transport pesticides and on location where the chemicals are being applied.

   Although these kits may vary in what they contain depending on the chemical type and the situation, at a minimum they should include:

   - Written spill-control procedures
   - A five gallon drum with seal-able lid
   - A dust pan and broom
   - A squeegee
   - A shovel
   - Protective goggles, gloves, boots, coveralls
   - A tarp (for covering dry spills)
   - Detergent and water (check label or MSDS for proper use)
   - Barricade tape, florescent traffic safety cones or string to cordon off an area
   - Large sponges, containment booms or other absorbent material

3. Cleanup Procedures – Spilled pesticides must be prevented from entering the local surface and/or groundwater supplies. Specific recommendations for spill cleanup should be available on the pesticide label or MSDS. Specific recommendations for the sequence of procedures may also vary depending on the situation. **Figure 5.11** provides a flowchart of the general steps that a worker should follow in case of a spill. A good overview of spill containment procedures can be found in the book "The Safe and Effective Use of Pesticides" (see Reference section).

Figure 5.11
General Steps to Follow in Case of a Spill



EVALUATE the accident and quickly determine the most immediate concerns (medical and/or environmental).

CONTAIN OR CONTROL the spill.

NOTIFY the supervisor in charge who should, in turn, notify the proper authorities. If contact cannot be made, dial 911.

ISOLATE the area with fluorescent traffic safety cones, ropes or other cordon device to be sure that no one walks, wanders or drives through the spill area.

EVALUATE any damage that may have occurred resulting from the spill (property, health, and equipment damage) and make notes on all relevant details and circumstances before leaving the scene.

PREPARE A COMPLETE REPORT detailing the incident immediately after leaving the scene upon returning to the work place and submit it to the immediate supervisor.

5.5.3.7 Emergency Medical Care

Accident situations requiring emergency medical care are likely to involve acute exposure to potentially toxic chemicals. Instructions for handling these exposures appear on the pesticide label.

Workers should:

1. Be aware of the symptoms of acute exposures for each pesticide being used.

2. Have a predetermined strategy for dealing with exposure scenarios, including knowing the label recommendations for dealing with acute exposures and the nearest medical facility where emergency care is available.

5.5.3.8 Equipment and Equipment Maintenance

All equipment for the handling of pesticides should be inspected and cleaned by workers each day before use, to ensure that there are no problems that could lead to chemical leaks, spills or accidents during the day's work (3CCR, section 6742).

The calibration of equipment should be done routinely to ensure that the proper amount of pesticide is applied. The maintenance of application rates within label recommendations also reduces the risk of surface and ground water contamination.

5.5.3.9 Groundwater and Surface Water Protection

The main factors determining the rate at which pesticides enter groundwater and surface water systems are chemical mobility, solubility and persistence and the soil type. For example, potentially dangerous chemicals are likely to have a high solubility and an extremely long half-life, and they are not likely to be easily absorbed into the soil. Therefore, pesticides that decompose rapidly may be preferred under certain conditions.

However, it should be noted that if a less dangerous pesticide is chosen, but then applied two or three times as often, it may not make sense from a transportation and application risk standpoint to choose the pesticide. Therefore, because of these factors, regardless of the category of pesticides being used, pesticide advisors should always be aware of the compatibility of the pesticide with the characteristics of the site of application (soil type, slope, proximity to a water body, vegetation) before recommending pesticides for a specific area. For example, recommended surflan rates vary according to the amount of organic matter in the soil.

Furthermore, because the effect of these uses is not always immediately apparent, public agencies should periodically test areas where frequent pesticide applications occur and the area is identified as particularly vulnerable to contamination or deterioration.

PesticideWise (http://www.pw.ucr.edu/WQ_Homep.asp) is an informational database that public agencies can utilize to determine various properties of pesticides and their potential risk to water quality.

5.5.3.10 Pesticide Use in Aquatic Environments

The application of pesticides to aquatic environments for the control of pests requires coverage under the NPDES permit program. A General Permit, with January 31, 2004 expiration, was issued by the State Water Resources Control Board to authorize the application of pesticides directly to waters. The permit allows the application of aquatic pesticides by public entities as long as certain requirements are meet. These requirements state that dischargers must:

1. Comply with all pesticide label instructions, DPR and Department of Health and Safety regulations, and any Use Permits issued by the local Agicultural Commissioner;
2. Identify and implement BMPs to minimize adverse effects to the environment;
3. Submit technical and monitoring reports as required by the local RWQCB.

Specific details on these requirements can be found in the General Permit available at the following link:

http://www.swrcb.ca.gov/resdec/wqorders/2001/wqo/wqo2001-12.doc

Further information on the direct application of pesticides to aquatic environments can be found in the University of California Division of Agriculture and Natural Resources publication titled 'Aquatic Pest Control' (see the references section). In addition, the publication entitled 'Pesticides and Aquatic Animals: A Guide to Reducing Impacts on Aquatic Systems' provides a review of aquatic pesticide management practices.

5.5.4 Application of Pesticides

In cases where State Laws require supervision of pesticide applications, supervision must be handled by a state-licensed or certified pesticide applicator. For all other pesticide applications, workers with equivalent training may handle supervision.

Public agencies that contract for pest control should periodically inspect contracted work crews to be certain that contractors are following the same or more stringent pesticide management guidelines as required by the County agencies. Public agencies handling their own applications should likewise inspect their work crews on a regular basis to ensure that safety standards are being met.

5.5.4.1 Proper Techniques

The pesticide label must be attached to the container and available on site. The label contains information regarding how to safely use the product. It is important that the applicator and handlers read the label carefully and follow application instructions exactly. Special attention should be paid to the list of pests that the pesticide will control to ensure that the right chemical is being used for the right job.

When a range of rates is given on the pesticide label, the applicator should use the lowest rate unless there are circumstances that warrant using a higher rate. These circumstances are provided on the label.

State regulations mandate that no pesticide application shall be made or continued when:

(a) There is a reasonable possibility of the pesticide contacting the body or clothing of persons not involved in the application process;

(b) There is a reasonable possibility of damage to non-target crops or animals; and

(c) There is a reasonable possibility of contamination of non-target public or private property. (3CCR, section 6614).

Weather conditions are a major factor in determining the likelihood of offsite movement from the application target (i.e drift), and therefore must be incorporated into the planning of pesticide applications. This information can be found on the product label or supplemental labeling.

5.5.4.2 User Safety and Protection

The following is a list of suggestions for user safety and protection:

1. Have equipment on hand personal protective equipment (PPE) for application of pesticides. This would include eye protection, gloves, and respiratory gear and impervious full-body, chemical resistant clothing when called for by the chemical label.

2. Workers should avoid inhaling pesticide spray and dust at all times.

3. Avoid working alone, especially at night. If it is necessary to work alone at night, the worker should be in contact with a supervisor via a phone or radio.

4. Equipment should be cleaned at least at the end of the day's applications. The equipment should not be rinsed in an area where the wash water can contaminate surface or ground water. Workers doing the cleaning must wear the same safety equipment as required on the pesticide label, e.g., eye protection, gloves.

5. Use of removable coveralls, gloves and shoes/boots is required when stated on the label, under PPE, when applying certain pesticides. Use of these protections is recommended for most applications, especially if the applicator does not have the opportunity to change clothes prior to driving or riding in a vehicle or eating or drinking. In this way, the applicator's clothing is less likely to become contaminated. The applicator should also wash his or her hands thoroughly after each application even though gloves are worn. (3CCR, sections 6736 and 6738)

6. State laws regarding re-entry into areas that have recently been treated with pesticides should be followed (3CCR, section 6770). For the most part, pesticides used for landscape and turf pest control allow entry after the product has dried. Nevertheless, treated areas must be blocked off or otherwise isolated until re-entry is allowed in order to reduce human exposure to the pesticide.

7. Before workers come in contact with pesticides they need to be trained about the specific pesticides being used, including how to properly handle them, the dangers involved in their use, and proper training and safety procedures of the pesticides.

8. Keep current records including a complete list of pesticides being used in their jurisdiction. This should include the pesticide name, amount in storage, dates, use site, and rate of applications and pests controlled with each application.

9. Keep all relevant label and MSDS information for each pesticide updated and readily available at all times to workers handling the materials.

5.5.4.3 Storage, Disposal and Transportation

Storage of pesticides should be away from living areas and in a covered area that is well-insulated from temperature extremes; they should have a cement floor and good ventilation. Also, storage areas should be clearly marked according to state standards and be securely locked at all times when not in use.

Signs, visible from any direction of probable approach, must be posted around all storage areas where containers that hold, or have held pesticides required to be labeled with the signal words "warning" or "danger".

Each sign should be of such size that it is readable at a distance of 25 feet and contain the following statements:

DANGER
POISON STORAGE AREA
ALL UNAUTHORIZED PERSONS KEEP OUT
KEEP DOOR LOCKED WHEN NOT IN USE

The notice shall be repeated in an appropriate language other than English when it may reasonably be anticipated that persons who do not understand the English language will come to the enclosure (3CCR, section 6674).

Pesticide labels on pesticides being stored or used should be kept in good condition and attached to all containers holding pesticides (3CCR, section 6676 and 6678) and storage equipment and containers should be inspected frequently for leaks or defects before being taken on the job. Containers should also be inspected before storing at the end of the day.

Proper Disposal

Following are recommendations that should be followed in order to ensure the proper disposal the pesticide containers:

1. Pesticide containers should be triple-rinsed before disposal (3CCR, section 6684).

2. Cleaned containers should be sent back to the manufacturer for recycling whenever possible. However, once triple-rinsed most haulers will take them to most landfills.

3. Leftover rinse water should be used as spray.

4. Surplus or out-of-date pesticides should be given to a licensed hazardous waste hauler for disposal.

Safe Transportation Methods

Following is a list of recommendations that should be followed to ensure that workers utilize safe transportation methods when traveling to and from worksites:

1. Pesticide containers should be tightly sealed and secured from tipping or excess jarring (3CCR, section 6682).

2. Pesticide transportation compartments on vehicles should be isolated from the compartment carrying people, food and clothing (3CCR, section 6682) and should be securely locked.

3. Only the amount of pesticide needed for the day should be transported to the site. If the pesticide is transferred to another container, a copy of the label or a service label must be attached. (3CCR, sections 6676 and 6678).

In no case shall a pesticide be placed or kept in any container of a type commonly used for food, drink or household products. (3CCR, section 6680).

4. Appropriate pesticide labels and MSDS sheets, a spill cleanup kit, and a first aid kit should always be brought along when transporting pesticides. Additionally, the location of an emergency medical care center should be known.
5. All vehicles used for pesticide transportation should include radio or cellular communications for contacting help in case of a spill or some other emergency.

5.5.5 Fertilizer Management

Fertilizers are nutrients applied to soil or plants to promote plant growth or health. Fertilizers commonly used in landscapes contain both:

- Nitrogen (N); and
- Phosphorus (P)

Soluble forms of nitrogen and phosphorus can leach through soils or move off-site in surface runoff causing algal blooms or eutrophication within the local waterways.

Fertilizers also play an important role in promoting plant growth that protects soil from erosion and enhances landscape aesthetics. Because of the necessity for soil nutrients and the potential for adverse effects on local waterways due to the loss of these nutrients through runoff and leaching, management guidelines are necessary as a means of reducing the loss of fertilizers into water bodies.

5.5.5.1 State and Federal Law

Fertilizer use is not regulated under state and federal law, as its use does not pose an immediate danger to public health and safety. However, it is well known that the misuse of fertilizers poses risks to the environment. As a result, various organizations have developed management guidelines for fertilizer use on specific crops. The California Plant Health Association (http://www.cpha.net) maintains a listing of fertilizer manufacturers, distributors, and associations that provide technical information on the proper use of fertilizer on their web site.

5.5.5.2 General Recommendations

The following is a list of general recommendations that should be followed when storing, applying and transporting fertilizers:

1. Whenever possible use foliar and/or soil nutrient testing before applying fertilizers to verify application timing and rate.

2. Use a higher percentage of fertilizers containing slow -release N, such as IBDU and sulfur-coated urea. Be aware that organics (i.e. bone meal) and some slow-release fertilizers are dependent on microbial activity for the release of nitrogen; therefore low soil temperature will decrease the release of nitrogen available for plant uptake.

3. If highly soluble-N fertilizers are use, apply smaller amounts on a more frequent basis.

4. Incorporate fertilizer directly into the soil around the plant, where possible, to minimize potential surface runoff.

5. Although fertilizers must be watered in the soil in order to work, the watering in should occur with light irrigation just after the application. Due to the unpredictability of rain events, it is recommended that fertilizers not be applied in the rain or on the same day that rain is expected.

6. Irrigation application rates and schedules should be adjusted to minimize surface runoff, especially immediately following the application of a fertilizer.

7. Immediately clean up any spill of fertilizers using dry methods of cleanup such as by sweeping or scooping up the material.

8. Fertilizer storage facilities should be covered and have an impermeable foundation so that potential spills cannot runoff into surface water or leach into groundwater systems.

9. Fertilizers must be securely covered in the vehicle before being transported to application sites to avoid spillage or loss during transport.

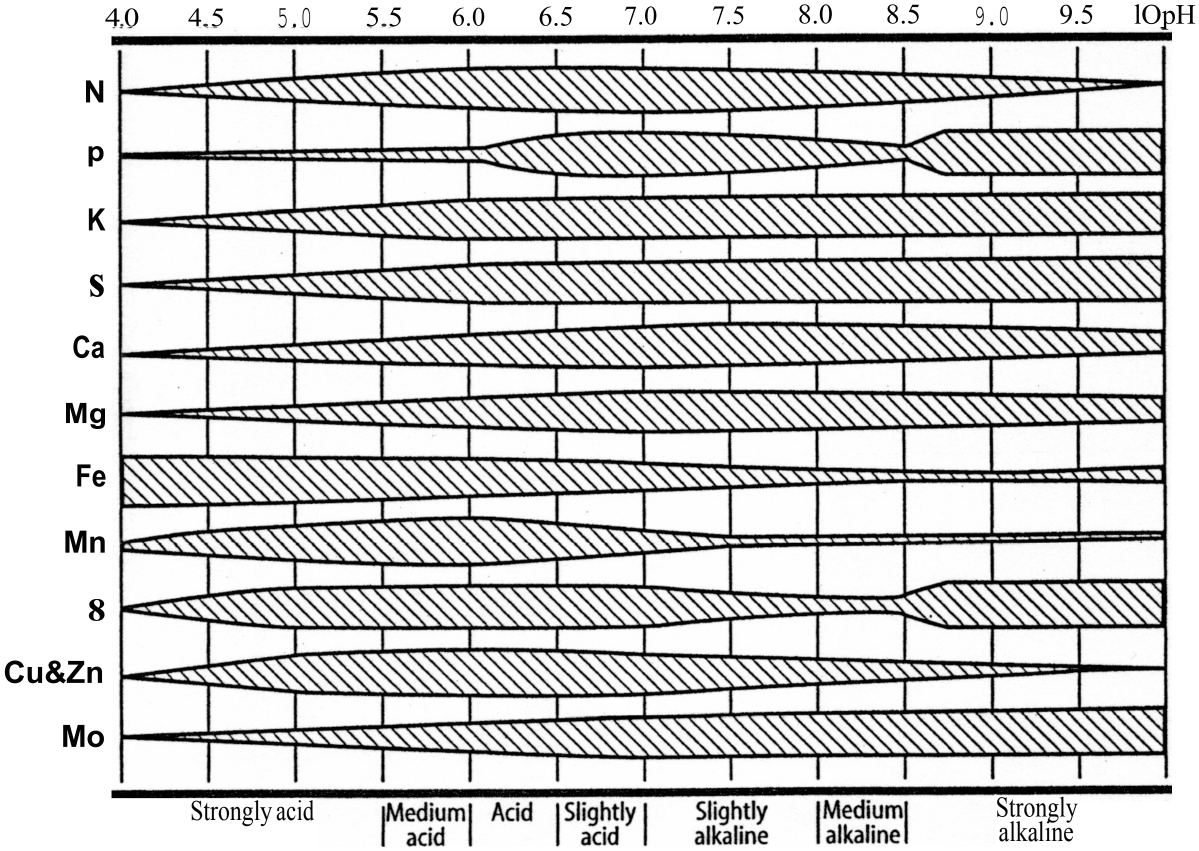
5.5.5.3 Nutrient and Soil Assessment

Soluble fertilizers can easily leach through soil and potentially contaminate groundwater following excess irrigation, after heavy rains and where the water table is high. Generally, the most significant loss of fertilizer is from nitrate-nitrogen, but there is some evidence that phosphorus leaching can be significant in soils that have received regular applications of soluble phosphorus.

Foliar and soil analysis should be utilized whenever possible to assist in the determination of the nutrient status of plants and the soil where they are growing. Nutrient testing can be an important management tool for determining baseline nutrient levels in order to adjust application rates appropriately. Generally, soil testing is done only for newly developed sites, but valuable information can be obtained on established sites as well. For example, the chemical and physical properties of the soil affect the availability of nutrients. **Figure 5.12** illustrates the range of nutrient availability as pH of the soil increases or decreases.

Nutrient analyses are often accompanied with an interpretation and recommendation from the testing laboratory in order to assist the applicator in choosing the proper type and rate of fertilizer. Fertilizer recommendations should be based on the type of plant material (i.e. mature tree versus groundcover), the growth stage, overall health of the plant, and the current nutrient status of the soil. If a public employee with expertise in plant nutrition is not available, the testing laboratory or a Certified Crop Advisor (CCA) with expertise in urban horticulture should be able to provide a useful interpretation of a foliar or soil analysis.

Figure 5.12
The Effect of pH on Plant Nutrient Availability.



Source: California Master Gardener Handbook 2002, p. 54 (Dennis Pittenger, Editor).

5.5.5.4 Fertilizer Types

- Inorganic and Synthetic Fertilizers

  The most widely used fertilizers are inorganics characterized as being relatively low in cost, easy to apply, and quick releasing. However, over use of inorganic fertilizers can result in increased soil salinity and the need to leach soils to avoid salt damage to plants (i.e. leaf burn). Inorganic fertilizers are also available as slow-release fertilizers, but at a much higher cost.

  The main advantage in using slow-release fertilizers is their ability to provide nitrogen to the root zone at rates that more closely match the growth of the plant, thereby minimizing the amount of nitrogen available for leaching below the root zone. One disadvantage is their use on steep slopes, where broadcast fertilizer prills (capsules) may easily become mobile during irrigation and storm events.

- Organic Fertilizers

  Manures and organic concentrates such as blood and fish meal are considered organic fertilizers and offer the advantage of releasing nitrogen at a slower rate. A significant advantage to the use of organic fertilizers is that many of them are also classified as soil amendments due to their effect on the soil's physical properties. Disadvantages include high salt content, presence of weed seeds, varying nutrient content, and a higher cost per pound than inorganic fertilizers rendering them cost ineffective for municipal use.

  It should also be noted that recent studies have indicated that organic fertilizers and amendments may be significant sources of fecal coliform in irrigation and storm water runoff. In contrast to the traditional assumption that fecal bacteria only multiply within the digestive tracts of warm-blooded animals, recent research suggests that fertilizers may contribute to propagation of fecal bacteria in the warm, moist and dark environments the storm drain infrastructure.

  Although State regulations require commercial composters to reduce fecal bacteria in manure-composted materials, green waste materials are not currently regulated for fecal bacteria and may contain incidental amounts of animal waste, such as from pets or wild birds. In addition, uncomposted animal manures and yard trimmings can have fecal coliform concentrations as high as Class B sewage biosolids.

Prior to choosing the type of fertilizer, the following should be taken into consideration:

1. Ability of the plant material to uptake and utilize nitrogen (soil temperature, species, growth rate).
2. Leaching requirements due to soil salinity.
3. Severity of slope and potential for runoff to carry fertilizer.
4. Proximity to storm drains or hard surfaces.
5. Receiving water impairments (such as bacteriological impairments)
6. Type of irrigation and scheduling.

5.5.5.5 Application Rates and Timing

The amount of fertilizer needed for different applications depends on a number of factors. The following factors should be considered prior to the application:

1. Rooting characteristics of the vegetation (turf, shrubs, and trees).
2. The growth stage of the plant.
3. The ability of the plant to uptake the nutrients from the soil (temperature, water status, pH of the soil, salinity, etc.).
4. The current nutrient content of the soil.
5. Additional sources of nutrients (i.e. composts, reclaimed water, atmospheric deposition).
6. Potential for loss of nutrients by leaching.
7. Method of irrigation.
8. Chemical properties of fertilizer being applied.

The application of fertilizers should coincide with the growth stage requirements of the plant. For mixed plantings having different growth stages, fertilizer applications should be divided into several applications targeting each of the growth stages.

The vegetation being managed should be researched and fertilizers applied only according to the amounts and at the time intervals recommended by the manufacturer or a public employee qualified to make fertilizer recommendations. This should minimize the waste of fertilizer and reduce the risk of water contamination. Although recommendations for the application of fertilizers to turf are well researched, there is more uncertainty in the rate and timing of the application of fertilizer to landscapes consisting of a mixture of trees, shrubs, turf, and groundcovers. As a result, foliar and soil nutrient testing should be used as a tool to assist in the determination of application rates and timing until more information is available.

5.5.5.6 Application Methods of Fertilizers

This section details the most common methods for application of fertilizers, however, these are not the only acceptable methods of fertilizer application since every application has its own circumstances and variables to consider. **Table 5.15** provides a summary of the major advantages and disadvantages of each application method.

The types of application methods included in this section are:

- Banding
- Sidedressing
- Foliar Fertilization
- Broadcast Application

Regardless of what type of application method is chosen, the method should strive to deliver nutrients to the location where maximum plant uptake and utilization occurs and the chosen method should take into account the potential for surface runoff, dust, leaching into groundwater and the volatilization of materials. Proper calibration of application equipment insures that fertilizer is delivered at the recommended rate and record keeping for the amount applied, the location of the application, and the frequency of the application will assist in tracking fertilizer use and refining application timing and rates.

- Banding of Fertilizer

  This method involves physically working small amounts of fertilizer into the soil in a band beneath and/or around the sides of a plant. It allows new roots to efficiently use the nutrients and minimizes potential nutrient loss to surface runoff. Banding is particularly useful for new plantings, however, given the labor involved, banding may not be practical for some fertilizer applications.

- Sidedressing

  Similar to the banding method of fertilizer application, sidedressing involves the placement of dry fertilizer in a band directly next to actively growing plants. Sidedressing is particularly effective for applying fertilizer to established plantings during critical growth stages. Although this method is labor intensive, it delivers nutrients directly to growing roots and minimizes the potential for fertilizer move in surface runoff.

- Foliar Fertilization

  This type of application refers to fertilizer that is applied in liquid form directly to the leaves and stems. However, runoff problems may occur where the spray is allowed to drip off the leaves onto the ground or irrigation and rainfall occur immediately after the application.

  This method can reduce nutrient leaching into the soil when applied correctly and can often be performed at the same time as pesticide applications to avoid spraying twice (if this is done, it is important to check that the materials are compatible for spraying). In this case, the guidelines for pesticide applications must also apply and the pesticide label checked for appropriateness of this method.

- Broadcast Application

  The most common method utilized by public agencies is the application of dry or liquid fertilizer uniformly spread over the soil surface. This is often done mechanically with a:

  - Drop Spreader
  - Rotary Spreader and Belly-Grinder
  - Spray Booms
  - Spinning Disks

  Drop Spreader - The simplest of mechanical applicators, the drop spreader, is commonly mounted on wheels and pushed by hand or pulled by vehicle to drop granular fertilizer out of the hopper. The use of a drop spreader in that situation reduces the potential for off-target application of fertilizers.

  Rotary Spreaders and Belly Grinders - generally operate by "throwing" fertilizer in front of the spreader. This type of spreader should not be utilized to fertilize vegetation adjacent to hardscapes, such as streets and sidewalks.

  Spray Booms - for liquid fertilization. As with the use a rotary spreader, this method does not offer much control over fertilizer drift in adverse weather conditions and care should be taken to avoid spreading fertilizer onto impermeable surfaces such as sidewalks and driveways. If fertilizer lands on these types of surfaces, sweep or blow the material onto the vegetation or into a container for later use.

  Spinning Disks - mounted on a moving vehicle in a manner allowing for the throwing of dry fertilizer into the air. As with the use a rotary spreader, this method does not offer much control over fertilizer drift in adverse weather conditions and care should be taken to avoid spreading fertilizer onto impermeable surfaces such as sidewalks and driveways. If fertilizer lands on these types of surfaces, sweep or blow the material onto the vegetation or into a container for later use.

Table 5.15
Advantages and Disadvantages of Common Fertilizer Application Methods

Fertilizer Application Methods	**Advantages**	**Disadvantages**
Banding	Nutrients placed directly near roots. Minimizes nutrient loss in surface runoff.	Labor intensive. Generally only utilized for new plantings.
Sidedressing	Efficient application of nutrients to growing roots in established plantings.	Labor intensive
Foliar	Reduces leaching potential of nutrients below the rootzone. May be applied with pesticides under certain circumstances.	High potential for nutrients to be washed from plant surfaces during irrigation. Adverse conditions such as wind may cause drift on to hard surfaces.
Broadcast		
Drop Spreader	Off-target application is minimized.	Coverage of large areas is time consuming.
Rotary Spreader or Belly Grinder	Ease of application. Covers large areas quickly and provides access to difficult areas.	Off-target application of fertilizers to hard surfaces is common.
Spray Booms	Useful for foliar applications over large areas.	Potential for drift under adverse weather conditions.
Spinning Disks	Allows for fertilizer applications over large areas quickly and easily.	Off-target application to hard surfaces is common.

5.5.5.7 Storage and Handling of Fertilizers

Although fertilizers present no hazard to the user's health when stored and handled properly, employees responsible for the storage and handling of fertilizers should be aware that some fertilizers have properties that can result in dangerous chemical reactions if mixed with other substances or under unusual circumstances.

Therefore, a dehumidifier may be necessary for storage areas where sensitive fertilizers are stored such as ammonium nitrate. In addition, since most fertilizers tend to be corrosive to metals, concrete structures are preferred for fertilizer storage facilities. These problems can be minimized by only purchasing those quantities that will be used in the immediate future instead of storing materials for long periods.

- Dry Fertilizer

  In most cases, dry fertilizers are safe to store, transport and handle. However, because some fertilizers have unique, potentially dangerous properties, it is advisable for public agencies to consult a qualified individual having knowledge of the safest storage and handling procedures for specific fertilizers. Fertilizer supplies are an excellent source of information on the proper handling and storage of fertilizers. In general, the following precautions should be taken when storing and handling fertilizers:

  Keep away from open flame.
  Keep chemicals separate from each other to avoid cross contamination.
  Proper disposal of empty fertilizer bags.
  Sweep up and dispose of all contaminated material (Do not wash with water).
  Store in a cool dry facility.

- Liquid Fertilizer

  Since fertilizers in liquid form are potentially more hazardous than dry fertilizer, employees responsible for storage and handling need to be aware of the specific properties of each liquid fertilizer in use, including corrosiveness and tolerable temperature and pressure ranges. In addition, protective equipment may be necessary for workers handling fertilizers such as sulfuric or phosphoric acid.

  Fertilizers suppliers should be consulted for recommending the safest handling and storage procedures for specific liquid fertilizers.

5.5.6 References

Literature

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Websites

California Department of Pesticide Regulation – www.cdpr.ca.gov

California Fertilizer Foundation (CFF) - http://www.calfertilizer.org/
The mission of the foundation is to enhance awareness of plant nutrients and agriculture in California through educational outreach such as a school garden grants program. .

The California Plant Health Association (CPHA) - http://www.cpha.net/
An organization represents the interests of the fertilizer and crop protection manufacturers, distributors, formulators and retailers in California, Arizona and Hawaii. CPHA members market commercial fertilizers, soil amendments, agricultural minerals and crop protection products. The purpose of the organization is to promote the environmentally sound use and handling of plant health products and services for the production of safe and high quality food, fiber and horticultural products.

The California Department of Food and Agriculture Fertilizer Research and Education Program (CDFA -FREP) - http://www.cdfa.ca.gov/is/frep/index.htm
Group created to advance the environmentally safe and agronomically sound use and handling of fertilizer materials. Most of FREP's current work is concerned specifically with nitrate contamination of groundwater. FREP facilitates and coordinates research and demonstration projects by providing funding, developing and disseminating information, and serving as a clearinghouse on information on this topic. FREP serves growers, agricultural supply and service professionals, extension personnel, public agencies, consultants, and other interested parties

University of California Statewide IPM Program – http://www.ipm.ucdavis.edu

The Fertilizer Institute - http://www.tfi.org/
An organization that provides educational information on fertilizers and a reference guide on public policy issues affecting the use of fertilizers.

PesticideWise **- http://www.pw.ucr.edu/**

Searches a comprehensive EPA-USDA database and presents critical information on a pesticide's properties and water quality risks.

5.5.7 Glossary

California Code of Regulations, Title 3, Division 6 (3 CCR)
California State Code regulating pesticides and pest control operations.
http://www.calregs.com

Equivalent Training
A term referring to municipal employees dealing with the application of pesticides who have not received a qualified applicator's license or certificate (QAL or QAC) from the State of California, but who has completed a training course in pesticide application offered by the County of Orange.

Eutrophication
A response to an increase in the nutrient status (nitrogen and phosphorus) of a water body. The result is an increase in the growth of vegetation (usually algae), a decrease in dissolved oxygen, increased turbidity, and a general degradation in water quality.

Food and Agricultural Code, Divisions 6, 7 & 13 (FAC)
California state statutes relating to pesticides. Laws passed by the California Legislature. Provides the authority for the Department of Pesticide Regulation (DPR) and 3CCR.

Integrated Pest Management (IPM)
A sustainable approach to pest management that combines the use of prevention, avoidance, monitoring and suppression strategies in a way that minimizes economic, health, and environmental risks.

Maximum Extent Practicable (MEP)
MEP means taking into account equitable considerations of competing factors, including, but not limited to, the gravity of the problem, fiscal feasibility, public health risks, societal concern and social benefit.

Materials Data Safety Sheet (MSDS)
These sheets contain all information necessary for the safe handling of pesticides. They include chemical identifications, hazardous ingredients, physical data, fire and explosion data, health hazards, reactivity data, spill or leak cleanup procedures, special protection and special precautions. Federal law requires them to be kept on file for every pesticide or other hazardous material stored or used.

Pest Control Advisor (PCA)
Any person who offers a recommendation on any agricultural use (includes landscape and turf maintenance), who holds him or herself forth as an authority on any agricultural use, or who solicits services or sales for any agricultural use, must possess a valid Agricultural Pest Control Adviser License. To obtain a license the applicant must meet certain educational requirements and successfully complete examinations relating to knowledge of pests, pesticides and laws and

regulations concerning pesticide use. Officials of federal, state, and county departments of agriculture, and University of California personnel engaged in duties relating to agricultural use are not required to be licensed. A PCA must also register with the County Agricultural Commissioner (CAC).

Pesticide Labels

In California, all pesticide use is regulated through federal and state laws and regulations. Food and Agricultural Code (FAC), section 12973, states: 'the use of any pesticide shall not conflict with the registered label'. In other words "the label is the law". No pesticide can be used in California until the Department of Pesticide Regulation (DPR) has registered it. The approved pesticide label contains all the regulations regarding the use of the particular product. This includes: the EPA registration number, the active ingredient and percentage of inert ingredients, the allowed use sites, the solution and dilution rates, the personal protection equipment (PPE) needed, as well as precautionary statements, environmental hazards, use requirements and directions for use. To use a product in a manner inconsistent with its label is against the law. As required by federal law, manufacturers of pesticides must provide labels on the containers of all pesticides intended for sale and distribution.

Qualified Applicator's Certificate (QAC)

A certificate obtained from the State of California after demonstrating adequate knowledge of the proper techniques for handling, storing, transporting and applying pesticides. Any person who uses or supervises the use of federally restricted use pesticides or state restricted materials for any purpose or on any property other than that provided by the definition of "private applicator" must have a QAC. A QAC is obtained by passing the Laws, Regulations, and Basic Principles examination and at least one pest control category examination.

Qualified Applicator's License (QAL)

Any person who supervises pesticide applications made by a licensed Pest Control Business and who is responsible for the safe and legal operation of the pest control business must obtain this license. Those persons who supervise the use of federal or state restricted materials for any purpose (and on any property) other than that provided by the definition provided under "private applicator" must also obtain a QAL.

Restricted Materials Permit

A permit that must be acquired by any public agency before application of the pesticides listed as restricted in 3CCR, section 6000. In Orange County, this permit must be obtained from the County Agricultural Commissioner. A list of restricted materials can be found at **http://www.cdpr.ca.gov/docs/license/pr-pml-013a.pdf** or Agricultural Commissioner's Office.

State Laws

The California Food and Agricultural Code (FAC) and the California Code of Regulations, Title 3 (3CCR), constitute the laws and regulations referenced in these guidelines. They are referenced often and usually are referred to as "State Laws".

Toxicity Classification

The Environmental Protection Agency (EPA) groups pesticides into three categories according to their toxicity or potential to cause injury to people. Category I pesticides are often the most hazardous because they are the most toxic and their use is normally restricted; they will carry the word"danger" or "danger-poison" with the skull and crossbones on the label. Category II pesticides are moderately toxic and carry the word "warning" on the label. The least hazardous pesticides are Category III and IV pesticides. These are slightly toxic or relatively nontoxic but basic safety precautions should still be taken. These carry the word"caution" on the label.

MODEL WATER EFFICIENT LANDSCAPE ORDINANCE

Model Water Efficient Landscape Ordinance
September 10, 2009

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California Code of Regulations
Title 23. Waters
Division 2. Department of Water Resources
Chapter 2.7. Model Water Efficient Landscape Ordinance

§ 490. Purpose.

(a) The State Legislature has found:
(1) that the waters of the state are of limited supply and are subject to ever increasing demands;
(2) that the continuation of California's economic prosperity is dependent on the availability of adequate supplies of water for future uses;
(3) that it is the policy of the State to promote the conservation and efficient use of water and to prevent the waste of this valuable resource;
(4) that landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development; and
(5) that landscape design, installation, maintenance and management can and should be water efficient; and
(6) that Section 2 of Article X of the California Constitution specifies that the right to use water is limited to the amount reasonably required for the beneficial use to be served and the right does not and shall not extend to waste or unreasonable method of use.
(b) Consistent with these legislative findings, the purpose of this model ordinance is to:
(1) promote the values and benefits of landscapes while recognizing the need to invest water and other resources as efficiently as possible;
(2) establish a structure for planning, designing, installing, maintaining and managing water efficient landscapes in new construction and rehabilitated projects;
(3) establish provisions for water management practices and water waste prevention for existing landscapes;
(4) use water efficiently without waste by setting a Maximum Applied Water Allowance as an upper limit for water use and reduce water use to the lowest practical amount;
(5) promote the benefits of consistent landscape ordinances with neighboring local and regional agencies;
(6) encourage local agencies and water purveyors to use economic incentives that promote the efficient use of water, such as implementing a tiered-rate structure; and
(7) encourage local agencies to designate the necessary authority that implements and enforces the provisions of the Model Water Efficient Landscape Ordinance or its local landscape ordinance.

Note: Authority cited: Section 65593, Government Code. Reference: Sections 65591, 65593, 65596, Government Code.

§ 490.1 Applicability

(a) After January 1, 2010, this ordinance shall apply to all of the following landscape projects:
(1) new construction and rehabilitated landscapes for public agency projects and private development projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check or design review;
(2) new construction and rehabilitated landscapes which are developer-installed in single-family and multi-family projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review;

(3) new construction landscapes which are homeowner-provided and/or homeowner-hired in single-family and multi-family residential projects with a total project landscape area equal to or greater than 5,000 square feet requiring a building or landscape permit, plan check or design review;
(4) existing landscapes limited to Sections 493, 493.1 and 493.2; and
(5) cemeteries. Recognizing the special landscape management needs of cemeteries, new and rehabilitated cemeteries are limited to Sections 492.4, 492.11 and 492.12; and existing cemeteries are limited to Sections 493, 493.1 and 493.2.
(b) This ordinance does not apply to:
(1) registered local, state or federal historical sites;
(2) ecological restoration projects that do not require a permanent irrigation system;
(3) mined-land reclamation projects that do not require a permanent irrigation system; or
(4) plant collections, as part of botanical gardens and arboretums open to the public.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 491. Definitions.

The terms used in this ordinance have the meaning set forth below:
(a) "applied water" means the portion of water supplied by the irrigation system to the landscape.
(b) "automatic irrigation controller" means an automatic timing device used to remotely control valves that operate an irrigation system. Automatic irrigation controllers schedule irrigation events using either evapotranspiration (weather-based) or soil moisture data.
(c) "backflow prevention device" means a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.
(d) "Certificate of Completion" means the document required under Section 492.9.
(e) "certified irrigation designer" means a person certified to design irrigation systems by an accredited academic institution a professional trade organization or other program such as the US Environmental Protection Agency's WaterSense irrigation designer certification program and Irrigation Association's Certified Irrigation Designer program.
(f) "certified landscape irrigation auditor" means a person certified to perform landscape irrigation audits by an accredited academic institution, a professional trade organization or other program such as the US Environmental Protection Agency's WaterSense irrigation auditor certification program and Irrigation Association's Certified Landscape Irrigation Auditor program.
(g) "check valve" or "anti-drain valve" means a valve located under a sprinkler head, or other location in the irrigation system, to hold water in the system to prevent drainage from sprinkler heads when the sprinkler is off.
(h) "common interest developments" means community apartment projects, condominium projects, planned developments, and stock cooperatives per Civil Code Section 1351.
(i) "conversion factor (0.62)" means the number that converts acre-inches per acre per year to gallons per square foot per year
(j) "drip irrigation" means any non-spray low volume irrigation system utilizing emission devices with a flow rate measured in gallons per hour. Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.
(k) "ecological restoration project" means a project where the site is intentionally altered to establish a defined, indigenous, historic ecosystem.
(l)"effective precipitation" or "usable rainfall" (Eppt) means the portion of total precipitation which becomes available for plant growth.
(m) "emitter" means a drip irrigation emission device that delivers water slowly from the system to the soil.
(n) "established landscape" means the point at which plants in the landscape have developed significant root growth into the soil. Typically, most plants are established after one or two years of growth.

(o) “establishment period of the plants” means the first year after installing the plant in the landscape or the first two years if irrigation will be terminated after establishment. Typically, most plants are established after one or two years of growth.
(p) “Estimated Total Water Use” (ETWU) means the total water used for the landscape as described in Section 492.4.
(q) “ET adjustment factor” (ETAF) means a factor of 0.7, that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape.
A combined plant mix with a site-wide average of 0.5 is the basis of the plant factor portion of this calculation. For purposes of the ETAF, the average irrigation efficiency is 0.71. Therefore, the ET Adjustment Factor is (0.7)=(0.5/0.71). ETAF for a Special Landscape Area shall not exceed 1.0. ETAF for existing non-rehabilitated landscapes is 0.8.
(r) “evapotranspiration rate” means the quantity of water evaporated from adjacent soil and other surfaces and transpired by plants during a specified time.
(s) “flow rate” means the rate at which water flows through pipes, valves and emission devices, measured in gallons per minute, gallons per hour, or cubic feet per second.
(t) “hardscapes” means any durable material (pervious and non-pervious).
(u) “homeowner-provided landscaping” means any landscaping either installed by a private individual for a single family residence or installed by a licensed contractor hired by a homeowner. A homeowner, for purposes of this ordinance, is a person who occupies the dwelling he or she owns. This excludes speculative homes, which are not owner-occupied dwellings.
(v) “hydrozone” means a portion of the landscaped area having plants with similar water needs. A hydrozone may be irrigated or non-irrigated.
(w) “infiltration rate” means the rate of water entry into the soil expressed as a depth of water per unit of time (e.g., inches per hour).
(x)“invasive plant species” means species of plants not historically found in California that spread outside cultivated areas and can damage environmental or economic resources. Invasive species may be regulated by county agricultural agencies as noxious species. “Noxious weeds” means any weed designated by the Weed Control Regulations in the Weed Control Act and identified on a Regional District noxious weed control list. Lists of invasive plants are maintained at the California Invasive Plant Inventory and USDA invasive and noxious weeds database.
(y) “irrigation audit” means an in-depth evaluation of the performance of an irrigation system conducted by a Certified Landscape Irrigation Auditor. An irrigation audit includes, but is not limited to: inspection, system tune-up, system test with distribution uniformity or emission uniformity, reporting overspray or runoff that causes overland flow, and preparation of an irrigation schedule.
(z) “irrigation efficiency” (IE) means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum average irrigation efficiency for purposes of this ordinance is 0.71. Greater irrigation efficiency can be expected from well designed and maintained systems.
(aa) “irrigation survey” means an evaluation of an irrigation system that is less detailed than an irrigation audit. An irrigation survey includes, but is not limited to: inspection, system test, and written recommendations to improve performance of the irrigation system.
(bb) “irrigation water use analysis” means an analysis of water use data based on meter readings and billing data.
(cc) “landscape architect” means a person who holds a license to practice landscape architecture in the state of California Business and Professions Code, Section 5615.
(dd) “landscape area” means all the planting areas, turf areas, and water features in a landscape design plan subject to the Maximum Applied Water Allowance calculation. The landscape area does not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or

stone walks, other pervious or non-pervious hardscapes, and other non-irrigated areas designated for non-development (e.g., open spaces and existing native vegetation).

(ee) “landscape contractor” means a person licensed by the state of California to construct, maintain, repair, install, or subcontract the development of landscape systems.

(ff) “Landscape Documentation Package” means the documents required under Section 492.3.

(gg) “landscape project” means total area of landscape in a project as defined in “landscape area” for the purposes of this ordinance, meeting requirements under Section 490.1.

(hh) “lateral line” means the water delivery pipeline that supplies water to the emitters or sprinklers from the valve.

(ii) “local agency” means a city or county, including a charter city or charter county, that is responsible for adopting and implementing the ordinance. The local agency is also responsible for the enforcement of this ordinance, including but not limited to, approval of a permit and plan check or design review of a project.

(jj) “local water purveyor” means any entity, including a public agency, city, county, or private water company that provides retail water service.

(kk) “low volume irrigation” means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip, drip lines, and bubblers. Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

(ll) “main line” means the pressurized pipeline that delivers water from the water source to the valve or outlet.

(mm) “Maximum Applied Water Allowance” (MAWA) means the upper limit of annual applied water for the established landscaped area as specified in Section 492.4. It is based upon the area’s reference evapotranspiration, the ET Adjustment Factor, and the size of the landscape area. The Estimated Total Water Use shall not exceed the Maximum Applied Water Allowance. Special Landscape Areas, including recreation areas, areas permanently and solely dedicated to edible plants such as orchards and vegetable gardens, and areas irrigated with recycled water are subject to the MAWA with an ETAF not to exceed 1.0.

(nn) “microclimate” means the climate of a small, specific area that may contrast with the climate of the overall landscape area due to factors such as wind, sun exposure, plant density, or proximity to reflective surfaces.

(oo) “mined-land reclamation projects” means any surface mining operation with a reclamation plan approved in accordance with the Surface Mining and Reclamation Act of 1975.

(pp) “mulch” means any organic material such as leaves, bark, straw, compost, or inorganic mineral materials such as rocks, gravel, and decomposed granite left loose and applied to the soil surface for the beneficial purposes of reducing evaporation, suppressing weeds, moderating soil temperature, and preventing soil erosion.

(qq) “new construction” means, for the purposes of this ordinance, a new building with a landscape or other new landscape, such as a park, playground, or greenbelt without an associated building.

(rr) “operating pressure” means the pressure at which the parts of an irrigation system are designed by the manufacturer to operate.

(ss) “overhead sprinkler irrigation systems” means systems that deliver water through the air (e.g., spray heads and rotors).

(tt) “overspray” means the irrigation water which is delivered beyond the target area.

(uu) “permit” means an authorizing document issued by local agencies for new construction or rehabilitated landscapes.

(vv) “pervious” means any surface or material that allows the passage of water through the material and into the underlying soil.

(ww) “plant factor” or “plant water use factor” is a factor , when multiplied by ETo, estimates the amount of water needed by plants. For purposes of this ordinance, the plant factor range for low water use plants is 0 to 0.3, the plant factor range for moderate water use plants is 0.4 to 0.6, and the plant factor range for high water use plants is 0.7 to 1.0. Plant factors cited in this ordinance are derived from the Department of Water Resources 2000 publication "Water Use Classification of Landscape Species".

(xx) "precipitation rate" means the rate of application of water measured in inches per hour.

(yy) "project applicant" means the individual or entity submitting a Landscape Documentation Package required under Section 492.3, to request a permit, plan check, or design review from the local agency. A project applicant may be the property owner or his or her designee.

(zz) "rain sensor" or "rain sensing shutoff device" means a component which automatically suspends an irrigation event when it rains.

(aaa) "record drawing" or "as-builts" means a set of reproducible drawings which show significant changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the contractor.

(bbb) "recreational area" means areas dedicated to active play such as parks, sports fields, and golf courses where turf provides a playing surface.

(ccc) "recycled water", "reclaimed water", or "treated sewage effluent water" means treated or recycled waste water of a quality suitable for non-potable uses such as landscape irrigation and water features. This water is not intended for human consumption.

(ddd) "reference evapotranspiration" or "ETo" means a standard measurement of environmental parameters which affect the water use of plants. ETo is expressed in inches per day, month, or year as represented in Section 495.1, and is an estimate of the evapotranspiration of a large field of four- to seven-inch tall, cool-season grass that is well watered. Reference evapotranspiration is used as the basis of determining the Maximum Applied Water Allowance so that regional differences in climate can be accommodated.

(eee) "rehabilitated landscape" means any re-landscaping project that requires a permit , plan check, or design review, meets the requirements of Section 490.1, and the modified landscape area is equal to or greater than 2,500 square feet, is 50% of the total landscape area, and the modifications are completed within one year.

(fff) "runoff" means water which is not absorbed by the soil or landscape to which it is applied and flows from the landscape area. For example, runoff may result from water that is applied at too great a rate (application rate exceeds infiltration rate) or when there is a slope.

(ggg) "soil moisture sensing device" or "soil moisture sensor" means a device that measures the amount of water in the soil. The device may also suspend or initiate an irrigation event.

(hhh) "soil texture" means the classification of soil based on its percentage of sand, silt, and clay.

(iii)"Special Landscape Area" (SLA) means an area of the landscape dedicated solely to edible plants, areas irrigated with recycled water, water features using recycled water and areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface.

(jjj) "sprinkler head" means a device which delivers water through a nozzle.

(kkk) "static water pressure" means the pipeline or municipal water supply pressure when water is not flowing.

(lll) "station" means an area served by one valve or by a set of valves that operate simultaneously.

(mmm) "swing joint" means an irrigation component that provides a flexible, leak-free connection between the emission device and lateral pipeline to allow movement in any direction and to prevent equipment damage.

(nnn) "turf" means a ground cover surface of mowed grass. Annual bluegrass, Kentucky bluegrass, Perennial ryegrass, Red fescue, and Tall fescue are cool-season grasses. Bermudagrass, Kikuyugrass, Seashore Paspalum, St. Augustinegrass, Zoysiagrass, and Buffalo grass are warm-season grasses.

(ooo) "valve" means a device used to control the flow of water in the irrigation system.

(ppp) "water conserving plant species" means a plant species identified as having a low plant factor.

(qqq) "water feature" means a design element where open water performs an aesthetic or recreational function. Water features include ponds, lakes, waterfalls, fountains, artificial streams, spas, and

swimming pools (where water is artificially supplied). The surface area of water features is included in the high water use hydrozone of the landscape area. Constructed wetlands used for on-site wastewater treatment or stormwater best management practices that are not irrigated and used solely for water treatment or stormwater retention are not water features and, therefore, are not subject to the water budget calculation.
(rrr) "watering window" means the time of day irrigation is allowed.
(sss) "WUCOLS" means the Water Use Classification of Landscape Species published by the University of California Cooperative Extension, the Department of Water Resources and the Bureau of Reclamation, 2000.

Note: Authority Cited: Section 65595, Government Code. Reference: Sections 65592, 65596, Government Code.

§ 492. Provisions for New Construction or Rehabilitated Landscapes.

(a) A local agency may designate another agency, such as a water purveyor, to implement some or all of the requirements contained in this ordinance. Local agencies may collaborate with water purveyors to define each entity's specific responsibilities relating to this ordinance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.1 Compliance with Landscape Documentation Package.

(a) Prior to construction, the local agency shall:
(1) provide the project applicant with the ordinance and procedures for permits, plan checks, or design reviews;
(2) review the Landscape Documentation Package submitted by the project applicant;
(3) approve or deny the Landscape Documentation Package;
(4) issue a permit or approve the plan check or design review for the project applicant; and
(5) upon approval of the Landscape Documentation Package, submit a copy of the Water Efficient Landscape Worksheet to the local water purveyor.
(b) Prior to construction, the project applicant shall:
(1) submit a Landscape Documentation Package to the local agency.
(c) Upon approval of the Landscape Documentation Package by the local agency, the project applicant shall:
(1) receive a permit or approval of the plan check or design review and record the date of the permit in the Certificate of Completion;
(2) submit a copy of the approved Landscape Documentation Package along with the record drawings, and any other information to the property owner or his/her designee; and
(3) submit a copy of the Water Efficient Landscape Worksheet to the local water purveyor.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.2 Penalties.

(a) A local agency may establish and administer penalties to the project applicant for non-compliance with the ordinance to the extent permitted by law.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.3 Elements of the Landscape Documentation Package.

(a) The Landscape Documentation Package shall include the following six (6) elements:
(1) project information;
(A) date
(B) project applicant
(C) project address (if available, parcel and/or lot number(s))
(D) total landscape area (square feet)
(E) project type (e.g., new, rehabilitated, public, private, cemetery, homeowner-installed)
(F) water supply type (e.g., potable, recycled, well) and identify the local retail water purveyor if the applicant is not served by a private well
(G) checklist of all documents in Landscape Documentation Package
(H) project contacts to include contact information for the project applicant and property owner
(I) applicant signature and date with statement, “I agree to comply with the requirements of the water efficient landscape ordinance and submit a complete Landscape Documentation Package”.
(2) Water Efficient Landscape Worksheet;
(A) hydrozone information table
(B) water budget calculations
1. Maximum Applied Water Allowance (MAWA)
2. Estimated Total Water Use (ETWU)
(3) soil management report;
(4) landscape design plan;
(5) irrigation design plan; and
(6) grading design plan.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.4 Water Efficient Landscape Worksheet.

(a) A project applicant shall complete the Water Efficient Landscape Worksheet which contains two sections (see sample worksheet in Appendix B):
(1) a hydrozone information table (see Appendix B, Section A) for the landscape project; and
(2) a water budget calculation (see Appendix B, Section B) for the landscape project. For the calculation of the Maximum Applied Water Allowance and Estimated Total Water Use, a project applicant shall use the ETo values from the Reference Evapotranspiration Table in Appendix A. For geographic areas not covered in Appendix A, use data from other cities located nearby in the same reference evapotranspiration zone, as found in the CIMIS Reference Evapotranspiration Zones Map, Department of Water Resources, 1999.
(b) Water budget calculations shall adhere to the following requirements:
(1) The plant factor used shall be from WUCOLS. The plant factor ranges from 0 to 0.3 for low water use plants, from 0.4 to 0.6 for moderate water use plants, and from 0.7 to 1.0 for high water use plants.
(2) All water features shall be included in the high water use hydrozone and temporarily irrigated areas shall be included in the low water use hydrozone.
(3) All Special Landscape Areas shall be identified and their water use calculated as described below.
(4) ETAF for Special Landscape Areas shall not exceed 1.0.
(c) Maximum Applied Water Allowance
The Maximum Applied Water Allowance shall be calculated using the equation:

$$MAWA = (ETo) (0.62) [(0.7 \times LA) + (0.3 \times SLA)]$$

The example calculations below are hypothetical to demonstrate proper use of the equations and do not represent an existing and/or planned landscape project. The ETo values used in these calculations are from the Reference Evapotranspiration Table in Appendix A, for planning purposes only. For actual irrigation scheduling, automatic irrigation controllers are required and shall use current reference evapotranspiration data, such as from the California Irrigation Management Information System (CIMIS), other equivalent data, or soil moisture sensor data.

(1) Example MAWA calculation: a hypothetical landscape project in Fresno, CA with an irrigated landscape area of 50,000 square feet without any Special Landscape Area (SLA= 0, no edible plants, recreational areas, or use of recycled water). To calculate MAWA, the annual reference evapotranspiration value for Fresno is 51.1 inches as listed in the Reference Evapotranspiration Table in Appendix A.

MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]
MAWA = Maximum Applied Water Allowance (gallons per year)
ETo = Reference Evapotranspiration (inches per year)
0.62 = Conversion Factor (to gallons)
0.7 = ET Adjustment Factor (ETAF)
LA = Landscape Area including SLA (square feet)
0.3 = Additional Water Allowance for SLA
SLA = Special Landscape Area (square feet)
MAWA = (51.1 inches) (0.62) [(0.7 x 50,000 square feet) + (0.3 x 0)]
= 1,108,870 gallons per year
To convert from gallons per year to hundred-cubic-feet per year:
= 1,108,870/748 = 1,482 hundred-cubic-feet per year
(100 cubic feet = 748 gallons)

(2) In this next hypothetical example, the landscape project in Fresno, CA has the same ETo value of 51.1 inches and a total landscape area of 50,000 square feet. Within the 50,000 square foot project, there is now a 2,000 square foot area planted with edible plants. This 2,000 square foot area is considered to be a Special Landscape Area.

MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]
MAWA = (51.1 inches) (0.62) [(0.7 x 50,000 square feet) + (0.3 x 2,000 square feet)]
= 31.68 x [35,000 + 600] gallons per year
= 31.68 x 35,600 gallons per year
=1,127,808 gallons per year or 1,508 hundred-cubic-feet per year

(d) Estimated Total Water Use.

The Estimated Total Water Use shall be calculated using the equation below. The sum of the Estimated Total Water Use calculated for all hydrozones shall not exceed MAWA.

$$ETWU = (ETo)(0.62)\left(\frac{PF\ x\,HA}{IE} + SLA\right)$$

Where:

ETWU = Estimated Total Water Use per year (gallons)
ETo = Reference Evapotranspiration (inches)
PF = Plant Factor from WUCOLS (see Section 491)
HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
SLA = Special Landscape Area (square feet)
0.62 = Conversion Factor
IE = Irrigation Efficiency (minimum 0.71)

(1) Example ETWU calculation: landscape area is 50,000 square feet; plant water use type, plant factor, and hydrozone area are shown in the table below. The ETo value is 51.1 inches per year. There are no Special Landscape Areas (recreational area, area permanently and solely dedicated to edible plants, and area irrigated with recycled water) in this example.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)*	Hydrozone Area (HA) (square feet)	PF x HA (square feet)
1	High	0.8	7,000	5,600
2	High	0.7	10,000	7,000
3	Medium	0.5	16,000	8,000
4	Low	0.3	7,000	2,100
5	Low	0.2	10,000	2,000
			Sum	24,700

*Plant Factor from WUCOLS

$$ETWU = (51.1)(0.62)\left(\frac{24{,}700}{0.71} + 0\right)$$

= 1,102,116 gallons per year

Compare ETWU with MAWA: For this example MAWA = (51.1) (0.62) [(0.7 x 50,000) + (0.3 x 0)] = 1,108,870 gallons per year. The ETWU (1,102,116 gallons per year) is less than MAWA (1,108,870 gallons per year). In this example, the water budget complies with the MAWA.

(2) Example ETWU calculation: total landscape area is 50,000 square feet, 2,000 square feet of which is planted with edible plants. The edible plant area is considered a Special Landscape Area (SLA). The reference evapotranspiration value is 51.1 inches per year. The plant type, plant factor, and hydrozone area are shown in the table below.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)*	Hydrozone Area (HA) (square feet)	PF x HA (square feet)
1	High	0.8	7,000	5,600
2	High	0.7	9,000	6,300
3	Medium	0.5	15,000	7,500
4	Low	0.3	7,000	2,100
5	Low	0.2	10,000	2,000
			Sum	23,500
6	SLA	1.0	2,000	2,000

*Plant Factor from WUCOLS

$$ETWU = (51.1)(0.62)\left(\frac{23{,}500}{0.71} + 2{,}000\right)$$

= (31.68) (33,099 + 2,000)

= 1,111,936 gallons per year

Compare ETWU with MAWA. For this example:
MAWA = (51.1) (0.62) [(0.7 x 50,000) + (0.3 x 2,000)]
= 31.68 x [35,000 + 600]
= 31.68 x 35,600
=1,127,808 gallons per year

The ETWU (1,111,936 gallons per year) is less than MAWA (1,127,808 gallons per year). For this example, the water budget complies with the MAWA.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.5 Soil Management Report.

(a) In order to reduce runoff and encourage healthy plant growth, a soil management report shall be completed by the project applicant, or his/her designee, as follows:
(1) Submit soil samples to a laboratory for analysis and recommendations.
(A) Soil sampling shall be conducted in accordance with laboratory protocol, including protocols regarding adequate sampling depth for the intended plants.
(B) The soil analysis may include:
1. soil texture;
2. infiltration rate determined by laboratory test or soil texture infiltration rate table;
3. pH;
4. total soluble salts;
5. sodium;
6. percent organic matter; and
7. recommendations.
(2) The project applicant, or his/her designee, shall comply with one of the following:
(A) If significant mass grading is not planned, the soil analysis report shall be submitted to the local agency as part of the Landscape Documentation Package; or
(B) If significant mass grading is planned, the soil analysis report shall be submitted to the local agency as part of the Certificate of Completion.
(3) The soil analysis report shall be made available, in a timely manner, to the professionals preparing the landscape design plans and irrigation design plans to make any necessary adjustments to the design plans.
(4) The project applicant, or his/her designee, shall submit documentation verifying implementation of soil analysis report recommendations to the local agency with Certificate of Completion.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.6 Landscape Design Plan.

(a) For the efficient use of water, a landscape shall be carefully designed and planned for the intended function of the project. A landscape design plan meeting the following design criteria shall be submitted as part of the Landscape Documentation Package.
(1) Plant Material
(A) Any plant may be selected for the landscape, providing the Estimated Total Water Use in the landscape area does not exceed the Maximum Applied Water Allowance. To encourage the efficient use of water, the following is highly recommended:
1. protection and preservation of native species and natural vegetation;
2. selection of water-conserving plant and turf species;

3. selection of plants based on disease and pest resistance;
4. selection of trees based on applicable local tree ordinances or tree shading guidelines; and
5. selection of plants from local and regional landscape program plant lists.
(B) Each hydrozone shall have plant materials with similar water use, with the exception of hydrozones with plants of mixed water use, as specified in Section 492.7(a)(2)(D).
(C) Plants shall be selected and planted appropriately based upon their adaptability to the climatic, geologic, and topographical conditions of the project site. To encourage the efficient use of water, the following is highly recommended:
1. use the Sunset Western Climate Zone System which takes into account temperature, humidity, elevation, terrain, latitude, and varying degrees of continental and marine influence on local climate;
2. recognize the horticultural attributes of plants (i.e., mature plant size, invasive surface roots) to minimize damage to property or infrastructure [e.g., buildings, sidewalks, power lines]; and
3. consider the solar orientation for plant placement to maximize summer shade and winter solar gain.
(D) Turf is not allowed on slopes greater than 25% where the toe of the slope is adjacent to an impermeable hardscape and where 25% means 1 foot of vertical elevation change for every 4 feet of horizontal length (rise divided by run x 100 = slope percent).
(E) A landscape design plan for projects in fire-prone areas shall address fire safety and prevention. A defensible space or zone around a building or structure is required per Public Resources Code Section 4291(a) and (b). Avoid fire-prone plant materials and highly flammable mulches.
(F) The use of invasive and/or noxious plant species is strongly discouraged.
(G) The architectural guidelines of a common interest development, which include community apartment projects, condominiums, planned developments, and stock cooperatives, shall not prohibit or include conditions that have the effect of prohibiting the use of low-water use plants as a group.
(2) Water Features
(A) Recirculating water systems shall be used for water features.
(B) Where available, recycled water shall be used as a source for decorative water features.
(C) Surface area of a water feature shall be included in the high water use hydrozone area of the water budget calculation.
(D) Pool and spa covers are highly recommended.
(3) Mulch and Amendments
(A) A minimum two inch (2″) layer of mulch shall be applied on all exposed soil surfaces of planting areas except in turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is contraindicated.
(B) Stabilizing mulching products shall be used on slopes.
(C) The mulching portion of the seed/mulch slurry in hydro-seeded applications shall meet the mulching requirement.
(D) Soil amendments shall be incorporated according to recommendations of the soil report and what is appropriate for the plants selected (see Section 492.5).
(b) The landscape design plan, at a minimum, shall:
(1) delineate and label each hydrozone by number, letter, or other method;
(2) identify each hydrozone as low, moderate, high water, or mixed water use. Temporarily irrigated areas of the landscape shall be included in the low water use hydrozone for the water budget calculation;
(3) identify recreational areas;
(4) identify areas permanently and solely dedicated to edible plants;
(5) identify areas irrigated with recycled water;
(6) identify type of mulch and application depth;
(7) identify soil amendments, type, and quantity;
(8) identify type and surface area of water features;
(9) identify hardscapes (pervious and non-pervious);

(10) identify location and installation details of any applicable stormwater best management practices that encourage on-site retention and infiltration of stormwater. Stormwater best management practices are encouraged in the landscape design plan and examples include, but are not limited to:
(A) infiltration beds, swales, and basins that allow water to collect and soak into the ground;
(B) constructed wetlands and retention ponds that retain water, handle excess flow, and filter pollutants; and
(C) pervious or porous surfaces (e.g., permeable pavers or blocks, pervious or porous concrete, etc.) that minimize runoff.
(11) identify any applicable rain harvesting or catchment technologies (e.g., rain gardens, cisterns, etc.);
(12) contain the following statement: "I have complied with the criteria of the ordinance and applied them for the efficient use of water in the landscape design plan"; and
(13) bear the signature of a licensed landscape architect, licensed landscape contractor, or any other person authorized to design a landscape. (See Sections 5500.1, 5615, 5641, 5641.1, 5641.2, 5641.3, 5641.4, 5641.5, 5641.6, 6701, 7027.5 of the Business and Professions Code, Section 832.27 of Title16 of the California Code of Regulations, and Section 6721 of the Food and Agriculture Code.)

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code and Section 1351, Civil Code.

§ 492.7 Irrigation Design Plan.

(a) For the efficient use of water, an irrigation system shall meet all the requirements listed in this section and the manufacturers' recommendations. The irrigation system and its related components shall be planned and designed to allow for proper installation, management, and maintenance. An irrigation design plan meeting the following design criteria shall be submitted as part of the Landscape Documentation Package.
(1) System
(A) Dedicated landscape water meters are highly recommended on landscape areas smaller than 5,000 square feet to facilitate water management.
(B) Automatic irrigation controllers utilizing either evapotranspiration or soil moisture sensor data shall be required for irrigation scheduling in all irrigation systems.
(C) The irrigation system shall be designed to ensure that the dynamic pressure at each emission device is within the manufacturer's recommended pressure range for optimal performance.
1. If the static pressure is above or below the required dynamic pressure of the irrigation system, pressure-regulating devices such as inline pressure regulators, booster pumps, or other devices shall be installed to meet the required dynamic pressure of the irrigation system.
2. Static water pressure, dynamic or operating pressure. and flow reading of the water supply shall be measured at the point of connection. These pressure and flow measurements shall be conducted at the design stage. If the measurements are not available at the design stage, the measurements shall be conducted at installation.
(D) Sensors (rain, freeze, wind, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions shall be required on all irrigation systems, as appropriate for local climatic conditions. Irrigation should be avoided during windy or freezing weather or during rain.
(E) Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) shall be required, as close as possible to the point of connection of the water supply, to minimize water loss in case of an emergency (such as a main line break) or routine repair.

(F) Backflow prevention devices shall be required to protect the water supply from contamination by the irrigation system. A project applicant shall refer to the applicable local agency code (i.e., public health) for additional backflow prevention requirements.
(G) High flow sensors that detect and report high flow conditions created by system damage or malfunction are recommended.
(H) The irrigation system shall be designed to prevent runoff, low head drainage, overspray, or other similar conditions where irrigation water flows onto non-targeted areas, such as adjacent property, non-irrigated areas, hardscapes, roadways, or structures.
(I) Relevant information from the soil management plan, such as soil type and infiltration rate, shall be utilized when designing irrigation systems.
(J) The design of the irrigation system shall conform to the hydrozones of the landscape design plan.
(K) The irrigation system must be designed and installed to meet, at a minimum, the irrigation efficiency criteria as described in Section 492.4 regarding the Maximum Applied Water Allowance.
(L) It is highly recommended that the project applicant or local agency inquire with the local water purveyor about peak water operating demands (on the water supply system) or water restrictions that may impact the effectiveness of the irrigation system.
(M) In mulched planting areas, the use of low volume irrigation is required to maximize water infiltration into the root zone.
(N) Sprinkler heads and other emission devices shall have matched precipitation rates, unless otherwise directed by the manufacturer's recommendations.
(O) Head to head coverage is recommended. However, sprinkler spacing shall be designed to achieve the highest possible distribution uniformity using the manufacturer's recommendations.
(P) Swing joints or other riser-protection components are required on all risers subject to damage that are adjacent to high traffic areas.
(Q) Check valves or anti-drain valves are required for all irrigation systems.
(R) Narrow or irregularly shaped areas, including turf, less than eight (8) feet in width in any direction shall be irrigated with subsurface irrigation or low volume irrigation system.
(S) Overhead irrigation shall not be permitted within 24 inches of any non-permeable surface. Allowable irrigation within the setback from non-permeable surfaces may include drip, drip line, or other low flow non-spray technology. The setback area may be planted or unplanted. The surfacing of the setback may be mulch, gravel, or other porous material. These restrictions may be modified if:
1. the landscape area is adjacent to permeable surfacing and no runoff occurs; or
2. the adjacent non-permeable surfaces are designed and constructed to drain entirely to landscaping; or
3. the irrigation designer specifies an alternative design or technology, as part of the Landscape Documentation Package and clearly demonstrates strict adherence to irrigation system design criteria in Section 492.7 (a)(1)(H). Prevention of overspray and runoff must be confirmed during the irrigation audit.
(T) Slopes greater than 25% shall not be irrigated with an irrigation system with a precipitation rate exceeding 0.75 inches per hour. This restriction may be modified if the landscape designer specifies an alternative design or technology, as part of the Landscape Documentation Package, and clearly demonstrates no runoff or erosion will occur. Prevention of runoff and erosion must be confirmed during the irrigation audit.
(2) Hydrozone
(A) Each valve shall irrigate a hydrozone with similar site, slope, sun exposure, soil conditions, and plant materials with similar water use.
(B) Sprinkler heads and other emission devices shall be selected based on what is appropriate for the plant type within that hydrozone.
(C) Where feasible, trees shall be placed on separate valves from shrubs, groundcovers, and turf.
(D) Individual hydrozones that mix plants of moderate and low water use, or moderate and high water use, may be allowed if:

1. plant factor calculation is based on the proportions of the respective plant water uses and their plant factor; or
2. the plant factor of the higher water using plant is used for calculations.
(E) Individual hydrozones that mix high and low water use plants shall not be permitted.
(F) On the landscape design plan and irrigation design plan, hydrozone areas shall be designated by number, letter, or other designation. On the irrigation design plan, designate the areas irrigated by each valve, and assign a number to each valve. Use this valve number in the Hydrozone Information Table (see Appendix B Section A). This table can also assist with the irrigation audit and programming the controller.
(b) The irrigation design plan, at a minimum, shall contain:
(1) location and size of separate water meters for landscape;
(2) location, type and size of all components of the irrigation system, including controllers, main and lateral lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, pressure regulators, and backflow prevention devices;
(3) static water pressure at the point of connection to the public water supply;
(4) flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (pressure per square inch) for each station;
(5) recycled water irrigation systems as specified in Section 492.14;
(6) the following statement: “I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the irrigation design plan”; and
(7) the signature of a licensed landscape architect, certified irrigation designer, licensed landscape contractor, or any other person authorized to design an irrigation system. (See Sections 5500.1, 5615, 5641, 5641.1, 5641.2, 5641.3, 5641.4, 5641.5, 5641.6, 6701, 7027.5 of the Business and Professions Code, Section 832.27 of Title 16 of the California Code of Regulations, and Section 6721 of the Food and Agricultural Code.)

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.8 Grading Design Plan.

(a) For the efficient use of water, grading of a project site shall be designed to minimize soil erosion, runoff, and water waste. A grading plan shall be submitted as part of the Landscape Documentation Package. A comprehensive grading plan prepared by a civil engineer for other local agency permits satisfies this requirement.
(1) The project applicant shall submit a landscape grading plan that indicates finished configurations and elevations of the landscape area including:
(A) height of graded slopes;
(B) drainage patterns;
(C) pad elevations;
(D) finish grade; and
(E) stormwater retention improvements, if applicable.
(2) To prevent excessive erosion and runoff, it is highly recommended that project applicants:
(A) grade so that all irrigation and normal rainfall remains within property lines and does not drain on to non-permeable hardscapes;
(B) avoid disruption of natural drainage patterns and undisturbed soil; and
(C) avoid soil compaction in landscape areas.
(3) The grading design plan shall contain the following statement: “I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the grading design plan” and shall bear the signature of a licensed professional as authorized by law.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.9 Certificate of Completion.

(a) The Certificate of Completion (see Appendix C for a sample certificate) shall include the following six (6) elements:

(1) project information sheet that contains:

(A) date;

(B) project name;

(C) project applicant name, telephone, and mailing address;

(D) project address and location; and

(E) property owner name, telephone, and mailing address;

(2) certification by either the signer of the landscape design plan, the signer of the irrigation design plan, or the licensed landscape contractor that the landscape project has been installed per the approved Landscape Documentation Package;

(A) where there have been significant changes made in the field during construction, these "as-built" or record drawings shall be included with the certification;

(3) irrigation scheduling parameters used to set the controller (see Section 492.10);

(4) landscape and irrigation maintenance schedule (see Section 492.11);

(5) irrigation audit report (see Section 492.12); and

(6) soil analysis report, if not submitted with Landscape Documentation Package, and documentation verifying implementation of soil report recommendations (see Section 492.5).

(b) The project applicant shall:

(1) submit the signed Certificate of Completion to the local agency for review;

(2) ensure that copies of the approved Certificate of Completion are submitted to the local water purveyor and property owner or his or her designee.

(c) The local agency shall:

(1) receive the signed Certificate of Completion from the project applicant;

(2) approve or deny the Certificate of Completion. If the Certificate of Completion is denied, the local agency shall provide information to the project applicant regarding reapplication, appeal, or other assistance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.10 Irrigation Scheduling.

(a) For the efficient use of water, all irrigation schedules shall be developed, managed, and evaluated to utilize the minimum amount of water required to maintain plant health. Irrigation schedules shall meet the following criteria:

(1) Irrigation scheduling shall be regulated by automatic irrigation controllers.

(2) Overhead irrigation shall be scheduled between 8:00 p.m. and 10:00 a.m. unless weather conditions prevent it. If allowable hours of irrigation differ from the local water purveyor, the stricter of the two shall apply. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.

(3) For implementation of the irrigation schedule, particular attention must be paid to irrigation run times, emission device, flow rate, and current reference evapotranspiration, so that applied water meets the Estimated Total Water Use. Total annual applied water shall be less than or equal to Maximum Applied Water Allowance (MAWA). Actual irrigation schedules shall be regulated by automatic irrigation controllers using current reference evapotranspiration data (e.g., CIMIS) or soil moisture sensor data.

(4) Parameters used to set the automatic controller shall be developed and submitted for each of the following:

(A) the plant establishment period;

(B) the established landscape; and
(C) temporarily irrigated areas.
(5) Each irrigation schedule shall consider for each station all of the following that apply:
(A) irrigation interval (days between irrigation);
(B) irrigation run times (hours or minutes per irrigation event to avoid runoff);
(C) number of cycle starts required for each irrigation event to avoid runoff;
(D) amount of applied water scheduled to be applied on a monthly basis;
(E) application rate setting;
(F) root depth setting;
(G) plant type setting;
(H) soil type;
(I) slope factor setting;
(J) shade factor setting; and
(K) irrigation uniformity or efficiency setting.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.11 Landscape and Irrigation Maintenance Schedule.

(a) Landscapes shall be maintained to ensure water use efficiency. A regular maintenance schedule shall be submitted with the Certificate of Completion.
(b) A regular maintenance schedule shall include, but not be limited to, routine inspection; adjustment and repair of the irrigation system and its components; aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning; weeding in all landscape areas, and removing and obstruction to emission devices. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.
(c) Repair of all irrigation equipment shall be done with the originally installed components or their equivalents.
(d) A project applicant is encouraged to implement sustainable or environmentally-friendly practices for overall landscape maintenance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.12 Irrigation Audit, Irrigation Survey, and Irrigation Water Use Analysis.

(a) All landscape irrigation audits shall be conducted by a certified landscape irrigation auditor.
(b) For new construction and rehabilitated landscape projects installed after January 1, 2010, as described in Section 490.1:
(1) the project applicant shall submit an irrigation audit report with the Certificate of Completion to the local agency that may include, but is not limited to: inspection, system tune-up, system test with distribution uniformity, reporting overspray or run off that causes overland flow, and preparation of an irrigation schedule;
(2) the local agency shall administer programs that may include, but not be limited to, irrigation water use analysis, irrigation audits, and irrigation surveys for compliance with the Maximum Applied Water Allowance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.13 Irrigation Efficiency.

(a) For the purpose of determining Maximum Applied Water Allowance, average irrigation efficiency is assumed to be 0.71. Irrigation systems shall be designed, maintained, and managed to meet or exceed an average landscape irrigation efficiency of 0.71.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.14 Recycled Water.

(a) The installation of recycled water irrigation systems shall allow for the current and future use of recycled water, unless a written exemption has been granted as described in Section 492.14(b).
(b) Irrigation systems and decorative water features shall use recycled water unless a written exemption has been granted by the local water purveyor stating that recycled water meeting all public health codes and standards is not available and will not be available for the foreseeable future.
(c) All recycled water irrigation systems shall be designed and operated in accordance with all applicable local and State laws.
(d) Landscapes using recycled water are considered Special Landscape Areas. The ET Adjustment Factor for Special Landscape Areas shall not exceed 1.0.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.15 Stormwater Management.

(a) Stormwater management practices minimize runoff and increase infiltration which recharges groundwater and improves water quality. Implementing stormwater best management practices into the landscape and grading design plans to minimize runoff and to increase on-site retention and infiltration are encouraged.
(b) Project applicants shall refer to the local agency or Regional Water Quality Control Board for information on any applicable stormwater ordinances and stormwater management plans.
(c) Rain gardens, cisterns, and other landscapes features and practices that increase rainwater capture and create opportunities for infiltration and/or onsite storage are recommended.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.16 Public Education.

(a) Publications. Education is a critical component to promote the efficient use of water in landscapes. The use of appropriate principles of design, installation, management and maintenance that save water is encouraged in the community.
(1) A local agency shall provide information to owners of new, single-family residential homes regarding the design, installation, management, and maintenance of water efficient landscapes.
(b) Model Homes. All model homes that are landscaped shall use signs and written information to demonstrate the principles of water efficient landscapes described in this ordinance.
(1) Signs shall be used to identify the model as an example of a water efficient landscape featuring elements such as hydrozones, irrigation equipment, and others that contribute to the overall water efficient theme.
(2) Information shall be provided about designing, installing, managing, and maintaining water efficient landscapes.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.17 Environmental Review.

(a) The local agency must comply with the California Environmental Quality Act (CEQA), as appropriate.

Note: Authority cited: Section 21082, Public Resources Code. Reference: Sections 21080, 21082, Public Resources Code.

§ 493. Provisions for Existing Landscapes.

(a) A local agency may designate another agency, such as a water purveyor, to implement some or all of the requirements contained in this ordinance. Local agencies may collaborate with water purveyors to define each entity's specific responsibilities relating to this ordinance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 493.1 Irrigation Audit, Irrigation Survey, and Irrigation Water Use Analysis.

(a) This section, 493.1, shall apply to all existing landscapes that were installed before January 1, 2010 and are over one acre in size.
(1) For all landscapes in 493.1(a) that have a water meter, the local agency shall administer programs that may include, but not be limited to, irrigation water use analyses, irrigation surveys, and irrigation audits to evaluate water use and provide recommendations as necessary to reduce landscape water use to a level that does not exceed the Maximum Applied Water Allowance for existing landscapes. The Maximum Applied Water Allowance for existing landscapes shall be calculated as: MAWA = (0.8)(ETo)(LA)(0.62).
(2) For all landscapes in 493.1(a), that do not have a meter, the local agency shall administer programs that may include, but not be limited to, irrigation surveys and irrigation audits to evaluate water use and provide recommendations as necessary in order to prevent water waste.
(b) All landscape irrigation audits shall be conducted by a certified landscape irrigation auditor.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 493.2 Water Waste Prevention.

(a) Local agencies shall prevent water waste resulting from inefficient landscape irrigation by prohibiting runoff from leaving the target landscape due to low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures. Penalties for violation of these prohibitions shall be established locally.
(b) Restrictions regarding overspray and runoff may be modified if:
(1) the landscape area is adjacent to permeable surfacing and no runoff occurs; or
(2) the adjacent non-permeable surfaces are designed and constructed to drain entirely to landscaping.

Note: Authority cited: Section 65594, Government Code. Reference: Section 65596, Government Code.

§ 494. Effective Precipitation.

(a) A local agency may consider Effective Precipitation (25% of annual precipitation) in tracking water use and may use the following equation to calculate Maximum Applied Water Allowance:
MAWA= (ETo - Eppt) (0.62) [(0.7 x LA) + (0.3 x SLA)].

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

Appendices.

Appendix A. Reference Evapotranspiration (ETo) Table.

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
ALAMEDA													
Fremont	1.5	1.9	3.4	4.7	5.4	6.3	6.7	6.0	4.5	3.4	1.8	1.5	47.0
Livermore	1.2	1.5	2.9	4.4	5.9	6.6	7.4	6.4	5.3	3.2	1.5	0.9	47.2
Oakland	1.5	1.5	2.8	3.9	5.1	5.3	6.0	5.5	4.8	3.1	1.4	0.9	41.8
Oakland Foothills	1.1	1.4	2.7	3.7	5.1	6.4	5.8	4.9	3.6	2.6	1.4	1.0	39.6
Pleasanton	0.8	1.5	2.9	4.4	5.6	6.7	7.4	6.4	4.7	3.3	1.5	1.0	46.2
Union City	1.4	1.8	3.1	4.2	5.4	5.9	6.4	5.7	4.4	3.1	1.5	1.2	44.2
ALPINE													
Markleeville	0.7	0.9	2.0	3.5	5.0	6.1	7.3	6.4	4.4	2.6	1.2	0.5	40.6
AMADOR													
Jackson	1.2	1.5	2.8	4.4	6.0	7.2	7.9	7.2	5.3	3.2	1.4	0.9	48.9
Shanandoah Valley	1.0	1.7	2.9	4.4	5.6	6.8	7.9	7.1	5.2	3.6	1.7	1.0	48.8
BUTTE													
Chico	1.2	1.8	2.9	4.7	6.1	7.4	8.5	7.3	5.4	3.7	1.7	1.0	51.7
Durham	1.1	1.8	3.2	5.0	6.5	7.4	7.8	6.9	5.3	3.6	1.7	1.0	51.1
Gridley	1.2	1.8	3.0	4.7	6.1	7.7	8.5	7.1	5.4	3.7	1.7	1.0	51.9
Oroville	1.2	1.7	2.8	4.7	6.1	7.6	8.5	7.3	5.3	3.7	1.7	1.0	51.5
CALAVERAS													
San Andreas	1.2	1.5	2.8	4.4	6.0	7.3	7.9	7.0	5.3	3.2	1.4	0.7	48.8
COLUSA													
Colusa	1.0	1.7	3.4	5.0	6.4	7.6	8.3	7.2	5.4	3.8	1.8	1.1	52.8
Williams	1.2	1.7	2.9	4.5	6.1	7.2	8.5	7.3	5.3	3.4	1.6	1.0	50.8
CONTRA COSTA													
Benicia	1.3	1.4	2.7	3.8	4.9	5.0	6.4	5.5	4.4	2.9	1.2	0.7	40.3
Brentwood	1.0	1.5	2.9	4.5	6.1	7.1	7.9	6.7	5.2	3.2	1.4	0.7	48.3
Concord	1.1	1.4	2.4	4.0	5.5	5.9	7.0	6.0	4.8	3.2	1.3	0.7	43.4
Courtland	0.9	1.5	2.9	4.4	6.1	6.9	7.9	6.7	5.3	3.2	1.4	0.7	48.0
Martinez	1.2	1.4	2.4	3.9	5.3	5.6	6.7	5.6	4.7	3.1	1.2	0.7	41.8
Moraga	1.2	1.5	3.4	4.2	5.5	6.1	6.7	5.9	4.6	3.2	1.6	1.0	44.9
Pittsburg	1.0	1.5	2.8	4.1	5.6	6.4	7.4	6.4	5.0	3.2	1.3	0.7	45.4
Walnut Creek	0.8	1.5	2.9	4.4	5.6	6.7	7.4	6.4	4.7	3.3	1.5	1.0	46.2
DEL NORTE													
Crescent City	0.5	0.9	2.0	3.0	3.7	3.5	4.3	3.7	3.0	2.0	0.9	0.5	27.7
EL DORADO													
Camino	0.9	1.7	2.5	3.9	5.9	7.2	7.8	6.8	5.1	3.1	1.5	0.9	47.3
FRESNO													
Clovis	1.0	1.5	3.2	4.8	6.4	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.4
Coalinga	1.2	1.7	3.1	4.6	6.2	7.2	8.5	7.3	5.3	3.4	1.6	0.7	50.9
Firebaugh	1.0	1.8	3.7	5.7	7.3	8.1	8.2	7.2	5.5	3.9	2.0	1.1	55.4
FivePoints	1.3	2.0	4.0	6.1	7.7	8.5	8.7	8.0	6.2	4.5	2.4	1.2	60.4
Fresno	0.9	1.7	3.3	4.8	6.7	7.8	8.4	7.1	5.2	3.2	1.4	0.6	51.1
Fresno State	0.9	1.6	3.2	5.2	7.0	8.0	8.7	7.6	5.4	3.6	1.7	0.9	53.7
Friant	1.2	1.5	3.1	4.7	6.4	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.3
Kerman	0.9	1.5	3.2	4.8	6.6	7.7	8.4	7.2	5.3	3.4	1.4	0.7	51.2
Kingsburg	1.0	1.5	3.4	4.8	6.6	7.7	8.4	7.2	5.3	3.4	1.4	0.7	51.6
Mendota	1.5	2.5	4.6	6.2	7.9	8.6	8.8	7.5	5.9	4.5	2.4	1.5	61.7
Orange Cove	1.2	1.9	3.5	4.7	7.4	8.5	8.9	7.9	5.9	3.7	1.8	1.2	56.7
Panoche	1.1	2.0	4.0	5.6	7.8	8.5	8.3	7.3	5.6	3.9	1.8	1.2	57.2
Parlier	1.0	1.9	3.6	5.2	6.8	7.6	8.1	7.0	5.1	3.4	1.7	0.9	52.0
Reedley	1.1	1.5	3.2	4.7	6.4	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.3
Westlands	0.9	1.7	3.8	6.3	8.0	8.6	8.6	7.8	5.9	4.3	2.1	1.1	58.8

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
GLENN													
Orland	1.1	1.8	3.4	5.0	6.4	7.5	7.9	6.7	5.3	3.9	1.8	1.4	52.1
Willows	1.2	1.7	2.9	4.7	6.1	7.2	8.5	7.3	5.3	3.6	1.7	1.0	51.3
HUMBOLDT													
Eureka	0.5	1.1	2.0	3.0	3.7	3.7	3.7	3.7	3.0	2.0	0.9	0.5	27.5
Ferndale	0.5	1.1	2.0	3.0	3.7	3.7	3.7	3.7	3.0	2.0	0.9	0.5	27.5
Garberville	0.6	1.2	2.2	3.1	4.5	5.0	5.5	4.9	3.8	2.4	1.0	0.7	34.9
Hoopa	0.5	1.1	2.1	3.0	4.4	5.4	6.1	5.1	3.8	2.4	0.9	0.7	35.6
IMPERIAL													
Brawley	2.8	3.8	5.9	8.0	10.4	11.5	11.7	10.0	8.4	6.2	3.5	2.1	84.2
Calipatria/Mulberry	2.4	3.2	5.1	6.8	8.6	9.2	9.2	8.6	7.0	5.2	3.1	2.3	70.7
El Centro	2.7	3.5	5.6	7.9	10.1	11.1	11.6	9.5	8.3	6.1	3.3	2.0	81.7
Holtville	2.8	3.8	5.9	7.9	10.4	11.6	12.0	10.0	8.6	6.2	3.5	2.1	84.7
Meloland	2.5	3.2	5.5	7.5	8.9	9.2	9.0	8.5	6.8	5.3	3.1	2.2	71.6
Palo Verde II	2.5	3.3	5.7	6.9	8.5	8.9	8.6	7.9	6.2	4.5	2.9	2.3	68.2
Seeley	2.7	3.5	5.9	7.7	9.7	10.1	9.3	8.3	6.9	5.5	3.4	2.2	75.4
Westmoreland	2.4	3.3	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.4
Yuma	2.5	3.4	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.6
INYO													
Bishop	1.7	2.7	4.8	6.7	8.2	10.9	7.4	9.6	7.4	4.8	2.5	1.6	68.3
Death Valley Jct	2.2	3.3	5.4	7.7	9.8	11.1	11.4	10.1	8.3	5.4	2.9	1.7	79.1
Independence	1.7	2.7	3.4	6.6	8.5	9.5	9.8	8.5	7.1	3.9	2.0	1.5	65.2
Lower Haiwee Res.	1.8	2.7	4.4	7.1	8.5	9.5	9.8	8.5	7.1	4.2	2.6	1.5	67.6
Oasis	2.7	2.8	5.9	8.0	10.4	11.7	11.6	10.0	8.4	6.2	3.4	2.1	83.1
KERN													
Arvin	1.2	1.8	3.5	4.7	6.6	7.4	8.1	7.3	5.3	3.4	1.7	1.0	51.9
Bakersfield	1.0	1.8	3.5	4.7	6.6	7.7	8.5	7.3	5.3	3.5	1.6	0.9	52.4
Bakersfield/Bonanza	1.2	2.2	3.7	5.7	7.4	8.2	8.7	7.8	5.7	4.0	2.1	1.2	57.9
Bakersfield/Greenlee	1.2	2.2	3.7	5.7	7.4	8.2	8.7	7.8	5.7	4.0	2.1	1.2	57.9
Belridge	1.4	2.2	4.1	5.5	7.7	8.5	8.6	7.8	6.0	3.8	2.0	1.5	59.2
Blackwells Corner	1.4	2.1	3.8	5.4	7.0	7.8	8.5	7.7	5.8	3.9	1.9	1.2	56.6
Buttonwillow	1.0	1.8	3.2	4.7	6.6	7.7	8.5	7.3	5.4	3.4	1.5	0.9	52.0
China Lake	2.1	3.2	5.3	7.7	9.2	10.0	11.0	9.8	7.3	4.9	2.7	1.7	74.8
Delano	0.9	1.8	3.4	4.7	6.6	7.7	8.5	7.3	5.4	3.4	1.4	0.7	52.0
Famoso	1.3	1.9	3.5	4.8	6.7	7.6	8.0	7.3	5.5	3.5	1.7	1.3	53.1
Grapevine	1.3	1.8	3.1	4.4	5.6	6.8	7.6	6.8	5.9	3.4	1.9	1.0	49.5
Inyokern	2.0	3.1	4.9	7.3	8.5	9.7	11.0	9.4	7.1	5.1	2.6	1.7	72.4
Isabella Dam	1.2	1.4	2.8	4.4	5.8	7.3	7.9	7.0	5.0	3.2	1.7	0.9	48.4
Lamont	1.3	2.4	4.4	4.6	6.5	7.0	8.8	7.6	5.7	3.7	1.6	0.8	54.4
Lost Hills	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.1
McFarland/Kern	1.2	2.1	3.7	5.6	7.3	8.0	8.3	7.4	5.6	4.1	2.0	1.2	56.5
Shafter	1.0	1.7	3.4	5.0	6.6	7.7	8.3	7.3	5.4	3.4	1.5	0.9	52.1
Taft	1.3	1.8	3.1	4.3	6.2	7.3	8.5	7.3	5.4	3.4	1.7	1.0	51.2
Tehachapi	1.4	1.8	3.2	5.0	6.1	7.7	7.9	7.3	5.9	3.4	2.1	1.2	52.9
KINGS													
Caruthers	1.6	2.5	4.0	5.7	7.8	8.7	9.3	8.4	6.3	4.4	2.4	1.6	62.7
Corcoran	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.1
Hanford	0.9	1.5	3.4	5.0	6.6	7.7	8.3	7.2	5.4	3.4	1.4	0.7	51.5
Kettleman	1.1	2.0	4.0	6.0	7.5	8.5	9.1	8.2	6.1	4.5	2.2	1.1	60.2
Lemoore	0.9	1.5	3.4	5.0	6.6	7.7	8.3	7.3	5.4	3.4	1.4	0.7	51.7
Stratford	0.9	1.9	3.9	6.1	7.8	8.6	8.8	7.7	5.9	4.1	2.1	1.0	58.7

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual ETo**
LAKE													
Lakeport	1.1	1.3	2.6	3.5	5.1	6.0	7.3	6.1	4.7	2.9	1.2	0.9	42.8
Lower Lake	1.2	1.4	2.7	4.5	5.3	6.3	7.4	6.4	5.0	3.1	1.3	0.9	45.4
LASSEN													
Buntingville	1.0	1.7	3.5	4.9	6.2	7.3	8.4	7.5	5.4	3.4	1.5	0.9	51.8
Ravendale	0.6	1.1	2.3	4.1	5.6	6.7	7.9	7.3	4.7	2.8	1.2	0.5	44.9
Susanville	0.7	1.0	2.2	4.1	5.6	6.5	7.8	7.0	4.6	2.8	1.2	0.5	44.0
LOS ANGELES													
Burbank	2.1	2.8	3.7	4.7	5.1	6.0	6.6	6.7	5.4	4.0	2.6	2.0	51.7
Claremont	2.0	2.3	3.4	4.6	5.0	6.0	7.0	7.0	5.3	4.0	2.7	2.1	51.3
El Dorado	1.7	2.2	3.6	4.8	5.1	5.7	5.9	5.9	4.4	3.2	2.2	1.7	46.3
Glendale	2.0	2.2	3.3	3.8	4.7	4.8	5.7	5.6	4.3	3.3	2.2	1.8	43.7
Glendora	2.0	2.5	3.6	4.9	5.4	6.1	7.3	6.8	5.7	4.2	2.6	2.0	53.1
Gorman	1.6	2.2	3.4	4.6	5.5	7.4	7.7	7.1	5.9	3.6	2.4	1.1	52.4
Hollywood Hills	2.1	2.2	3.8	5.4	6.0	6.5	6.7	6.4	5.2	3.7	2.8	2.1	52.8
Lancaster	2.1	3.0	4.6	5.9	8.5	9.7	11.0	9.8	7.3	4.6	2.8	1.7	71.1
Long Beach	1.8	2.1	3.3	3.9	4.5	4.3	5.3	4.7	3.7	2.8	1.8	1.5	39.7
Los Angeles	2.2	2.7	3.7	4.7	5.5	5.8	6.2	5.9	5.0	3.9	2.6	1.9	50.1
Monrovia	2.2	2.3	3.8	4.3	5.5	5.9	6.9	6.4	5.1	3.2	2.5	2.0	50.2
Palmdale	2.0	2.6	4.6	6.2	7.3	8.9	9.8	9.0	6.5	4.7	2.7	2.1	66.2
Pasadena	2.1	2.7	3.7	4.7	5.1	6.0	7.1	6.7	5.6	4.2	2.6	2.0	52.3
Pearblossom	1.7	2.4	3.7	4.7	7.3	7.7	9.9	7.9	6.4	4.0	2.6	1.6	59.9
Pomona	1.7	2.0	3.4	4.5	5.0	5.8	6.5	6.4	4.7	3.5	2.3	1.7	47.5
Redondo Beach	2.2	2.4	3.3	3.8	4.5	4.7	5.4	4.8	4.4	2.8	2.4	2.0	42.6
San Fernando	2.0	2.7	3.5	4.6	5.5	5.9	7.3	6.7	5.3	3.9	2.6	2.0	52.0
Santa Clarita	2.8	2.8	4.1	5.6	6.0	6.8	7.6	7.8	5.8	5.2	3.7	3.2	61.5
Santa Monica	1.8	2.1	3.3	4.5	4.7	5.0	5.4	5.4	3.9	3.4	2.4	2.2	44.2
MADERA													
Chowchilla	1.0	1.4	3.2	4.7	6.6	7.8	8.5	7.3	5.3	3.4	1.4	0.7	51.4
Madera	0.9	1.4	3.2	4.8	6.6	7.8	8.5	7.3	5.3	3.4	1.4	0.7	51.5
Raymond	1.2	1.5	3.0	4.6	6.1	7.6	8.4	7.3	5.2	3.4	1.4	0.7	50.5
MARIN													
Black Point	1.1	1.7	3.0	4.2	5.2	6.2	6.6	5.8	4.3	2.8	1.3	0.9	43.0
Novato	1.3	1.5	2.4	3.5	4.4	6.0	5.9	5.4	4.4	2.8	1.4	0.7	39.8
Point San Pedro	1.1	1.7	3.0	4.2	5.2	6.2	6.6	5.8	4.3	2.8	1.3	0.9	43.0
San Rafael	1.2	1.3	2.4	3.3	4.0	4.8	4.8	4.9	4.3	2.7	1.3	0.7	35.8
MARIPOSA													
Coulterville	1.1	1.5	2.8	4.4	5.9	7.3	8.1	7.0	5.3	3.4	1.4	0.7	48.8
Mariposa	1.1	1.5	2.8	4.4	5.9	7.4	8.2	7.1	5.0	3.4	1.4	0.7	49.0
Yosemite Village	0.7	1.0	2.3	3.7	5.1	6.5	7.1	6.1	4.4	2.9	1.1	0.6	41.4
MENDOCINO													
Fort Bragg	0.9	1.3	2.2	3.0	3.7	3.5	3.7	3.7	3.0	2.3	1.2	0.7	29.0
Hopland	1.1	1.3	2.6	3.4	5.0	5.9	6.5	5.7	4.5	2.8	1.3	0.7	40.9
Point Arena	1.0	1.3	2.3	3.0	3.7	3.9	3.7	3.7	3.0	2.3	1.2	0.7	29.6
Sanel Valley	1.0	1.6	3.0	4.6	6.0	7.0	8.0	7.0	5.2	3.4	1.4	0.9	49.1
Ukiah	1.0	1.3	2.6	3.3	5.0	5.8	6.7	5.9	4.5	2.8	1.3	0.7	40.9
MERCED													
Kesterson	0.9	1.7	3.4	5.5	7.3	8.2	8.6	7.4	5.5	3.8	1.8	0.9	55.1
Los Banos	1.0	1.5	3.2	4.7	6.1	7.4	8.2	7.0	5.3	3.4	1.4	0.7	50.0
Merced	1.0	1.5	3.2	4.7	6.6	7.9	8.5	7.2	5.3	3.4	1.4	0.7	51.5

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
MODOC													
Modoc/Alturas	0.9	1.4	2.8	3.7	5.1	6.2	7.5	6.6	4.6	2.8	1.2	0.7	43.2
MONO													
Bridgeport	0.7	0.9	2.2	3.8	5.5	6.6	7.4	6.7	4.7	2.7	1.2	0.5	43.0
MONTEREY													
Arroyo Seco	1.5	2.0	3.7	5.4	6.3	7.3	7.2	6.7	5.0	3.9	2.0	1.6	52.6
Castroville	1.4	1.7	3.0	4.2	4.6	4.8	4.0	3.8	3.0	2.6	1.6	1.4	36.2
Gonzales	1.3	1.7	3.4	4.7	5.4	6.3	6.3	5.9	4.4	3.4	1.9	1.3	45.7
Greenfield	1.8	2.2	3.4	4.8	5.6	6.3	6.5	6.2	4.8	3.7	2.4	1.8	49.5
King City	1.7	2.0	3.4	4.4	4.4	5.6	6.1	6.7	6.5	5.2	2.2	1.3	49.6
King City-Oasis Rd.	1.4	1.9	3.6	5.3	6.5	7.3	7.4	6.8	5.1	4.0	2.0	1.5	52.7
Long Valley	1.5	1.9	3.2	4.1	5.8	6.5	7.3	6.7	5.3	3.6	2.0	1.2	49.1
Monterey	1.7	1.8	2.7	3.5	4.0	4.1	4.3	4.2	3.5	2.8	1.9	1.5	36.0
Pajaro	1.8	2.2	3.7	4.8	5.3	5.7	5.6	5.3	4.3	3.4	2.4	1.8	46.1
Salinas	1.6	1.9	2.7	3.8	4.8	4.7	5.0	4.5	4.0	2.9	1.9	1.3	39.1
Salinas North	1.2	1.5	2.9	4.1	4.6	5.2	4.5	4.3	3.2	2.8	1.5	1.2	36.9
San Ardo	1.0	1.7	3.1	4.5	5.9	7.2	8.1	7.1	5.1	3.1	1.5	1.0	49.0
San Juan	1.8	2.1	3.4	4.6	5.3	5.7	5.5	4.9	3.8	3.2	2.2	1.9	44.2
Soledad	1.7	2.0	3.4	4.4	5.5	5.4	6.5	6.2	5.2	3.7	2.2	1.5	47.7
NAPA													
Angwin	1.8	1.9	3.2	4.7	5.8	7.3	8.1	7.1	5.5	4.5	2.9	2.1	54.9
Carneros	0.8	1.5	3.1	4.6	5.5	6.6	6.9	6.2	4.7	3.5	1.4	1.0	45.8
Oakville	1.0	1.5	2.9	4.7	5.8	6.9	7.2	6.4	4.9	3.5	1.6	1.2	47.7
St Helena	1.2	1.5	2.8	3.9	5.1	6.1	7.0	6.2	4.8	3.1	1.4	0.9	44.1
Yountville	1.3	1.7	2.8	3.9	5.1	6.0	7.1	6.1	4.8	3.1	1.5	0.9	44.3
NEVADA													
Grass Valley	1.1	1.5	2.6	4.0	5.7	7.1	7.9	7.1	5.3	3.2	1.5	0.9	48.0
Nevada City	1.1	1.5	2.6	3.9	5.8	6.9	7.9	7.0	5.3	3.2	1.4	0.9	47.4
ORANGE													
Irvine	2.2	2.5	3.7	4.7	5.2	5.9	6.3	6.2	4.6	3.7	2.6	2.3	49.6
Laguna Beach	2.2	2.7	3.4	3.8	4.6	4.6	4.9	4.9	4.4	3.4	2.4	2.0	43.2
Santa Ana	2.2	2.7	3.7	4.5	4.6	5.4	6.2	6.1	4.7	3.7	2.5	2.0	48.2
PLACER													
Auburn	1.2	1.7	2.8	4.4	6.1	7.4	8.3	7.3	5.4	3.4	1.6	1.0	50.6
Blue Canyon	0.7	1.1	2.1	3.4	4.8	6.0	7.2	6.1	4.6	2.9	0.9	0.6	40.5
Colfax	1.1	1.5	2.6	4.0	5.8	7.1	7.9	7.0	5.3	3.2	1.4	0.9	47.9
Roseville	1.1	1.7	3.1	4.7	6.2	7.7	8.5	7.3	5.6	3.7	1.7	1.0	52.2
Soda Springs	0.7	0.7	1.8	3.0	4.3	5.3	6.2	5.5	4.1	2.5	0.7	0.7	35.4
Tahoe City	0.7	0.7	1.7	3.0	4.3	5.4	6.1	5.6	4.1	2.4	0.8	0.6	35.5
Truckee	0.7	0.7	1.7	3.2	4.4	5.4	6.4	5.7	4.1	2.4	0.8	0.6	36.2
PLUMAS													
Portola	0.7	0.9	1.9	3.5	4.9	5.9	7.3	5.9	4.3	2.7	0.9	0.5	39.4
Quincy	0.7	0.9	2.2	3.5	4.9	5.9	7.3	5.9	4.4	2.8	1.2	0.5	40.2
RIVERSIDE													
Beaumont	2.0	2.3	3.4	4.4	6.1	7.1	7.6	7.9	6.0	3.9	2.6	1.7	55.0
Blythe	2.4	3.3	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.4
Cathedral City	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.1
Coachella	2.9	4.4	6.2	8.4	10.5	11.9	12.3	10.1	8.9	6.2	3.8	2.4	88.1
Desert Center	2.9	4.1	6.4	8.5	11.0	12.1	12.2	11.1	9.0	6.4	3.9	2.6	90.0
Elsinore	2.1	2.8	3.9	4.4	5.9	7.1	7.6	7.0	5.8	3.9	2.6	1.9	55.0
Indio	**3.1**	3.6	6.5	8.3	10.5	11.0	10.8	9.7	8.3	5.9	3.7	2.7	83.9

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
RIVERSIDE													
La Quinta	2.4	2.8	5.2	6.5	8.3	8.7	8.5	7.9	6.5	4.5	2.7	2.2	66.2
Mecca	2.6	3.3	5.7	7.2	8.6	9.0	8.8	8.2	6.8	5.0	3.2	2.4	70.8
Oasis	2.9	3.3	5.3	6.1	8.5	8.9	8.7	7.9	6.9	4.8	2.9	2.3	68.4
Palm Deser	2.5	3.4	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.6
Palm Springs	2.0	2.9	4.9	7.2	8.3	8.5	11.6	8.3	7.2	5.9	2.7	1.7	71.1
Rancho California	1.8	2.2	3.4	4.8	5.6	6.3	6.5	6.2	4.8	3.7	2.4	1.8	49.5
Rancho Mirage	2.4	3.3	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.4
Ripley	2.7	3.3	5.6	7.2	8.7	8.7	8.4	7.6	6.2	4.6	2.8	2.2	67.8
Salton Sea North	2.5	3.3	5.5	7.2	8.8	9.3	9.2	8.5	6.8	5.2	3.1	2.3	71.7
Temecula East II	2.3	2.4	4.1	4.9	6.4	7.0	7.8	7.4	5.7	4.1	2.6	2.2	56.7
Thermal	2.4	3.3	5.5	7.6	9.1	9.6	9.3	8.6	7.1	5.2	3.1	2.1	72.8
Riverside UC	2.5	2.9	4.2	5.3	5.9	6.6	7.2	6.9	5.4	4.1	2.9	2.6	56.4
Winchester	2.3	2.4	4.1	4.9	6.4	6.9	7.7	7.5	6.0	3.9	2.6	2.1	56.8
SACRAMENTO													
Fair Oaks	1.0	1.6	3.4	4.1	6.5	7.5	8.1	7.1	5.2	3.4	1.5	1.0	50.5
Sacramento	1.0	1.8	3.2	4.7	6.4	7.7	8.4	7.2	5.4	3.7	1.7	0.9	51.9
Twitchell Island	1.2	1.8	3.9	5.3	7.4	8.8	9.1	7.8	5.9	3.8	1.7	1.2	57.9
SAN BENITO													
Hollister	1.5	1.8	3.1	4.3	5.5	5.7	6.4	5.9	5.0	3.5	1.7	1.1	45.1
San Benito	1.2	1.6	3.1	4.6	5.6	6.4	6.9	6.5	4.8	3.7	1.7	1.2	47.2
San Juan Valley	1.4	1.8	3.4	4.5	6.0	6.7	7.1	6.4	5.0	3.5	1.8	1.4	49.1
SAN BERNARDINO													
Baker	2.7	3.9	6.1	8.3	10.4	11.8	12.2	11.0	8.9	6.1	3.3	2.1	86.6
Barstow NE	2.2	2.9	5.3	6.9	9.0	10.1	9.9	8.9	6.8	4.8	2.7	2.1	71.7
Big Bear Lake	1.8	2.6	4.6	6.0	7.0	7.6	8.1	7.4	5.4	4.1	2.4	1.8	58.6
Chino	2.1	2.9	3.9	4.5	5.7	6.5	7.3	7.1	5.9	4.2	2.6	2.0	54.6
Crestline	1.5	1.9	3.3	4.4	5.5	6.6	7.8	7.1	5.4	3.5	2.2	1.6	50.8
Lake Arrowhead	1.8	2.6	4.6	6.0	7.0	7.6	8.1	7.4	5.4	4.1	2.4	1.8	58.6
Lucerne Valley	2.2	2.9	5.1	6.5	9.1	11.0	11.4	9.9	7.4	5.0	3.0	1.8	75.3
Needles	3.2	4.2	6.6	8.9	11.0	12.4	12.8	11.0	8.9	6.6	4.0	2.7	92.1
Newberry Springs	2.1	2.9	5.3	8.4	9.8	10.9	11.1	9.9	7.6	5.2	3.1	2.0	78.2
San Bernardino	2.0	2.7	3.8	4.6	5.7	6.9	7.9	7.4	5.9	4.2	2.6	2.0	55.6
Twentynine Palms	2.6	3.6	5.9	7.9	10.1	11.2	11.2	10.3	8.6	5.9	3.4	2.2	82.9
Victorville	2.0	2.6	4.6	6.2	7.3	8.9	9.8	9.0	6.5	4.7	2.7	2.1	66.2
SAN DIEGO													
Chula Vista	2.2	2.7	3.4	3.8	4.9	4.7	5.5	4.9	4.5	3.4	2.4	2.0	44.2
Escondido SPV	2.4	2.6	3.9	4.7	5.9	6.5	7.1	6.7	5.3	3.9	2.8	2.3	54.2
Miramar	2.3	2.5	3.7	4.1	5.1	5.4	6.1	5.8	4.5	3.3	2.4	2.1	47.1
Oceanside	2.2	2.7	3.4	3.7	4.9	4.6	4.6	5.1	4.1	3.3	2.4	2.0	42.9
Otay Lake	2.3	2.7	3.9	4.6	5.6	5.9	6.2	6.1	4.8	3.7	2.6	2.2	50.4
Pine Valley	1.5	2.4	3.8	5.1	6.0	7.0	7.8	7.3	6.0	4.0	2.2	1.7	54.8
Ramona	2.1	2.1	3.4	4.6	5.2	6.3	6.7	6.8	5.3	4.1	2.8	2.1	51.6
San Diego	2.1	2.4	3.4	4.6	5.1	5.3	5.7	5.6	4.3	3.6	2.4	2.0	46.5
Santee	2.1	2.7	3.7	4.5	5.5	6.1	6.6	6.2	5.4	3.8	2.6	2.0	51.1
Torrey Pines	2.2	2.3	3.4	3.9	4.0	4.1	4.6	4.7	3.8	2.8	2.0	2.0	39.8
Warner Springs	1.6	2.7	3.7	4.7	5.7	7.6	8.3	7.7	6.3	4.0	2.5	1.3	56.0
SAN FRANCISCO													
San Francisco	1.5	1.3	2.4	3.0	3.7	4.6	4.9	4.8	4.1	2.8	1.3	0.7	35.1
SAN JOAQUIN													
Farmington	1.5	1.5	2.9	4.7	6.2	7.6	8.1	6.8	5.3	3.3	1.4	0.7	50.0

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
SAN JOAQUIN													
Lodi West	1.0	1.6	3.3	4.3	6.3	6.9	7.3	6.4	4.5	3.0	1.4	0.8	46.7
Manteca	0.9	1.7	3.4	5.0	6.5	7.5	8.0	7.1	5.2	3.3	1.6	0.9	51.2
Stockton	0.8	1.5	2.9	4.7	6.2	7.4	8.1	6.8	5.3	3.2	1.4	0.6	49.1
Tracy	1.0	1.5	2.9	4.5	6.1	7.3	7.9	6.7	5.3	3.2	1.3	0.7	48.5
SAN LUIS OBISPO													
Arroyo Grande	2.0	2.2	3.2	3.8	4.3	4.7	4.3	4.6	3.8	3.2	2.4	1.7	40.0
Atascadero	1.2	1.5	2.8	3.9	4.5	6.0	6.7	6.2	5.0	3.2	1.7	1.0	43.7
Morro Bay	2.0	2.2	3.1	3.5	4.3	4.5	4.6	4.6	3.8	3.5	2.1	1.7	39.9
Nipomo	2.2	2.5	3.8	5.1	5.7	6.2	6.4	6.1	4.9	4.1	2.9	2.3	52.1
Paso Robles	1.6	2.0	3.2	4.3	5.5	6.3	7.3	6.7	5.1	3.7	2.1	1.4	49.0
San Luis Obispo	2.0	2.2	3.2	4.1	4.9	5.3	4.6	5.5	4.4	3.5	2.4	1.7	43.8
San Miguel	1.6	2.0	3.2	4.3	5.0	6.4	7.4	6.8	5.1	3.7	2.1	1.4	49.0
San Simeon	2.0	2.0	2.9	3.5	4.2	4.4	4.6	4.3	3.5	3.1	2.0	1.7	38.1
SAN MATEO													
Hal Moon Bay	1.5	1.7	2.4	3.0	3.9	4.3	4.3	4.2	3.5	2.8	1.3	1.0	33.7
Redwood City	1.5	1.8	2.9	3.8	5.2	5.3	6.2	5.6	4.8	3.1	1.7	1.0	42.8
Woodside	1.8	2.2	3.4	4.8	5.6	6.3	6.5	6.2	4.8	3.7	2.4	1.8	49.5
SANTA BARBARA													
Betteravia	2.1	2.6	4.0	5.2	6.0	5.9	5.8	5.4	4.1	3.3	2.7	2.1	49.1
Carpenteria	2.0	2.4	3.2	3.9	4.8	5.2	5.5	5.7	4.5	3.4	2.4	2.0	44.9
Cuyama	2.1	2.4	3.8	5.4	6.9	7.9	8.5	7.7	5.9	4.5	2.6	2.0	59.7
Goleta	2.1	2.5	3.9	5.1	5.7	5.7	5.4	5.4	4.2	3.2	2.8	2.2	48.1
Goleta Foothills	2.3	2.6	3.7	5.4	5.3	5.6	5.5	5.7	4.5	3.9	2.8	2.3	49.6
Guadalupe	2.0	2.2	3.2	3.7	4.9	4.6	4.5	4.6	4.1	3.3	2.4	1.7	41.1
Lompoc	2.0	2.2	3.2	3.7	4.8	4.6	4.9	4.8	3.9	3.2	2.4	1.7	41.1
Los Alamos	1.8	2.0	3.2	4.1	4.9	5.3	5.7	5.5	4.4	3.7	2.4	1.6	44.6
Santa Barbara	2.0	2.5	3.2	3.8	4.6	5.1	5.5	4.5	3.4	2.4	1.8	1.8	40.6
Santa Maria	1.8	2.3	3.7	5.1	5.7	5.8	5.6	5.3	4.2	3.5	2.4	1.9	47.4
Santa Ynez	1.7	2.2	3.5	5.0	5.8	6.2	6.4	6.0	4.5	3.6	2.2	1.7	48.7
Sisquoc	2.1	2.5	3.8	4.1	6.1	6.3	6.4	5.8	4.7	3.4	2.3	1.8	49.2
Solvang	2.0	2.0	3.3	4.3	5.0	5.6	6.1	5.6	4.4	3.7	2.2	1.6	45.6
SANTA CLARA													
Gilroy	1.3	1.8	3.1	4.1	5.3	5.6	6.1	5.5	4.7	3.4	1.7	1.1	43.6
Los Gatos	1.5	1.8	2.8	3.9	5.0	5.6	6.2	5.5	4.7	3.2	1.7	1.1	42.9
Morgan Hill	1.5	1.8	3.4	4.2	6.3	7.0	7.1	6.0	5.1	3.7	1.9	1.4	49.5
Palo Alto	1.5	1.8	2.8	3.8	5.2	5.3	6.2	5.6	5.0	3.2	1.7	1.0	43.0
San Jose	1.5	1.8	3.1	4.1	5.5	5.8	6.5	5.9	5.2	3.3	1.8	1.0	45.3
SANTA CRUZ													
De Laveaga	1.4	1.9	3.3	4.7	4.9	5.3	5.0	4.8	3.6	3.0	1.6	1.3	40.8
Green Valley Rd	1.2	1.8	3.2	4.5	4.6	5.4	5.2	5.0	3.7	3.1	1.6	1.3	40.6
Santa Cruz	1.5	1.8	2.6	3.5	4.3	4.4	4.8	4.4	3.8	2.8	1.7	1.2	36.6
Watsonville	1.5	1.8	2.7	3.7	4.6	4.5	4.9	4.2	4.0	2.9	1.8	1.2	37.7
Webb	1.8	2.2	3.7	4.8	5.3	5.7	5.6	5.3	4.3	3.4	2.4	1.8	46.2
SHASTA													
Burney	0.7	1.0	2.1	3.5	4.9	5.9	7.4	6.4	4.4	2.9	0.9	0.6	40.9
Fall River Mills	0.6	1.0	2.1	3.7	5.0	6.1	7.8	6.7	4.6	2.8	0.9	0.5	41.8
Glenburn	0.6	1.0	2.1	3.7	5.0	6.3	7.8	6.7	4.7	2.8	0.9	0.6	42.1
McArthur	0.7	1.4	2.9	4.2	5.6	6.9	8.2	7.2	5.0	3.0	1.1	0.6	46.8
Redding	1.2	1.4	2.6	4.1	5.6	7.1	8.5	7.3	5.3	3.2	1.4	0.9	48.8

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
SIERRA													
Downieville	0.7	1.0	2.3	3.5	5.0	6.0	7.4	6.2	4.7	2.8	0.9	0.6	41.3
Sierraville	0.7	1.1	2.2	3.2	4.5	5.9	7.3	6.4	4.3	2.6	0.9	0.5	39.6
SISKIYOU													
Happy Camp	0.5	0.9	2.0	3.0	4.3	5.2	6.1	5.3	4.1	2.4	0.9	0.5	35.1
MacDoel	1.0	1.7	3.1	4.5	5.9	7.2	8.1	7.1	5.1	3.1	1.5	1.0	49.0
Mt Shasta	0.5	0.9	2.0	3.0	4.5	5.3	6.7	5.7	4.0	2.2	0.7	0.5	36.0
Tule lake FS	0.7	1.3	2.7	4.0	5.4	6.3	7.1	6.4	4.7	2.8	1.0	0.6	42.9
Weed	0.5	0.9	2.0	2.5	4.5	5.3	6.7	5.5	3.7	2.0	0.9	0.5	34.9
Yreka	0.6	0.9	2.1	3.0	4.9	5.8	7.3	6.5	4.3	2.5	0.9	0.5	39.2
SOLANO													
Dixon	0.7	1.4	3.2	5.2	6.3	7.6	8.2	7.2	5.5	4.3	1.6	1.1	52.1
Fairfield	1.1	1.7	2.8	4.0	5.5	6.1	7.8	6.0	4.8	3.1	1.4	0.9	45.2
Hastings Tract	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.1
Putah Creek	1.0	1.6	3.2	4.9	6.1	7.3	7.9	7.0	5.3	3.8	1.8	1.2	51.0
Rio Vista	0.9	1.7	2.8	4.4	5.9	6.7	7.9	6.5	5.1	3.2	1.3	0.7	47.0
Suisun Valley	0.6	1.3	3.0	4.7	5.8	7.0	7.7	6.8	5.3	3.8	1.4	0.9	48.3
Winters	0.9	1.7	3.3	5.0	6.4	7.5	7.9	7.0	5.2	3.5	1.6	1.0	51.0
SONOMA													
Bennett Valley	1.1	1.7	3.2	4.1	5.5	6.5	6.6	5.7	4.5	3.1	1.5	0.9	44.4
Cloverdale	1.1	1.4	2.6	3.4	5.0	5.9	6.2	5.6	4.5	2.8	1.4	0.7	40.7
Fort Ross	1.2	1.4	2.2	3.0	3.7	4.5	4.2	4.3	3.4	2.4	1.2	0.5	31.9
Healdsburg	1.2	1.5	2.4	3.5	5.0	5.9	6.1	5.6	4.5	2.8	1.4	0.7	40.8
Lincoln	1.2	1.7	2.8	4.7	6.1	7.4	8.4	7.3	5.4	3.7	1.9	1.2	51.9
Petaluma	1.2	1.5	2.8	3.7	4.6	5.6	4.6	5.7	4.5	2.9	1.4	0.9	39.6
Santa Rosa	1.2	1.7	2.8	3.7	5.0	6.0	6.1	5.9	4.5	2.9	1.5	0.7	42.0
Valley of the Moon	1.0	1.6	3.0	4.5	5.6	6.6	7.1	6.3	4.7	3.3	1.5	1.0	46.1
Windsor	0.9	1.6	3.0	4.5	5.5	6.5	6.5	5.9	4.4	3.2	1.4	1.0	44.2
STANISLAUS													
Denair	1.0	1.9	3.6	4.7	7.0	7.9	8.0	6.1	5.3	3.4	1.5	1.0	51.4
La Grange	1.2	1.5	3.1	4.7	6.2	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.2
Modesto	0.9	1.4	3.2	4.7	6.4	7.7	8.1	6.8	5.0	3.4	1.4	0.7	49.7
Newman	1.0	1.5	3.2	4.6	6.2	7.4	8.1	6.7	5.0	3.4	1.4	0.7	49.3
Oakdale	1.2	1.5	3.2	4.7	6.2	7.7	8.1	7.1	5.1	3.4	1.4	0.7	50.3
Patterson	1.3	2.1	4.2	5.4	7.9	8.6	8.2	6.6	5.8	4.0	1.9	1.3	57.3
Turlock	0.9	1.5	3.2	4.7	6.5	7.7	8.2	7.0	5.1	3.4	1.4	0.7	50.2
SUTTER													
Nicolaus	0.9	1.6	3.2	4.9	6.3	7.5	8.0	6.9	5.2	3.4	1.5	0.9	50.2
Yuba City	1.3	2.1	2.8	4.4	5.7	7.2	7.1	6.1	4.7	3.2	1.2	0.9	46.7
TEHAMA													
Corning	1.2	1.8	2.9	4.5	6.1	7.3	8.1	7.2	5.3	3.7	1.7	1.1	50.7
Gerber	1.0	1.8	3.5	5.0	6.6	7.9	8.7	7.4	5.8	4.1	1.8	1.1	54.7
Gerber Dryland	0.9	1.6	3.2	4.7	6.7	8.4	9.0	7.9	6.0	4.2	2.0	1.0	55.5
Red Bluff	1.2	1.8	2.9	4.4	5.9	7.4	8.5	7.3	5.4	3.5	1.7	1.0	51.1
TRINITY													
Hay Fork	0.5	1.1	2.3	3.5	4.9	5.9	7.0	6.0	4.5	2.8	0.9	0.7	40.1
Weaverville	0.6	1.1	2.2	3.3	4.9	5.9	7.3	6.0	4.4	2.7	0.9	0.7	40.0
TULARE													
Alpaugh	0.9	1.7	3.4	4.8	6.6	7.7	8.2	7.3	5.4	3.4	1.4	0.7	51.6
Badger	1.0	1.3	2.7	4.1	6.0	7.3	7.7	7.0	4.8	3.3	1.4	0.7	47.3
Delano	1.1	1.9	4.0	4.9	7.2	7.9	8.1	7.3	5.4	3.2	1.5	1.2	53.6

Appendix A - Reference Evapotranspiration (ETo) Table*

County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
TULARE													
Dinuba	1.1	1.5	3.2	4.7	6.2	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.2
Lindcove	0.9	1.6	3.0	4.8	6.5	7.6	8.1	7.2	5.2	3.4	1.6	0.9	50.6
Porterville	1.2	1.8	3.4	4.7	6.6	7.7	8.5	7.3	5.3	3.4	1.4	0.7	52.1
Visalia	0.9	1.7	3.3	5.1	6.8	7.7	7.9	6.9	4.9	3.2	1.5	0.8	50.7
TUOLUMNE													
Groveland	1.1	1.5	2.8	4.1	5.7	7.2	7.9	6.6	5.1	3.3	1.4	0.7	47.5
Sonora	1.1	1.5	2.8	4.1	5.8	7.2	7.9	6.7	5.1	3.2	1.4	0.7	47.6
VENTURA													
Camarillo	2.2	2.5	3.7	4.3	5.0	5.2	5.9	5.4	4.2	3.0	2.5	2.1	46.1
Oxnard	2.2	2.5	3.2	3.7	4.4	4.6	5.4	4.8	4.0	3.3	2.4	2.0	42.3
Piru	2.8	2.8	4.1	5.6	6.0	6.8	7.6	7.8	5.8	5.2	3.7	3.2	61.5
Port Hueneme	2.0	2.3	3.3	4.6	4.9	4.9	4.9	5.0	3.7	3.2	2.5	2.2	43.5
Thousand Oaks	2.2	2.6	3.4	4.5	5.4	5.9	6.7	6.4	5.4	3.9	2.6	2.0	51.0
Ventura	2.2	2.6	3.2	3.8	4.6	4.7	5.5	4.9	4.1	3.4	2.5	2.0	43.5
YOLO													
Bryte	0.9	1.7	3.3	5.0	6.4	7.5	7.9	7.0	5.2	3.5	1.6	1.0	51.0
Davis	1.0	1.9	3.3	5.0	6.4	7.6	8.2	7.1	5.4	4.0	1.8	1.0	52.5
Esparto	1.0	1.7	3.4	5.5	6.9	8.1	8.5	7.5	5.8	4.2	2.0	1.2	55.8
Winters	1.7	1.7	2.9	4.4	5.8	7.1	7.9	6.7	5.3	3.3	1.6	1.0	49.4
Woodland	1.0	1.8	3.2	4.7	6.1	7.7	8.2	7.2	5.4	3.7	1.7	1.0	51.6
Zamora	1.1	1.9	3.5	5.2	6.4	7.4	7.8	7.0	5.5	4.0	1.9	1.2	52.8
YUBA													
Browns Valley	1.0	1.7	3.1	4.7	6.1	7.5	8.5	7.6	5.7	4.1	2.0	1.1	52.9
Brownsville	1.1	1.4	2.6	4.0	5.7	6.8	7.9	6.8	5.3	3.4	1.5	0.9	47.4

* The values in this table were derived from:
1) California Irrigation Management Information System (CIMIS);
2) Reference EvapoTranspiration Zones Map, UC Dept. of Land, Air & Water Resources and California Dept of Water Resources 1999; and
3) Reference Evapotranspiration for California, University of California, Department of Agriculture and Natural Resources
(1987) Bulletin 1922, 4) Determining Daily Reference Evapotranspiration, Cooperative Extension UC Division of Agriculture and Natural Resources (1987), Publication Leaflet 21426

Appendix B – Sample Water Efficient Landscape Worksheet.

WATER EFFICIENT LANDSCAPE WORKSHEET

This worksheet is filled out by the project applicant and it is a required element of the Landscape Documentation Package.
Please complete all sections (A and B) of the worksheet.

SECTION A. HYDROZONE INFORMATION TABLE

Please complete the hydrozone table(s) for each hydrozone. Use as many tables as necessary to provide the square footage of landscape area per hydrozone.

Hydrozone*	Zone or Valve	Irrigation Method**	Area (Sq. Ft.)	% of Landscape Area
	Total			**100%**

**** Hydrozone***
HW = High Water Use Plants
MW = Moderate Water Use Plants
LW = Low Water Use Plants

*****Irrigation Method***
MS = Micro-spray
S = Spray
R = Rotor
B= Bubbler
D= Drip
O = Other

SECTION B. WATER BUDGET CALCULATIONS

Section B1. Maximum Applied Water Allowance (MAWA)

The project's Maximum Applied Water Allowance shall be calculated using this equation:

MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]

where:

MAWA = Maximum Applied Water Allowance (gallons per year)
ETo = Reference Evapotranspiration from Appendix A (inches per year)
0.7 = ET Adjustment Factor (ETAF)
LA = Landscaped Area includes Special Landscape Area (square feet)
0.62 = Conversion factor (to gallons per square foot)
SLA = Portion of the landscape area identified as Special Landscape Area (square feet)
0.3 = the additional ET Adjustment Factor for Special Landscape Area (1.0 - 0.7 = 0.3)

Maximum Applied Water Allowance = ________________________**gallons per year**

Show calculations.

Effective Precipitation (Eppt)

If considering Effective Precipitation, use 25% of annual precipitation. Use the following equation to calculate Maximum Applied Water Allowance:

MAWA= (ETo – Eppt) (0.62) [(0.7 x LA) + (0.3 x SLA)]

Maximum Applied Water Allowance = ________________________**gallons per year**

Show calculations.

Section B2. Estimated Total Water Use (ETWU)

The project's Estimated Total Water Use is calculated using the following formula:

$$ETWU = (ETo)(0.62)\left(\frac{PF\,x\,HA}{IE} + SLA\right)$$

where:

ETWU = Estimated total water use per year (gallons per year)
ETo = Reference Evapotranspiration (inches per year)
PF = Plant Factor from WUCOLS (see Definitions)
HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
SLA = Special Landscape Area (square feet)
0.62 = Conversion Factor (to gallons per square foot)
IE = Irrigation Efficiency (minimum 0.71)

Hydrozone Table for Calculating ETWU

Please complete the hydrozone table(s). Use as many tables as necessary.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)	Area (HA) (square feet)	PF x HA (square feet)
			Sum	
	SLA			

Estimated Total Water Use = __________________________**gallons**

Show calculations.

Appendix C – Sample Certificate of Completion.

CERTIFICATE OF COMPLETION

This certificate is filled out by the project applicant upon completion of the landscape project.

PART 1. PROJECT INFORMATION SHEET

Date		
Project Name		
Name of Project Applicant	Telephone No.	
	Fax No.	
Title	Email Address	
Company	Street Address	
City	State	Zip Code

Project Address and Location:

Street Address		Parcel, tract or lot number, if available.
City		Latitude/Longitude (optional)
State	Zip Code	

Property Owner or his/her designee:

Name	Telephone No.	
	Fax No.	
Title	Email Address	
Company	Street Address	
City	State	Zip Code

Property Owner

“I/we certify that I/we have received copies of all the documents within the Landscape Documentation Package and the Certificate of Completion and that it is our responsibility to see that the project is maintained in accordance with the Landscape and Irrigation Maintenance Schedule.”

____

Property Owner Signature Date

Please answer the questions below:

1. Date the Landscape Documentation Package was submitted to the local agency_____________
2. Date the Landscape Documentation Package was approved by the local agency_____________
3. Date that a copy of the Water Efficient Landscape Worksheet (including the Water Budget Calculation) was submitted to the local water purveyor_____________

PART 2. CERTIFICATION OF INSTALLATION ACCORDING TO THE LANDSCAPE DOCUMENTATION PACKAGE

“I/we certify that based upon periodic site observations, the work has been substantially completed in accordance with the ordinance and that the landscape planting and irrigation installation conform with the criteria and specifications of the approved Landscape Documentation Package.”

Signature*****	Date	
Name (print)	Telephone No.	
	Fax No.	
Title	Email Address	
License No. or Certification No.		
Company	Street Address	
City	State	Zip Code

*****Signer of the landscape design plan, signer of the irrigation plan, or a licensed landscape contractor.

PART 3. IRRIGATION SCHEDULING

Attach parameters for setting the irrigation schedule on controller per ordinance Section 492.10.

PART 4. SCHEDULE OF LANDSCAPE AND IRRIGATION MAINTENANCE

Attach schedule of Landscape and Irrigation Maintenance per ordinance Section 492.11.

PART 5. LANDSCAPE IRRIGATION AUDIT REPORT

Attach Landscape Irrigation Audit Report per ordinance Section 492.12.

PART 6. SOIL MANAGEMENT REPORT

Attach soil analysis report, if not previously submitted with the Landscape Documentation Package per ordinance Section 492.5.

Attach documentation verifying implementation of recommendations from soil analysis report per ordinance Section 492.5.

Assembly Bill No. 1881

CHAPTER 559

An act to add Section 1353.8 to the Civil Code, to repeal and add Article 10.8 (commencing with Section 65591) of Chapter 3 of Division 1 of Title 7 of the Government Code, to add Section 25401.9 to the Public Resources Code, and to add Article 4.5 (commencing with Section 535) to Chapter 8 of Division 1 of the Water Code, relating to water conservation.

[Approved by Governor September 28, 2006. Filed with
Secretary of State September 28, 2006.]

LEGISLATIVE COUNSEL'S DIGEST

AB 1881, Laird. Water conservation.

(1) Existing law, the Davis-Sterling Common Interest Development Act, defines and regulates common interest developments, which include community apartment projects, condominium projects, planned developments, and stock cooperatives.

This bill would provide that the architectural guidelines of a common interest development shall not prohibit or include conditions that have the effect of prohibiting the use of low water-using plants as a group.

(2) The Water Conservation in Landscaping Act requires the Department of Water Resources to appoint an advisory task force to work with the department to draft a model local water efficient landscape ordinance that local agencies may adopt, requires the task force to submit the ordinance to the department on or before May 1, 1991, and requires the task force to cease to exist on the date the department adopts the model ordinance or January 1, 1992, whichever occurs first. The act requires the department, not later than January 1, 1992, to adopt a model local water efficient landscape ordinance which each local agency may adopt. The act makes the model local water efficient landscape ordinance adopted by the department applicable within the jurisdiction of a local agency if that local agency, by January 1, 1993, has not adopted a water efficient landscape ordinance or has not adopted certain findings that the adoption of the ordinance is unnecessary.

This bill would specify that the provision making the model ordinance applicable to a local agency on and after January 1, 1993, does not apply to chartered cities. The bill would require the department, to the extent funds are appropriated, not later than January 1, 2009, by regulation, to update the model ordinance in accordance with specified requirements. The bill would require the department to prepare and submit to the Legislature a prescribed report before the adoption of the updated model ordinance. The bill would require a local agency, not later than January 1, 2010, to adopt the updated model ordinance or other water efficient landscape ordinance that is at least as effective in conserving water as the updated model ordinance. The bill would make the updated model ordinance applicable within the jurisdiction of a local agency, including a chartered city, if, by January 1, 2010, the local agency has not adopted its own water efficient landscape ordinance or the updated model ordinance. The bill would require each local agency, not later than January 31, 2010, to notify the department as to whether the local agency is subject to the department's updated model ordinance and, if not, to submit to the department a copy of the water efficient landscape ordinance adopted by the local agency, among other documents. The bill would require the department, to the extent funds are appropriated, not later than January 31, 2011, to prepare and submit a report to the Legislature relating to the status of water efficient landscape ordinances adopted by local agencies.

By imposing requirements on local agencies in connection with the adoption of water efficient landscape ordinances, the bill would impose a state-mandated local program.

(3) Existing law requires the State Energy Resources Conservation and Development Commission (Energy Commission), after one or more public hearings, to take specified action to reduce the wasteful, uneconomic, inefficient, or unnecessary consumption of energy. Existing law requires the Energy Commission, by January 1, 2004, to amend specified regulations to require that residential clothes washers manufactured on or after January 1, 2007, be at least as water efficient as commercial clothes washers, and to take certain other related action.

This bill would require the Energy Commission, in consultation with the department, to adopt, to the extent funds are available, by regulation performance standards and labeling requirements for landscape irrigation equipment, including irrigation controllers, moisture sensors, emission devices, and valves to reduce the wasteful, uneconomic, inefficient, or unnecessary consumption of energy or water. The bill would require the Energy Commission to adopt those requirements for landscape irrigation controllers and moisture sensors by January 1, 2010, and, on and after January 1, 2012, would prohibit the sale or installation of an irrigation controller or moisture sensor for landscape use unless the controller or sensor meets those adopted requirements. The bill would require the Energy Commission, on or before January 1, 2010, to prepare and submit to the Legislature a report that sets forth a proposed schedule for adopting performance standards and labeling requirements for emission devices and valves.

(4) Existing law generally requires an urban water supplier to install water meters on all municipal and industrial service connections located within its service area on or before January 1, 2025.

This bill would require a water purveyor as defined, to require as a condition of new retail water service on and after January 1, 2008, the installation of separate water meters to measure the volume of water used exclusively for landscape purposes. The bill would make this requirement applicable to specified service connections.

(5) The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

This bill would provide that, if the Commission on State Mandates determines that the bill contains costs mandated by the state, reimbursement for those costs shall be made pursuant to these statutory provisions.

The people of the State of California do enact as follows:

SECTION 1. Section 1353.8 is added to the Civil Code, to read:

1353.8. The architectural guidelines of a common interest development shall not prohibit or include conditions that have the effect of prohibiting the use of low water-using plants as a group.

SEC. 2. Article 10.8 (commencing with Section 65591) of Chapter 3 of Division 1 of Title 7 of the Government Code is repealed.

SEC. 3. Article 10.8 (commencing with Section 65591) is added to Chapter 3 of Division 1 of Title 7 of the Government Code, to read:

Article 10.8. Water Conservation in Landscaping

65591. This article shall be known and may be cited as the Water Conservation in Landscaping Act.

65592. Unless the context requires otherwise, the following definitions govern the construction of this article:

(a) “Department” means the Department of Water Resources.

(b) “Local agency” means any city, county, or city and county, including a charter city or charter county.

(c) “Water efficient landscape ordinance” means an ordinance or resolution adopted by a local agency, or prepared by the department, to address the efficient use of water in landscaping.

65593. The Legislature finds and declares all of the following:

(a) The waters of the state are of limited supply and are subject to ever increasing demands.

(b) The continuation of California’s economic prosperity is dependent on adequate supplies of water being available for future uses.

(c) It is the policy of the state to promote the conservation and efficient use of water and to prevent the waste of this valuable resource.

(d) Landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development.

(e) Landscape design, installation, maintenance, and management can and should be water efficient.

(f) Section 2 of Article X of the California Constitution specifies that the right to use water is limited to the amount reasonably required for the beneficial use to be served and the right does not and shall not extend to waste or unreasonable use or unreasonable method of use.

(g) (1) The Legislature, pursuant to Chapter 682 of the Statutes of 2004, requested the California Urban Water Conservation Council to convene a stakeholders work group to develop recommendations for improving the efficiency of water use in urban irrigated landscapes.

(2) The work group report includes a recommendation to update the model water efficient landscape ordinance adopted by the department pursuant to Chapter 1145 of the Statutes of 1990.

(3) It is the intent of the Legislature that the department promote the use of this updated model ordinance.

(h) Notwithstanding Article 13 (commencing with Section 65700), this article addresses a matter that is of statewide concern and is not a municipal affair as that term is used in Section 5 of Article XI of the California Constitution. Accordingly, it is the intent of the Legislature that this article, except as provided in Section 65594, apply to all cities and counties, including charter cities and charter counties.

65594. (a) Except as provided in Section 65595, if by January 1, 1993, a local agency did not adopt a water efficient landscape ordinance and did not adopt findings based on climatic, geological, or topographical conditions, or water availability that state that a water efficient landscape ordinance is unnecessary, the model water efficient landscape ordinance adopted by the department pursuant to Chapter 1145 of the Statutes of 1990 shall apply within the jurisdiction of the local agency as of that date, shall be enforced by the local agency, and shall have the same force and effect as if adopted by the local agency.

(b) Notwithstanding subdivision (b) of Section 65592, subdivision (a) does not apply to chartered cities.

(c) This section shall apply only until the department updates the model ordinance.

65595. (a) (1) To the extent funds are appropriated, not later than January 1, 2009, by regulation, the department shall update the model water efficient landscape ordinance adopted pursuant to Chapter 1145 of the Statutes of 1990, after holding one or more public hearings. The updated model ordinance shall be based on the recommendations set forth in the report prepared pursuant to Chapter 682 of the Statutes of 2004 and shall meet the requirements of Section 65596.

(2) Before the adoption of the updated model ordinance pursuant to paragraph (1), the department shall prepare and submit to the Legislature a report relating to both of the following:

(A) The extent to which local agencies have complied with the model water efficient landscape ordinance adopted pursuant to Chapter 1145 of the Statutes of 1990.

(B) The department’s recommendations regarding the landscape water budget component of the updated model ordinance described in subdivision (b) of Section 65596.

(b) Not later than January 31, 2009, the department shall distribute the updated model ordinance adopted pursuant to subdivision (a) to all local agencies and other interested parties.

(c) On or before January 1, 2010, a local agency shall adopt one of the following:

(1) A water efficient landscape ordinance that is, based on evidence in the record, at least as effective in conserving water as the updated model ordinance adopted by the department pursuant to subdivision (a).

(2) The updated model ordinance described in paragraph (1).

(d) If the local agency has not adopted, on or before January 1, 2010, a water efficient landscape ordinance pursuant to subdivision (c), the updated model ordinance adopted by the department pursuant to subdivision (a) shall apply within the jurisdiction of the local agency as of that date, shall be enforced by the local agency, and shall have the same force and effect as if adopted by the local agency.

(e) Nothing in this article shall be construed to require the local agency's water efficient landscape ordinance to duplicate, or to conflict with, a water efficiency program or measure implemented by a public water system, as defined in Section 116275 of the Health and Safety Code, within the jurisdictional boundaries of the local agency.

65596. The updated model ordinance adopted pursuant to Section 65595 shall do all the following in order to reduce water use:

(a) Include provisions for water conservation and the appropriate use and groupings of plants that are well-adapted to particular sites and to particular climatic, soil, or topographic conditions. The model ordinance shall not prohibit or require specific plant species, but it may include conditions for the use of plant species or encourage water conserving plants. However, the model ordinance shall not include conditions that have the effect of prohibiting or requiring specific plant species.

(b) Include a landscape water budget component that establishes the maximum amount of water to be applied through the irrigation system, based on climate, landscape size, irrigation efficiency, and plant needs.

(c) Promote the benefits of consistent local ordinances in neighboring areas.

(d) Encourage the capture and retention of stormwater onsite to improve water use efficiency or water quality.

(e) Include provisions for the use of automatic irrigation systems and irrigation schedules based on climatic conditions, specific terrains and soil types, and other environmental conditions. The model ordinance shall include references to local, state, and federal laws and regulations regarding standards for water-conserving irrigation equipment. The model ordinance may include climate information for irrigation scheduling based on the California Irrigation Management Information System.

(f) Include provisions for onsite soil assessment and soil management plans that include grading and drainage to promote healthy plant growth and to prevent excessive erosion and runoff, and the use of mulches in shrub areas, garden beds, and landscaped areas where appropriate.

(g) Promote the use of recycled water consistent with Article 4 (commencing with Section 13520) of Chapter 7 of Division 7 of the Water Code.

(h) Seek to educate water users on the efficient use of water and the benefits of doing so.

(i) Address regional differences, including fire prevention needs.

(j) Exempt landscaping that is part of a registered historical site.

(k) Encourage the use of economic incentives to promote the efficient use of water.

(*l*) Include provisions for landscape maintenance practices that foster long-term landscape water conservation. Landscape maintenance practices may include, but are not limited to, performing routine irrigation system repair and adjustments, conducting water audits, and prescribing the amount of water applied per landscaped acre.

(m) Include provisions to minimize landscape irrigation overspray and runoff.

65597. Not later than January 31, 2010, each local agency shall notify the department as to whether the local agency is subject to the department's updated model ordinance adopted pursuant to Section 65595, and if not, shall submit to the department a copy of the water efficient landscape ordinance adopted by the local agency, and a copy of the local agency's findings and evidence in the record that its water efficient landscape ordinance is at least as effective in conserving water as the department's updated model ordinance. Not later than January 31, 2011, the department shall, to the extent funds are appropriated, prepare and submit a report to the Legislature summarizing the status of water efficient landscape ordinances adopted by local agencies.

65598. Any model ordinance adopted pursuant to this article shall exempt cemeteries from all provisions of the ordinance except those set forth in subdivisions (h), (k), and (*l*) of Section 65596. In adopting language specific to cemeteries, the department shall recognize the special landscape management needs of cemeteries.

65599. Any actions or proceedings to attach, review, set aside, void, or annul the act, decision, or findings of a local agency on the ground of noncompliance with this article shall be brought pursuant to Section 1085 of the Code of Civil Procedure.

SEC. 4. Section 25401.9 is added to the Public Resources Code, to read:

25401.9. (a) To the extent that funds are available, the commission, in consultation with the Department of Water Resources, shall adopt by regulation, after holding one or more public hearings, performance standards and labeling requirements for landscape irrigation equipment, including, but not limited to, irrigation controllers, moisture sensors, emission devices, and valves, for the purpose of reducing the wasteful, uneconomic, inefficient, or unnecessary consumption of energy or water.

(b) For the purposes of complying with subdivision (a), the commission shall do all of the following:

(1) Adopt performance standards and labeling requirements for landscape irrigation controllers and moisture sensors on or before January 1, 2010.

(2) Consider the Irrigation Association's Smart Water Application Technology Program testing protocols when adopting performance standards for landscape irrigation equipment, including, but not limited to, irrigation controllers, moisture sensors, emission devices, and valves.

(3) Prepare and submit a report to the Legislature, on or before January 1, 2010, that sets forth on a proposed schedule for adopting performance standards and labeling requirements for emission devices and valves.

(c) On and after January 1, 2012, an irrigation controller or moisture sensor for landscape irrigation uses may not be sold or installed in the state unless the controller or sensor meets the performance standards and labeling requirements established pursuant to this section.

SEC. 5. Article 4.5 (commencing with Section 535) is added to Chapter 8 of Division 1 of the Water Code, to read:

Article 4.5. Irrigated Landscape

535. (a) A water purveyor shall require as a condition of new retail water service on and after January 1, 2008, the installation of separate water meters to measure the volume of water used exclusively for landscape purposes.

(b) Subdivision (a) does not apply to either of the following:

(1) Single-family residential connections.

(2) Connections used to supply water for the commercial production of agricultural crops or livestock.

(c) Subdivision (a) applies only to a service connection for which both of the following apply:

(1) The connection serves property with more than 5,000 square feet of irrigated landscape.

(2) The connection is supplied by a water purveyor that serves 15 or more service connections.

(d) For the purposes of this section, "new retail water service" means the installation of a new water meter where water service has not been previously provided, and does not include applications for new water service submitted before January 1, 2007.

SEC. 6. If the Commission on State Mandates determines that this act contains costs mandated by the state, reimbursement to local agencies and school districts for those costs shall be made pursuant to Part 7 (commencing with Section 17500) of Division 4 of Title 2 of the Government Code.

O

BMP SPECIFICATIONS AND DESIGN CALCULATIONS

Proprietary Bioretention BMP
(Modular Wetlands unit)

Calculation of WQDF

Q = CiA *Equation III.3, Section III.1.2 Technical Guidance Document (TGD)*
Q = design flowrate, cfs
C = runoff coefficient = (0.75 x *imp* + 0.15)
imp = impervious fraction of drainage area (ranges from 0 to 1)
i = design intensity (inches/hour) - *multiplier to convert design capture storm depth to design intensity from Table VI.1 TGD*
A = tributary area (acres)

T_C = time of concentration estimate of tributary area for use in determining multiplier for **i** above

DMA #1

T_C = 5.16 minutes
i = 0.26
imp = 0.10 from Section IV.1 Project Performance Criteria
C = 0.225
A = 1.26 from Section IV.1 Project Performance Criteria

Q_{WQDF} = 0.074 cfs

Per Modular Wetlands System sizing table MWS Linear 2.0 Surface Loading Sizing Calculations – State of California, model number MWS-L-4-8 has the treatment capacity of 0.115 and would be adequate to treat the Q_{WQDF} of 0.074 cfs.

DMA #2

T_C = 5.16 minutes
i = 0.26
imp = 0.93 from Section IV.1 Project Performance Criteria
C = 0.8475
A = 1.39 from Section IV.1 Project Performance Criteria

Q_{WQDF} = 0.306 cfs

Per Modular Wetlands System sizing table MWS Linear 2.0 Surface Loading Sizing Calculations – State of California, model number MWS-L-8-12 has the treatment capacity of 0.346 and would be adequate to treat the Q_{WQDF} of 0.306 cfs.

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

	Model #	Physical Depth of Model from TC, FS, TC to INVERT OUT	Wetland Perimiter (ft)	**Wetland Chamber Max HGL Height (ft)	Wetland Surface Area (sq ft)	Treatment Capacity for Flow Based Design **FLOW DESIGN**	
						GPM	CFS
	MWS-L-4-4	4.13'	6.7	3.40	22.78	**23.46**	**0.052**
	MWS-L-4-6	4.13'	9.4	3.40	31.96	**32.92**	**0.073**
DMA #1	MWS-L-4-8	4.13'	14.8	3.40	50.32	**51.83**	**0.115**
	MWS-L-4-13	4.13'	18.4	3.40	62.56	**64.44**	**0.144**
	MWS-L-4-15	4.13'	22.4	3.40	76.16	**78.44**	**0.175**
	MWS-L-4-17	4.13'	26.4	3.40	89.76	**92.45**	**0.206**
	MWS-L-4-19	4.13'	30.4	3.40	103.36	**106.46**	**0.237**
	MWS-L-4-21	4.13'	34.4	3.40	116.96	**120.47**	**0.268**
DMA #2	MWS-L-8-12	4.13'	44.4	3.40	150.96	**155.49**	**0.346**
	MWS-L-8-16	4.13'	59.2	3.40	201.28	**207.32**	**0.462**

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

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

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

Modular Wetland Systems, Inc. **www.modularwetlands.com**

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

DMA #1

SITE SPECIFIC DATA

PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			N/A
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			DEPENDENT ON PIPE SIZE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1		PVC	
INLET PIPE 2		PVC	
OUTLET PIPE 1		PVC	
OUTLET PIPE 2		PVC	
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD			
FRAME & COVER			
WETLANDMEDIA VOLUME (CY)			
WETLANDMEDIA DELIVERY METHOD			PER CONTRACT
ORIFICE SIZE (DIA. INCHES)			

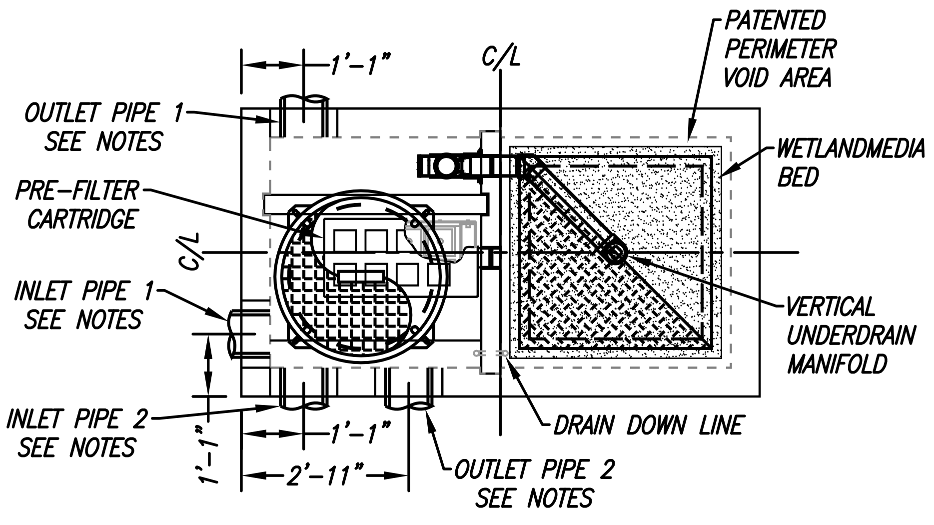
INSTALLATION NOTES

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

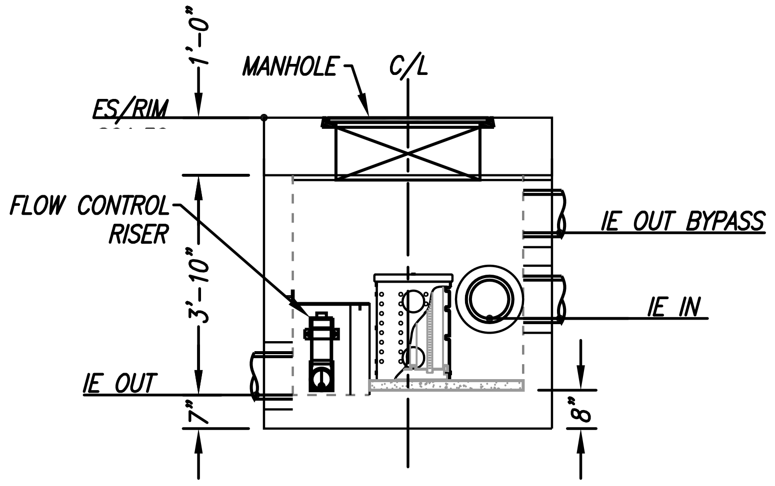
GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.

5/11/16ASPOLAR

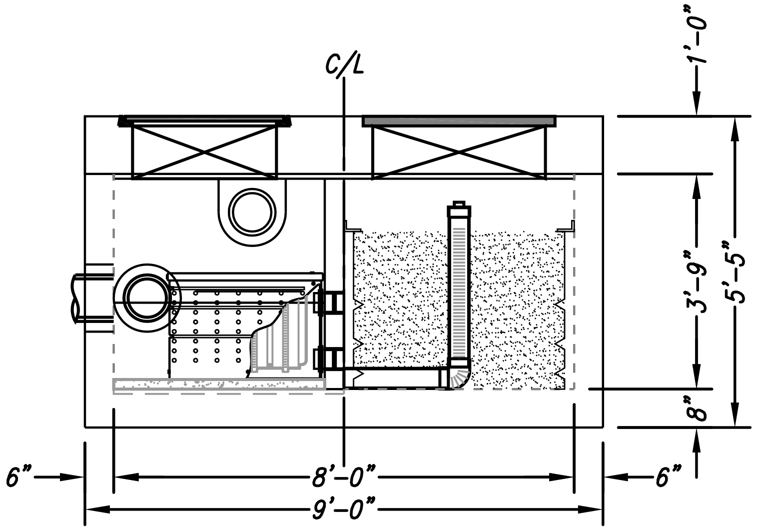


PLAN VIEW

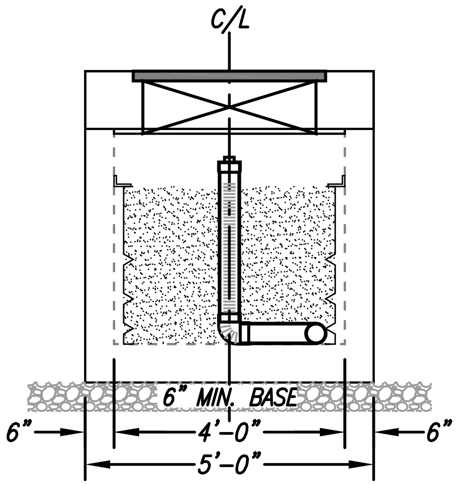


LEFT END VIEW

BIOFILTRATION



ELEVATION VIEW



RIGHT END VIEW

PRETREATMENT/DISCHARGE

INTERNAL BYPASS DISCLOSURE:

THE DESIGN AND CAPACITY OF THE PEAK CONVEYANCE METHOD TO BE REVIEWED AND APPROVED BY THE ENGINEER OF RECORD. HGL(S) AT PEAK FLOW SHALL BE ASSESSED TO ENSURE NO UPSTREAM FLOODING. PEAK HGL AND BYPASS CAPACITY SHOWN ON DRAWING ARE USED FOR GUIDANCE ONLY.

TREATMENT FLOW (CFS)	0.115
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

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

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MWS-L-4-8-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA*

PROJECT NAME	
PROJECT LOCATION	
STRUCTURE ID	

PERFORMANCE DATA

TREATMENT VOLUME (CF)	
DRAINDOWN TIME (HR)	
TREATMENT HGL (FT)	
BYPASS FLOW RATE (CFS)	

PROJECT PARAMETERS

PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
OUTLET PIPE 1			
RIM ELEVATION			
SURFACE LOADING REQUIREMENT			

	PRETREATMENT	BIOFILTRATION	DISCHARGE
FRAME & COVER			

WETLANDMEDIA VOLUME (CY)	
MEDIA DELIVERED	
ORIFICE SIZE (DIA)	
MAX PICK WEIGHT (LBS)	

NOTES:

*PER ENGINEER OF RECORD

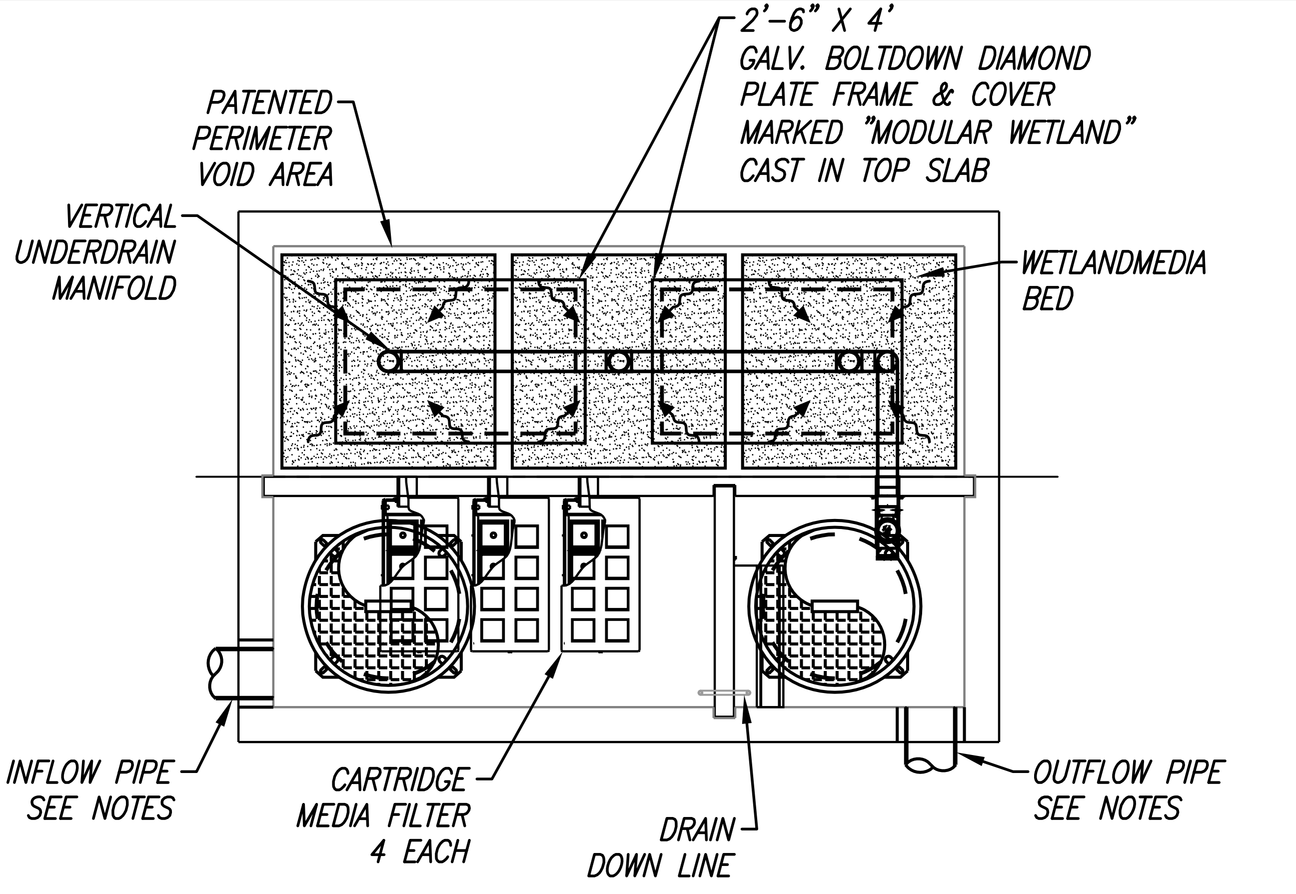
INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. MANUFACTURER RECOMMENDS A MINIMUM 6"LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH).
4. INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR.
5. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
6. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.

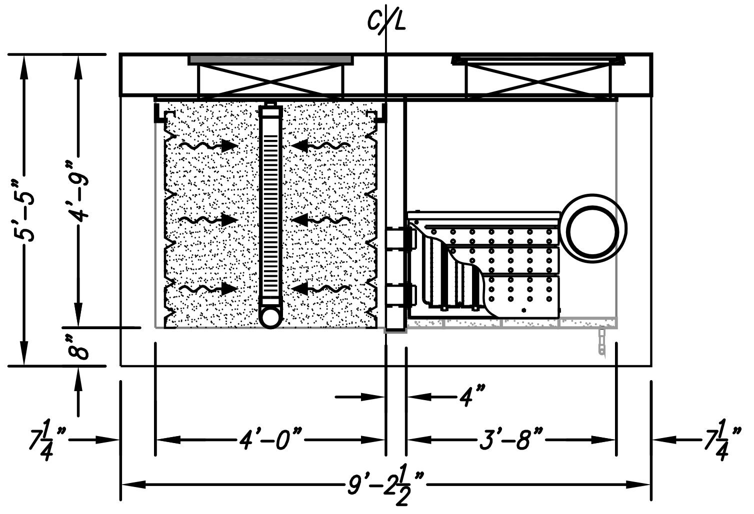
GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.

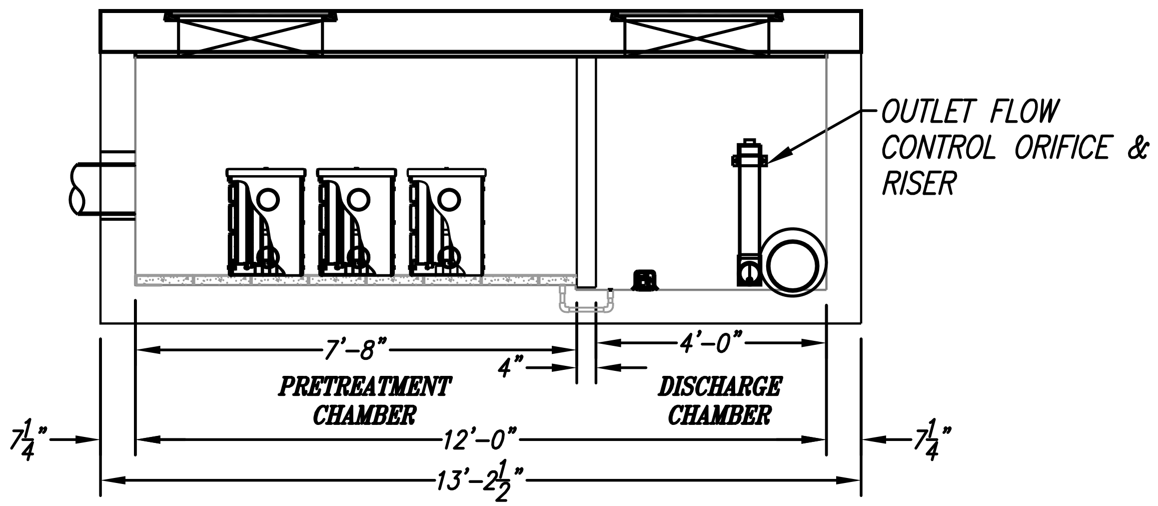
DMA #2



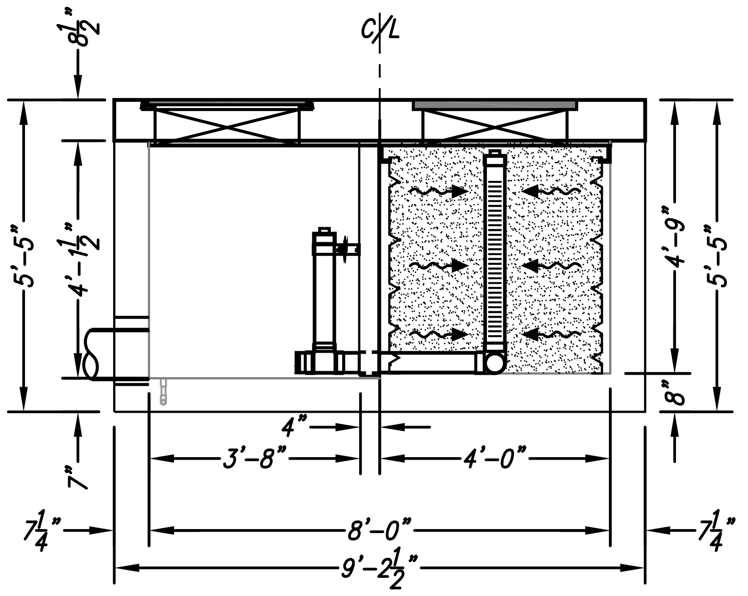
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

MWS UNIT DESIGN DATA

TREATMENT CAPACITY (CFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT SURFACE AREA (SF)	105.84
WETLAND LOADING RATE (GPM/MIN)	1.03

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

MODULAR WETLANDS

MWS-L-8-12-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

Section [________]
Modular Subsurface Flow Wetland System

PART 1 – GENERAL

01.01.00 Purpose

The purpose of this specification is to establish generally acceptable criteria for Modular Subsurface Flow Wetland Systems used for biofiltration of stormwater runoff including dry weather flows and other contaminated water sources. It is intended to serve as a guide to producers, distributors, architects, engineers, contractors, plumbers, installers, inspectors, agencies and users; to promote understanding regarding materials, manufacture and installation; and to provide for identification of devices complying with this specification.

01.02.00 Description

Modular Subsurface Flow Wetland Systems (MSFWS) are used for filtration of stormwater runoff including dry weather flows. The MSFWS is a pre-engineered biofiltration system composed of a pretreatment chamber containing filtration cartridges, a horizontal flow biofiltration chamber with a peripheral void area and a centralized and vertically extending underdrain, the biofiltration chamber containing a sorptive media mix which does not contain any organic material and a layer of plant establishment media, and a discharge chamber containing an orifice control structure . Treated water flows horizontally in series through the pretreatment chamber cartridges, biofiltration chamber and orifice control structure.

01.03.00 Manufacturer

The manufacturer of the MSFWS shall be one that is regularly engaged in the engineering design and production of systems developed for the treatment of stormwater runoff for at least (10) years, and which have a history of successful production, acceptable to the engineer of work. In accordance with the drawings, the MSFWS(s) shall be a filter device Manufactured by Bio Clean Environmental Services, Inc., or Modular Wetland Systems, Inc., or assigned distributors or licensees. Bio Clean Environmental Services Inc., and Modular Wetland Systems, Inc., can be reached at:

Corporate Headquarters:
Bio Clean Environmental Service, Inc.
2972 San Luis Rey Road
Oceanside, CA 92058
Phone: (760) 433-7640
Fax: (760) 433-3176
www.biocleanenvironmental.net

Corporate Headquarters:
Modular Wetland Systems, Inc.
P.O. Box 869
Oceanside, CA 92049
Phone: (760) 433-7650
www.modularwetlands.net

01.04.00 Submittals

01.04.01 Shop drawings are to be submitted with each order to the contractor and consulting engineer.

01.04.02 Shop drawings are to detail the MSFWS and all components required and the sequence for installation, including:

- System configuration with primary dimensions
- Interior components
- Any accessory equipment called out on shop drawings

01.04.03 Inspection and maintenance documentation submitted upon request.

01.05.00 Work Included

01.05.01 Specification requirements for installation of MSFWS.

01.05.02 Manufacturer to supply components of the MSFWS(s):

- Pretreatment chamber components (pre-assembled)
- Concrete Structure(s)
- Biofiltration chamber components (pre-assembled)
- Flow control discharge structure (pre-assembled)

01.06.00 Reference Standards

ASTM C 29	Standard Test Method for Unit Weight and Voids in Aggregate
ASTM C 88	C 88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C131	C 131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregates by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	C 136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 330	C 330 Standard Specification for Lightweight Aggregate for Structural Concrete
ASTM D 698	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft.-lbf/ft3 (600 kN-m/m3)
ASTM D 1621	10 Standard Test Method for Compressive Properties Of Rigid Cellular Plastics
ASTM D 1777	ASTM D1777 - 96(2007) Standard Test Method for Thickness of Textile Materials
ASTM D 4716	Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
AASHTO T 99-01	Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in) Drop
AASHTO T 104	Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
AASHTO T 260	Standard Method of Test for Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials.
AASHTO T 288	Standard Method of Test for Determining Minimum Laboratory Soil Resistivity
AASHTO T 289	Standard Method of Test for Determining ph of Soil for Use in Corrosion Testing
AASHTO T 291	Standard Method of Test for Determining Water Soluble Chloride Ion Content in Soil
AASHTO T 290	T 290 Standard Method of Test for Determining Water Soluble Sulfate Ion Content in Soil

PART 2 – COMPONENTS

The Modular Subsurface Flow Wetland Systems (MSFWS) and all of its components shall be self-contained within a concrete structure constructed of concrete with a minimum 28 day compressive strength of 5,000 psi, with reinforcing per ASTM A 615, Grade 60, and supports and H20 loading as indicated by AASHTO. Each Chamber shall have appropriate access hatches for easy maintenance and sized to allow removal of all internal components without disassembly. All water transfer system components shall conform with the following;

- Filter netting shall be 100% Polyester with a number 16 sieve size, and strength tested per ASTM D 3787.
- Drainage cells shall be manufactured of lightweight injection-molded plastic and have a minimum compressive strength test of 6,000 psi and a void area along the surface making contact with the filter media of 75% or greater. The cells shall be at least 2” in thickness and allow water to freely flow in all four directions.

02.01.00 Pretreatment Chamber Components

02.01.01 Filter Cartridges shall operate at a loading rate not to exceed 3 gallons per minute per square foot surface area.

02.01.02 Drain Down System shall include a pervious floor that allows water to drain into the underdrain pipe that is connected to the discharge chamber.

02.02.00 Biofiltration Chamber Components

02.02.01 Media shall consist of ceramic material produced by expanding and vitrifying select material in a rotary kiln. Media must be produced to meet the requirements of ASTM C330, ASTM C331, and AASHTO M195. Aggregates must have a minimum 24-hour water absorption of 10.5% mass. Media shall not contain any organic material. Flow through media shall be horizontal from the outer perimeter of the chamber toward the centralized and vertically extending underdrain. The retention time in the media shall be at least 3 minutes. Downward flow filters are not acceptable alternatives. The thickness of the media shall be at least 19” from influent end to effluent end. The loading rate on the media shall not exceed 1.1 gallons per minute per square foot surface area. Media must be contained within structure that spaces the surface of the media at least 2” from all vertically extending walls of the concrete structure.

02.02.02 Planting shall be native, drought tolerant species recommend by manufacturer and/or landscape architect.

02.02.03 Plant Support Media shall be made of a 3” thick moisture retention cell that is inert and contains no chemicals or fertilizers, is not made of organic material and has an internal void percentage of 80%.

02.03.00 Discharge Chamber

The discharge device shall house a flow control orifice plate that restricts flows greater than designed treatment flow rate. All piping components shall be made of a high-density polyethylene. The discharge chamber shall also contain a drain down filter if specified on the drawing.

PART 3 – PERFORMANCE

03.01.00 General

03.01.01 Function - The MSFWS has no moving internal components and functions based on gravity flow, unless otherwise specified. The MSFWS is composed of a pretreatment chamber, a biofiltration chamber and a discharge chamber. The pretreatment device houses cartridge media filters, which consist of filter media housed in a perforated enclosure. The untreated runoff flows into the system via subsurface piping and or surface inlet. Water entering the system is forced through the filter cartridge enclosures by gravity flow. Then the flow contacts the filter media. The flow through the media is horizontal toward the center of each individual media filter. In the center of the media shall be a round slotted PVC pipe of no greater than 1.5” in diameter. The slotted PVC pipe shall extend downward into the water transfer cavity of the cartridge. The slotted PVC pipe shall be threaded on the bottom to connect to the water transfer cavity. After pollutants have been removed by the filter media the water discharges the pretreatment chamber and flows into the water transfer system and is conveyed to the biofiltration chamber. Once runoff has been filtered by the biofiltration chamber it is collected by the vertical underdrain and conveyed to a discharge chamber equipped with a flow control orifice plate. Finally the treated flow exits the system.

03.01.02 Pollutants - The MSFWS will remove and retain debris, sediments, TSS, dissolved and particulate metals and nutrients including nitrogen and phosphorus species, bacteria, BOD, oxygen demanding substances, organic compounds and hydrocarbons entering the filter during frequent storm events and continuous dry weather flows.

03.01.03 Treatment Flow Rate and Bypass - The MSFWS operates in-line. The MSFWS will treat 100% of the required water quality treatment flow based on a minimum filtration capacities listed in section 03.02.00. The size of the system must match those provided on the drawing to ensure proper performance and hydraulic residence time.

Minimum Treatment Capabilities

- System must be capable of treating flows to the specified treatment flow rate on the drawings. The flow rate shall be controlled by an orifice plate.

PART 4 - EXECUTION

04.01.00 General

The installation of the MSFWS shall conform to all applicable national, state, state highway, municipal and local specifications.

04.02.00 Installation

The Contractor shall furnish all labor, equipment, materials and incidentals required to install the (MSFWS) device(s) and appurtenances in accordance with the drawings and these specifications.

04.02.01 Grading and Excavation site shall be properly surveyed by a registered professional surveyor, and clearly marked with excavation limits and elevations. After site is marked it is the responsibility of the contractor to contact local utility companies and/or DigAlert to check for underground utilities. All grading permits shall be approved by governing agencies before commencement of grading and excavation. Soil conditions shall be tested in accordance with the governing agencies requirements. All earth removed shall be transported, disposed, stored, and handled per governing agencies standards. It is the responsibility of the contractor to install and maintain proper erosion control measures during grading and excavation operations.

04.02.02 Compaction – All soil shall be compacted per registered professional soils engineer's recommendations prior to installation of MSFWS components.

04.02.03 Backfill shall be placed according to a registered professional soils engineer's recommendations, and with a minimum of 6" of gravel under all concrete structures.

04.02.04 Concrete Structures – After backfill has been inspected by the governing agency and approved the concrete structures shall be lifted and placed in proper position per plans.

04.02.05 Subsurface Flow Wetland Media shall be carefully loaded into area so not to damage the Wetland Liner or Water Transfer Systems. The entire wetland area shall be filled to a level 9 inches below finished surface.

04.02.06 Planting layer shall be installed per manufacturer's drawings and consist of a minimum 3" grow enhancement media that ensures greater than 95% plant survival rate, and 6" of wetland media. Planting shall consist of native plants recommended by manufacturer and/or landscape architect. Planting shall be drip irrigated for at least the first 3 months to insure long term plant growth. No chemical herbicides, pesticides, or fertilizers shall be used in the planting or care and maintenance of the planted area.

04.03.00 Shipping, Storage and Handling

04.03.01 Shipping – MSFWS shall be shipped to the contractor's address or job site, and is the responsibility of the contractor to offload the unit(s) and place in the exact site of installation.

04.03.02 Storage and Handling– The contractor shall exercise care in the storage and handling of the MSFWS and all components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be born by the contractor. The MSFWS(s) and all components shall always be stored indoors and transported inside the original shipping container until the unit(s) are ready to be installed. The MSFWS shall always be handled with care and lifted according to OSHA and NIOSA lifting recommendations and/or contractor's workplace safety professional recommendations.

04.04.00 Maintenance and Inspection

04.04.01 Inspection – After installation, the contractor shall demonstrate that the MSFWS has been properly installed at the correct location(s), elevations, and with appropriate components. All components associated with the MSFWS and its installation shall be subject to inspection by the engineer at the place of installation. In addition, the contractor shall demonstrate that the MSFWS has been installed per the manufacturer's specifications and recommendations. All components shall be inspected by a qualified person once a year and results of inspection shall be kept in an inspection log.

04.04.02 Maintenance – The manufacturer recommends cleaning and debris removal maintenance of once a year and replacement of the Cartridge Filters as needed. The maintenance shall be performed by someone qualified. A Maintenance Manual is available upon request from the manufacturer. The manual has detailed information regarding the maintenance of the MSFWS. A Maintenance/Inspection record shall be kept by the maintenance operator. The record shall include any maintenance activities preformed, amount and description of debris collected, and the condition of the filter.

04.04.03 Material Disposal - All debris, trash, organics, and sediments captured by the MSFWS shall be transported and disposed of at an approved facility for disposal in accordance with local and state requirements. Please refer to state and local regulations for the proper disposal of toxic and non-toxic material.

PART 5 – QUALITY ASSURNACE

05.01.00 Warranty

The Manufacturer shall guarantee the MSFWS against all manufacturing defects in materials and workmanship for a period of (5) years from the date of delivery to the ______. The manufacturer shall be notified of repair or replacement issues in writing within the warranty period. The MSFWS is limited to recommended application for which it was designed.

05.02.00 Performance Certification

The MSFWS manufacturer shall submit to the Engineer of Record a “Manufacturer’s Performance Certificate” certifying the MSFWS is capable of achieving the specified removal efficiency for suspended solids, phosphorous and dissolved metals.

Installation Guidelines for Modular Wetland System

Delivery & Unloading/Lifting

1. Modular Wetland Systems, Inc. shall deliver the unit(s) to the site in coordination with the Contractor.

2. The Contractor will require spreader bars and chains/cables to safely and securely lift the main structure, lids and risers (if applicable). Modular Wetlands will supply a set of suitable lifting hooks, knuckles, shackles and eye bolts with each project at no extra charge.

3. The main structure and lid can be lifted together or separately.

   Please see Modular Wetland Weights and Lifting Details. Contact Modular Wetlands for additional lifting details.

Inspection

1. Inspection of the Modular Wetland unit and all parts contained in or shipped outside of the unit shall be inspected at time of delivery by the site Engineer/Inspector and the Contractor. Any non-conformance to approved drawings or damage to any part of the system shall be documented on the Modular Wetland shipping ticket. Damage to the unit during and after unloading shall be corrected at the expense of the Contractor. Any necessary repairs to the Modular Wetland unit shall be made to the acceptance of the Engineer/Inspector.

Site Preparation

1. The Contractor is responsible for providing adequate and complete site/inlet protection when the Modular Wetland unit is installed prior to final site stabilization (full landscaping, grass cover, final paving, and street sweeping completed).

2. The Contractor shall adhere to all jurisdictional and/or OSHA safety rules in providing temporary shoring of the excavation.

3. The Contractor or Owner is responsible for appropriately barricading the Modular Wetland unit from traffic (in accordance with local codes).

Installation Guidelines for Modular Wetland System

Installation

1. Each unit shall be constructed at the locations and elevations according to the sizes shown on the approved drawings. Any modifications to the elevation or location shall be at the direction of and approved by the Engineer.

2. The unit shall be placed on the compacted sub-grade with a minimum 6-inch gravel base matching the final grade of the curb line in the area of the unit. The unit is to be placed such that the unit and top slab match the grade of the curb in the area of the unit. Compact undisturbed sub-grade materials to 95% of maximum density at +1% to 2% of the optimum moisture. Unsuitable material below sub-grade shall be replaced to site engineer's approval. Please see Modular Wetlands Weights and Lifting Details. Contact Modular Wetlands for guidance where slope exceeds 5%.

3. Once the unit is set, the internal wooden forms and protective silt fabric cover must be left intact (if WetlandMedia pre-installed). The top lid(s) should be sealed onto the box section before backfilling, using a non-shrink grout, butyl rubber or similar waterproof seal. The boards on the top of the lid and boards sealed in the unit's throat must NOT be removed. The Supplier will remove these sections at the time of activation.

4. Outlet connections shall be aligned and sealed to meet the approved drawings with modifications necessary to meet site conditions and local regulations. The correct outlet will be marked on the Modular Wetland unit.

5. Backfilling should be performed in a careful manner, bringing the appropriate fill material up in 6-inch lifts on all sides. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of the Modular Wetland unit shall conform to ASTM specification C891 "Standard Practice for Installation of Underground Precast Utility Structures" unless specified otherwise in contract documents.

6. It is the responsibility of the Contractor to provide curb and gutter and transition to the Modular Wetland unit for proper stormwater flow into the system through the throat, pipe or grate opening. A standard drawing of the throat and gutter detail is available in the following section; however the plans and contract documents supersede all standard drawings. Several variations of the standard design are available. Effective bypass for the Modular Wetland System is essential for correct operation (i.e. bypass to an overflow at lower elevation).

Installation Procedure

A set of lifting hooks, shackles, knuckles and eye bolts are provided by Modular Wetlands with the first delivery of every project.

The contractor **MUST** provide all rigging And lifting apparatus, such as all cables and chains or straps.

It is the contractor's responsibility to provide suitable lifting equipment to off-load the Modular Wetland unit.

Modular Wetland units are designed to be off-loaded using the contractor's spreader bar.

1. Apply Butyl Tape Seal

Apply butyl tape seal along the top of the box section. Butyl tape seal is provided with every unit.

Modular Wetland installed protective throat board and installed silt fabric must be left in place to protect the unit from construction sediment.

2. Unload and Set Box

Unload the Modular Wetland unit
the prepared hole with appropriate sub-grade.*

* Compacted sub-grade with a minimum
of six inches of gravel base which must match
the final grade of curb line the area of the unit.

3. Set Top On Box

Set the top slab on the box.

The Contractor is responsible for providing adequate and complete site/inlet protection when the Modular Wetland is installed prior to final site stabilization (full landscaping, grass cover, final paving, and street sweeping completed).

4. Connect Outfall Pipe

The correct outlet will be marked on the Modular Wetland.

Invert of outlet pipe **MUST** be even with the floor of the system.

5. Install Curb & Gutter

It is the responsibility of the Contractor to provide curb and gutter and transition to the Modular Wetland for proper flow into the system through a 5”- 7” throat opening. A standard drawing of the throat and gutter detail in the following section. CONTRACTOR RESPONSIBLE FOR GROUTING IN ANY VISIBLE LIFTING POINTS.

6. Activation

Activation is performed **ONLY** by Modular Wetland personnel.

Activation can occur once the project site is fully stabilized (full landscaping, grass cover, final paving and street sweeping completed) and there is a 5” - 7” throat opening.

Call 760-433-7640 to schedule your activation.

NOTE: WetlandMedia Installation

For Larger models (MWS-L-4-13 and above) the system will be delivered without WetlandMedia pre-installed to minimize pick weight and prevent contamination of the media during construction. For these models the WetlandMedia will be delivered in bulk or in super sacks. It will be responsibility of the contractor to fill the system with the WetlandMedia during the installation process. Installation of the WetlandMedia can be done after the unit is fully installed to avoid contamination. See following pages for details.

WetlandMedia Install (if applicable)

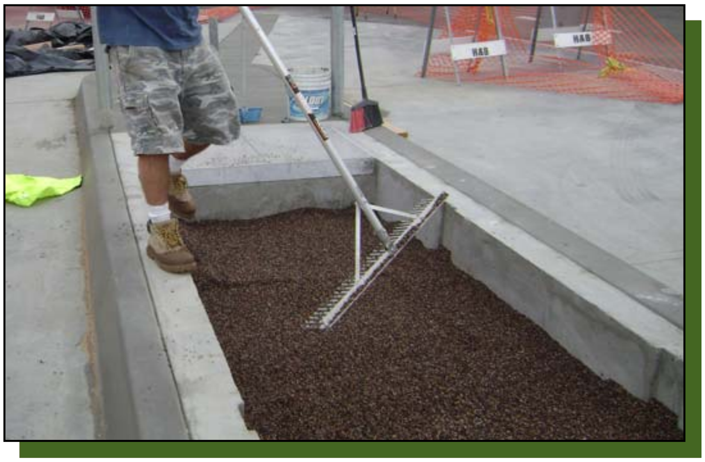
1. Fill WetlandMedia

Position super sack of WetlandMedia over wetland chamber. Bottom of sack should not be more than 2' above top of system. Open sack and fill evenly*.

* One to several hundred cubic yards of WetlandMedia will be required based upon the model number and size of the system. For large scale jobs WetlandMedia will be delivered in bulk and will require a bobcat of similar to fill the system. All equipment is the responsibility of the contractor.

2. Install Plant Propagation Layer

Fill WetlandMedia up to 9" below the top of the wetland chamber. Level out the WetlandMedia as shown. Ensure that the level does not vary more than one inch or plant growth will be affected.

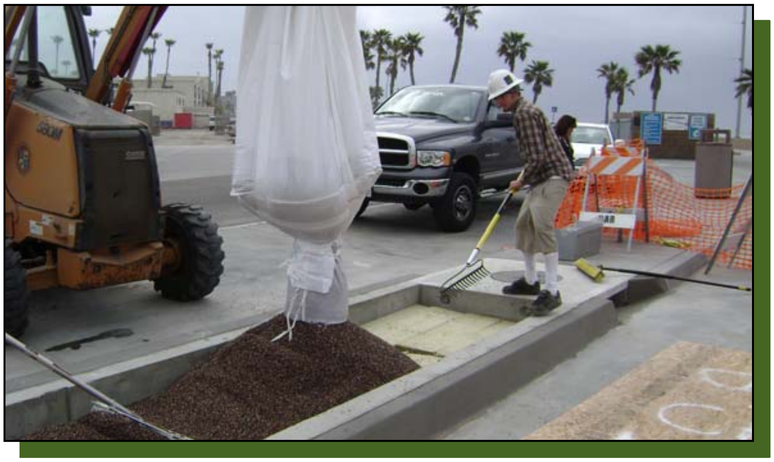


3. Install Plant Propagation Layer

Utilize plant propagation blocks provided by the manufacturer. Each block is approximately 40" by 6" by 3" thick. Blocks shall be placed side by side and end to end and cover the entire length and width of the wetland chamber unless specified.

4. Finish Filling WetlandMedia

After plant propagation blocks are installed repeat step 1 and fill the system to the top of the wetland chamber as shown. WetlandMedia must be filled within 2” of the top of the unit.



5. Planting

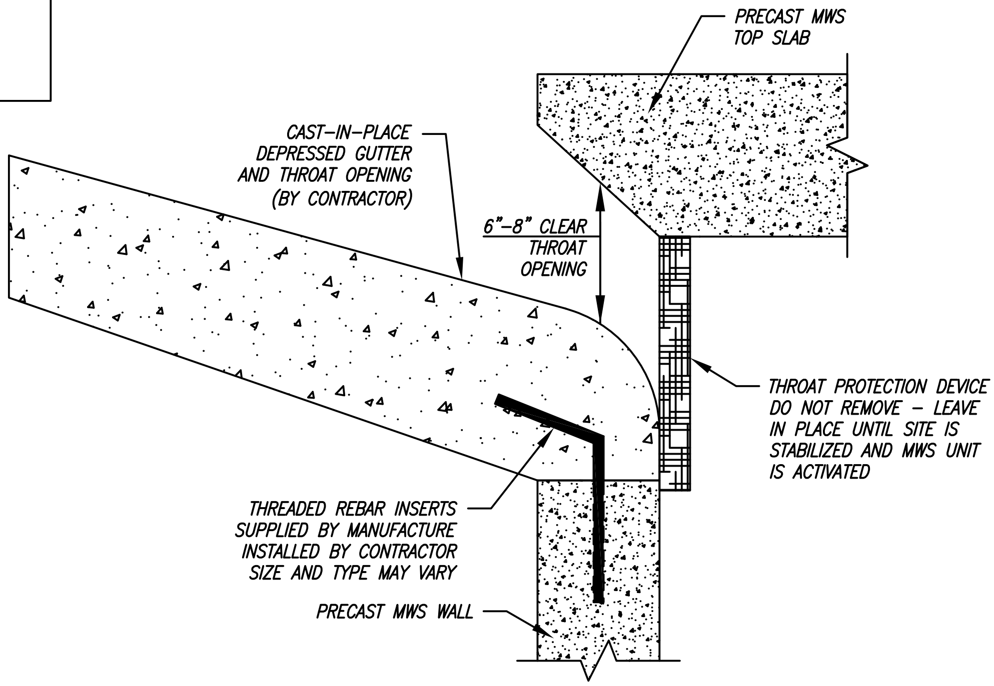
After system is filled with WetlandMedia planting of vegetation can begin. Utilizing 1 gallon plants dig down until The plant propagation blocks are reached. Remove plant and it’s root ball from the container. Set the bottom of the root ball on the tops of the blocks. Fill hole back in with WetlandMedia. After planting a thorough watering of the plants is necessary. The plant propagation blocks must be saturated to provide a water source for the plants during the establishment phase. It is recommended that hand watering is done three times a week for the first two months. Hand water can be supplemented with drip or spray irrigation after the second week. Please call the manufacturer for more details on plants, planting arrangement and irrigation options.

NOTE: planting is required on all units, including units delivered with WetlandMedia pre-installed.

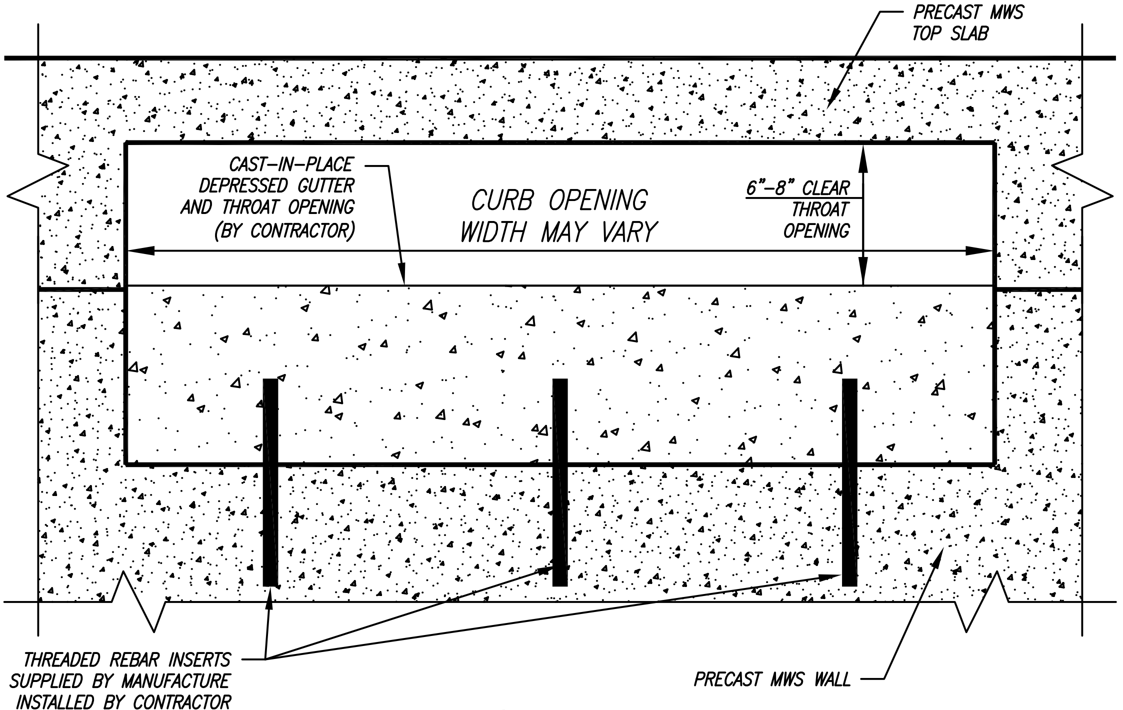
Curb and Gutter Details

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

www.modularwetlands.com



SECTION VIEW
STANDARD MODULAR WETLAND CURB OPENING



FRONT VIEW
STANDARD MODULAR WETLAND CURB OPENING

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

PROPRIETARY AND CONFIDENTIAL

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	NAME	DATE
DRAWN	John	5/3/13
EDITED		

COMMENTS:

TITLE: MWS LINEAR 2.0 CURB INLET DETAILS

SIZE DWG. NO. REV

SCALE NTS UNITS = INCHES SHEET 1 OF 1

Weights and Lifting Details

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

www.modularwetlands.com

MWS-L 2.0 Max Pick Weights

Model #	Size (O.D)	Size (I.D)	Unit Weight (lbs)	Media Weight (lbs)	Total Weight (lbs)
MWS-L-4-4	5' x 5'	4' x 4'	7500.0	1447.1	8947.1
MWS-L-4-6 MWS-L-4-6.5	5' x 7' 5 x 7.5'	4' x 6' 4' x 6.5'	11,000 11,500	1619.2	12,619.2 13,119.2
MWS-L-4-8	5' x 9'	8' x 4'	12500	3570	16070
MWS-L-4-13	5' x 14'	13' x 4'	21200	5306	26506
MWS-L-4-15	5' x 16'	15' x 4'	23700	7236	30936
MWS-L-4-17	5' x 18'	17' x 4'	26500	9165	35665
MWS-L-4-19	5' x 20'	19' x 4'	28300	11095	39395
MWS-L-4-21	5' x 22'	21' x 4'	30000	13024	43024

Max Pick Weight if Shipped Without Media Installed

Max Pick Weight if Shipped With Media Installed

Note: All weights listed hereon are standard max pick weights, actual pick weights may vary based upon state and local regulations and variation in concerte and rebar standards. For project specific pick weights contact the manufacturer prior to shipping of the unit(s). Is is the contractors responsibility to off-load the unit with an adequate size crane. Units are shipped with WetlandMEDIA in superbags and installed by contractor.

When Available see project contract terms, if lifting points are on the inside of the unit due to custom designs or installations requiring pionts to be on the inside the media will be shipped in bags and the contractor will be reponsibile to install after the unit is installed. For example, units places against a wall.

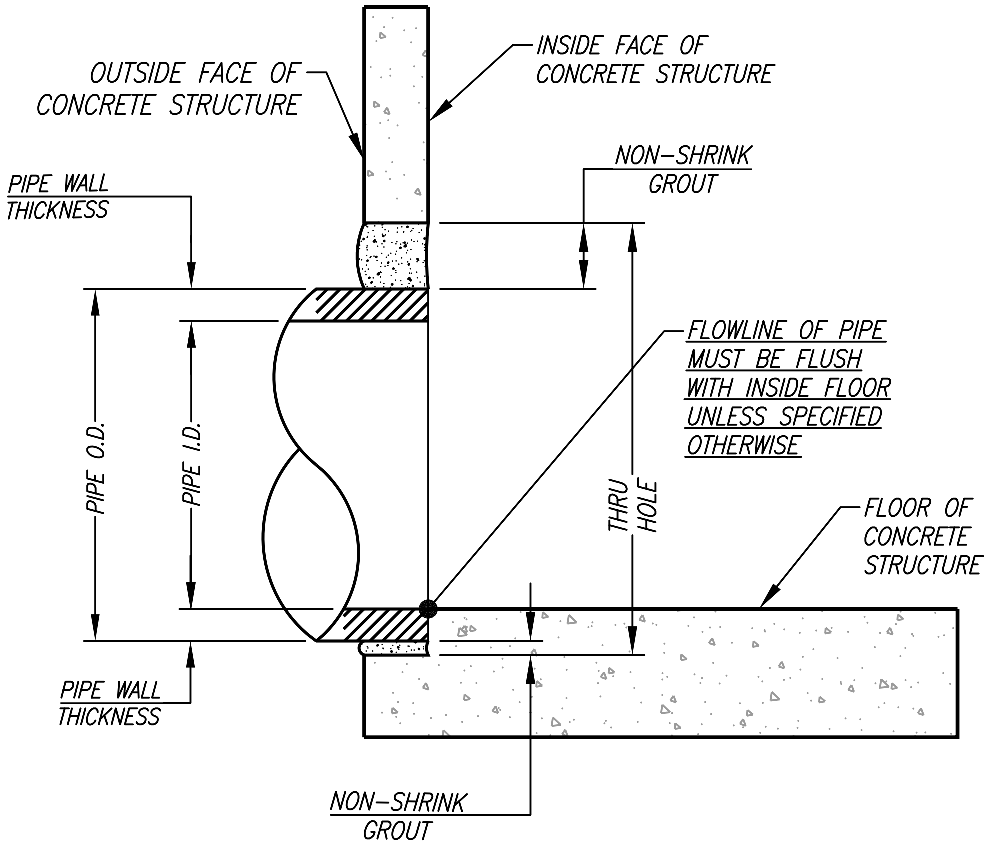
For Questions or Comments Please Call 760-433-7640 or email: info@modularwetlands.com

MODULAR WETLANDS™

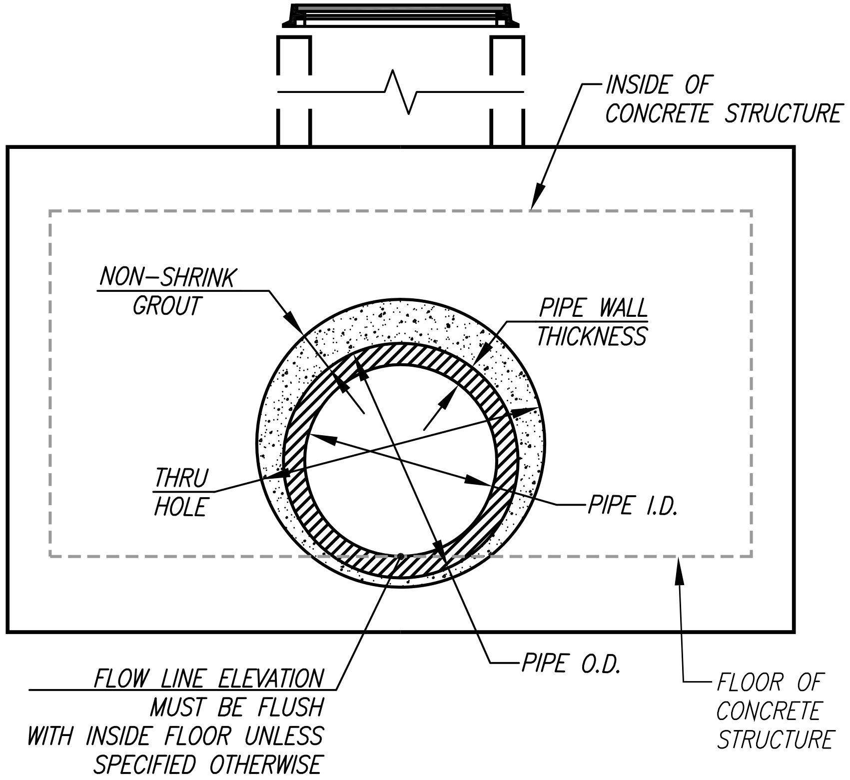
Connection Details

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

www.modularwetlands.com



ELEVATION VIEW



END VIEW

INSTALLATION NOTES

1. ALL CONNECTION PIPES SUPPLIED AND INSTALLED BY CONTRACTOR. MODULAR WETLAND UNIT WILL BE DELIVERED WITH A THRU HOLE AND ITS THE CONTRACTORS RESPONSIBILITY TO SUPPLY PIPE, AND ALL LABOR AND MATERIAL TO CONNECT PIPE AND SEAL UNIT WATER TIGHT INCLUDING BUT NOT LIMITED TO GROUT, CONCRETE LUG, REBAR, PLUG, ANCHORS, COUPLER, FITTINGS AND/OR ALL SUPPORT AND CONNECTING HARDWARE.

2. ALL CONNECTIONS ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE. (CAN NOT INTRUDE BEYOND FLUSH) ALL PIPE FLOWLINES SHALL BE FLUSH WITH INSIDE FLOOR UNLESS SPECIFIED OTHERWISE.

3. ALL GROUT AND/OR CONCRETE SHALL BE NON-SHRINK AND MEET OR EXCEED LOCAL PIPE CONNECTION STANDARDS.

4. REFER TO AGENCY SPECIFICATIONS WHERE APPLICABLE.

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

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MODULAR WETLANDS™

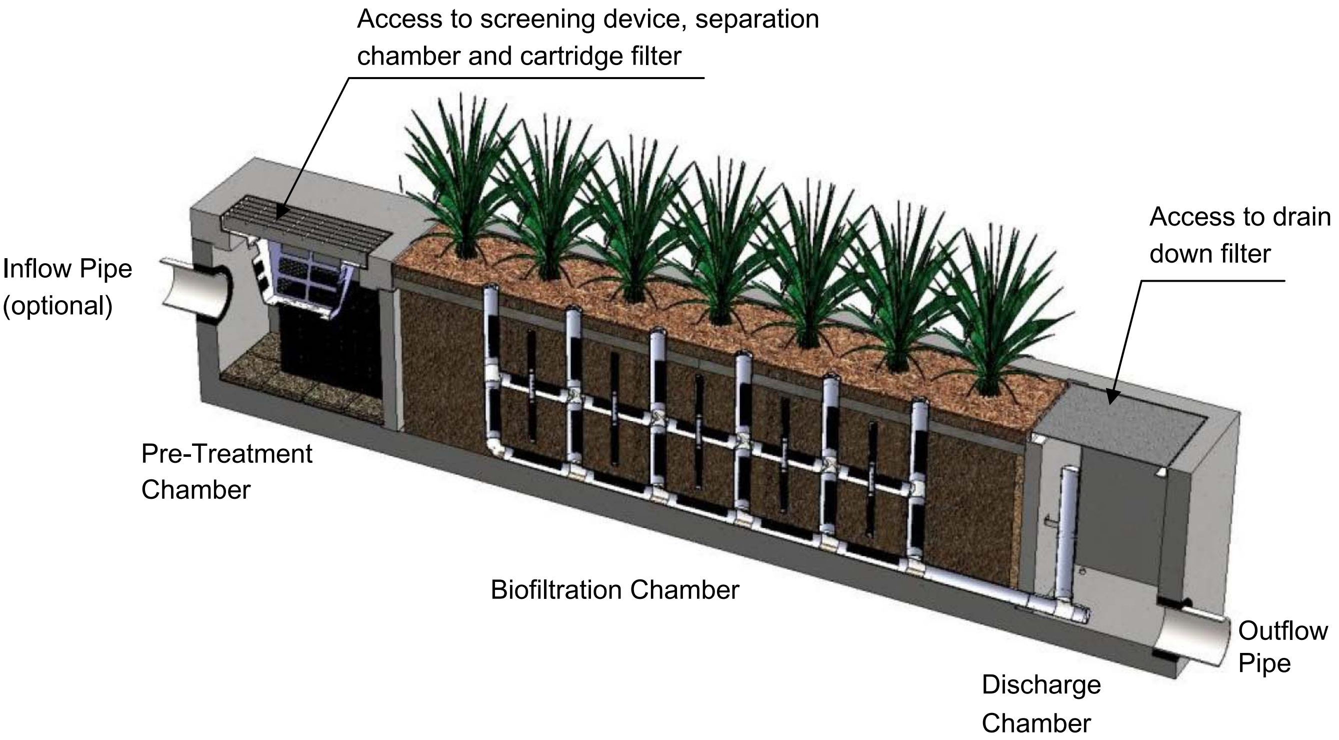
PIPE CONNECTION
STANDARD DETAIL

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

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

System Diagram



Maintenance Procedures

Screening Device

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

Separation Chamber

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

Cartridge Filters

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

Drain Down Filter

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

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.
2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.
3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.
4. Entry into chambers may require confined space training based on state and local regulations.
5. No fertilizer shall be used in the Biofiltration Chamber.
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

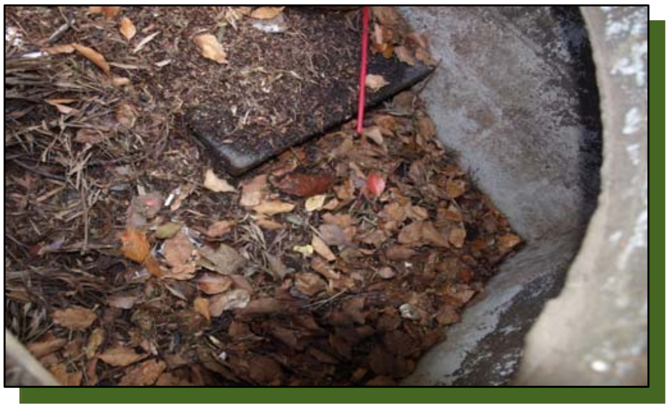
Maintenance Procedure Illustration

Screening Device

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

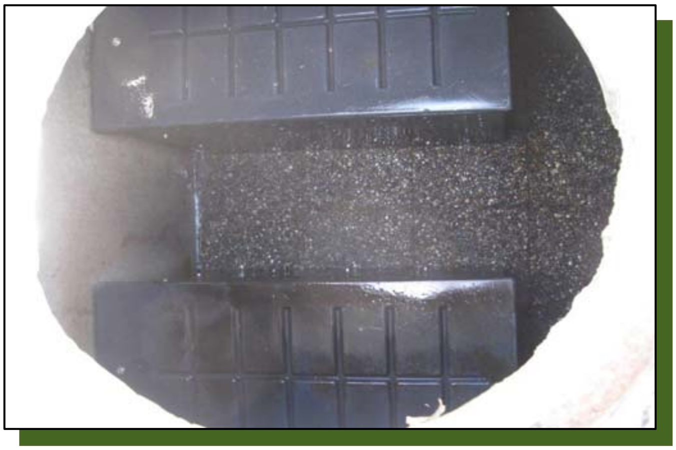
Separation Chamber

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



Cartridge Filters

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



Drain Down Filter

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

Trim Vegetation

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

Inspection Form

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

www.modularwetlands.com

Inspection Report
Modular Wetlands System

Project Name ____________________

Project Address ____________________
(city) (Zip Code)

Owner / Management Company ____________________

Contact ____________________ Phone (   )   –

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

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

Weather Condition ____________________ Additional Notes ____________________

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

Inspection Checklist

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

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

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

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

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: ____________________

Maintenance Report

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

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

Project Name ____________________

Project Address ____________________ (city) (Zip Code)

Owner / Management Company ____________________

Contact ____________________ Phone ( ) –

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

For Office Use Only

(Reviewed By)

(Date)

Office personnel to complete section to the left.

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

Weather Condition ____________________ Additional Notes ____________________

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

Comments:

GEOTECHNICAL INVESTIGATION REPORT
AUTONATION – NEWPORT PORSCHE
600 WEST COAST HIGHWAY
NEWPORT BEACH, CA
PREPARED BY STANTEC, DATED APRIL 20, 2015

Stantec

GEOTECHNICAL INVESTIGATION REPORT

AutoNation – Newport Porsche
600 West Coast Highway
Newport Beach, California

Prepared for:
AutoNation
200 SW 1st Street, Suite 1400
Ft. Lauderdale, Florida 33301

Prepared by:
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April 20, 2015

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STATEMENT OF CONFIDENTIALITY

This report has been submitted for the sole and exclusive use of the AutoNation and shall not be disclosed or provided to any other entity, corporation, or third party for purposes beyond the specific scope or intent of this report without the express written consent of Stantec Consulting Services Inc.

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April 20, 2015

Mr. Axay Patel
AutoNation
200 SW 1st Street, Suite 1400
Ft. Lauderdale, Florida 33301

RE: GEOTECHNICAL INVESTIGATION REPORT
AutoNation – Newport Porsche
600 West Coast Highway
Newport Beach, California

Dear Mr. Patel,

Pursuant to the request of the AutoNation, Stantec Consulting Services Inc. (Stantec) has prepared the attached Geotechnical Investigation report for the proposed Newport Porsche auto dealership facility, located at 600 West Coast Highway, in the City of Newport Beach, California.

This investigation was performed in general accordance with Stantec's standard protocol for geotechnical investigations. The objective of the geotechnical investigation was to assess the soil conditions underlying the Site and make geotechnical recommendations for design and construction of the proposed development, which includes a 31,290-square-foot (sf) showroom, service, and parts building, a retaining wall north of the building, and associated landscaping and parking.

The findings of this investigation are presented in the attached report. It is our pleasure to be of service to you and we look forward to providing AutoNation with future engineering services. Should you have any questions regarding the information contained in the attached report, please contact the undersigned at your convenience.

Respectfully submitted,
Stantec Consulting Services Inc.

Jaret Fischer, P.E.
Senior Engineer

Enclosure: Geotechnical Investigation Report

cc: Ms. Vandana Kelkar
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Facility: AutoNation – Newport Porsche
Location: 600 West Coast Highway
Newport Beach, California

Consultant: Stantec
Stantec JN: 2007105003

REPORT SUMMARY

Footing Bearing Pressures	- Building Foundations	2,000 psf

(See Section 7 for alternative building foundation recommendations)

Coefficient of Friction	- Building Foundations	0.30
Expansive Soils		o Yes x No
Expansion Potential		o V. Low x Low o Medium o High o V. High
R-Value		20 (estimated)
Automobile Traffic (TI = 5)		4.0" AC / 4.0" AB
Automobile and Truck Traffic (TI = 7)		4.0" AC / 10.0" AB
Artificial Fill		x Yes o No
Relatively Loose Near-Surface Soils		x Yes o No
Groundwater Within 20 Feet of Surface		x Yes o No
Monitoring Well Installed		o Yes x No
Hydrocarbons Detected		o Yes x No
Existing Underground Tanks		o Yes x No
Existing Structures		x Yes o No

Special Considerations:

- To provide uniform and firm support for the proposed building conventional foundation, the existing soils should be stabilized to a minimum depth of 7 feet below the ground surface (bgs) in accordance with recommendations provided in Section 7.3.1.
- In lieu of subgrade stabilization, the building may be supported on grade beams and drilled piers that extend to a minimum depth of 10 feet bgs.
- To provide uniform and firm support for the proposed pavement area, the existing soils should be removed to a minimum depth of one foot below the bottom of the structural pavement section and replaced with compacted fill.

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1.0 INTRODUCTION

1.1 AUTHORIZATION AND LIMITATIONS

This report presents the results of a geotechnical investigation performed at the request of the AutoNation, by Stantec Consulting Services Inc. (Stantec), for the proposed Newport Porsche automobile dealership facility, located at 600 West Coast Highway, in the City of Newport Beach, California. This report has been prepared for AutoNation and their project design consultants to be used solely in the design of the proposed project, as described herein. This report may not contain sufficient information for other uses or the purposes of other parties.

1.2 PURPOSE AND SCOPE OF WORK

The objective of this investigation was to assess the nature and engineering properties of the encountered subsurface soils and to provide geotechnical design recommendations for Site development. The scope of work was performed in general accordance with Stantec's standard protocol for geotechnical assessments, and consisted of the following tasks:

- Review available subsurface information for the Site,
- Drill, log and sample 4 borings,
- Advance 3 cone penetrometer test (CPT) soundings,
- Perform soil mechanics laboratory testing on select soil samples,
- Evaluate geotechnical properties of soils pertinent to the design and construction of the proposed project, and
- Develop conclusions and recommendations regarding:
    - Minimum building foundation recommendations for the new showroom, service, and parts building,
    - Minimum foundation recommendations and lateral earth pressures for the proposed retaining wall,
    - Subgrade preparation beneath new foundations, pavements, and sidewalks,
    - Fill and backfill materials along with fill and backfill placement and compaction criteria,
    - Appropriate foundation type(s) for support of new structures along with geotechnical criteria for foundation design,
    - New flexible pavement structural sections for driveway and parking areas,
    - Corrosivity of Site soils with respect to steel and concrete.

1.3 SITE LOCATION

The Site is located approximately 800 feet west of Dover Drive on the north side of West Coast Highway (CA Highway 1), at 600 West Coast Highway, in the City of Newport Beach, California (referred herein as the Site). The Site is bounded by West Coast Highway followed by the single family residential homes to the south, commercial businesses to the east and west, and single family residential to the north above a 40-foot high slope.

1.4 SITE DESCRIPTION

The Site is rectangular in shape, approximately 1.8 acres in size, and occupied by several existing retail businesses. The retail businesses include a small classic automobile dealership (European Collections), a dog food store (Just Food for Dogs), a two story former motel converted to small retail shops (Shops at the Cove), a linen shop (La Tavola Fine Linens), and a consignment store (Find Consignments).

An existing retaining wall, ranging from approximately 2 to 12 feet tall, is located along the northern portion of the property.

2.0 PROJECT DESCRIPTION

Stantec Architecture (Stantec), of Irvine, California provided the preliminary development layout for the proposed project. The proposed development will consist of a 31,290-square-foot (sf) showroom, service, and parts building, a retaining wall north of the building, and associated landscaping and parking. The retaining wall will be located approximately 3 feet south of the northern property line. The Site location is shown on Figure 1 and the layout of the proposed structure is shown on Figure 2.

There were no building and grading plans or design loads available at the time of this report. Foundation loads for the proposed structures were estimated for the purpose of this report at less than 2.0 kips per linear foot (klf) for walls and 50 kips for columns. If actual design loading conditions differ from those indicated above, the recommendations of this report may have to be re-evaluated and are subject to change.

Based upon Stantec's review of the existing Site topography, it is assumed that the final surface elevations away from the slope will not vary more than 0.5 to 1.0 foot from existing grades and that minor grade changes will be made for the purpose of establishing Site drainage. Stantec recommends that the final grading plan be provided to the Project Geotechnical Engineer for review. The recommendations in this report are subject to change based upon review of the final grading plan.

3.0 SUBSURFACE INVESTIGATION

3.1 PRE-DRILLING PROCEDURES

Underground Service Alert (USA) was notified several days prior to commencing drilling activities to identify public utilities that may conflict with the proposed boring locations. In addition, potential conflict with underground utilities was minimized by manually augering the upper five feet of soil at each proposed geotechnical sol boring location prior to drilling.

3.2 CONE PENETRATION TEST SOUNDINGS

Three (3) cone penetration test (CPT) soundings (CPT-1 through CPT-3) were completed on March 20, 2015, by Gregg Drilling and Testing, Inc. (Gregg) under the direction of a Stantec engineer or geologist. All CPT soundings were performed under the general guidance of ASTM D 6441 (Standard Test Method for Mechanical Cone Penetration Tests of Soils).

The CPT soundings completed for this geotechnical investigation were advanced using a truck mounted CPT rig, to a maximum depth of approximately 55 feet below the ground surface (bgs), at the locations shown on Figure 2. The soundings were distributed throughout the area of the proposed building to assess underlying subsurface conditions, including skin friction.

Piezo-cone penetrometers were advanced using a push rod equipped with a telescoping penetrometer tip. Continuous tip and side friction data was collected for each sounding. Following completion of the CPT soundings, the holes were abandoned by removing the CPT equipment from the hole and subsequently backfilling with native soil. CPT data is included in Appendix B.

3.3 HOLLOW STEM AUGER DRILLING

Four hollow stem auger (HSA) borings were drilled on March 20, 2015, by California Pacific Drilling (CalPac) under the direction of a Stantec representative. CalPac drilled the soil borings using a Mobile B-61 HSA drill rig. Drilling and soil sampling were performed under the general guidance of ASTM D6151 (Standard Practice for Using Hollow-Stem Augers (HSA) for Geotechnical Exploration and Soil Sampling).

The HSA soil borings drilled for this geotechnical investigation were advanced using six-inch outside diameter auger, to a maximum depth of approximately 36.5 feet below the ground surface (bgs), at the locations shown on Figure 2.

At each boring location, drilling was initiated by pushing the lead HSA auger below the ground surface and rotating it at a low velocity. Firm downward pressure and low rotation velocity were maintained in the beginning to produce a straight borehole. Once a straight hole was initiated and the HSA auger appeared clear of potential underground utilities, rotation velocity and downward pressure were increased. The rotation velocity and downward pressures were adjusted during drilling to optimize penetration rates with appropriate drill cutting return up the HSA auger flight. Additional five-foot sections of HSA auger flight were attached to the drill column to achieve the desired drilling/sampling depths.

When the desired sampling depth was achieved, the bottom of the borehole was cleaned by slowly rotating the auger with minimal downward pressure. When the borehole was sufficiently clean, soil samples were collected as described in the section below.

Following completion of drilling and soil sampling, the borings were abandoned by removing the auger and/or sampling equipment from the borehole and subsequently backfilling with native soil.

3.4 SPLIT SPOON SOIL SAMPLING

A Stantec representative, under the direct supervision of a licensed engineer, was onsite to supervise field operations, log subsurface soil conditions, and to collect soil samples for physical and chemical analysis. Soil samples were collected using a California Modified (CM) and Standard Penetration Test (SPT) split-spoon samplers, under the general guidance of ASTM D1586 (Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils), D3550 (Standard Practice for Ring-Lined Barrel Sampling of Soils) and D6066 (Standard Practice for Determining the Normalized Penetration Resistance of Sands for Evaluation of Liquefaction Potential). The CM sampler is approximately 18 inches long by 2.5 inches inside diameter (ID). The SPT sampler is approximately 18 inches long by 1.5 inches ID. The samplers were driven at approximately 5 foot intervals with a 140 pound hammer, free-falling 30 inches. Unless otherwise indicated on the boring logs, the samplers were advanced 18 inches at each sample interval and the blow counts required to advance the sampler each six-inch drive length were recorded on the boring logs. The blow counts are used in the evaluation of the consistency of the soils and are correlated to various engineering properties. The observed soils were classified in accordance with the Unified Soil Classification System, under the guidance of ASTM D2488 (Standard Practice for Description and Identification of Soils [Visual-Manual Method]).

Geotechnical samples were collected from the CM and SPT samplers. Six relatively undisturbed brass rings were carefully removed from the CM sampler, placed in a plastic sleeve and sealed with plastic end caps. Electrical tape was used to secure the end caps to the plastic sleeve to preserve natural moisture content. Disturbed samples were also collected from the lowermost brass tube of the SPT sampler. The soil was extruded from the brass tube and placed in a sealed plastic bag. Geotechnical ring and bulk samples were labeled and transported to a soil mechanics laboratory for physical testing. The CM soil samples were securely packed with foam or other shipping materials to minimize sample disturbance, under the guidance of ASTM D4220 (Standard Practice for Preserving and Transporting Soil Samples).

3.5 LABORATORY SOIL TESTING

The following laboratory tests were performed on samples collected at the Site either in general accordance with the American Society for Testing and Materials (ASTM) or contemporary practices of the soil engineering profession:

- In-Situ Moisture and Density (ASTM D2216): In-situ moisture and density are calculated by weighing and measuring the drive samples obtained from the borings to determine their in-place moisture and density. These results are used to analyze the density or consistency of the subsurface soils.
- Direct Shear Test (ASTM D3080): The tests were performed on an undisturbed sandy soil sample in order to obtain the soil shear strength values, which are among the basic soil parameters that are used to estimate soil bearing capacity and lateral earth pressures.
- Consolidation Tests (ASTM D2435): One-dimensional consolidation tests were conducted to evaluate soil compressibility and estimate the potential settlement of the structures. A one-inch thick sample contained in a 2.5-inch diameter ring was subjected to various load increments. The compression under each load increment was recorded and plotted against the logarithm of applied effective stress.

- Sieve Analysis (ASTM D422 and ASTM C136): This test is used to evaluate the distribution of soil grain sizes, which constitute the soil fabric and is used in soil classification and assessment of soil engineering behavior.
- No. 200 Sieve Wash (ASTM D1140): This test is used to evaluate the amount of soil grain sizes finer than the 0.075 mm (No. 200 sieve) and is used in soil classification and assessment of soil engineering behavior.
- Hydrometer Analysis (ASTM D422 and ASTM C 136): This test is used to evaluate the distribution of soil grain sizes, which constitute the soil fabric and is used in soil classification and assessment of soil engineering behavior.
- Expansion Index (ASTM D4829 and UBC Standard 18-2): This test is performed on a near surface bulk sample, remolded to approximately 50 percent saturation, to determine the expansion potential of the soil when fully saturated.
- Atterberg Limits (ASTM D 4318): The Atterberg Limits are utilized to classify fine-grained soils and correlate them to specific engineering properties. The Atterberg limits are composed of the liquid limit, and the plastic limit. The liquid limit is the moisture where the soil changes from a plastic to a liquid state and the plastic limit is the moisture content where the soil changes from a semi-solid state to a plastic state.
- Maximum Dry Density and Optimum Moisture Content (ASTM D1557): The compaction curve defines the relationship between water content and dry unit weight of soils compacted soils effort. The maximum dry density and optimum water content are used to determine the relative density of existing soils and to determine the level of compaction during grading activities.
- Chemical Tests for Corrosion Potential (Applicable EPA, ASTM or local test methods): The pH, resistivity, and the quantity of various chemical components useful in the assessment of corrosion potential were evaluated in a near surface soil sample.

The laboratory test results are presented in Appendix C.

4.0 REGIONAL GEOLOGIC CONDITIONS

4.1 REGIONAL PHYSIOGRAPHIC CONDITIONS

The Site is located in the northwestern portion of the Peninsular Range Geomorphic Province in southwestern California. The region is separated by northwest trending valleys, subparallel to faults branching from the San Andreas Fault. The Site resides in the portion of the Province drained by surface runoff into Newport Bay.

Newport Bay is located approximately 1,100 feet southwest of the Site, the California State Highway 1 (Pacific Coast Highway) is located adjacent to the south of the Site, and the Balboa Peninsula is located approximately 3,700 feet southwest of the Site. Based on interpretation of the ground surface elevation contour lines drawn on the topographic map, the Site is located at an elevation of approximately 12 to 61 feet above mean sea level (msl). The regional topography consists of northwest trending mountain ranges and valleys. The topography in the on the majority of the Site is relatively flat, with a slope to the southwest toward Newport Bay. The western portion of the Site slopes from approximately 14 to 61 feet above msl (USGS, 1965).

4.2 REGIONAL GEOLOGY

The regional surficial geology is described as late Holocene deposits consisting of unconsolidated sand, silt, and clay. The sloped northern portion of the Site is underlain by middle Miocene age siltstone facies consisting of massive to crudely bedded and friable white to pale gray siltstone and mudstone (USGS, 2004).

The Site is located in Southern California, a seismically active area. The nearest recently active fault includes the Newport Inglewood (LA Basin) Fault located approximately 1.2 southwest of the Site. The Site is not located within an Alquist-Priolo Earthquake Fault Zone (CDMG, 2000).

4.3 REGIONAL HYDROGEOLOGY

According to the California Department of Water Resources (CDWR) Bulletin 118 report, the Site is located within the Coastal Plain of Orange Groundwater Basin, which underlies approximately 350 square miles of Orange County. This subbasin is bounded on the north by unconsolidated rocks exposed on the Puente and Chino Hills, on the east by the Santa Ana Mountains, on the south by the San Joaquin Hills, and on the west by the Pacific Ocean (DWR, 2004).

Based on documented data in the site vicinity, the regional depth to first groundwater is approximately 5 to 10 feet below the ground surface (bgs) (CDMG, 1997). Groundwater in the site vicinity generally flows to the southwest toward Newport Bay.

5.0 SUBSURFACE SOIL AND GROUNDWATER CONDITIONS

5.1 STANTEC FIELD INVESTIGATION

The subsurface soils encountered are composed of various mixtures and combinations of interbedded layers of sand (SP, SW, SP-SM, and SM USCS soil type), clay and clay with sand (CL and CH USCS soil type), and silt (MH USCS soil type) from the ground surface to the maximum depth of exploration. The sands were fine to coarse grained and generally, moist to wet and very loose to loose in density. The clays exhibited low to high plasticity and were moist to wet and very soft to hard in consistency. The highly plastic silts were moist and very stiff to hard in consistency.

The subsurface soils were difficult to penetrate past at a depth of approximately 18 to 35 feet where drilling refusal was encountered in borings B1 and B2. Groundwater was encountered at depths of approximately 6 to 7 feet bgs during this investigation.

A more detailed description of the interpreted soil profile in each borehole is presented on boring logs in Appendix A. The groupings represent the predominant materials encountered in soil samples. Also, stratification lines indicate the approximate boundary between the major material types. The actual transition may be gradual.

6.0 REGIONAL SEISMIC CONDITIONS

6.1 REGIONAL SEISMICITY

The Site, as is most of California, is located in a seismically active area. The estimated distance of the Site to the nearest expected surface expression of nearby faults is presented in the table below.

Fault	Distance (miles) (1)	Maximum Moment Magnitude (1)
Newport – Inglewood (L.A. Basin)	1.2	7.5
Newport – Inglewood (Offshore)	1.8	7.0
San Joaquin Hills	5.3	7.1
Palos Verdes	13.1	7.7
Puente Hills (Coyote Hills)	17.6	6.9
Elsinore - Whittier	20.8	7.0
Elsinore – Glen Ivy	20.8	7.3
Coronado Bank	23.2	7.4
Chino – Central Avenue (Elsinore)	24.2	6.7

1. Measured from 2008 National Seismic Hazard Maps - USGS (USGS, 2008).

6.2 CALIFORNIA BUILDING CODE SEISMIC CRITERIA

Based on the specified design criteria of the 2013 California Building Code, the following Site seismic information may be considered for earthquake design.

Design Criteria	Design Value
Site Class	D
Mapped Spectral Response Acceleration for Short Periods S_S (g)	1.855
Mapped Spectral Response Acceleration for 1-second Period S_1 (g)	0.696
Maximum Considered Earthquake Spectral Acceleration for Short Periods S_{MS} (g)	1.855
Maximum Considered Earthquake Spectral Response Acceleration for 1-second Periods S_{M1} (g)	1.045
5-percent Design Spectral Response Acceleration for Short Periods S_{DS} (g)	1.236
5-percent Design Spectral Response Acceleration for 1-second Periods S_{D1} (g)	0.696
Site Coefficient F_a	1.0
Site Coefficient F_v	1.5

6.3 REGIONAL SEISMIC HAZARDS

6.3.1 Fault Rupture Hazard

The Site is not located within a currently mapped California Earthquake Fault Zone. As described above, the nearest fault is the Newport Inglewood (LA Basin) Fault, located approximately 1.2 miles southwest of the Site. Based on available geologic data, there is low potential for surface fault rupture from the Newport Inglewood (LA Basin) Fault and other nearby active faults propagating to the surface of the Site during the design life of the proposed development.

6.3.2 Liquefaction Hazard

Liquefaction Background

Liquefaction of saturated sandy soils is generally results in a sudden decrease in soil shear strength due to vibration. During cyclic shaking, typically caused by an earthquake, the soil mass is distorted, and interparticulate stresses are transferred from the soil particles to the pore water. As pore pressure increases the bearing capacity decreases and the soil may behave temporarily as a viscous fluid (liquefaction) and, consequently, lose its capacity to support the structures founded thereon.

Engineering research of soil liquefaction potential (Seed, et. al., 1982 and 1985) indicates that generally three basic factors must exist concurrently in order for liquefaction to occur, namely:

- A source of ground shaking, such as an earthquake, capable of generating soil mass distortions.
- A relatively loose, clean sandy soil fabric exhibiting a potential for volume reduction.
- A relative shallow groundwater table (within approximately 50 feet below ground surface) or completely saturated soil conditions that will allow positive pore pressure generation.

Screening Investigation for Liquefaction Potential

The Site is located within a current, mapped California Liquefaction Hazard Zone. A liquefaction evaluation for the Site was completed under the guidance of Special Publication 117a: Guidelines for Evaluating and Mitigating Seismic Hazards in California," published by the California Department of Conservation, California Geologic Survey, dated 2008 and based on empirical procedures described in summarized by Martin and Lew et al. (1999). The in-situ characteristics of the subsurface soils were analyzed, and similarities and dissimilarities of the subsurface conditions were compared with those sites where the subsurface soils are known to have liquefied.

The general Site characteristics, such as potential for seismic shaking, soil type, soil density, depth to groundwater, etc., were evaluated in an initial Screening Investigation (CGS, 2008). These characteristics were compared to conditions of known liquefaction susceptibility.

- *Potential for Strong Seismic Activity*—The Site is located within 1.2 miles of active faults capable of generating a magnitude 7.5 earthquake, respectively.
- *Shallow Groundwater within 50 feet* — Groundwater was encountered at a depth of approximately 6 to 7 feet in the borings drilled during this investigation. However, historic high depth to groundwater is reported at approximately 2 feet bgs (CDMG, 1997).

- *Relatively Loose Soils*—Blowcounts were recorded at less than 30 blows per foot in subsurface soils in the upper 50 feet bgs.
- *Cohesionless Soils*—Boring logs indicate that subsurface soils consist of interbedded layers of relatively clean sands and silty sands along with silt and clay soils in the upper 50 feet bgs.
- Potentially liquefiable soils with $(N_1)_{60}$ values less than 15, are generally considered potentially susceptible to lateral displacement (Youd et al., 2002). Various layers below the site exhibit $(N_1)_{60}$ values less than 15.

The data indicate conditions at the Site may be susceptible to seismically induced liquefaction. Consequently, a quantitative evaluation of liquefaction potential was conducted.

Quantitative Evaluation of Liquefaction Resistance

In accordance with protocols outlined in SP 117a (CDMG, 2008), a Quantitative Evaluation of Liquefaction Resistance was performed on soil layers in the upper 40 feet bgs. The assumed or estimated soil conditions used in the analysis are based on the boring logs, laboratory data, and applicable references, as discussed below.

The soil conditions used in the liquefaction model are based on conditions represented in the boring logs. Where blow counts were recorded using a 2.5-inch inside diameter California Modified sampler, the representative California Modified sampler blow counts were converted to equivalent SPT blow counts following the Lowe and Zaccheo Sampler Hammer Ratio (Winterkorn and Fang, 1975).

A probabilistic seismic hazard analysis (PSHA) was conducted to estimate ground motion accelerations corresponding to an earthquake having a 10 percent probability of exceedance over a 50-year time period. The design peak ground acceleration (PGA) was determined using the computer program FRISKSP, Version 4.00. The faults used in the PSHA were based upon a CGS fault catalog.

The site specific PGA was developed using Campbell and Bozorgonia's 1997 revised ground motion attenuation relation for alluvium. Dispersion in the Campbell and Bozorgonia ground motion attenuation relationship was considered by inclusion of the standard deviation of the ground motion data in the attenuation relationship used in the PSHA. For liquefaction analysis, the DBE induced peak ground acceleration (PGA) was scaled to an earthquake magnitude 7.5 using the NCEER 1997 magnitude scaling factor (Youd and Idriss, 2001). The 7.5 earthquake magnitude scaled site specific PGA is 0.8g (where "g" is the acceleration due to gravity).

The liquefaction probabilities were calculated using guidance developed by Seed and others (2003), and represent the corrected cyclic stress ratio (CSR*) required to cause liquefaction in a given soil layer divided by the overburden correction value. For the purpose of this evaluation, a layer was considered to be susceptible to liquefaction if the probability of liquefaction was greater than 20 percent. A liquefaction hazard analysis was conducted for the liquefaction susceptible soils in the depth interval of 2 to 7 feet bgs.

Effect of Potential Soil Liquefaction

Based on a quantitative evaluation, the loose saturated sand and silty sand appear to be susceptible to liquefaction in the event of a major earthquake. Soil liquefaction alone does not pose a risk to site development, but the effects of soil liquefaction on a site typically do. Such risks may include sand boils, lateral spreading, foundation bearing failure, and ground settlement.

Based on the available data for the site, the potentially liquefiable soils are overlain by approximately 5 feet of relatively loose soils in the unsaturated zone. The potential for surface manifestation of sand boils and lateral spreading are considered to be moderate.

The potential ground settlement resulting from seismic induced settlement was evaluated for the site based on the empirical procedures developed by Seed and others (2003) which compare the volumetric strain in the soil with the induced cyclic stress ratios. Assuming that the epicenter of the design earthquake occurs at the closest proximal distance from the fault to the site, the anticipated settlement in the potentially liquefiable layers between 2 to 7 feet bgs is expected to be approximately 2.6 inches, with differential settlements on the order of 1.3 to 1.7 inches.

6.3.3 Seismic Induced Settlement in Unsaturated Zone

Near surface soils in the unsaturated zone consist of relatively loose sands and silts. These sediments may be prone to significant volumetric strain as a result of cyclic loading from seismic activity. Although difficult to predict, surface settlements in the unsaturated zone were estimated to be approximately 1.6 inches, with differential settlements on the order of 0.8 inches, following methods promulgated by Tokimatsu and Seed (1987).

7.0 ENGINEERING RECOMMENDATIONS

Based upon the results of the investigation and previous geotechnical documentation, development of the Site is geotechnically feasible provided that the recommendations presented herein are implemented in the design and construction of the project. Soil stabilization followed by removal and recompaction of the near surface soils is recommended in the building area to provide a relatively uniform and firm engineered soil blanket for support of the proposed development and reduce the potential for differential settlement.

7.1 EXPANSIVE SOIL POTENTIAL

The near-surface soils consist of silt and silty sand. Expansion index testing in the area of the proposed development area indicate near surface soils exhibit low expansion potential, as defined by the 2013 California Building Code (CBC, 2013). Design for expansive soils is not required.

If imported soils are used for earthwork, Stantec recommends that the proposed soils be tested for expansion potential prior to import. Imported soils should be pre-approved by the Project Geotechnical Engineer prior to utilization.

7.2 CORROSIVE SOIL POTENTIAL

Chemical tests to evaluate corrosive soil potential of near surface soils were performed by Converse Consultants. The test results indicated pH of 7.7, water soluble sulfate = 1,060 ppm, soluble chlorides = 531 ppm, and saturated resistivity = 480 ohm-cm.

Based on the test results, the near surface soils are expected to have a moderate corrosion potential for concrete (Caltrans, 2014) and a very severe corrosion potential for steel (Romanoff, 1989). As such, special design considerations for concrete and steel are required.

Material Type	Degree of Corrosivity	Recommendation
Concrete	Moderate	Type II Modified Portland Cement
Steel	Very Severe	Corrosion Resistant Piping and Adequate Concrete Cover Over Reinforcing Steel

If imported soil is utilized for earthwork at the site, Stantec recommends that the proposed soils be tested for corrosion potential prior to import.

7.3 FOUNDATION DESIGN

7.3.1 Building Foundations

The shallow spread footings may provide adequate support under static conditions, but likely will not provide adequate support for the proposed structure in the event of seismic induced settlement should the design earthquake occur.

Engineered measures will be required to mitigate potential hazards from liquefaction-induced total. Such measures may include:

- Grade beam or mat foundation system supported by
  - Drilled in place concrete piers,
  - Helical piles,
  - Geopiers
- Conventional foundation with soil stabilization such as
  - Vibrocompaction,
  - Soil mixing,
  - Pressure grouting

It is recommended that a contractor specializing in ground improvement techniques be consulted if soil stabilization techniques are considered.

The potentially liquefiable soils extend to a depth of approximately 7 feet. Consequently, foundations should extend below this depth. The following recommendations may be used in design. If alternative mitigation measures are selected, additional investigations or recommendations may be required to evaluate foundation capacity at depth.

Vertical loads will be resisted by end bearing and skin friction in the silt and clay soils below about 10 feet bgs. Stantec estimates that additional vertical loading will occur due to seismic settlement of the loose to medium dense sand in the upper 7 feet. As a result, the piers will be required to support structural load as well as temporary negative skin friction. The allowable loads below include considerations of negative skin friction.

The lateral capacity of the piles will depend on the permissible deflection and on the degree of fixity at the top of the pile. The vertical and lateral capacities presented below are based upon soil characteristics described in the boring logs in Appendix A, a minimum 28-day grout or concrete compressive strength of 4,000 pounds per square inch (psi), fixed head condition, and a maximum deflection of 0.5 inches. The structural engineer should be consulted for actual design specifications and reinforcement.

Pile Design Parameters

Pile Diameter (inches)	**Design Parameters**	
	Allowable Vertical Capacity (kips)**	Allowable Lateral Capacity (kips)**
24	75	10

**Allowable vertical capacity is based on a minimum embedment depth of 10 feet bgs.

Design parameters for alternative pile diameters can be developed during the detailed design.

<u>Design Data</u>

The computer algorithm L-Pile or ALL PILE may be used to model the lateral behavior of a drilled shaft using estimated non-linear response of the soil. For a given pile loading, an iterative solution is performed to evaluate the deflection of the pile vs. depth.

Recommended soil parameters for use in L-Pile or ALL PILE (or similar) to analyze lateral soil interaction are presented in the table below. The native site soils in the proposed service canopy area are primarily silts and clays with variable amounts of sand with generally moderate moisture contents (moderate degree of saturation).

Soil Parameters Recommended for L-Pile or ALL PILE Lateral Drilled Shaft Analysis

Soil Boring Location	**Recommended Soil Type to Model**	**Elevation Range (ft) (below existing grade)**	**Effective Unit Weight (pcf)**	**Angle of Internal Friction, phi (degrees)**	**Undrained Shear Strength, Cohesion, c (psf)**	**Lateral Soil Parameter, K (pci)**	**Soil Strain Ratio, e50**	**Relative Density (Dr) (%)**
B3	Silty SAND (SM)	0-10	105	30	0	12	--	20
B3	Hard SILT (MH)	10-30	75	35	1,000	200	0.4	--

- pcf = pounds per cubic foot, psf = pounds per square foot, pci = pounds per square inch
- Neglect Lateral Resistance in the Upper 7 Feet

7.3.2 Showroom Building Foundation with Mitigation

Shallow foundations are expected to provide adequate support for the proposed building between 0 and 10 feet following stabilization utilizing one of the options in Section 7.3.1. An allowable bearing pressure of 2,000 pounds per square foot (psf) may be incorporated in the design. The footings should be at least 12 inches in width and founded a minimum of 12 inches below the lowest adjacent grade. For resistance to transient lateral loads, such as earthquake and wind loads, the allowable bearing capacity may be increased by one-third.

Design for resistance to lateral forces may be based upon a passive lateral earth pressure/resistance (equivalent fluid pressure) of 300D psf/ft and a coefficient of friction between the concrete footing and subsurface soils equal to 0.30, where D corresponds to the embedment depth of the footing in feet. For lateral bearing capacity analysis and design, the passive earth pressure and frictional resistance may be combined without reduction.

7.3.3 Retaining Wall Foundations

Cantilever Wall:

For cantilever retaining wall foundations, bearing on small diameter drilled piers or micro piles may be incorporated in the design with an average allowable bearing capacity of 3,000 psf embedded a minimum of 10 feet below the ground surface (bgs). To mitigate against potential detrimental effects of loose potentially liquefiable soils the following recommendations should be incorporated into the foundation design:

1. Minimum cantilever foundation embedment depth of 12 inches.
2. Micropiles (3” to 10” diameter) or small diameter drilled piers installed to a minimum depth of 10 feet below the wall foundation to mitigate potential liquefaction settlement.
3. Design and construction of features that prevent surface water from infiltrating around the foundation including construction of hardscape extending out from the footing at

least 6 feet, sloping surface and providing drainage away from the footings, and no planters or irrigation within 6 feet of the footing.
4. Weep holes or a back drain should be installed to provide positive drainage from behind wall.
5. All fill soil behind retaining wall should be non-expansive, and extend at least one foot beyond the back of the wall (presuming competent bedrock is encountered).
6. Compaction moisture content in clay should be 2 percentage points over optimum and maintained through construction.
7. Alternatively, depending on the height of the wall, the upper 7 feet of soil could be improved using techniques described in Section 7.3.1 and the wall supported on conventional spread footings.

The following lateral earth pressures (equivalent fluid pressures with a triangular pressure distribution) may be used in the design of the cantilever retaining wall foundations, up to a wall height of 20 feet.

Static Passive: 400D psf/ft, where the resultant force acts at 0.33D from the base of the wall
Static Active: 35H psf/ft, where the resultant force acts at 0.33H from the base of the wall.
Dynamic (Earthquake) Active: 24H psf/ft, where the resultant force acts at 0.65H measured from the base of the retaining structure

where H is the vertical height of the wall measured from the ground surface to the heel of the footing (or base of keyway) and D is the embedment depth of the footing measured from the ground surface to the bottom of the toe in front of the retaining wall, and a coefficient of friction between the concrete footing and subsurface soils equal to 0.30. The equivalent fluid pressures should be applied as a triangular pressure distribution and assume level backfill behind and in front of retaining wall, with the exception of the dynamic (earthquake) active, which should be considered an inverted triangular pressure distribution.

The earth pressures are based on drained conditions (no hydrostatic or buoyant conditions) and the assumption that the retaining wall is vertical (no batter). For different wall geometries or loading conditions, the above lateral earth pressures will need to be reevaluated. The earth pressures indicated above do not include a safety factor, therefore the retaining wall design should include an appropriate safety factor.

Retaining Structures:

Retaining structures can increase the stability of slopes by:

- Retaining fills that add weight to the resisting part of the landslide block.
- Retain part of the driving forces.
- Transfer driving forces into stable ground.
- Increase the resisting forces of the soil along the failure surface.

In-situ walls are structures that are built in place, without removing large volumes of soil to form a footing. They are well suited to retain the soil where access limitations or stability concerns prevent excavations needed to construct other wall types or to place earth buttress fills.

Several types of retaining structures were evaluated to create an integral stabilized ground reinforcement system capable of resisting the driving forces in the slope. These alternative retaining/stabilization systems included the following: (1) secant pile wall and/or tangent pile wall; (2) soldier pile wall; and (3) soil nail wall. As noted above, the minimum retaining structure depth was determined to be 35 feet bgs, which includes a minimum of 10 feet of embedment below the slide plane. A brief description of the slope stabilizing retaining structure options are provided below.

Secant Pile or Tangent Pile Wall:

Secant piles are drilled shafts that interlock to form a continuous reinforced concrete wall. The wall is constructed by drilling alternate shafts and then "back stepping" to drill the intervening shafts in order to interlock the two adjacent shafts. Every second shaft is reinforced usually with a wide flanged steel section or reinforcing steel cage. The reinforced shafts are called "primary". The alternate shafts, which are not reinforced, are called "secondary". The drilling sequence typically calls for the secondary piles to be drilled first, so the reinforcing of the primary piles will not be compromised by subsequent drilling. The concrete used for the secondary piles is usually lean concrete; to remain soft enough for the drilling and interlocking of the primary shafts. The primary piles are usually poured with structural concrete. In a secant pile wall, overlap is typically in the order of 3 inches (8 cm). In a tangent pile wall, there is no pile overlap as the piles are constructed flush to each other.

It may to necessary to install tieback anchors to further resist sliding forces. A tieback anchor consists of single or multiple steel wires, strands, or bars that are installed at a shallow inclination from the face of the pile, through the landslide mass, and into the underlying undisturbed soil. The tieback is anchored into stable, dense or hard soils with a cement grout or a mechanical end such as a helical plate or a swivel plate that expands into the soil when pulled. Typically the tieback anchor is post-tensioned and load tested. These anchors transmit sliding forces exerted by the landslide mass into the underlying stable soil. Secant pile walls and tieback installations require a specialty contractor with equipment capable of driving deep shafts and installing tiebacks into a hillside.

One of the drawbacks for these walls is that the amount of material and, consequently, the number of truck trips required to construct the wall, is generally much greater than for other retaining wall options. However, the secant wall offers the greatest protection against continued erosion of soil from behind the wall and the least amount of post slide maintenance.

Soldier Pile and Lagging or Soil Nail Wall:

A soldier pile and lagging wall or a soil nail wall may be technically practical. However, depending on the proximity to the property line, soil nails may not be feasible unless an agreement is made with the adjacent property owner(s). The slope in front of the wall face would need to be near vertical, thus these wall types may be desirable. As with the previously discussed wall type, these structures are permanent installations with little need for maintenance or repair. Typical maintenance would include visual inspection of weep holes and cleaning of weep holes if they become clogged.

The soldier pile and lagging wall would involve boring holes on the order of 18 to 24 inches in diameter through the soil overburden and creating a rock socket into the bedrock. Steel H-piles would be placed into the boreholes and the portion of the borehole in the bedrock grouted or filled with concrete. Spacing of the piles would be between 6 feet to 10 feet on center. The face of the wall would be constructed of wood timbers or precast concrete panels. The borehole construction would require a track mounted machine. A crane capable of lifting steel H-piles on the order of 30 to 40 feet long would be required to install the piles. Depending of the forces, tieback anchors may be required.

Soil nailing would involve the excavation of a vertical face through the soil at the top of the slope in increments of 5 vertical feet and installing rows of soil nails in inclined boreholes. The soil nails consist of steel bars grouted into the boreholes anchored to the wall face. A permanent concrete face is established by applying shotcrete to the soil face. The construction would be performed using a relatively small track-mounted drill rig and an on-site grout plant.

7.3.4 Foundation Construction

The Project Geotechnical Engineer should review and approve the foundation plans and observe foundation excavations prior concrete placement to check that foundation excavations extent into suitable material. The bottom of the foundation excavations should be drilled or excavated in such a way as to minimize slough, debris and unsuitable material from collecting at the bottom of the excavation.

7.3.5 Estimated Foundation Settlement

Static foundation settlement for the above described foundations is estimated to be less than one-inch total and less than one-half inch differential over a lateral distance of 50 feet, between similarly loaded footings of the same size.

Seismically induced settlements in the event of the design earthquake are calculated to be on the order of 4.2 inches total and approximately 2.1 to 2.7 inches of differential settlement over a lateral distance of 50 feet, between similarly loaded footings of the same size. Incorporating sufficient stiffness into the foundation design for the building expansion (i.e. footings tied together with grade beams), will minimize the differential movement in the event of a significant earthquake. Nevertheless, some damage to the building requiring subsequent repair should be anticipated in the event of a major earthquake in conjunction with a historic high groundwater level.

7.4 CONCRETE FLOOR

If soil stabilization and conventional foundations are incorporated into the design, concrete slab-on-grade floors can be used following site preparation as described in Section 7.8.2. Concrete slabs-on-grade should have a thickness of at least 5 inches and be reinforced with at least No. 4 reinforcing bars placed at 18 inches on-center each way. Slab reinforcement should be placed approximately at mid-height of the slab and extend at least 6 inches down into the footings.

Slabs-on-grade should be underlain by a 4-inch thick blanket of clean, poorly graded, coarse sand or crushed rock. A moisture vapor retarder/barrier should be placed beneath slabs where floor coverings will be installed. Typically, plastic is used as a vapor retarder/barrier. If plastic is used, a minimum 10 mil is recommended. The plastic should comply with ASTM E1745. Plastic installation should comply with ASTM E1643.

Current construction practice typically includes placement of a two-inch thick sand cushion between the bottom of the concrete slab and the moisture vapor retarder/barrier. This cushion can provide some protection to the vapor retarder/barrier during construction, and may assist in reducing the potential for edge curling in the slab during curing. However, the sand layer also provides a source of moisture vapor to the underside of the slab that can increase the time required to reduce moisture vapor emissions to limits acceptable for the type of floor covering placed on top of the slab. The floor covering manufacturer should be contacted to determine the volume of moisture vapor allowable and any treatment needed to reduce moisture vapor emissions to acceptable limits for the particular type of floor covering installed.

7.5 SLOPES

Although pertinent grading information is currently unavailable, permanent slopes are anticipated in the northern portion of the project. The stability of slopes should be evaluated when design-grading information becomes available.

7.6 TEMPORARY EXCAVATIONS

Temporary excavations should be shored or excavated with a slope not steeper than 1:1 (horizontal to vertical) in accordance with OSHA requirements. The excavations should be inspected by the contractor's competent person daily before personnel are allowed to enter the excavation. Surcharges from soil stockpiles, structures, vehicles, etc., should not be positioned a horizontal distance from the top of the excavation equal to the excavation depth.

Where cantilevered shoring is used in lieu of sloping the temporary excavation sidewalls, the shoring design may be tentatively based upon the following lateral earth pressures (equivalent fluid pressures with a triangular pressure distribution), up to an excavation depth of 16 feet bgs.

Active:	35H psf/ft,
At-rest:	55H psf/ft,
Passive:	370D psf/ft,

where H is the length of the sheet pile below the ground surface and D is the embedment depth of the shoring measured from the bottom of the excavation (unless pavement or hardscape are present, exclude the upper foot when calculating passive resistance to account for erosion). These equivalent fluid pressures should be applied as a triangular pressure distribution behind the shoring and assume level backfill behind and in front of shoring.

For braced shoring, a uniform rectangular pressure distribution should be used from top to bottom of the shoring equivalent to the following,

Bracing: 25H psf/ft

where H is the depth of the excavation.

The earth pressures are based on drained conditions (no hydrostatic or buoyant conditions) and the assumption that the shoring is vertical (no batter), and the ground surface in front and behind the shoring is level. For different geometries or conditions, the above lateral earth pressures should be reevaluated. The earth pressures indicated above do not include a safety factor; therefore, the shoring design should include an appropriate safety factor for the overall performance of the system.

7.7 PRELIMINARY PAVEMENT DESIGN

Preliminary flexible pavement structural sections were developed based on the visual onsite soil classifications, a presumed subgrade resistance R-Value of 20, an equivalent single axle load (ESAL) value comparable to the referenced traffic index (TI) value below, and an AASHTO Reliability Factor of 75%.

7.7.1 Asphalt Concrete Pavement

Traffic Type	Auto Traffic TI = 5.0	Auto and Truck Traffic TI = 7.0
Asphalt Concrete (AC) Thickness	4.0"	4.0"
Class 2 Aggregate Base (AB) Thickness	5.0"	10.0"

*AASHTO Highway Design Manual

7.7.2 Portland Cement Concrete Pavement

Proposed Portland cement concrete pavement areas that are subject to vehicle traffic loads, should have a minimum thickness of six inches overlying a minimum of six inches of Class II Aggregate Base.

The concrete should exhibit a minimum 28-day compressive strength of 2,500 psi and approximate three-inch slump (± one inch). Minimum reinforcement for concrete pavement in vehicle traffic areas should include #3 bars on 18-inch centers. Additional reinforcement and/or slab thickness may be appropriate as structural conditions dictate, as determined by the project structural or civil engineer. Other design and construction criteria for concrete floor slabs, such as mix design, strength, durability, reinforcement, joint spacing, etc., should conform to current specifications promulgated by the American Concrete Institute (ACI).

7.7.3 Subgrade and Aggregate Base Recommendations

The above pavement sections are based upon the assumption that the subgrade is uniformly compacted to at least 90 percent relative compaction with uniform moisture content within 2 percentage points above or below the optimum moisture content, as determined by ASTM Standard D1557, to a depth of 12 inches at the time of base course placement. Final geotechnical observation and testing of subgrade should be performed just prior to the placement of aggregate base or asphalt concrete.

The aggregate base for asphalt concrete pavement sections should meet Caltrans specifications for Class 2 base or the specifications for Processed Miscellaneous Base (PMB), as contained in the Standard Specifications for Public Works Construction. Aggregate base should be compacted to at least 95 percent relative compaction with uniform moisture content near the optimum percent, as determined by ASTM Standard D1557. Final geotechnical observation and testing of aggregate base should be performed just prior to the placement of asphalt concrete.

It is possible that Site grading, use of import fill soils, utility line backfilling, and/or underground storage tank installation could alter the distribution of near-surface materials, thus requiring re-evaluation of the recommended pavement structural sections. Stantec recommends that at least one near surface soil sample be tested to evaluate the subgrade R-value, following rough grading of the pavement areas.

7.8 SITE GRADING

Site grading will be required to achieve plan grades and to provide uniform support for foundations, slabs-on-grade and pavement. Recommendations for Site grading are presented in the following subsections, while general guide specifications for earthwork and grading are presented in Appendix D. The following grading recommendations are subject to change, depending on the actual earthwork required for the project and the subsurface conditions encountered during grading.

7.8.1 Clearing and Grubbing

The ground surface of the Site should be cleared and grubbed all of vegetation and deleterious materials, prior to grading. Clearing and grubbing is considered complete when soil supporting structural fill material or soil to be excavated as reused as structural fill materials contains less than five percent organic materials (by volume). Excavations created by removing underground structures, construction debris, vegetation roots, contaminated soils, and any other unsuitable materials should be backfilled with clean fill soil and should be compacted in accordance with the recommendations presented below.

7.8.2 Site Preparation

Pavement Areas:

Removal of the existing soils to a minimum depth of one foot below the subgrade elevation is recommended. The removed soils may be placed back in the excavation as compacted fill, in accordance with the recommendations in Section 7.8.3. Removal, replacement, and compaction beneath pavement areas should extend horizontally at least 3 feet beyond the rear curb face or as property line constraints dictate.

Unsuitable areas, as determined by the geotechnical engineer, should be removed to a minimum depth of one foot. Depending on the condition of the subexcavation bottom, additional removal depth may be recommended. Once a suitable excavation bottom is achieved, the exposed surface at the bottom of the excavation should be scarified to a depth of 6 inches, moisture conditioned, and surface compacted to the specified density. The removed soils can be placed back in the excavation as compacted fill, in accordance with the recommendations of Section 7.8.3.

Required Inspection of Subexcavation:

The project geotechnical engineer should check the bottoms of all subexcavations. Should unsuitable materials be encountered, the depth of removal may be extended.

7.8.3 Placement of Compacted Fill

General guide specifications for placement of fill and backfill are provided in Appendix D. The bottom of excavations and areas to receive fill should be scarified to a depth of six inches, moisture conditioned to 0 to 2 percentage points over optimum moisture content and then surface compacted to the relative compaction specified below.

Placement of compacted fill should be performed in thin lifts at two percentage points over optimum moisture content using mechanical compaction equipment and maintained at this moisture content until after pavement, slabs, or foundations are constructed. Unless specified otherwise, fill should be compacted to a minimum of 90 percent relative compaction based upon the maximum density obtained in accordance with ASTM Standard D1557. Gravel should not be used to backfill excavations onsite without the approval of the project geotechnical engineer.

During grading, frequent density testing should be performed by a representative of the geotechnical engineer to evaluate compliance with grading specifications. Where testing indicates insufficient relative compaction, additional compactive effort should be applied, with the adjustment of moisture content where necessary, until the required relative compaction is obtained.

7.9 POST INVESTIGATION SERVICES

Post investigation services are an important and necessary continuation of this investigation, and it is recommended that Stantec be retained as the Project Geotechnical Engineer to perform such services to assure adherence with the intent of the geotechnical recommendations presented herein.

Final project grading and foundation plans, foundation details and specifications should be reviewed by Stantec, prior to construction, to confirm that the intent of the recommendations presented herein have been applied to the designs. Following review of plans and specifications, sufficient and timely observation during construction should be performed to correlate the findings of this investigation with the actual subsurface conditions exposed during construction.

The following should be observed and tested by the Project Geotechnical Engineer:

- Rough Site grading, including the bottom of subexcavations.
- Footing excavations to confirm that the foundation elements are founded in the recommended materials.
- Utility trench backfill.
- Subgrade preparation, base placement and compaction.
- All other items of work requiring an opinion of adequacy from the Project Geotechnical Engineer to be included in a final geotechnical report.

During construction, the Project Geotechnical Engineer and/or authorized representatives should be present to observe the geotechnical aspects of the project and to test the earthwork. It is the sole responsibility of the contractor performing the work to confirm that the work complies with federal, state, and local safety procedures/regulations and with all applicable plans, specifications, and ordinances.

8.0 CLOSURE

Our conclusions, recommendations and discussions are (1) based upon an evaluation and interpretation of the findings of the field and laboratory programs, (2) based upon an interpolation of subsurface conditions between and beyond the exploration locations, (3) subject to confirmation of the actual conditions encountered during construction, and (4) based upon the assumption that sufficient observation and testing will be provided by Stantec during construction.

Any person using this report for bidding or construction purposes should perform such independent investigations deemed necessary to be satisfied as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project.

This report contains information which is valid as of this date. However, conditions that are beyond our control or that may occur with the passage of time may invalidate, either partially or wholly, the conclusions and recommendations presented herein.

The conclusions in this report are based on an interpolation and extrapolation of subsurface conditions encountered at the boring locations. The actual subsurface conditions at unexplored locations may be different. Consequently, the findings and recommendations in this report will require re-evaluation if subsurface conditions different than stated herein are encountered.

Inherent in most projects performed in the heterogeneous subsurface environment, additional subsurface investigations and analyses may reveal findings that are different than those presented herein. This facet of the geotechnical profession should be considered when formulating professional opinions on the limited data collected on this project.

The findings and recommendations contained in this report were developed in accordance with generally accepted current professional principles and practice ordinarily exercised, under similar circumstances, by geotechnical engineers and geologists practicing in this locality. No other warranty, express or implied, is made.

9.0 REFERENCES

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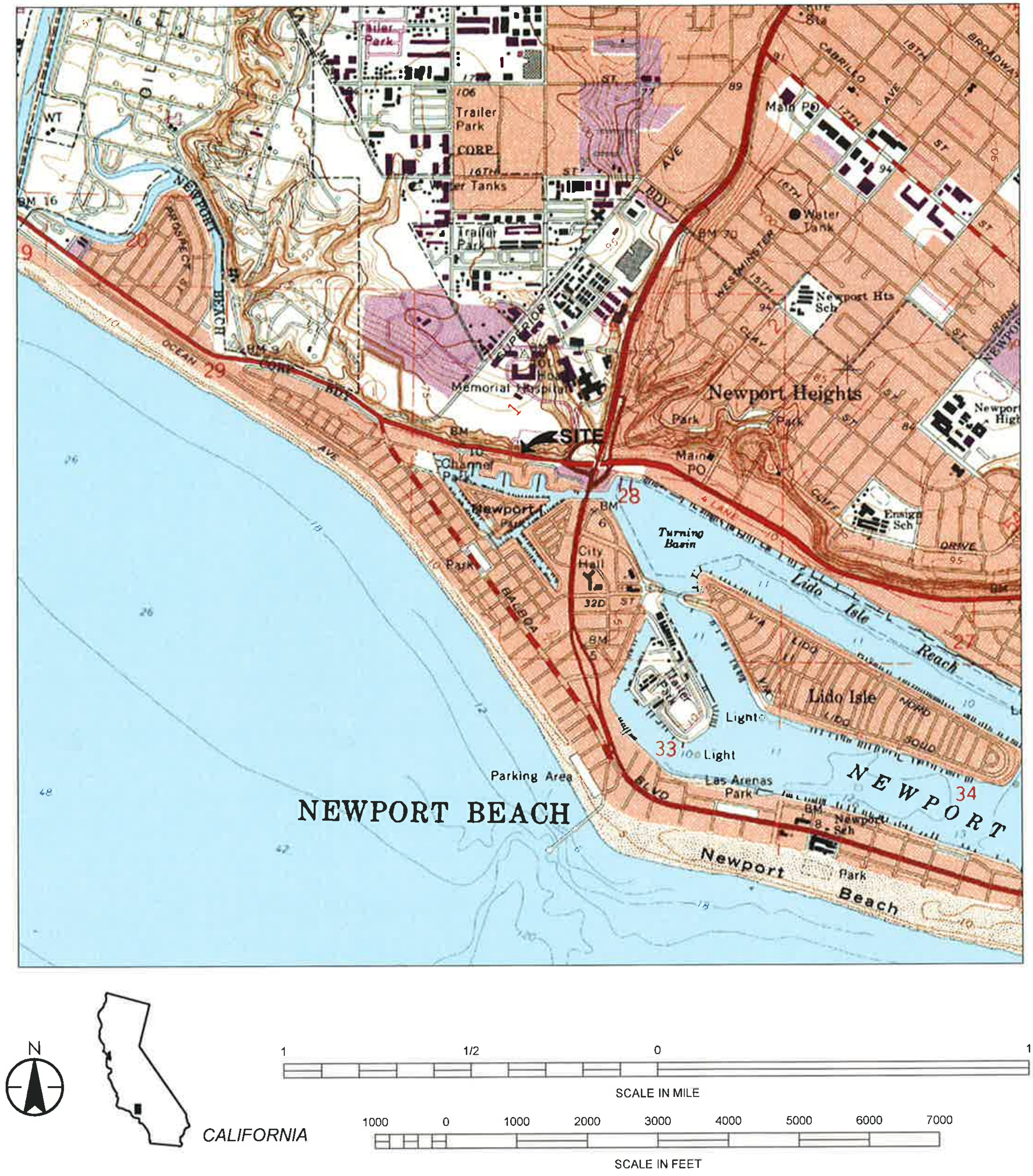
FIGURES



REFERENCE: USGS 7.5 X 15 MINUTE QUADRANGLE; NEWPORT BEACH, 1965, PHOTOREVISED 1981.

Stantec

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REDLANDS, CA 92374
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FOR:

AUTO NATION - NEWPORT PORSCHE
600 WEST COAST HIGHWAY (CA HWY 1)
NEWPORT BEACH, CALIFORNIA

SITE LOCATION MAP

FIGURE:
1

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
2007105003	JEF	JEF	JEF	4/15/15

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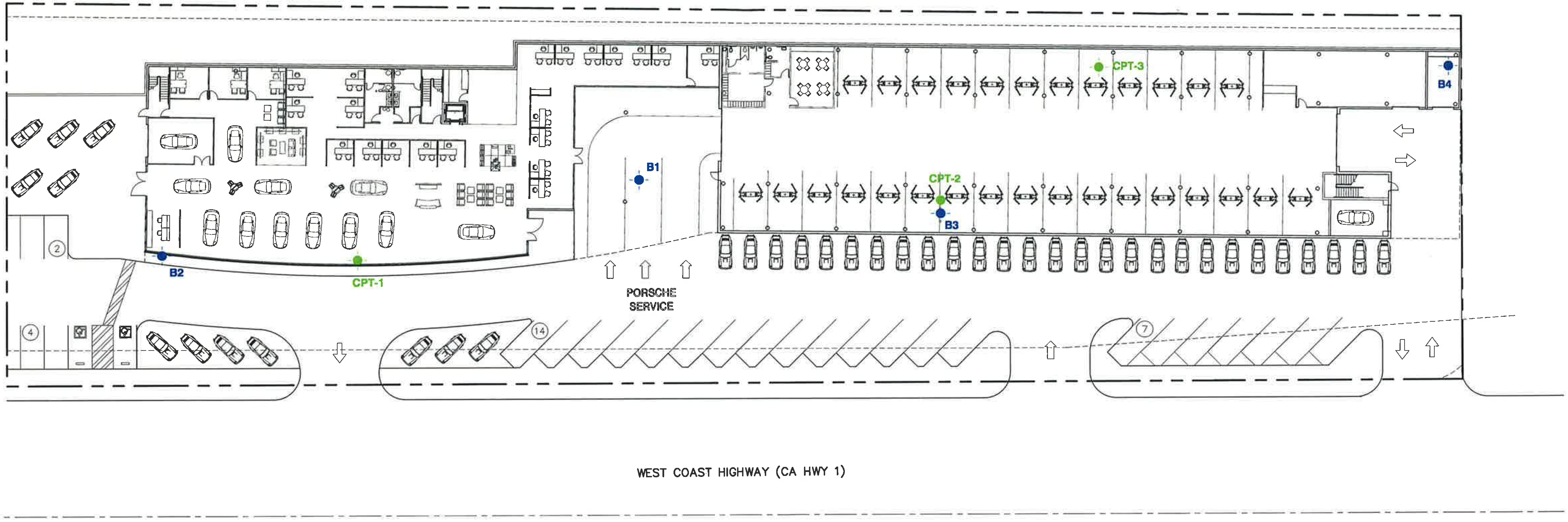
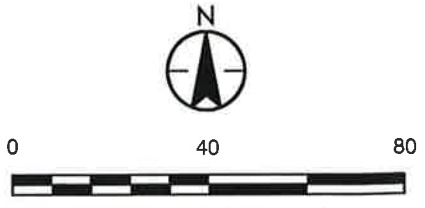


EXPLANATION

☐ APPROXIMATE LOCATION OF PROPOSED FEATURES

● B4 APPROXIMATE SOIL BORING LOCATION

● CPT-3 APPROXIMATE CONE PENETRATION TEST (CPT) LOCATION



APPROXIMATE SCALE (FEET)

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FOR:
AUTO NATION - NEWPORT PORSCHE
600 WEST COAST HIGHWAY (CA HWY 1)
NEWPORT BEACH, CALIFORNIA

SITE PLAN

FIGURE: 2

JOB NUMBER: 2007105003
DRAWN BY: JEF
CHECKED BY: JEF
APPROVED BY: JEF
DATE: 4/15/15

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APPENDIX A
BORING LOGS

PROJECT: **Geotechnical Legend**
LOCATION: **123 Main St. Anywhere USA**
PROJECT NUMBER: **00AB.12345.00**

WELL / PROBEHOLE / BOREHOLE NO:
Legend PAGE 1 OF 1

DRILLING: STARTED **1/1/06** COMPLETED: **1/1/06**
INSTALLATION: STARTED **1/1/06** COMPLETED: **1/1/06**
DRILLING COMPANY: **Driling Sub-contractor**
DRILLING EQUIPMENT: **Drilling Equipment**
DRILLING METHOD: **Drilling Method**
SAMPLING EQUIPMENT: **Sampling Equipment**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **NE**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **NA**
LOGGED BY: **Onsite Technician**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **25.0**
WELL DEPTH (ft): **25.0**
BOREHOLE DIAMETER (in):
CHECKED BY: **Project Eng.**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Geotechnical Lab Testing	Environmental Lab Testing	Blow Count	Headspace PID (units)	Depth (feet)	Well Construction
5 10	🟥		Geotechnical Lab Testing CNSL - Consolidation CRSN - Corrosion EI - Expansion Index HA - Hydrometer Analysis MD - Moisture Density M - Moisture R-Val - R-Value SA - Sieve Analysis DS - Direct Shear UC - Unconfined Compression AL - Atterberg Limits #200 - #200 Sieve Wash MP - Modified Proctor		CNSL CRSN EI HA MD M R-Val SA DS UC AL #200 MP			As Shown	5 10	Surface Completion
15	🟦		Environmental Lab Testing 8015M - Volatile and/or Extractable Petroleum Hydrocarbons 8260 - Halogenated Volatile Organic Compounds with Oxygenates 8270 - Semi-Volatile Organic Compounds 8081 - Organochlorine Pesticides			8015M 8260 8270 8081			15	Backfill Description
	🟧		Hand Auger Sample	▯						
20			Driven Sample, Blows Per 6 Inches, 2.5 Inch ID California Modified Sample Interval	⧗			10 11 15		20	
			Driven Sample, Blows Per 6 Inches, 1.5 Inch ID SPT Sample Interval	☒			20 22 23			
25 30 35			Hole terminated at 25 feet.						25 30 35	

GEO FORM 304 GEOTECHNICAL LEGEND.GPJ SECOR INTL.GDT 12/5/06

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

Topsoil	- mixture of soil and humus capable of supporting vegetative growth
Peat	- mixture of visible and invisible fragments of decayed organic matter
Till	- unstratified glacial deposit which may range from clay to boulders
Fill	- material below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

Desiccated	- having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured	- having cracks, and hence a blocky structure
Varved	- composed of regular alternating layers of silt and clay
Stratified	- composed of alternating successions of different soil types, e.g. silt and sand
Layer	- > 75 mm in thickness
Seam	- 2 mm to 75 mm in thickness
Parting	- < 2 mm in thickness

Terminology describing soil types:
The classification of soil types are made on the basis of grain size and plasticity in accordance with the Unified Soil Classification System (USCS) (ASTM D 2487 or D 2488). The classification excludes particles larger than 76 mm (3 inches). The USCS provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing cobbles, boulders, and non-matrix materials (organic matter or debris):
Terminology describing materials outside the USCS, (e.g. particles larger than 76 mm, visible organic matter, construction debris) is based upon the proportion of these materials present:

Trace, or occasional	Less than 10%
Some	10-20%
Frequent	> 20%

Terminology describing compactness of cohesionless soils:
The standard terminology to describe cohesionless soils includes compactness (formerly "relative density"), as determined by the Standard Penetration Test N-Value (also known as N-Index). A relationship between compactness condition and N-Value is shown in the following table.

Compactness Condition	SPT N-Value
Very Loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

Terminology describing consistency of cohesive soils:
The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by *in situ* vane tests, penetrometer tests, or unconfined compression tests.

Consistency	Undrained Shear Strength	
	kips/sq.ft.	kPa
Very Soft	<0.25	<12.5
Soft	0.25 - 0.5	12.5 - 25
Firm	0.5 - 1.0	25 - 50
Stiff	1.0 - 2.0	50 – 100
Very Stiff	2.0 - 4.0	100 - 200
Hard	>4.0	>200

ROCK DESCRIPTION

Terminology describing rock quality:

RQD	Rock Mass Quality
0-25	*Very Poor*
25-50	*Poor*
50-75	*Fair*
75-90	*Good*
90-100	*Excellent*

Rock quality classification is based on a modified core recovery percentage (RQD) in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. RQD was originally intended to be done on NW core; however, it can be used on different core sizes if the bulk of the fractures caused by drilling stresses are easily distinguishable from *in situ* fractures. The terminology describing rock mass quality based on RQD is subjective and is underlain by the presumption that sound strong rock is of higher engineering value than fractured weak rock.

Terminology describing rock mass:

Spacing (mm)	Joint Classification	Bedding, Laminations, Bands
> 6000	*Extremely Wide*	-
2000-6000	*Very Wide*	*Very Thick*
600-2000	*Wide*	*Thick*
200-600	*Moderate*	*Medium*
60-200	*Close*	*Thin*
20-60	*Very Close*	*Very Thin*
<20	*Extremely Close*	*Laminated*
<6	-	*Thinly Laminated*

Terminology describing rock strength:

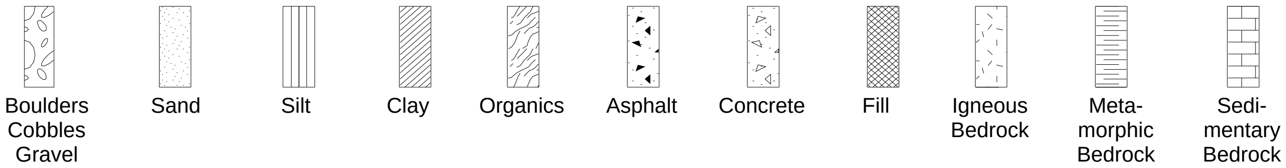
Strength Classification	Unconfined Compressive Strength (MPa)
Extremely Weak	< 1
Very Weak	1 – 5
Weak	5 – 25
Medium Strong	25 – 50
Strong	50 – 100
Very Strong	100 – 250
Extremely Strong	> 250

Terminology describing rock weathering:

Term	Description
Fresh	No visible signs of rock weathering. Slight discolouration along major discontinuities
Slightly Weathered	Discolouration indicates weathering of rock on discontinuity surfaces. All the rock material may be discoloured.
Moderately Weathered	Less than half the rock is decomposed and/or disintegrated into soil.
Highly Weathered	More than half the rock is decomposed and/or disintegrated into soil.
Completely Weathered	All the rock material is decomposed and/or disintegrated into soil. The original mass structure is still largely intact.

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.



SAMPLE TYPE

SS	Split spoon sample (obtained by performing the Standard Penetration Test)
ST	Shelby tube or thin wall tube
DP	Direct-Push sample (small diameter tube sampler hydraulically advanced)
PS	Piston sample
BS	Bulk sample
WS	Wash sample
HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond coring bits.

WATER LEVEL MEASUREMENT

▼	measured in standpipe, piezometer, or well
▽	inferred

RECOVERY

For soil samples, the recovery is recorded as the length of the soil sample recovered. For rock core, recovery is defined as the total cumulative length of all core recovered in the core barrel divided by the length drilled and is recorded as a percentage on a per run basis.

N-VALUE

Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (305 mm) into the soil. For split spoon samples where insufficient penetration was achieved and N-values cannot be presented, the number of blows are reported over sampler penetration in millimetres (e.g. 50/75). Some design methods make use of N value corrected for various factors such as overburden pressure, energy ratio, borehole diameter, etc. No corrections have been applied to the N-values presented on the log.

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to A size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone one foot (305 mm) into the soil. The DCPT is used as a probe to assess soil variability.

OTHER TESTS

S	Sieve analysis
H	Hydrometer analysis
k	Laboratory permeability
γ	Unit weight
G_s	Specific gravity of soil particles
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial with pore pressure measurements
UU	Unconsolidated undrained triaxial
DS	Direct Shear
C	Consolidation
Q_u	Unconfined compression
I_p	Point Load Index (I_p on Borehole Record equals $I_p(50)$ in which the index is corrected to a reference diameter of 50 mm)

	Single packer permeability test; test interval from depth shown to bottom of borehole
	Double packer permeability test; test interval as indicated
	Falling head permeability test using casing
	Falling head permeability test using well point or piezometer

PROJECT: **Newport Porsche**
LOCATION: **600 West Coast Highway, Newport Beach, CA**
PROJECT NUMBER: **2007105003**

WELL / PROBEHOLE / BOREHOLE NO: **B1** PAGE 1 OF 1

Stantec

DRILLING: STARTED **3/20/15** COMPLETED: **3/20/15**
INSTALLATION: STARTED **3/20/15** COMPLETED: **3/20/15**
DRILLING COMPANY: **Calpac Drilling**
DRILLING EQUIPMENT: **Mobile B-61**
DRILLING METHOD: **Hollowstem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **7.0 3/20/15**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **-**
LOGGED BY: **JS**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **18.0**
WELL DEPTH (ft): **18.0**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **JF**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Well Construction
			2" AC							
1050		SM	**SILTY SAND** ; SM; 10YR 5/6 yellowish brown; 82.4% fine to medium grained sand; 17.4% fines; 0.2% fine gravel; loose; moist; no staining; no odors.		1050 B1-2	SA, MD	3 4 5			
1055 5			...same as above; 10YR 4/4; dark yellowish brown; 69.0% fine to medium grained sand; 30.8% fines; 0.2% fine gravel; very loose; moist; no staining; no odor.		1055 B1-5	SA	1 1 2		5	
1100			...same as above; 10YR 5/4; yellowish brown; 55% fine to medium grained sand; 45% fines; loose; wet; no staining; no odors		1100 B1-7	DS	2 2 2		▽	
										Native soil backfill
1108 10		MH	**SILT** ; MH; 10YR 4/3 brown; 95% fines; 5% fine grained sand; high plasticity; stiff; moist; no staining; slight organic odor.		1108 B1-10		1 5 5		10	
1115 15			... same as above; dark grayish brown (10YR 3/2); hard, laminations present.		1115 B1-15	MD	14 22 33		15	
			Refusal at 18 feet. Hole terminated at 18 feet.							

PROJECT: **Newport Porsche**
LOCATION: **600 West Coast Highway, Newport Beach, CA**
PROJECT NUMBER: **2007105003**

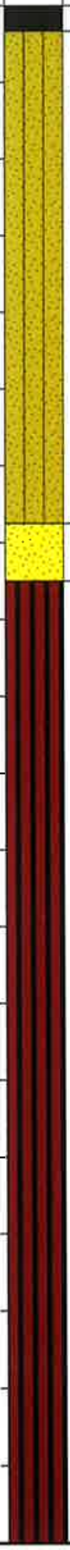
WELL / PROBEHOLE / BOREHOLE NO:
B2 PAGE 1 OF 2

Stantec

DRILLING: STARTED **3/20/15** COMPLETED: **3/20/15**
INSTALLATION: STARTED **3/20/15** COMPLETED: **3/20/15**
DRILLING COMPANY: **Calpac Drilling**
DRILLING EQUIPMENT: **Mobile B-61**
DRILLING METHOD: **Hollowstem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

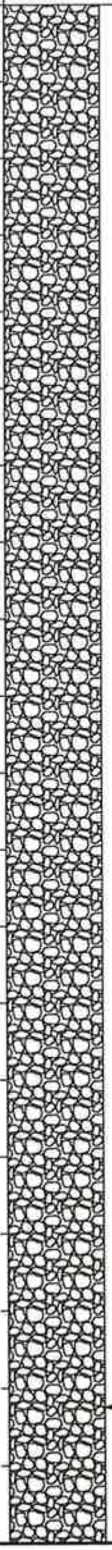
NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **7.0 3/20/15**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **-**
LOGGED BY: **JS**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **36.5**
WELL DEPTH (ft): **36.5**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **JF**



Time & Depth (feet)	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)
		4" AC						
1233	SM	**SILTY SAND** ; SM; 10YR 4/4 dark yellowish brown; 87.5% fine to medium grained sand; 12.5% fines; minor shell fragments; very loose; moist; no staining; no odor.	☒	1233 B2-2	SA	2 1 1		
1240 5		...same as above; 79.5% fine to medium grained sand; 19.8% fines; 0.6% fine gravel; loose; moist; no staining; no odor.	☒	1240 B2-5	SA, MD	3 5 6		5
1250	SW	**SAND** ; SW; 10YR 5/6 yellowish brown; poorly graded; 90% fine to medium grained sand; 10% fines; loose; wet; no staining; no odors.	☒	1250 B2-7		16 7 13		∇
	MH	**SILT** ; MH; 10YR 3/2 very dark grayish brown; 95% fines; <5% fine sand; very stiff; high plasticity; moist; no staining; slight organic odor.						
1300 10		... same as above; hard.	☒	1300 B2-10	CNSL	9 26 34		10
1310 15		... same as above; 85.5% fines; 14.5% fine to medium grained sand.	☒	1310 B2-15	HA, AL, %M	5 13 20		15

Well Construction



Native soil backfill

PROJECT: **Newport Porsche**
LOCATION: **600 West Coast Highway, Newport Beach, CA**
PROJECT NUMBER: **2007105003**

WELL / PROBEHOLE / BOREHOLE NO: **B2** PAGE 2 OF 2

Stantec

DRILLING: STARTED **3/20/15** COMPLETED: **3/20/15**
INSTALLATION: STARTED **3/20/15** COMPLETED: **3/20/15**
DRILLING COMPANY: **Calpac Drilling**
DRILLING EQUIPMENT: **Mobile B-61**
DRILLING METHOD: **Hollowstem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **7.0 3/20/15**
BOREHOLE DEPTH (ft): **36.5**
STATIC DTW (ft): **NE**
WELL DEPTH (ft): **36.5**
WELL CASING DIAMETER (in): **-**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **JS**
CHECKED BY: **JF**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Well Construction
1315		MH	... same as above; 83.9% fines; 16.1% fine to medium grained sand.		1315 B2-20	HA, AL, MD	14 50-6"			
1325 25									25	
		SP-SM	**SAND WITH SILT** ; SP-SM; 5Y 3/2 dark olive gray; 89.5% medium sand; 10.5% fines; wet; dense; no staining; no odor.		1325 B2-25	SA	6 15 21			
1330 30		MH	**SILT** ; MH; 10YR 3/2 very dark grayish brown; 79.3% fines; 20.7% fine sand; hard; high plasticity; moist; no staining; slight organic odor.		1330 B2-30	HA, AL, %M	6 14 50-3"		30	
1335 35			... same as above; angular 1-2 cm rock chips		1335 B2-35		25 50-6"		35	
			Refusal at 35 feet. Hole terminated at 36.5 feet.							

PROJECT: **Newport Porsche**
LOCATION: **600 West Coast Highway, Newport Beach, CA**
PROJECT NUMBER: **2007105003**

WELL / PROBEHOLE / BOREHOLE NO: **B3** PAGE 1 OF 2

Stantec

DRILLING: STARTED **3/20/15** COMPLETED: **3/20/15**
INSTALLATION: STARTED **3/20/15** COMPLETED: **3/20/15**
DRILLING COMPANY: **Calpac Drilling**
DRILLING EQUIPMENT: **Mobile B-61**
DRILLING METHOD: **Hollowstem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **6.0 3/20/15**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **-**
LOGGED BY: **JS**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **31.5**
WELL DEPTH (ft): **31.5**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **JF**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Well Construction
			2" AC							
0831		SP-SM	**SAND WITH SILT** ; SP-SM; 10YR 4/4 dark yellowish brown; 90.9% fine to medium grained sand; 8.2% fines; loose; moist; no staining; no odors.		0831 B3-2	SA, MD	2 3 4			
0838 5		SM	**SILTY SAND** ; SM; 10YR 3/2 very dark grayish brown; 71.0% fine to medium grained sand; 29.0% fines; very loose to loose; moist; no staining; no odor.		0838 B3-5	#200	1 2 2		5 ▽	
0845			...same as above; 2.5YR 4/3; dark olive brown; 82.7% fine to medium grained sand; 17.3% fines; loose; wet; no staining; no odor.		0845 B3-7	SA, MD	1 2 9			
0852 10		MH	**SILT** ; MH; 2.5Y 3/2 very dark grayish brown; 95% fines; 5% fine sand; hard; high plasticity; moist; no staining; no odor.		0852 B3-10		5 11 20		10	
0900 15			... same as above.		0900 B3-15		6 25 50-6"		15	Native soil backfill

PROJECT: **Newport Porsche**
LOCATION: **600 West Coast Highway, Newport Beach, CA**
PROJECT NUMBER: **2007105003**

WELL / PROBEHOLE / BOREHOLE NO: **B3** PAGE 2 OF 2

Stantec

DRILLING: STARTED **3/20/15** COMPLETED: **3/20/15**
INSTALLATION: STARTED **3/20/15** COMPLETED: **3/20/15**
DRILLING COMPANY: **Calpac Drilling**
DRILLING EQUIPMENT: **Mobile B-61**
DRILLING METHOD: **Hollowstem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **6.0 3/20/15**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **-**
LOGGED BY: **JS**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **31.5**
WELL DEPTH (ft): **31.5**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **JF**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Well Construction
0908			... same as above.		0908 B3-20		6 13 21			
0915 25			... same as above.		0915 B3-25		4 12 19		25	
0923 30			... same as above.		0923 B3-30		6 16 24		30	
			Hole terminated at 31.5 feet.							
35									35	

PROJECT: **Newport Porsche**
LOCATION: **600 West Coast Highway, Newport Beach, CA**
PROJECT NUMBER: **2007105003**

WELL / PROBEHOLE / BOREHOLE NO:
B4 PAGE 1 OF 2

DRILLING: STARTED **3/20/15** COMPLETED: **3/20/15**
INSTALLATION: STARTED **3/20/15** COMPLETED: **3/20/15**
DRILLING COMPANY: **Calpac Drilling**
DRILLING EQUIPMENT: **Mobile B-61**
DRILLING METHOD: **Hollowstem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **7.0 3/20/15**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **-**
LOGGED BY: **JS**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **31.5**
WELL DEPTH (ft): **31.5**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **JF**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Well Construction
1530		SM	**SILTY SAND** ; SM; 10YR 4/3 brown; 57.7% fine grained sand; 42.3% fines; trace shell fragments; moist; very loose; no staining; no odor.	☒	1530 B4-2	#200	1 1 2			
1535 5			...same as above; 10YR 4/4; dark yellowish brown; 58.9% fine to medium grained sand; 38.1% fines; 3.0% fine gravel; loose; moist; no staining; no odor.	☒	1535 B4-5	SA, DS	3 3 4		5	
1540		CL	**CLAY** ; CL; 10YR 4/4 dark yellowish brown; 75% fines; 25% fine to medium grained sand; low plasticity; very soft; wet; no staining; no odor.	☒	1540 B4-7		1 1 1		∇	
1545 10		SP	**SAND** ; SP; 10YR 3/4 dark yellowish brown; poorly graded; 95% fine to medium grained sand; 5% fines; trace shell fragments; loose; wet; no staining; no odor.	☒	1545 B4-10	DS	1 2 3		10	
1550 15		CH	**CLAY** ; CH; 10YR 3/2 very dark grayish brown; 95% fines; 5% fine sand; high plasticity; very stiff; moist; no staining; slight organic odor; minor laminations present.	☒	1550 B4-15		5 9 16		15	←Native soil backfill

PROJECT: **Newport Porsche**
LOCATION: **600 West Coast Highway, Newport Beach, CA**
PROJECT NUMBER: **2007105003**

WELL / PROBEHOLE / BOREHOLE NO:
B4 PAGE 2 OF 2

Stantec

DRILLING: STARTED **3/20/15** COMPLETED: **3/20/15**
INSTALLATION: STARTED **3/20/15** COMPLETED: **3/20/15**
DRILLING COMPANY: **Calpac Drilling**
DRILLING EQUIPMENT: **Mobile B-61**
DRILLING METHOD: **Hollowstem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **7.0 3/20/15**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **-**
LOGGED BY: **JS**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **31.5**
WELL DEPTH (ft): **31.5**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **JF**

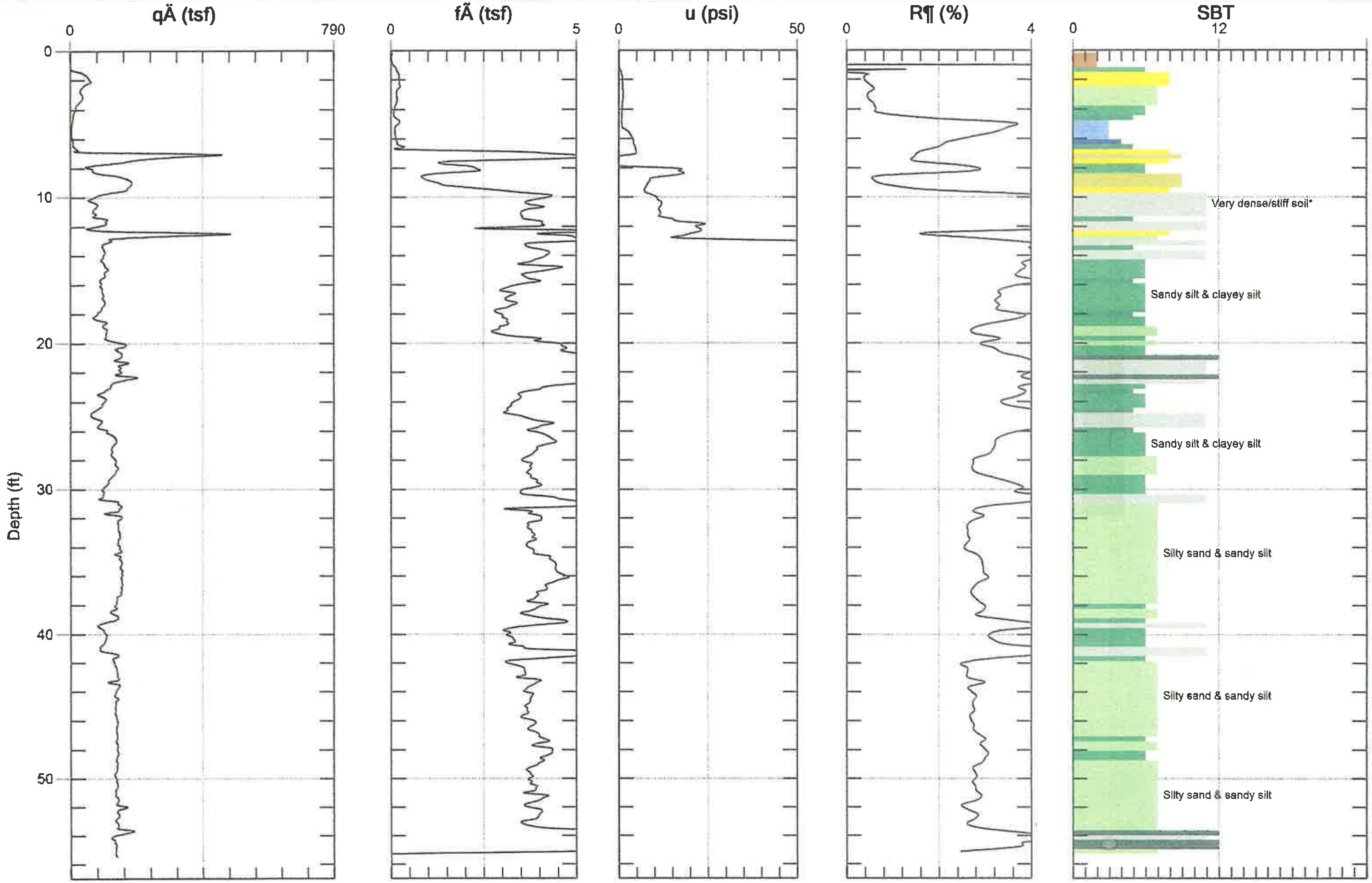
Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)	Well Construction
1600			... same as above; hard.		1600 B4-20	MD	7 23 32			
1605 25			... same as above; 2" angular rock @ 25.5'; trace shell fragments.		1605 B4-25		17 32 22		25	
1610 30			... same as above; no laminations present.		1610 B4-30		7 14 26		30	
			Hole terminated at 31.5 feet.							
35									35	

APPENDIX B
CONE PENETROMETER TEST RESULTS

Stantec Consulting Services

Site: Future Auto Nation
Sounding: CPT-1

Engineer: Josh Sargent
Date: 3/20/2015 11:06



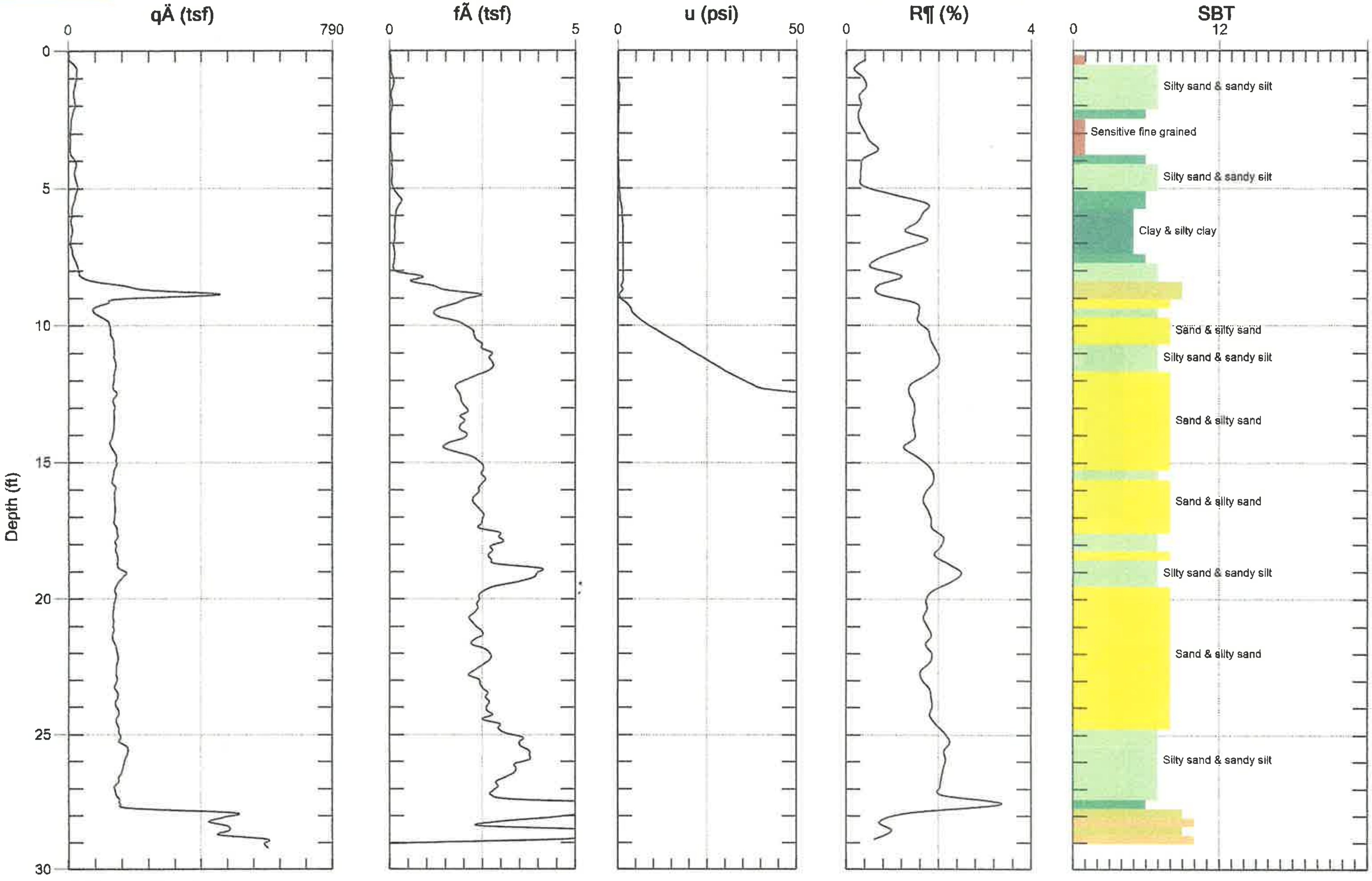
Max. Depth: 55.446 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

Stantec Consulting Services

Site: Future Auto Nation
Sounding: CPT-2

Engineer: Josh Sargent
Date: 3/20/2015 07:20



Max. Depth: 29.199 (ft)
Avg. Interval: 0.328 (ft)

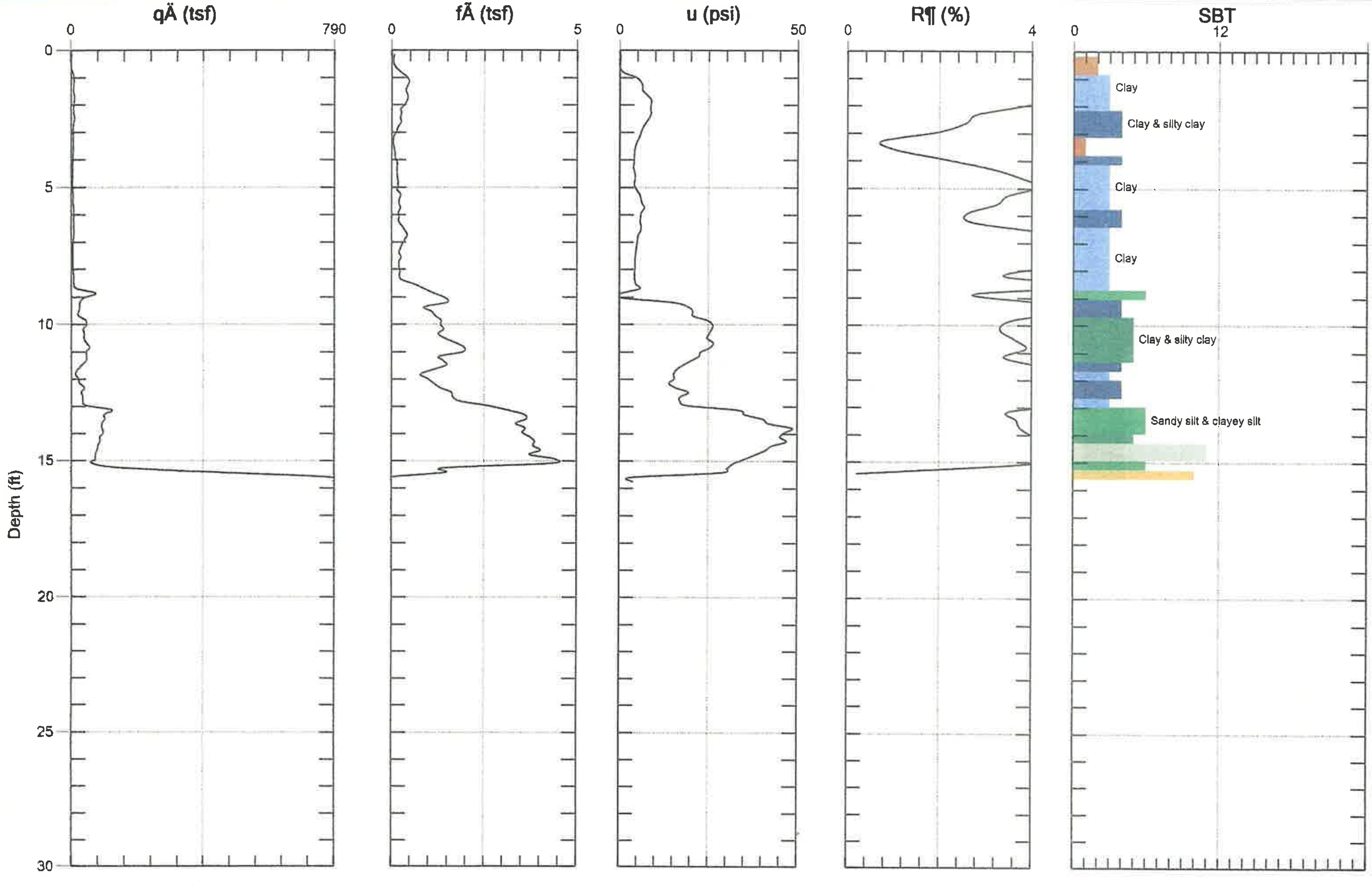
SBT: Soil Behavior Type (Robertson 1990)

Stantec Consulting Services

GREGG

Site: Future Auto Nation
Sounding: CPT-3

Engineer: Josh Sargent
Date: 3/20/2015 08:35



Max. Depth: 15.748 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

APPENDIX C
LABORATORY TEST RESULTS

SUMMARY OF MOISTURE DENSITY TEST RESULTS
ASTM D 2216

Boring Location	Sample Depth (ft)	Wet Density (lb/ft^3)	Dry Density (lb/ft^3)	Moisture Content (percent)
B1-2	2	125.6	116.0	8.3
B1-15	15	116.5	90.0	29.4
B2-5	5	106.3	89.5	18.8
B2-20	20	110.4	81.8	34.9
B3-2	2	107.6	100.3	7.3
B3-7	7	108.6	92.4	17.5
B4-20	20	111.9	84.8	32.0

Stantec

Gradation Analysis
ASTM D 422

Project Name AutoNation - Newport
Source B3-2

Preparation Method ASTM D 1140 Method A
Particle Shape Angular
Particle Hardness Hard and Durable
Sample Dry Mass (g) 360.20
Moisture Content (%) 3.8

Project Number 2007105003
Lab ID B3-2
Date Received 03-23-2015
Preparation Date 03-25-2015
Test Date 03-26-2015

Analysis based on total sample.

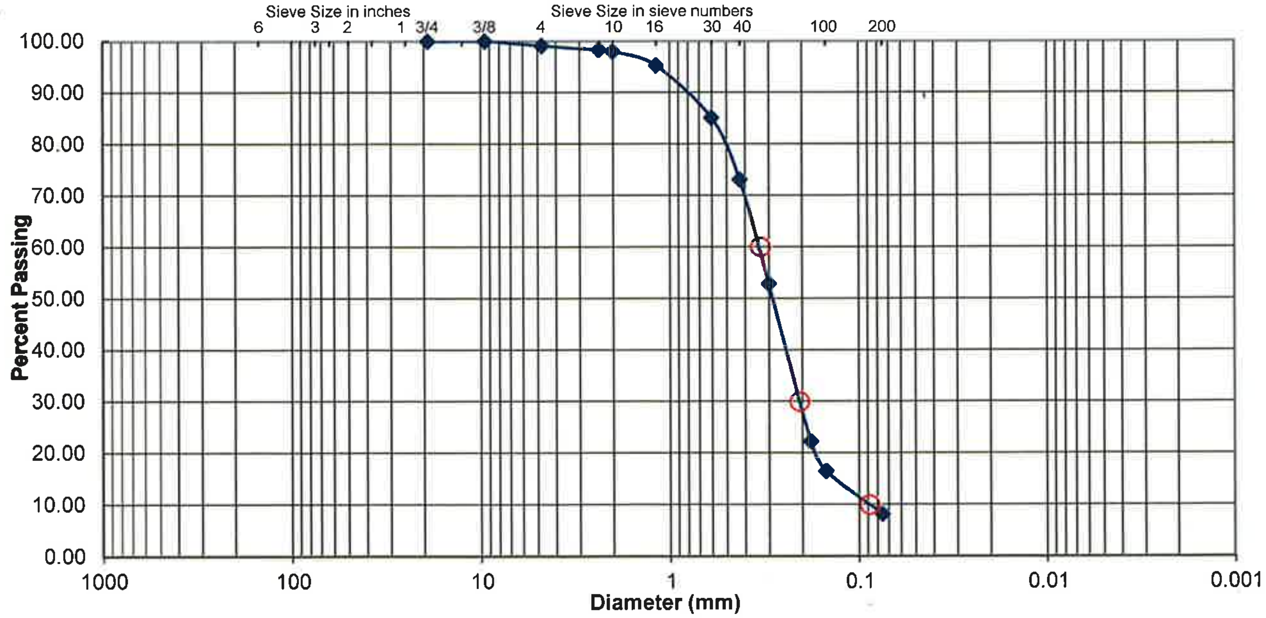
Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	3.20	0.9	99.1
No. 8	3.00	0.8	98.3
No. 10	1.10	0.3	98.0
No. 16	9.70	2.7	95.3
No. 30	36.60	10.2	85.1
No. 40	43.20	12.0	73.1
No. 50	73.00	20.3	52.9
No. 80	110.10	30.6	22.3
No. 100	20.60	5.7	16.6
No. 200	30.20	8.4	8.2
Pan	29.50	8.2	---

% Gravel	0.9
% Sand	90.9
% Fines	8.2
Fines Classification	ML
D_{10} (mm)	0.0871
D_{30} (mm)	0.2047
D_{60} (mm)	0.3292
Cu	3.78
Cc	1.46

Classification
Poorly Graded Sand (SP-SM) with Silt

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Stantec

Gradation Analysis
ASTM D 422

Project Name AutoNation - Newport
Source B3-7

Preparation Method ASTM D 1140 Method A
Particle Shape Angular
Particle Hardness Hard and Durable
Sample Dry Mass (g) 132.00
Moisture Content (%) 23.3

Project Number 2007105003
Lab ID B3-7
Date Received 03-23-2015
Preparation Date 03-25-2015
Test Date 03-26-2015

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.00	0.0	100.0
No. 8	0.40	0.3	99.7
No. 10	0.40	0.3	99.4
No. 16	2.80	2.1	97.3
No. 30	12.40	9.4	87.9
No. 40	10.70	8.1	79.8
No. 50	16.50	12.5	67.3
No. 80	40.10	30.4	36.9
No. 100	8.80	6.7	30.2
No. 200	17.00	12.9	17.3
Pan	22.90	17.3	---

% Gravel 0.0
% Sand 82.7
% Fines 17.3
Fines Classification ML

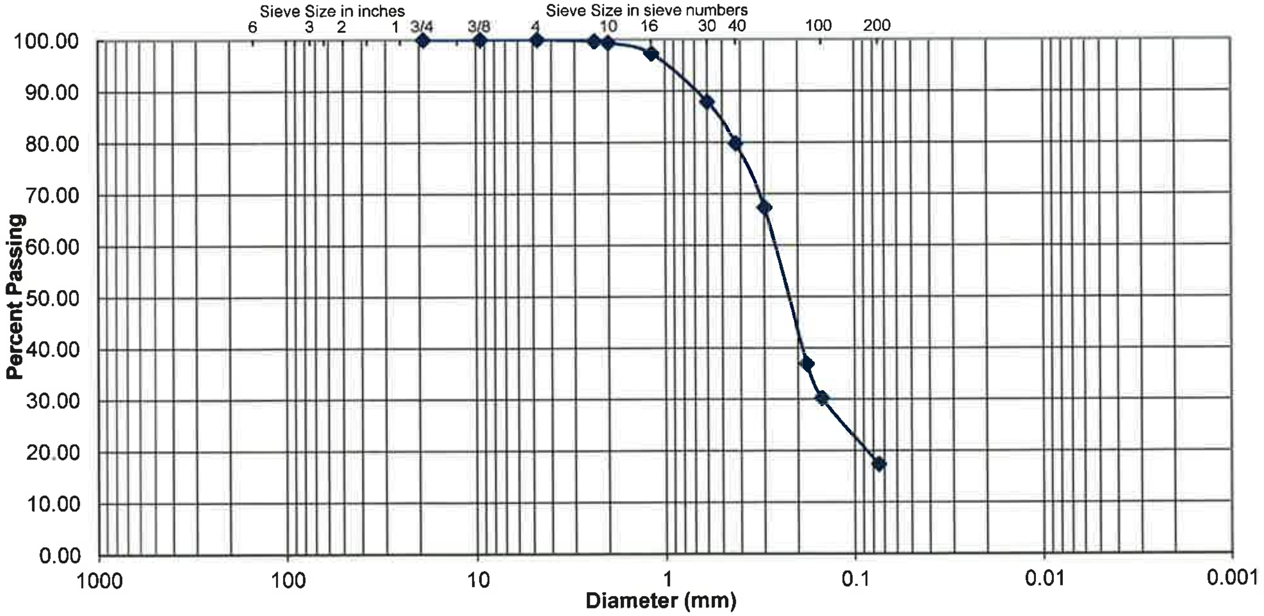
D_{10} (mm) N/A
D_{30} (mm) N/A
D_{60} (mm) N/A

Cu N/A
Cc N/A

Classification
Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Stantec

Gradation Analysis
ASTM D 422

Project Name AutoNation - Newport
Source B1-2

Project Number 2007105003
Lab ID B1-2
Date Received 03-23-2015
Preparation Date 03-25-2015
Test Date 03-26-2015

Preparation Method ASTM D 1140 Method A
Particle Shape Angular
Particle Hardness Hard and Durable
Sample Dry Mass (g) 309.20
Moisture Content (%) 9.7

Analysis based on total sample.

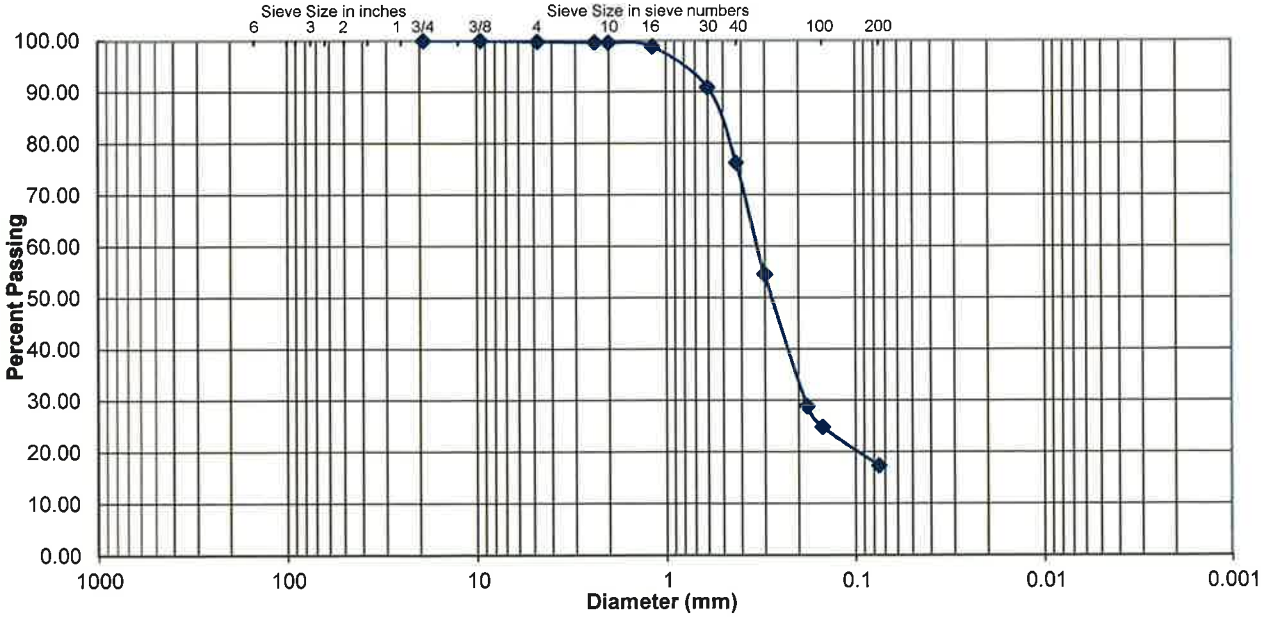
Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.60	0.2	99.8
No. 8	0.40	0.1	99.7
No. 10	0.20	0.1	99.6
No. 16	2.40	0.8	98.8
No. 30	24.50	7.9	90.9
No. 40	45.30	14.7	76.3
No. 50	67.20	21.7	54.5
No. 80	79.00	25.5	29.0
No. 100	12.40	4.0	25.0
No. 200	23.50	7.6	17.4
Pan	53.70	17.4	---

% Gravel	0.2
% Sand	82.4
% Fines	17.4
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Classification
Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Stantec

Gradation Analysis
ASTM D 422

Project Name AutoNation - Newport
Source B1-5

Project Number 2007105003
Lab ID B1-5
Date Received 03-23-2015
Preparation Date 03-25-2015
Test Date 03-26-2015

Preparation Method ASTM D 1140 Method A
Particle Shape Angular
Particle Hardness Hard and Durable
Sample Dry Mass (g) 310.60
Moisture Content (%) 18.1

Analysis based on total sample.

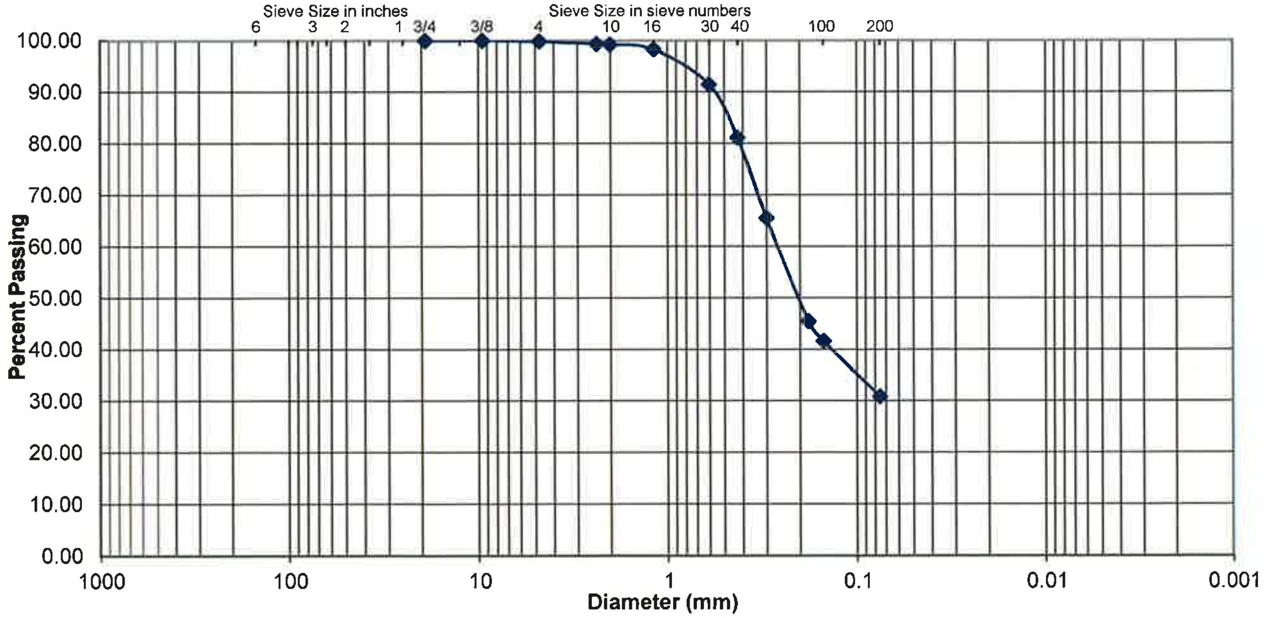
Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.50	0.2	99.8
No. 8	1.50	0.5	99.4
No. 10	0.30	0.1	99.3
No. 16	3.00	1.0	98.3
No. 30	21.10	6.8	91.5
No. 40	32.20	10.4	81.1
No. 50	48.40	15.6	65.6
No. 80	62.20	20.0	45.5
No. 100	12.00	3.9	41.7
No. 200	33.60	10.8	30.8
Pan	95.80	30.8	---

% Gravel	0.2
% Sand	69.0
% Fines	30.8
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Classification
Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Gradation Analysis
ASTM D 422

Project Name AutoNation - Newport
Source B2-2

Project Number 2007105003
Lab ID B2-2
Date Received 03-23-2015
Preparation Date 03-25-2015
Test Date 03-26-2015

Preparation Method ASTM D 1140 Method A
Particle Shape Angular
Particle Hardness Hard and Durable
Sample Dry Mass (g) 255.80
Moisture Content (%) 11.4

Analysis based on total sample.

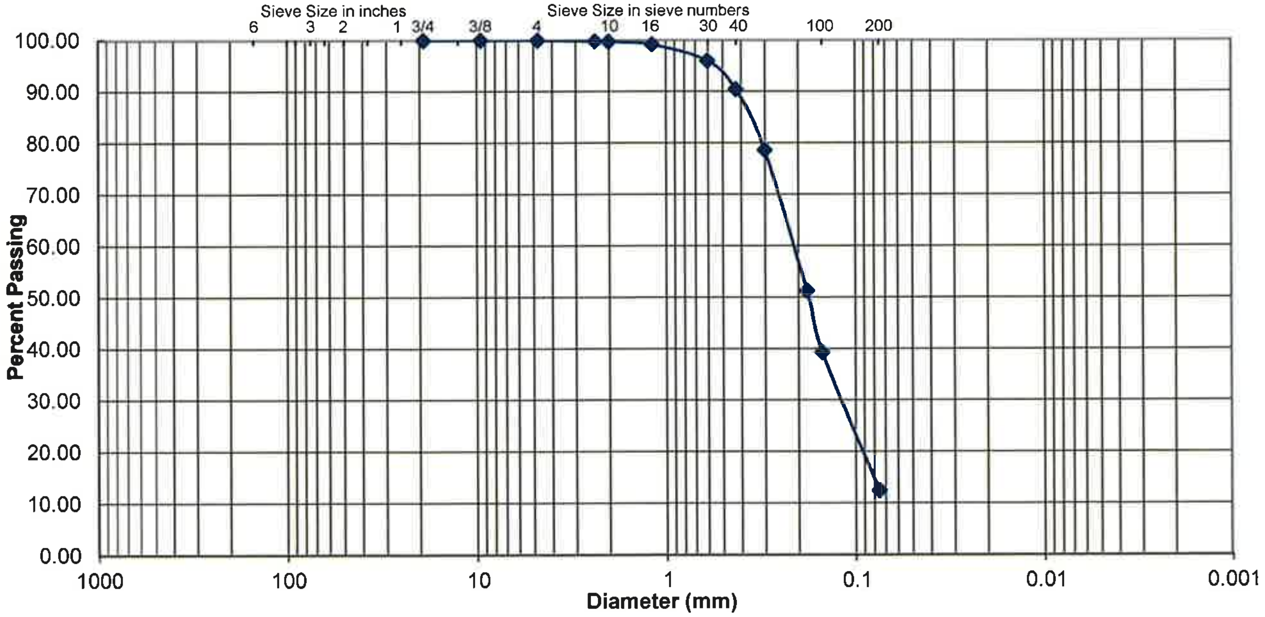
Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.00	0.0	100.0
No. 8	0.50	0.2	99.8
No. 10	0.20	0.1	99.7
No. 16	1.40	0.5	99.2
No. 30	8.10	3.2	96.0
No. 40	14.20	5.6	90.5
No. 50	30.20	11.8	78.7
No. 80	70.10	27.4	51.3
No. 100	30.60	12.0	39.3
No. 200	68.50	26.8	12.5
Pan	32.00	12.5	---

% Gravel	0.0
% Sand	87.5
% Fines	12.5
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Classification
Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

File: newport_porsche_b2-2_sieve.xlsm Sheet: Report
Preparation Date: 1-2008
Revision Date: 4-2008

Stantec Consulting Services Inc.

Laboratory Document
Prepared By: JW
Approved By: TLK

Stantec

Gradation Analysis
ASTM D 422

Project Name AutoNation - Newport
Source B2-5

Project Number 2007105003
Lab ID B2-5
Date Received 03-23-2015
Preparation Date 03-25-2015
Test Date 03-26-2015

Preparation Method ASTM D 1140 Method A
Particle Shape Angular
Particle Hardness Hard and Durable
Sample Dry Mass (g) 345.60
Moisture Content (%) 14.8

Analysis based on total sample.

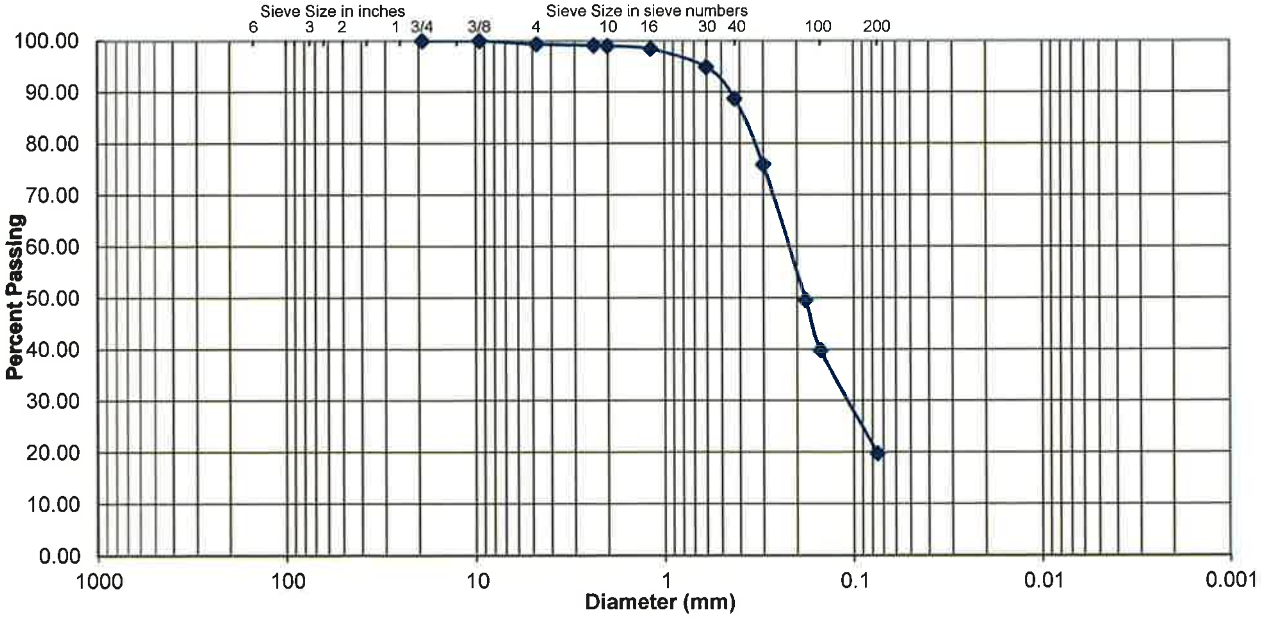
Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	2.20	0.6	99.4
No. 8	0.80	0.2	99.1
No. 10	0.50	0.1	99.0
No. 16	2.00	0.6	98.4
No. 30	12.10	3.5	94.9
No. 40	21.30	6.2	88.7
No. 50	44.20	12.8	76.0
No. 80	91.10	26.4	49.6
No. 100	33.80	9.8	39.8
No. 200	69.10	20.0	19.8
Pan	68.50	19.8	---

% Gravel	0.6
% Sand	79.5
% Fines	19.8
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Classification
Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

File: newport_porsche_b2-5_sieve.xlsm Sheet: Report
Preparation Date: 1-2008
Revision Date: 4-2008

Stantec Consulting Services Inc.

Laboratory Document
Prepared By: JW
Approved By: TLK

Gradation Analysis
ASTM D 422

Project Name AutoNation - Newport
Source B2-25

Project Number 2007105003
Lab ID B2-25
Date Received 03-23-2015
Preparation Date 03-25-2015
Test Date 03-26-2015

Preparation Method ASTM D 1140 Method A
Particle Shape Angular
Particle Hardness Hard and Durable
Sample Dry Mass (g) 143.10
Moisture Content (%) 17.3

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	0.00	0.0	100.0
No. 4	0.00	0.0	100.0
No. 8	3.50	2.4	97.6
No. 10	2.40	1.7	95.9
No. 16	16.00	11.2	84.7
No. 30	31.30	21.9	62.8
No. 40	15.90	11.1	51.7
No. 50	14.20	9.9	41.8
No. 80	21.40	15.0	26.8
No. 100	6.60	4.6	22.2
No. 200	16.80	11.7	10.5
Pan	15.00	10.5	---

% Gravel 0.0
% Sand 89.5
% Fines 10.5
Fines Classification ML

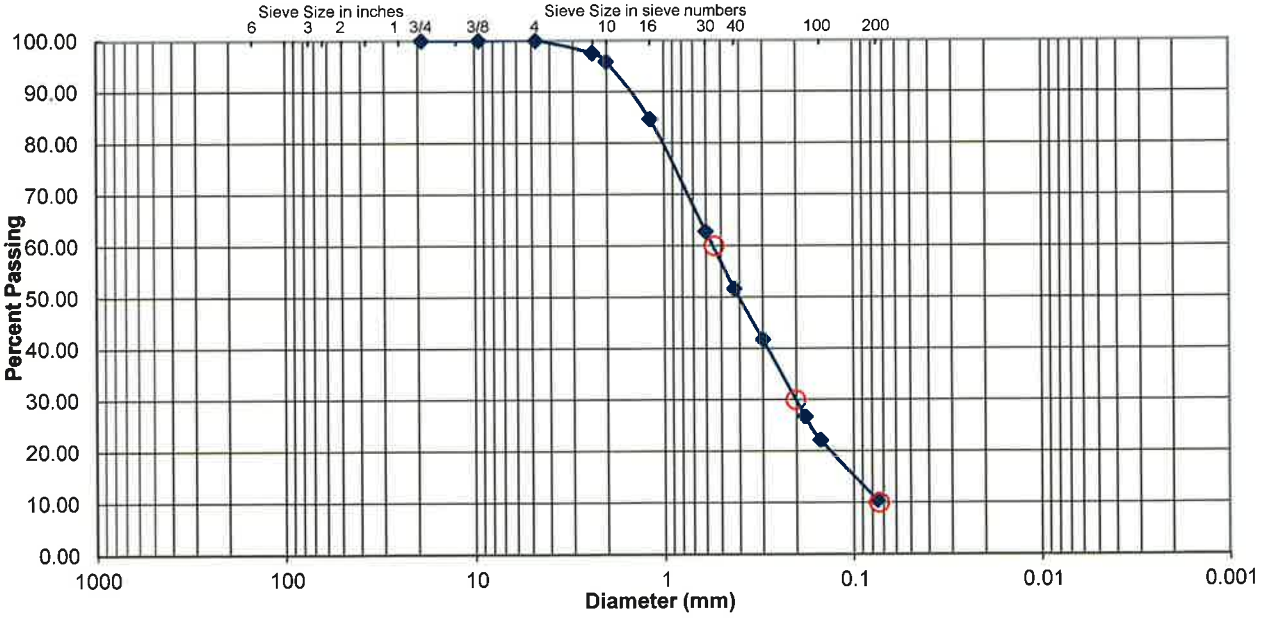
D_{10} (mm) 0.0729
D_{30} (mm) 0.2006
D_{60} (mm) 0.5397

Cu 7.40
Cc 1.02

Classification
Poorly Graded Sand (SP-SM) with Silt

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution



Comments

Reviewed By

Stantec

Gradation Analysis
ASTM D 422

Project Name	AutoNation - Newport	Project Number	2007105003
Source	B4-5	Lab ID	B4-5
		Date Received	03-23-2015
Preparation Method	ASTM D 1140 Method A	Preparation Date	03-25-2015
Particle Shape	Angular	Test Date	03-26-2015
Particle Hardness	Hard and Durable		
Sample Dry Mass (g)	308.20		
Moisture Content (%)	17.3		

Analysis based on total sample.

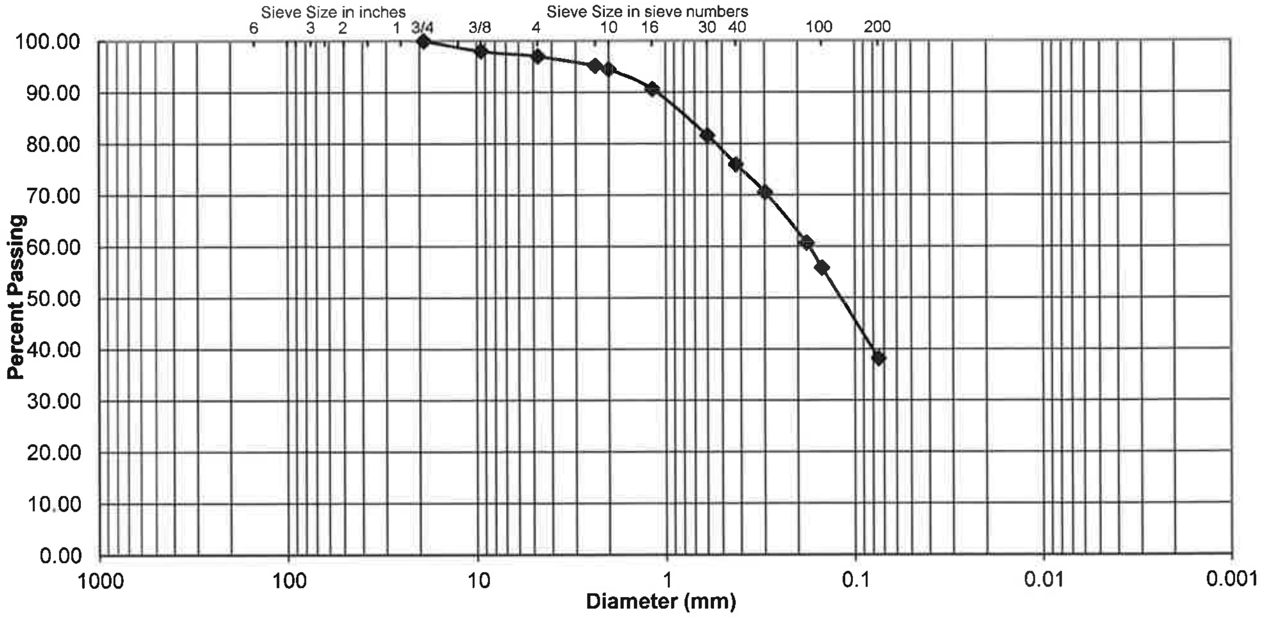
Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
3/8"	6.20	2.0	98.0
No. 4	3.10	1.0	97.0
No. 8	5.60	1.8	95.2
No. 10	2.20	0.7	94.5
No. 16	11.80	3.8	90.6
No. 30	27.90	9.1	81.6
No. 40	17.30	5.6	76.0
No. 50	16.80	5.5	70.5
No. 80	30.50	9.9	60.6
No. 100	14.80	4.8	55.8
No. 200	54.50	17.7	38.1
Pan	117.50	38.1	---

% Gravel	3.0
% Sand	58.9
% Fines	38.1
Fines Classification	ML
D_{10} (mm)	N/A
D_{30} (mm)	N/A
D_{60} (mm)	N/A
Cu	N/A
Cc	N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.



Particle Size Distribution

Comments

Reviewed By

File: newport_porsche_b4-5_sieve.xlsm Sheet: Report
Preparation Date: 1-2008
Revision Date: 4-2008

Laboratory Document
Prepared By: JW
Approved By: TLK

Stantec

Materials Finer Than 75µm (No. 200) Sieve

ASTM D 1140

Project Name AutoNation - Newport

Source B3-5

Preparation Method ASTM D 1140 Method A

Project Number 2007105003

Lab ID B3-5

Date Received 03-23-2015

Test Date 03-25-2015

Initial Sample Wet Mass (g)	410.90
Initial Oven Dry Sample Mass (g)	327.90
Final Oven Dry Sample Mass (g)	232.90
Materials Finer Than 75µm (No. 200) Sieve (g)	95.00
Percent Finer Than 75µm (No. 200) Sieve (%)	29.0

Moisture Content (%) 25.3

Comments

Reviewed By

Stantec

Materials Finer Than 75µm (No. 200) Sieve

ASTM D 1140

Project Name AutoNation - Newport

Source B4-2

Preparation Method ASTM D 1140 Method A

Project Number 2007105003

Lab ID B4-2

Date Received 03-23-2015

Test Date 03-25-2015

Initial Sample Wet Mass (g)	252.10
Initial Oven Dry Sample Mass (g)	208.50
Final Oven Dry Sample Mass (g)	120.40
Materials Finer Than 75µm (No. 200) Sieve (g)	88.10
Percent Finer Than 75µm (No. 200) Sieve (%)	42.3

Moisture Content (%) 20.9

Comments

Reviewed By

Stantec

ATTERBERG LIMITS

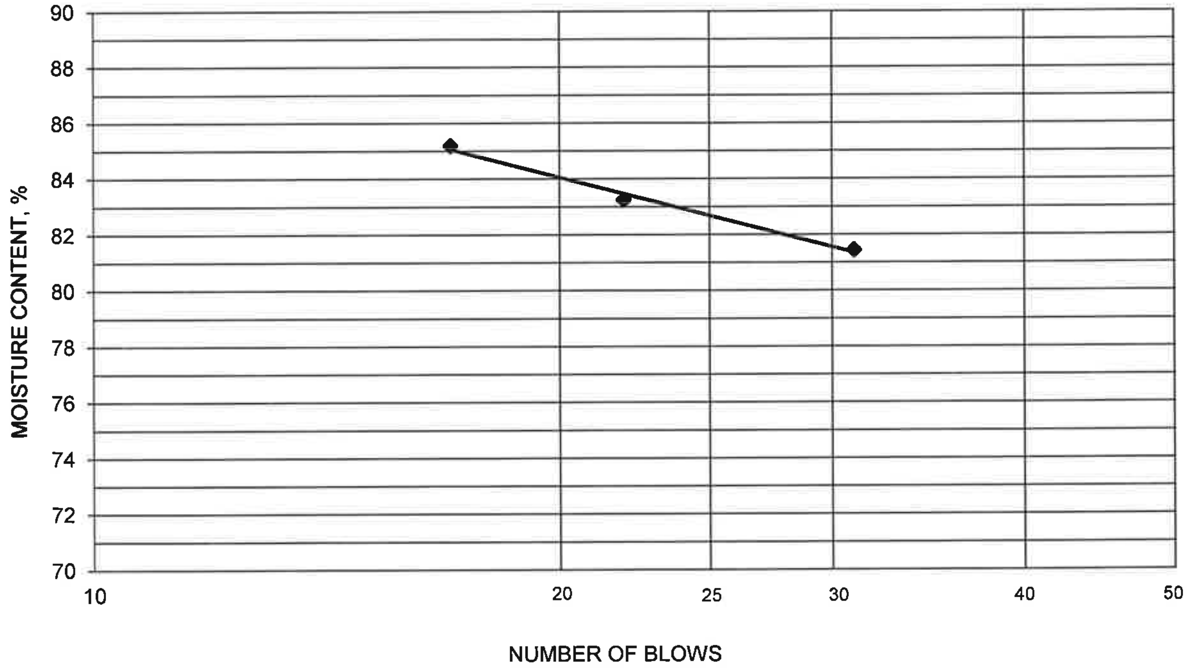
Project	Newport Porsche	Project No.	2007105003
Source	B2-15	Lab ID	B2-15
Tested By	JP	% + No. 40	70
Test Date	03-24-2015	Date Received	03-23-2015

Test Method ASTM D 4318

Prepared Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
14.88	13.08	10.87	31	81.4	83
13.85	12.41	10.68	22	83.2	
15.41	13.34	10.91	17	85.2	

Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
26.87	22.00	12.13	49.3	49	34

Remarks:

Reviewed By

ATTERBERG LIMITS

Project Newport Porsche

Source B2-20

Tested By JP Test Method ASTM D 4318

Test Date 03-24-2015 Prepared Dry

Project No. 2007105003

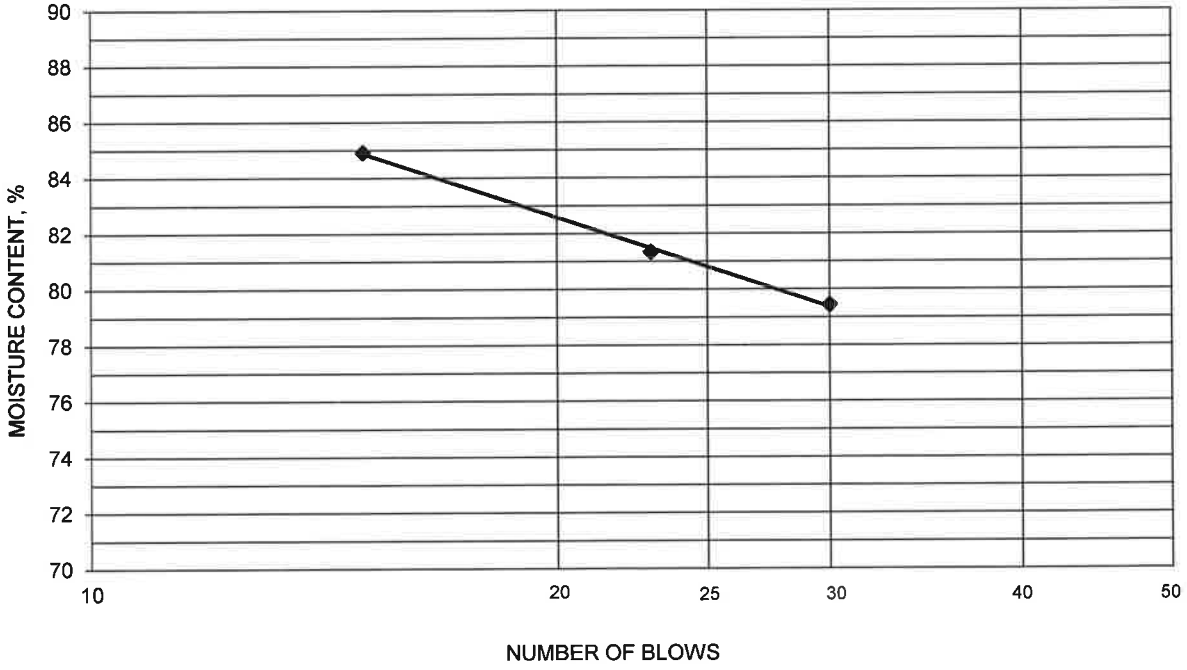
Lab ID B2-20

% + No. 40 60

Date Received 03-23-2015

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
12.69	10.99	8.85	30	79.4	81
15.13	13.30	11.05	23	81.3	
11.63	10.11	8.32	15	84.9	

Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
25.01	20.88	12.01	46.6	47	34

Remarks:

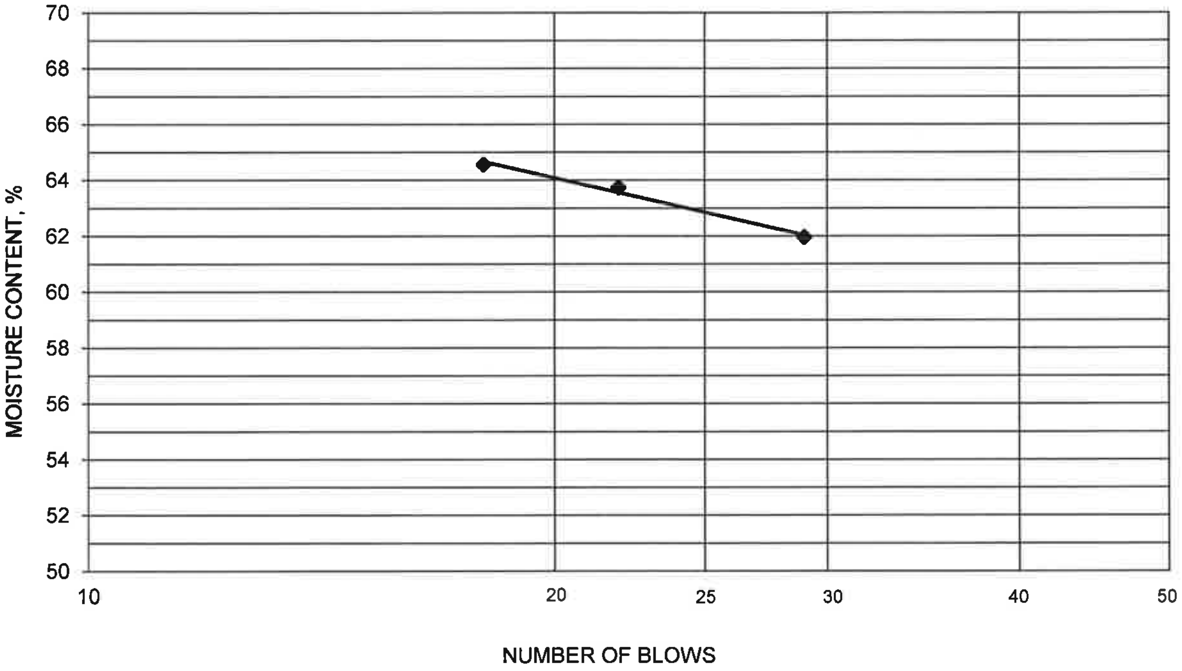
Reviewed By

ATTERBERG LIMITS

Project	Newport Porsche	Project No.	2007105003
Source	B2-30	Lab ID	B2-30
Tested By	JP	Test Method	ASTM D 4318
% + No. 40	50		
Test Date	03-24-2015	Prepared	Dry
Date Received	03-23-2015		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
15.16	13.58	11.03	29	62.0	63
15.88	14.00	11.05	22	63.7	
14.04	12.71	10.65	18	64.6	

Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

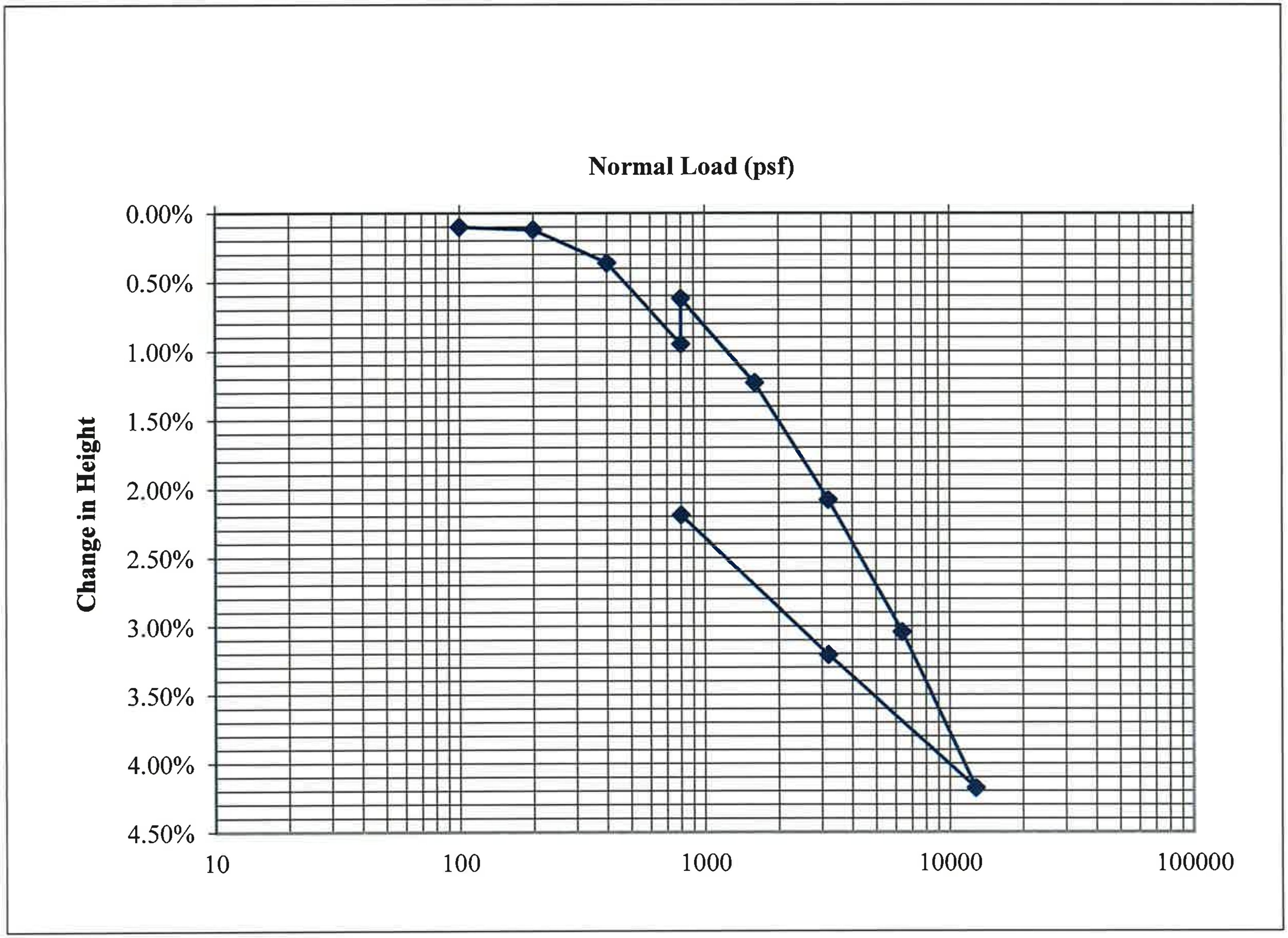
Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
24.04	20.89	12.09	35.8	36	27

Remarks:

Reviewed By

CONSOLIDATION TEST

AUTONATION - NEWPORT PORSCHE
B2-10



Note: Water was added at 800
psf normal load.

γ_w=105.4 pcf
m=46.5%

Figure B-1

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Compaction Characteristics of Soil Using Modified Effort

ASTM D 1557 - Method A

Project AutoNation Newport
Source
Description Dark Yellow Brown SAND with Silt
Visual Notes

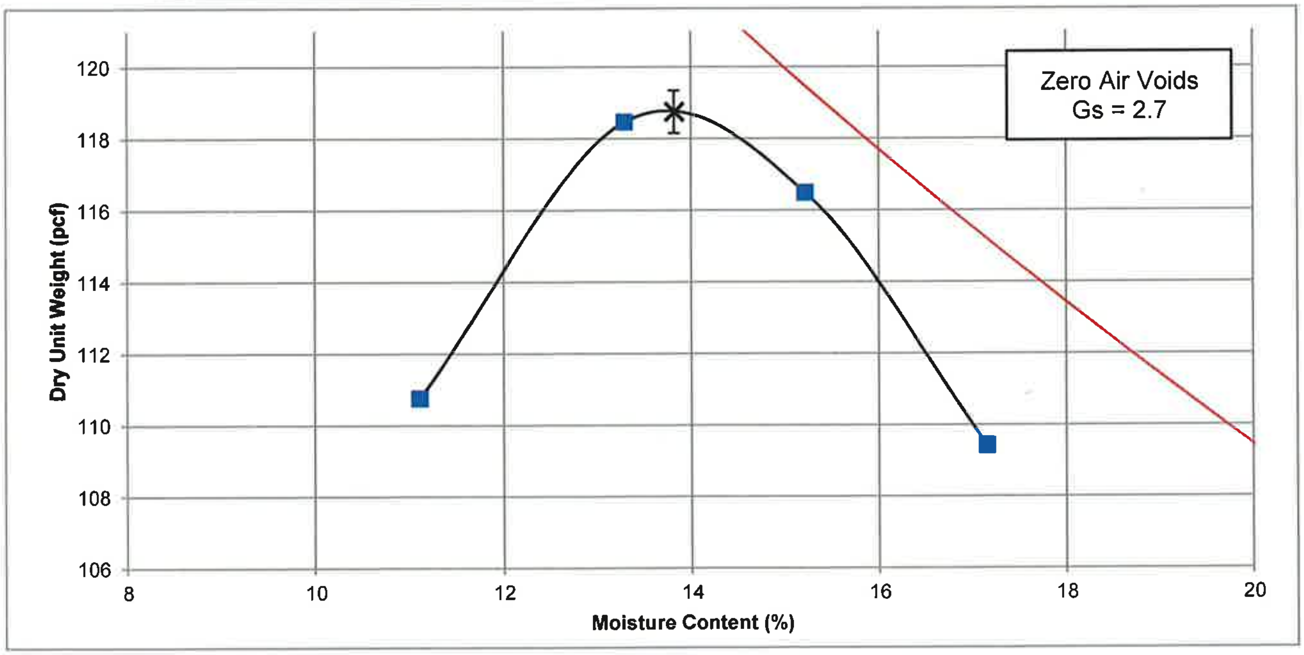
Project No. 2007105003
Sample ID B4 Bulk
Date Received 03/23/2015
Date Tested 03/19/2015

Test Fraction (%)
Gs of Test Fraction 2.7 Estimated
Oversized Fraction Sieve 3/4"

Oversized Fraction (%)
Gs of Oversized Fraction 2.7 ASTM C 127
MC of Oversized Fraction (%) 11.1

Mold Weight (g) 4227
Preparation Method Moist
Rammer Type Manual

Wet Soil & Mold Weight (g)	Wet Soil Weight (g)	Moisture Content Determination				Dry Unit Weight (pcf)
		Wet Soil & Tare (g)	Dry Soil & Tare (g)	Tare (g)	Water Content (%)	
6069	1842	340.00	306.00	0.00	11.1	110.8
6236	2009	409.00	361.00	0.00	13.3	118.5
6236	2009	371.00	322.00	0.00	15.2	116.5
6146	1919	362.00	309.00	0.00	17.2	109.4



Maximun Dry Unit Weight (pcf) 118.7
Optimum Moisture Content (%) 13.8

Corrected Maximun Dry Unit Weight (pcf) N/A
Corrected Optimum Moisture Content (%) N/A

Comments

Converse Consultants
Geotechnical Engineering, Environmental and Groundwater Science, Inspection and Testing Services

April 8, 2015

Mr. Jaret Fischer
Stantec Consulting Inc.
25864-F Business Center Drive
Redlands, CA 92374

Subject: **LABORATORY TEST RESULTS**
2007105003 – Auto Nation Porsche
Converse Project No. 15-81-104-08

Dear Mr. Fischer:

Presented below are the results of the laboratory tests that you requested for the above-referenced project. We received the samples from your office on March 24, 2015. The following tests were performed in accordance with the relevant standard:

- Three (3) Direct Shear Tests (ASTM D3080)
- Three (3) Hydrometer Tests (ASTM D422)
- One (1) Expansion Index Test (ASTM D4829)
- One (1) Soil Corrosivity Test (Caltrans 643, 422, 417, and 532)

We appreciate the opportunity to be of continued service to Stantec Consulting Inc. If you should have any questions or need additional information, please feel free to contact us at (909) 796-0544.

CONVERSE CONSULTANTS

Jordan Roper, E.I.T.
Staff Engineer

KVG/JR

Encl: Table No. 1, *Direct Shear Test Results*
Table No. 2, *Hydrometer Test Results*
Table No. 3, *Expansion Index Test Results*
Table No. 4, *Corrosivity Test Results*
Drawing No. 1 - 3, *Direct Shear Test Results*
Drawing No. 4, *Grain Sized Distribution Results*

Table No. 1, Direct Shear Test Results

Sample ID	Depth (feet)	Soil Description	Cohesion	Friction Angle
B-4 @ 5'	5.0	Silty Sand (SM), Fine to Medium Grained, Olive-Brown	10	33
B-1 @ 7'	7.0	Silty Sand (SM), Fine to Medium Grained, Yellow-Brown	40	32
B-4 @ 10'	10.0	Sandy Clay (CL), Fine to Medium Grained Sand, Olive-Yellow	440	27

Table No. 2, Hydrometer Test Results

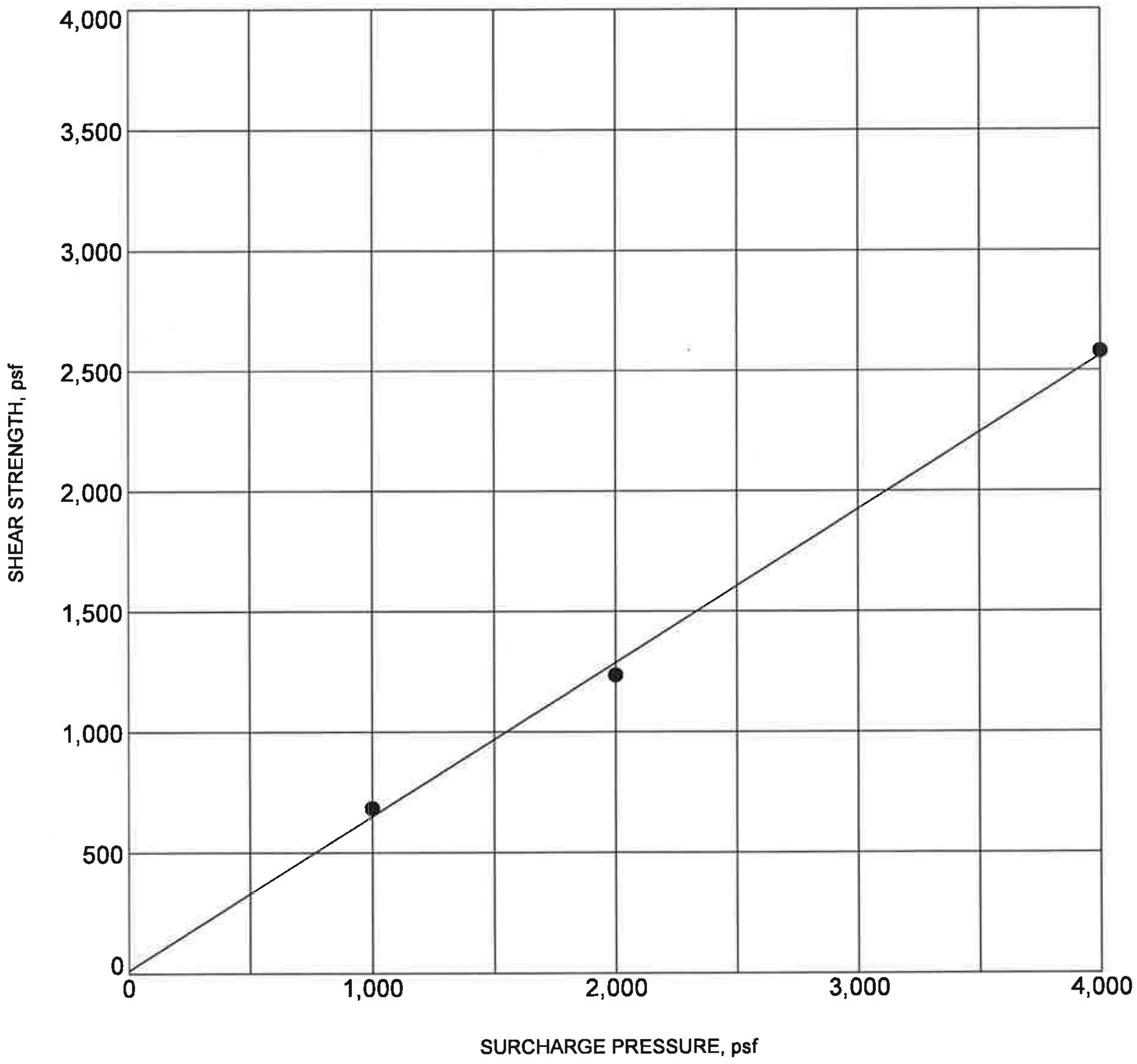
Sample ID	Depth (feet)	Percent Finer (%)			Silt (%)	Clay (%)
		#10	#50	#200		
B-2 @ 15'	15.0	100.00	85.48	85.5	64.84	20.64
B-2 @ 20'	20.0	99.40	93.03	83.87	59.66	24.21
B-2 @ 30'	30.0	100.00	90.70	79.27	61.98	17.29

Table No. 3, Expansion Index Test Results

Sample ID	Soil Description	Expansion Index	Expansion Potential
B-4 Bulk	Clayey Sand (SC), Fine to Medium Grained, Olive	30	Low

Table No. 4, Corrosivity Test Results

Sample Location	pH	Soluble Sulfate (CA 417) (ppm)	Soluble Chlorides (CA 422) (ppm)	Saturated Resistivity (CA 643) Ohm-cm
B-1 @ 0-5'	7.7	1060	531	480



BORING NO. :	B-4 @ 5'	DEPTH (ft) :	5.0
DESCRIPTION :	Silty Sand (SM), Fine to Medium Grained, Olive-Brown		
COHESION (psf) :	10	FRICTION ANGLE (degrees):	33
MOISTURE CONTENT (%) :	24.5	DRY DENSITY (pcf) :	85.7

NOTE: Ultimate Strength.

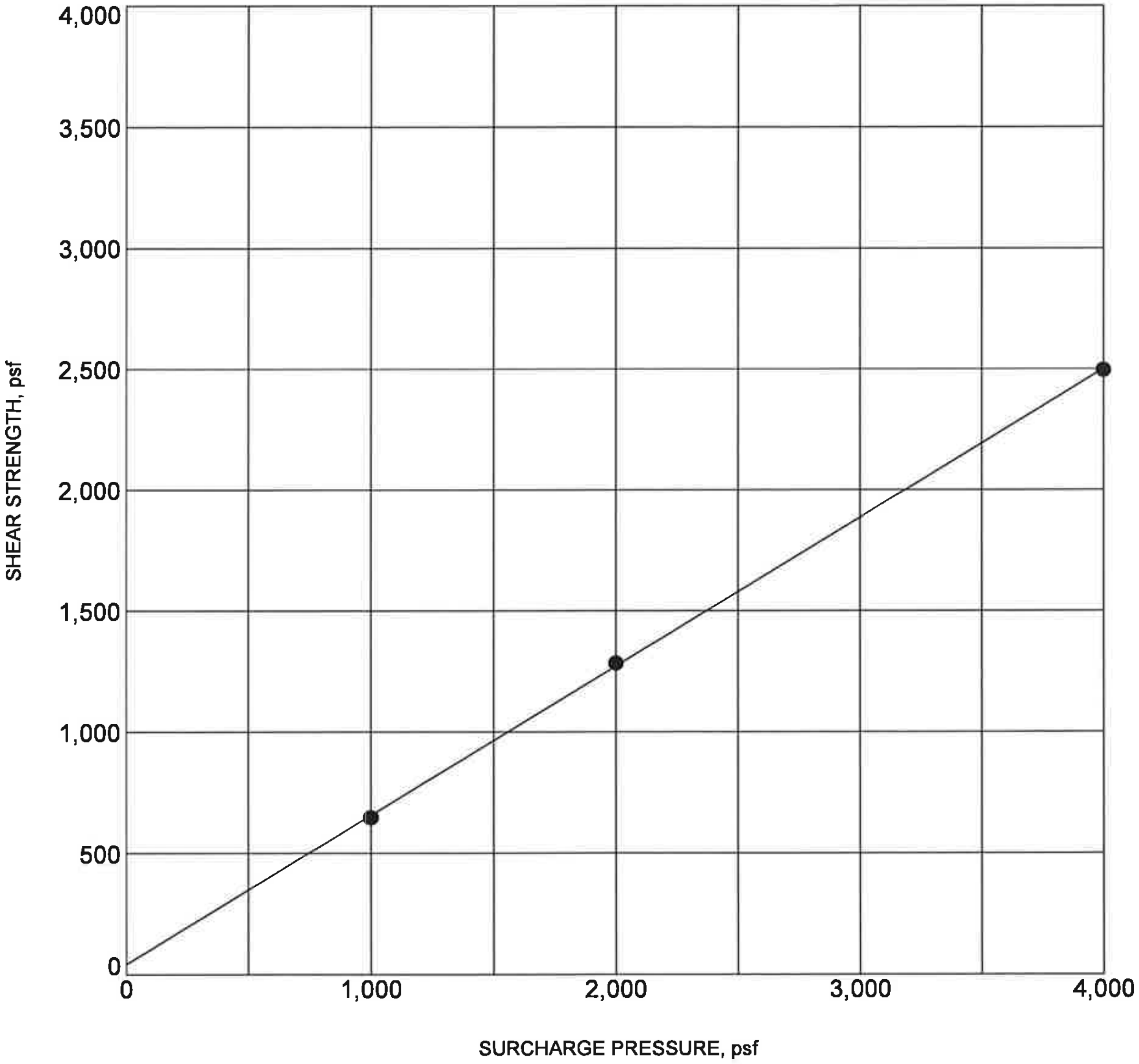
DIRECT SHEAR TEST RESULTS

Converse Consultants

Auto Nation Porsche
Job No: 2007105003
For: Stantec

Project No.
15-81-104-08

Drawing No.
1



BORING NO.	:	B-1 @ 7'	DEPTH (ft)	:	7.0
DESCRIPTION	:	Silty Sand (SM), Fine to Medium Grained, Yellow-Brown			
COHESION (psf)	:	40	FRICTION ANGLE (degrees)	:	32
MOISTURE CONTENT (%)	:	26.3	DRY DENSITY (pcf)	:	97.2

NOTE: Ultimate Strength.

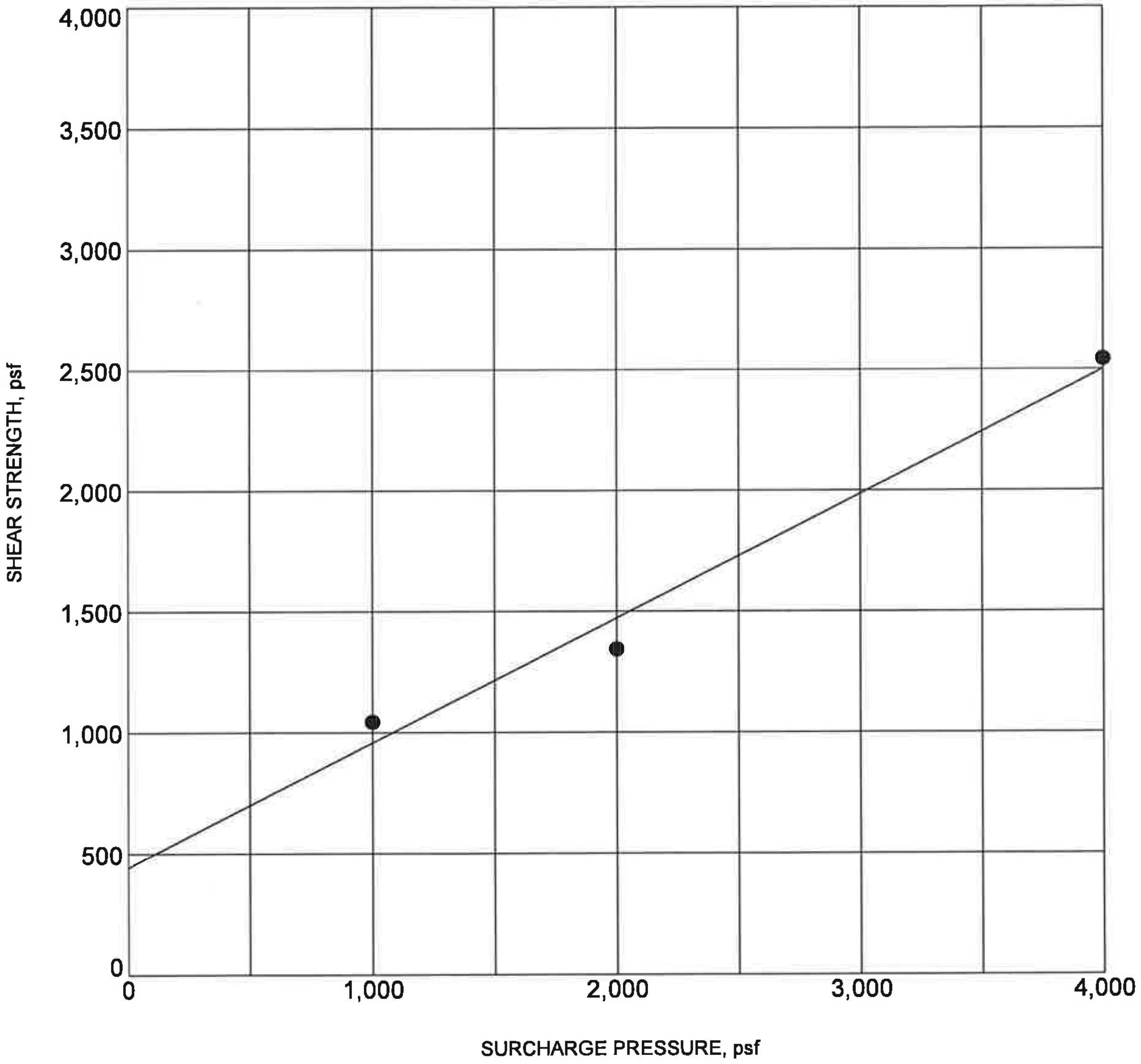
DIRECT SHEAR TEST RESULTS

Converse Consultants

Auto Nation Porsche
Job No: 2007105003
For: Stantec

Project No. 15-81-104-08

Drawing No. 2



BORING NO.	:	B-4 @ 10'	DEPTH (ft)	:	10.0
DESCRIPTION	:	Sandy Clay (CL), Fine to Medium Grained, Olive-Yellow			
COHESION (psf)	:	440	FRICTION ANGLE (degrees):		27
MOISTURE CONTENT (%)	:	53.0	DRY DENSITY (pcf)	:	69.3

NOTE: Ultimate Strength.

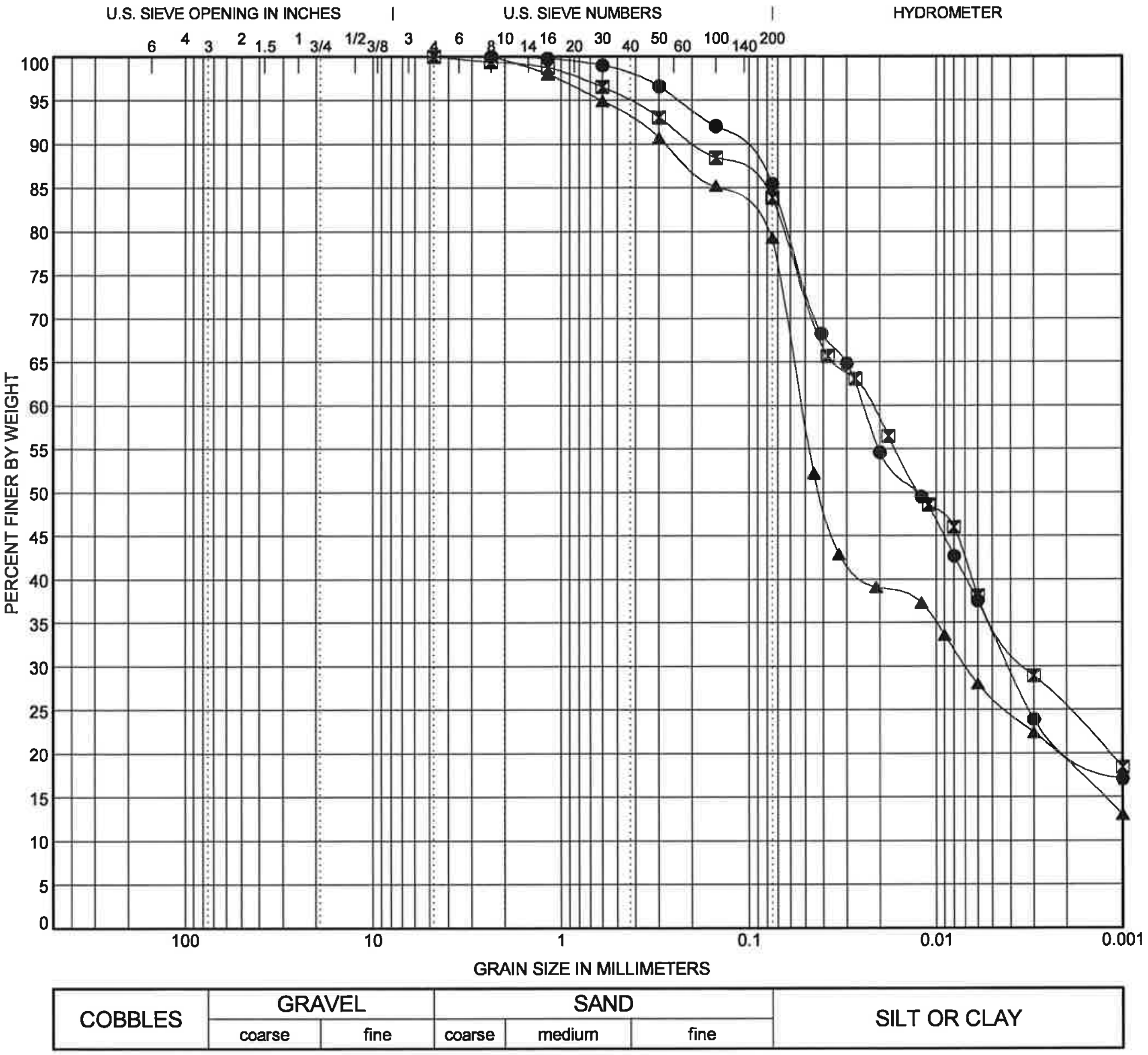
DIRECT SHEAR TEST RESULTS

Converse Consultants

Auto Nation Porsche
Job No: 2007105003
For: Stantec

Project No.
15-81-104-08

Drawing No.
3



	Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu
●	**B-2 @ 15'**	**15**	**Clayey Silt (ML)**					
☒	**B-2 @ 20'**	**20**	**Clayey Silt (ML), with Sand**					
▲	**B-2 @ 30'**	**30**	**Clayey Silt (ML), with Sand**					

	Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-2 @ 15'**	**15**	**2.36**	**0.025**	**0.004**		**0.0**	**14.5**	**85.5**	
☒	**B-2 @ 20'**	**20**	**4.75**	**0.022**	**0.003**		**0.0**	**16.1**	**83.9**	
▲	**B-2 @ 30'**	**30**	**2.36**	**0.052**	**0.007**		**0.0**	**20.7**	**79.3**	

GRAIN SIZE DISTRIBUTION RESULTS

Converse Consultants

Auto Nation Porsche
Job No: 2007105003
For: Stantec

Project No.
15-81-104-08

Drawing No.
4

Table 1 - Laboratory Tests on Soil Samples

Converse Consultants
Auto Nation
Your #15-81-104-08, HDR Lab #15-0248LAB
31-Mar-15

Sample ID			
			B-1 @ 0-5'
Resistivity		**Units**	
as-received		ohm-cm	2,000
saturated		ohm-cm	480
pH			7.7
Electrical Conductivity		mS/cm	0.84
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	316
magnesium	Mg^{2+}	mg/kg	59
sodium	Na^{1+}	mg/kg	419
potassium	K^{1+}	mg/kg	45
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	131
fluoride	F^{1-}	mg/kg	1.0
chloride	Cl^{1-}	mg/kg	531
sulfate	SO_4^{2-}	mg/kg	1,060
phosphate	PO_4^{3-}	mg/kg	3.0
Other Tests			
ammonium	NH_4^{1+}	mg/kg	ND
nitrate	NO_3^{1-}	mg/kg	15
sulfide	S^{2-}	qual	na
Redox		mV	na

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

APPENDIX D
GENERAL EARTHWORK AND GRADING SPECIFICATIONS

APPENDIX D

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

These general earthwork and grading specifications are for the grading and earthwork shown on the approved grading plan(s) and/or as indicated in this geotechnical report(s). These specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these general specifications. However, observations of the earthwork by the Project Geotechnical Engineer during the course of grading could result in new or revised recommendations that could supersede these specifications or the recommendations of the geotechnical report(s).

PROJECT GEOTECHNICAL ENGINEER

The owner shall contract with the Project Geotechnical Engineer of Record. The Project Geotechnical Engineer shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of grading. During the grading and earthwork operations, the Project Geotechnical Engineer shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Project Geotechnical Engineer shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of overexcavation areas, all key bottoms, and benches made on sloping ground to receive fill.

The Project Geotechnical Engineer shall observe the moisture conditioning and processing of the areas to receive fill materials and the fill materials themselves, and perform compaction testing of fill to determine the level of compaction. The responsibility of achieving soil compaction is that of the Contractor. The Project Geotechnical Engineer shall provide the test results to the owner and the Contractor on a routine and frequent basis to assist the Contractor in determining the best means to achieve the required soil compaction. The Project Geotechnical Engineer shall schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing as informed by Contractor of the anticipated schedule. The purpose of these specifications, the term Project Geotechnical Engineer includes workman working under the authority of the Project Geotechnical Engineer.

EARTHWORK CONTRACTOR

The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture conditioning, processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

If requested by the Owner, the Contractor shall prepare and submit to the owner and the Project Geotechnical Engineer a work plan that indicates the sequence of earthwork grading and the estimated quantities of daily earthwork contemplated for the Site prior to commencement of grading. The Contractor shall inform the Owner and the Project

Geotechnical Engineer of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Project Geotechnical Engineer is aware of all grading operations. The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Project Geotechnical Engineer, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Contractor shall rectify the unsatisfactory conditions to the satisfaction of the Project Geotechnical Engineer. If the unsatisfactory conditions cannot be rectified to the satisfaction of the Project Geotechnical Engineer, the Owner should stop construction until an adequate plan to remedy the conditions can be established.

GUIDE SPECIFICATIONS

The following items of these guide specifications should be regarded as the minimum requirements for general earthwork and grading operations. On a Site specific basis, local governmental agencies may have more stringent requirements than specified herein.

1. All filling and backfilling operations should conform with applicable local building and safety codes and to the rules and regulations of those governmental agencies having jurisdiction over the subject construction. The earthworks contractor is responsible to notify governmental agencies, as required, and the Project Geotechnical Engineer at the initiation of grading, and when grading operations are resumed after an interruption. Each step of the grading should be approved in a specific area by the Project Geotechnical Engineer and, where required, by the applicable governmental agencies before proceeding with subsequent work.
2. Prior to the start of grading, the Site shall be cleared and grubbed of all debris, vegetation, deleterious materials, surface obstructions and loose unapproved fill shall be removed and disposed offsite. Existing irrigation, drainage or utility lines, or other abandoned subsurface structures shall be removed, destroyed or abandoned in compliance with specifications and recommendations from the Project Geotechnical Engineer, owner or local governing agencies. The Project Geotechnical Engineer shall evaluate the extent of these removals depending on Site specific conditions. No fill material or soil supporting structural fill material shall contain more than five percent organic materials (by volume). As allowed by the Owner, unsuitable materials may potentially by utilized in non-structural fill areas.
3. Existing ground that has been declared satisfactory to support fill by the Project Geotechnical Engineer shall be scarified a minimum depth of six inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.
4. In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, uncontrolled artificial fill, soft, loose, dry, saturated, spongy, organic-rich, highly fractured, porous, collapsible or otherwise unsuitable ground shall be overexcavated to competent ground, as evaluated by the Project Geotechnical Engineer during grading. Competent ground may include dense, non-porous natural deposits of soil.

5. If potentially hazardous materials are encountered, the Contractor shall stop work in the area and the Project Environmental Engineer or Project Geotechnical Engineer shall be informed immediately for proper evaluation and handling of these materials prior to continuing work in that area.
6. Where fill is placed on a sloping ground that is steeper than 20 percent, the ground to receive fill shall be prepared by proper keying and benching. The Project Geotechnical Engineer shall determine the vertical and horizontal sizes of the keys and benches. In general, the lowest keyway shall be constructed under the toe of the fill at least 15 feet in width and at least two feet deep, into competent material, as evaluated by the Project Geotechnical Engineer. Subsequent benches shall be excavated a minimum height of four feet into competent material or as otherwise recommended by the Project Geotechnical Engineer. Fill placed on sloping ground that is flatter than 20 percent shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.
7. All areas to receive fill, including processed areas, overexcavation bottoms, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested to evaluate if geotechnically suitable materials have been exposed.
8. Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan or as recommended by the Project Geotechnical engineer. The Project Geotechnical engineer may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on the actual subsurface conditions encountered during grading. A registered land surveyor/civil engineer shall survey all subdrains after installation and prior to burial for line and grade.
9. Material to be used as fill shall be approved by the Project Geotechnical engineer and shall be essentially free of organic matter and other deleterious substances. Soils of poor quality, such as those with unacceptable gradation, expansive potential (import soils with an expansion index greater than 20), or low strength shall be placed in areas acceptable to the Project Geotechnical engineer and/or mixed with other soils to achieve satisfactory fill material.
10. Oversize material defined as rock, or other irreducible material with a maximum dimension greater than three inches, shall not be buried or incorporated in the fill unless the Project Geotechnical Engineer specifically accepts the placement methods. If approved by the Project Geotechnical Engineer, placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill.
11. If importing of fill material is required for grading, proposed import material shall meet the requirements specified herein. The potential import source shall be given to the Project Geotechnical Engineer at least two working days before importing begins so that its suitability can be determined and appropriate tests can be performed.
12. Approved fill material shall be placed in areas prepared to receive fill in near-horizontal layers not exceeding eight inches in loose thickness. The Project Geotechnical Engineer may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture content throughout. Thinner layers of soil may be necessary if the Contractor is unable to achieve the required compaction.
13. Fill soils shall be moisture conditioned (e.g. watered, dried back, blended, and/or mixed, as necessary) to attain a relatively uniform moisture content near the optimum. The maximum dry density and optimum soil moisture content of fill materials shall be performed in accordance with ASTM Test Method D 1557.
14. After each layer has been moisture-conditioned, mixed, and evenly placed, the soil shall be uniformly compacted to not less than 90 percent of maximum dry density, unless otherwise specified in the approved geotechnical report(s). The contractor shall utilize equipment that is sized to efficiently achieve the specified level of compaction in a

uniform manner. The contractor's earthwork operations should not result in movement or damage to completed work.

15. Field tests for moisture content and relative compaction of the fill soils shall be performed by the Project Geotechnical Engineer in accordance with ASTM standards or as required by local governmental agencies. The location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Tests shall be taken at intervals not exceeding two feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. The Contractor shall allow the Project Geotechnical Engineer a safe means to adequately test fill construction. If the Contractor achieves substandard compaction, the contractor shall adjust the earthwork operations (which may include additional compactive energy, adjustment of moisture content, thinner soil lifts, uniform soil placement, etc.) to meet the project specifications.
16. Wherever, in the opinion of the Project Geotechnical Engineer or Owner, an unstable condition is being created by cutting or filling, the work shall not proceed in that area until an investigation has been made and the grading recommendations revised, if necessary.

HARVEST AND REUSE ANALYSIS

minimum incremental benefit required to mandate its use (See discussion of threshold incremental benefit in **Appendix XIII**). This level of performance is termed the "minimum partial capture." A harvest and use system would be considered to achieve less than "minimum partial capture" if:

- Based on a system sized for the full DCV from the tributary area, and
- Based on the combined project demand for harvested water,
- The system draws down in greater than 30 days (720 hours), therefore captures less than 40 percent of average annual runoff (See Figure III.2).

Harvest and use systems with demand lower than required to achieve minimum partial capture are not required to be considered to demonstrate retention of stormwater to the MEP. If this is the case, other LID BMPs must be evaluated for retention and/or biotreatment of the Project DCV.

X.3.2. Demand Thresholds for Minimum Partial Capture

Table X.6 provides the minimum combined project demand to meet the minimum partial capture for the range of precipitation zones found in Orange County. Projects with a total demand below this value not required to prepare a project specific evaluation of harvest and use feasibility.

Table X.6: Harvested Water Demand Thresholds for Minimum Partial Capture

Design Capture Storm Depth[1], inches	Wet Season Demand Required for Minimum Partial Capture[2], gpd per impervious acre
0.60	490
0.65	530
0.70	570
0.75	610
0.80	650
0.85	690
0.90	730
0.95	770
1.00	810

0.66 in - interpolate = 538 gpd per impervious acre

1 - Based on isopluvial map (See **XVI.1**)

2 –Minimum Partial Capture is a performance standard whereby system performance exceeds 40 percent capture (See **Appendix** XIII) , such that the system must be considered for use even if it cannot achieve the full DCV.

Table X.8: Minimum Irrigated Area for Potential Partial Capture Feasibility

General Landscape Type	Conservation Design: $K_L = 0.35$			Active Turf Areas: $K_L = 0.7$		
Closest ET Station	*Irvine*	*Santa Ana*	*Laguna*	*Irvine*	*Santa Ana*	*Laguna*
Design Capture Storm Depth, inches	**Minimum Required Irrigated Area per Tributary Impervious Acre for Potential Partial Capture, ac/ac**					
0.60	0.66	0.68	0.72	0.33	0.34	0.36
0.65	0.72	0.73	0.78	0.36	0.37	0.39
0.70	0.77	0.79	0.84	0.39	0.39	0.42
0.75	0.83	0.84	0.90	0.41	0.42	0.45
0.80	0.88	0.90	0.96	0.44	0.45	0.48
0.85	0.93	0.95	1.02	0.47	0.48	0.51
0.90	0.99	1.01	1.08	0.49	0.51	0.54
0.95	1.04	1.07	1.14	0.52	0.53	0.57
1.00	1.10	1.12	1.20	0.55	0.56	0.60

Worksheet J: Summary of Harvested Water Demand and Feasibility

1	What demands for harvested water exist in the tributary area (check all that apply):			
2	Toilet and urinal flushing		☒	
3	Landscape irrigation		☒	
4	Other:____		☐	
5	What is the design capture storm depth? (**Figure III.1**)	d	0.66	inches
6	What is the project size?	A	1.64	ac
7	What is the acreage of impervious area?	IA	1.36	ac
	For projects with both toilet flushing and indoor demand			
8	What is the minimum use required for partial capture? (**Table X.6**)		732	gpd
9	What is the project estimated minimum wet season total daily use?		316	gpd
10	Is partial capture potentially feasible? (Line 9 > Line 8?)		No	
	For projects with only toilet flushing demand			
11	What is the minimum TUTIA for partial capture? (**Table X.7**)			
12	What is the project estimated TUTIA?			

Worksheet J: Summary of Harvested Water Demand and Feasibility

13	Is partial capture potentially feasible? (Line 12 > Line 11?)		
	For projects with only irrigation demand		
14	What is the minimum irrigation area required based on conservation landscape design? (**Table X.8**)		ac
15	What is the proposed project irrigated area? (multiply conservation landscaping by 1; multiply active turf by 2)		ac
16	Is partial capture potentially feasible? (Line 15 > Line 14?)		
Provide supporting assumptions and citations for controlling demand calculation:			

PRE AND POST DEVELOPMENT
2-YEAR HYDROLOGY AND VOLUME CALCULATIONS

```
*****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2014 Advanced Engineering Software (aes)
             Ver. 21.0  Release Date: 06/01/2014  License ID 1535

                           Analysis prepared by:

                                  Stantec




-----------------------------------------------------------------------------
  FILE NAME: EX_2YR.DAT
  TIME/DATE OF STUDY: 10:07 06/01/2016
=============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

*****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
-----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   226.00
  ELEVATION DATA: UPSTREAM(FEET) =     88.00  DOWNSTREAM(FEET) =     12.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.295
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.191
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B        0.25      0.30     0.900    36    5.29
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      0.43
  TOTAL AREA(ACRES) =      0.25   PEAK FLOW RATE(CFS) =      0.43

*****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    101.00 IS CODE =  81
-----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
  MAINLINE Tc(MIN.) =    5.29
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.191
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B        1.35      0.30     0.900    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =     1.35      SUBAREA RUNOFF(CFS) =    2.33
  EFFECTIVE AREA(ACRES) =       1.60   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       2.77

*****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    103.00 IS CODE =  81
-----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
============================================================================
  MAINLINE Tc(MIN.) =    5.29
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.191
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.05      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.05      SUBAREA RUNOFF(CFS) =    2.04
  EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =        2.7       PEAK FLOW RATE(CFS) =       4.81
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.7  TC(MIN.) =      5.29
  EFFECTIVE AREA(ACRES) =      2.65  AREA-AVERAGED Fm(INCH/HR)=  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.583
  PEAK FLOW RATE(CFS)   =       4.81
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS

♀
```

```
****************************************************************************
                      SMALL AREA UNIT HYDROGRAPH MODEL
============================================================================
         (C) Copyright 1989-2014 Advanced Engineering Software (aes)
             Ver. 21.0  Release Date: 06/01/2014  License ID 1535

                           Analysis prepared by:

                                  Stantec



****************************************************************************
----------------------------------------------------------------------------

 Problem Descriptions:
  Newport Beach Porsche
  Hydrograph - 2-Year
  Pre-Development
----------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.89
    TOTAL CATCHMENT AREA(ACRES) =    2.65
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.170
    LOW LOSS FRACTION = 0.350
    TIME OF CONCENTRATION(MIN.) =  5.29
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

----------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.27
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.18

****************************************************************************
  TIME     VOLUME       Q    0.         2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
----------------------------------------------------------------------------
  0.04      0.0001      0.05  Q         .         .         .         .
  0.13      0.0004      0.05  Q         .         .         .         .
  0.22      0.0008      0.05  Q         .         .         .         .
  0.31      0.0012      0.05  Q         .         .         .         .
  0.39      0.0015      0.05  Q         .         .         .         .
  0.48      0.0019      0.05  Q         .         .         .         .
  0.57      0.0023      0.05  Q         .         .         .         .
  0.66      0.0026      0.05  Q         .         .         .         .
  0.75      0.0030      0.05  Q         .         .         .         .
  0.84      0.0034      0.05  Q         .         .         .         .
  0.92      0.0037      0.05  Q         .         .         .         .
  1.01      0.0041      0.05  Q         .         .         .         .
  1.10      0.0045      0.05  Q         .         .         .         .
  1.19      0.0048      0.05  Q         .         .         .         .
  1.28      0.0052      0.05  Q         .         .         .         .
  1.36      0.0056      0.05  Q         .         .         .         .
  1.45      0.0060      0.05  Q         .         .         .         .
  1.54      0.0063      0.05  Q         .         .         .         .
  1.63      0.0067      0.05  Q         .         .         .         .
  1.72      0.0071      0.05  Q         .         .         .         .
  1.81      0.0075      0.05  Q         .         .         .         .
  1.89      0.0079      0.05  Q         .         .         .         .
```

```
  1.98      0.0083      0.05  Q          .          .          .          .
  2.07      0.0086      0.05  Q          .          .          .          .
  2.16      0.0090      0.05  Q          .          .          .          .
  2.25      0.0094      0.05  Q          .          .          .          .
  2.33      0.0098      0.05  Q          .          .          .          .
  2.42      0.0102      0.05  Q          .          .          .          .
  2.51      0.0106      0.05  Q          .          .          .          .
  2.60      0.0110      0.05  Q          .          .          .          .
  2.69      0.0114      0.05  Q          .          .          .          .
  2.78      0.0118      0.06  Q          .          .          .          .
  2.86      0.0122      0.06  Q          .          .          .          .
  2.95      0.0126      0.06  Q          .          .          .          .
  3.04      0.0130      0.06  Q          .          .          .          .
  3.13      0.0134      0.06  Q          .          .          .          .
  3.22      0.0138      0.06  Q          .          .          .          .
  3.30      0.0142      0.06  Q          .          .          .          .
  3.39      0.0147      0.06  Q          .          .          .          .
  3.48      0.0151      0.06  Q          .          .          .          .
  3.57      0.0155      0.06  Q          .          .          .          .
  3.66      0.0159      0.06  Q          .          .          .          .
  3.74      0.0163      0.06  Q          .          .          .          .
  3.83      0.0168      0.06  Q          .          .          .          .
  3.92      0.0172      0.06  Q          .          .          .          .
  4.01      0.0176      0.06  Q          .          .          .          .
  4.10      0.0180      0.06  Q          .          .          .          .
  4.19      0.0185      0.06  Q          .          .          .          .
  4.27      0.0189      0.06  Q          .          .          .          .
  4.36      0.0193      0.06  Q          .          .          .          .
  4.45      0.0198      0.06  Q          .          .          .          .
  4.54      0.0202      0.06  Q          .          .          .          .
  4.63      0.0206      0.06  Q          .          .          .          .
  4.71      0.0211      0.06  Q          .          .          .          .
  4.80      0.0215      0.06  Q          .          .          .          .
  4.89      0.0220      0.06  Q          .          .          .          .
  4.98      0.0224      0.06  Q          .          .          .          .
  5.07      0.0229      0.06  Q          .          .          .          .
  5.16      0.0233      0.06  Q          .          .          .          .
  5.24      0.0238      0.06  Q          .          .          .          .
  5.33      0.0242      0.06  Q          .          .          .          .
  5.42      0.0247      0.06  Q          .          .          .          .
  5.51      0.0252      0.06  Q          .          .          .          .
  5.60      0.0256      0.06  Q          .          .          .          .
  5.68      0.0261      0.06  Q          .          .          .          .
  5.77      0.0266      0.06  Q          .          .          .          .
  5.86      0.0270      0.07  Q          .          .          .          .
  5.95      0.0275      0.07  Q          .          .          .          .
  6.04      0.0280      0.07  Q          .          .          .          .
  6.13      0.0285      0.07  Q          .          .          .          .
  6.21      0.0289      0.07  Q          .          .          .          .
  6.30      0.0294      0.07  Q          .          .          .          .
  6.39      0.0299      0.07  Q          .          .          .          .
  6.48      0.0304      0.07  Q          .          .          .          .
  6.57      0.0309      0.07  Q          .          .          .          .
  6.65      0.0314      0.07  Q          .          .          .          .
  6.74      0.0319      0.07  Q          .          .          .          .
  6.83      0.0324      0.07  Q          .          .          .          .
  6.92      0.0329      0.07  Q          .          .          .          .
  7.01      0.0334      0.07  Q          .          .          .          .
  7.10      0.0339      0.07  Q          .          .          .          .
  7.18      0.0344      0.07  Q          .          .          .          .
  7.27      0.0350      0.07  Q          .          .          .          .
  7.36      0.0355      0.07  Q          .          .          .          .
  7.45      0.0360      0.07  Q          .          .          .          .
  7.54      0.0365      0.07  Q          .          .          .          .
  7.62      0.0371      0.07  Q          .          .          .          .
  7.71      0.0376      0.07  Q          .          .          .          .
  7.80      0.0381      0.07  Q          .          .          .          .
  7.89      0.0387      0.07  Q          .          .          .          .
  7.98      0.0392      0.08  Q          .          .          .          .
  8.06      0.0398      0.08  Q          .          .          .          .
```

```
  8.15      0.0403      0.08  Q          .          .          .          .
  8.24      0.0409      0.08  Q          .          .          .          .
  8.33      0.0415      0.08  Q          .          .          .          .
  8.42      0.0420      0.08  Q          .          .          .          .
  8.51      0.0426      0.08  Q          .          .          .          .
  8.59      0.0432      0.08  Q          .          .          .          .
  8.68      0.0437      0.08  Q          .          .          .          .
  8.77      0.0443      0.08  Q          .          .          .          .
  8.86      0.0449      0.08  Q          .          .          .          .
  8.95      0.0455      0.08  Q          .          .          .          .
  9.03      0.0461      0.08  Q          .          .          .          .
  9.12      0.0467      0.08  Q          .          .          .          .
  9.21      0.0473      0.08  Q          .          .          .          .
  9.30      0.0479      0.08  Q          .          .          .          .
  9.39      0.0485      0.08  Q          .          .          .          .
  9.48      0.0491      0.09  Q          .          .          .          .
  9.56      0.0498      0.09  Q          .          .          .          .
  9.65      0.0504      0.09  Q          .          .          .          .
  9.74      0.0510      0.09  Q          .          .          .          .
  9.83      0.0517      0.09  Q          .          .          .          .
  9.92      0.0523      0.09  Q          .          .          .          .
 10.00      0.0530      0.09  Q          .          .          .          .
 10.09      0.0536      0.09  Q          .          .          .          .
 10.18      0.0543      0.09  Q          .          .          .          .
 10.27      0.0550      0.09  Q          .          .          .          .
 10.36      0.0556      0.09  Q          .          .          .          .
 10.45      0.0563      0.09  Q          .          .          .          .
 10.53      0.0570      0.10  Q          .          .          .          .
 10.62      0.0577      0.10  Q          .          .          .          .
 10.71      0.0584      0.10  Q          .          .          .          .
 10.80      0.0591      0.10  Q          .          .          .          .
 10.89      0.0599      0.10  Q          .          .          .          .
 10.97      0.0606      0.10  Q          .          .          .          .
 11.06      0.0613      0.10  Q          .          .          .          .
 11.15      0.0621      0.10  Q          .          .          .          .
 11.24      0.0628      0.10  Q          .          .          .          .
 11.33      0.0636      0.11  Q          .          .          .          .
 11.42      0.0643      0.11  Q          .          .          .          .
 11.50      0.0651      0.11  Q          .          .          .          .
 11.59      0.0659      0.11  Q          .          .          .          .
 11.68      0.0667      0.11  Q          .          .          .          .
 11.77      0.0675      0.11  Q          .          .          .          .
 11.86      0.0683      0.11  Q          .          .          .          .
 11.94      0.0692      0.11  Q          .          .          .          .
 12.03      0.0700      0.12  Q          .          .          .          .
 12.12      0.0710      0.14  Q          .          .          .          .
 12.21      0.0720      0.14  Q          .          .          .          .
 12.30      0.0731      0.15  Q          .          .          .          .
 12.39      0.0741      0.15  Q          .          .          .          .
 12.47      0.0752      0.15  Q          .          .          .          .
 12.56      0.0763      0.15  Q          .          .          .          .
 12.65      0.0775      0.15  Q          .          .          .          .
 12.74      0.0786      0.16  Q          .          .          .          .
 12.83      0.0797      0.16  Q          .          .          .          .
 12.91      0.0809      0.16  Q          .          .          .          .
 13.00      0.0821      0.16  Q          .          .          .          .
 13.09      0.0833      0.17  Q          .          .          .          .
 13.18      0.0845      0.17  Q          .          .          .          .
 13.27      0.0858      0.17  Q          .          .          .          .
 13.35      0.0870      0.17  Q          .          .          .          .
 13.44      0.0883      0.18  Q          .          .          .          .
 13.53      0.0896      0.18  Q          .          .          .          .
 13.62      0.0910      0.19  Q          .          .          .          .
 13.71      0.0923      0.19  Q          .          .          .          .
 13.80      0.0937      0.19  Q          .          .          .          .
 13.88      0.0951      0.20  Q          .          .          .          .
 13.97      0.0966      0.20  Q          .          .          .          .
 14.06      0.0981      0.21  Q          .          .          .          .
 14.15      0.0996      0.22  Q          .          .          .          .
 14.24      0.1013      0.22  Q          .          .          .          .
```

```
14.32      0.1029      0.23  Q         .         .         .         .
14.41      0.1046      0.24  Q         .         .         .         .
14.50      0.1064      0.25  Q         .         .         .         .
14.59      0.1082      0.25  .Q        .         .         .         .
14.68      0.1100      0.26  .Q        .         .         .         .
14.77      0.1120      0.27  .Q        .         .         .         .
14.85      0.1140      0.28  .Q        .         .         .         .
14.94      0.1160      0.29  .Q        .         .         .         .
15.03      0.1182      0.31  .Q        .         .         .         .
15.12      0.1205      0.31  .Q        .         .         .         .
15.21      0.1228      0.34  .Q        .         .         .         .
15.29      0.1253      0.35  .Q        .         .         .         .
15.38      0.1279      0.36  .Q        .         .         .         .
15.47      0.1305      0.35  .Q        .         .         .         .
15.56      0.1332      0.39  .Q        .         .         .         .
15.65      0.1362      0.42  .Q        .         .         .         .
15.74      0.1396      0.52  . Q       .         .         .         .
15.82      0.1436      0.59  . Q       .         .         .         .
15.91      0.1489      0.87  .  Q      .         .         .         .
16.00      0.1570      1.34  .    Q    .         .         .         .
16.09      0.1794      4.81  .         .        Q.         .         .
16.18      0.1993      0.68  . Q       .         .         .         .
16.26      0.2035      0.46  .Q        .         .         .         .
16.35      0.2065      0.37  .Q        .         .         .         .
16.44      0.2092      0.36  .Q        .         .         .         .
16.53      0.2117      0.33  .Q        .         .         .         .
16.62      0.2139      0.30  .Q        .         .         .         .
16.71      0.2160      0.27  .Q        .         .         .         .
16.79      0.2180      0.26  .Q        .         .         .         .
16.88      0.2198      0.24  Q         .         .         .         .
16.97      0.2215      0.23  Q         .         .         .         .
17.06      0.2231      0.22  Q         .         .         .         .
17.15      0.2246      0.20  Q         .         .         .         .
17.23      0.2260      0.19  Q         .         .         .         .
17.32      0.2274      0.18  Q         .         .         .         .
17.41      0.2287      0.18  Q         .         .         .         .
17.50      0.2300      0.17  Q         .         .         .         .
17.59      0.2312      0.17  Q         .         .         .         .
17.68      0.2324      0.16  Q         .         .         .         .
17.76      0.2335      0.16  Q         .         .         .         .
17.85      0.2346      0.15  Q         .         .         .         .
17.94      0.2357      0.15  Q         .         .         .         .
18.03      0.2368      0.14  Q         .         .         .         .
18.12      0.2377      0.12  Q         .         .         .         .
18.20      0.2386      0.11  Q         .         .         .         .
18.29      0.2394      0.11  Q         .         .         .         .
18.38      0.2402      0.11  Q         .         .         .         .
18.47      0.2409      0.10  Q         .         .         .         .
18.56      0.2417      0.10  Q         .         .         .         .
18.64      0.2424      0.10  Q         .         .         .         .
18.73      0.2431      0.10  Q         .         .         .         .
18.82      0.2438      0.10  Q         .         .         .         .
18.91      0.2445      0.09  Q         .         .         .         .
19.00      0.2452      0.09  Q         .         .         .         .
19.09      0.2459      0.09  Q         .         .         .         .
19.17      0.2465      0.09  Q         .         .         .         .
19.26      0.2472      0.09  Q         .         .         .         .
19.35      0.2478      0.09  Q         .         .         .         .
19.44      0.2484      0.08  Q         .         .         .         .
19.53      0.2490      0.08  Q         .         .         .         .
19.61      0.2496      0.08  Q         .         .         .         .
19.70      0.2502      0.08  Q         .         .         .         .
19.79      0.2508      0.08  Q         .         .         .         .
19.88      0.2514      0.08  Q         .         .         .         .
19.97      0.2519      0.08  Q         .         .         .         .
20.06      0.2525      0.08  Q         .         .         .         .
20.14      0.2531      0.07  Q         .         .         .         .
20.23      0.2536      0.07  Q         .         .         .         .
20.32      0.2541      0.07  Q         .         .         .         .
20.41      0.2547      0.07  Q         .         .         .         .
```

```
  20.50      0.2552      0.07  Q          .         .         .         .
  20.58      0.2557      0.07  Q          .         .         .         .
  20.67      0.2562      0.07  Q          .         .         .         .
  20.76      0.2567      0.07  Q          .         .         .         .
  20.85      0.2572      0.07  Q          .         .         .         .
  20.94      0.2577      0.07  Q          .         .         .         .
  21.03      0.2582      0.07  Q          .         .         .         .
  21.11      0.2587      0.07  Q          .         .         .         .
  21.20      0.2591      0.06  Q          .         .         .         .
  21.29      0.2596      0.06  Q          .         .         .         .
  21.38      0.2601      0.06  Q          .         .         .         .
  21.47      0.2605      0.06  Q          .         .         .         .
  21.55      0.2610      0.06  Q          .         .         .         .
  21.64      0.2614      0.06  Q          .         .         .         .
  21.73      0.2619      0.06  Q          .         .         .         .
  21.82      0.2623      0.06  Q          .         .         .         .
  21.91      0.2628      0.06  Q          .         .         .         .
  22.00      0.2632      0.06  Q          .         .         .         .
  22.08      0.2636      0.06  Q          .         .         .         .
  22.17      0.2641      0.06  Q          .         .         .         .
  22.26      0.2645      0.06  Q          .         .         .         .
  22.35      0.2649      0.06  Q          .         .         .         .
  22.44      0.2653      0.06  Q          .         .         .         .
  22.52      0.2657      0.06  Q          .         .         .         .
  22.61      0.2661      0.06  Q          .         .         .         .
  22.70      0.2665      0.06  Q          .         .         .         .
  22.79      0.2669      0.05  Q          .         .         .         .
  22.88      0.2673      0.05  Q          .         .         .         .
  22.97      0.2677      0.05  Q          .         .         .         .
  23.05      0.2681      0.05  Q          .         .         .         .
  23.14      0.2685      0.05  Q          .         .         .         .
  23.23      0.2689      0.05  Q          .         .         .         .
  23.32      0.2693      0.05  Q          .         .         .         .
  23.41      0.2696      0.05  Q          .         .         .         .
  23.49      0.2700      0.05  Q          .         .         .         .
  23.58      0.2704      0.05  Q          .         .         .         .
  23.67      0.2708      0.05  Q          .         .         .         .
  23.76      0.2711      0.05  Q          .         .         .         .
  23.85      0.2715      0.05  Q          .         .         .         .
  23.93      0.2719      0.05  Q          .         .         .         .
  24.02      0.2722      0.05  Q          .         .         .         .
  24.11      0.2724      0.00  Q          .         .         .         .
 -----------------------------------------------------------------------------
---------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                            1444.2
              10%                              31.7
              20%                              10.6
              30%                               5.3
              40%                               5.3
              50%                               5.3
              60%                               5.3
              70%                               5.3
              80%                               5.3
              90%                               5.3
```

SMALL AREA UNIT HYDROGRAPH INPUT DATA

Composite Curve Number (CN) of Watershed for 25-YR Storm

		CN value from Orange County Hydrology Manual
Watershed Area (Ac) =	2.65	
Impervious Area (Ac) =	1.17	98
Pervious Area (Ac) =	1.48	75

$$\text{Composite CN} = \frac{\sum(\text{impervious CN value})(\text{impervious area}) + (\text{pervious CN value})(\text{pervious area})}{\text{watershed area}}$$

$$= 85$$

$\bar{Y}$ Calculation for Watershed Losses

CN = 85

S = (1000/CN)-10 = 1.74

Ia = 0.2S = 0.35

P_{24} = 4.49

$Y = (P_{24} - Ia)^2 / ((P_{24} - Ia + S)P_{24})$ = 0.649101

$\bar{Y} = 1 - Y$ = 0.35

Input $\bar{Y}$, watershed area, T_C, and F_M values into CH1 module of HydroWin computer program.

T_C and F_M values from rational method hydrology study of watershed.

```
____________________________________________________________________________
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2014 Advanced Engineering Software (aes)
             Ver. 21.0  Release Date: 06/01/2014  License ID 1535

                           Analysis prepared by:

                                  Stantec




----------------------------------------------------------------------------
  FILE NAME: PR-2YR.DAT
  TIME/DATE OF STUDY: 15:31 05/25/2016
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   196.00
  ELEVATION DATA: UPSTREAM(FEET) =     88.00  DOWNSTREAM(FEET) =     31.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.158
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.224
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B        1.26      0.30     0.900    36    5.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      2.22
  TOTAL AREA(ACRES) =      1.26   PEAK FLOW RATE(CFS) =      2.22

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.16
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.224
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.39      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.39      SUBAREA RUNOFF(CFS) =    2.74
  EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        2.7       PEAK FLOW RATE(CFS) =       4.96
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        2.7  TC(MIN.) =      5.16
  EFFECTIVE AREA(ACRES) =      2.65  AREA-AVERAGED Fm(INCH/HR)=  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.480
  PEAK FLOW RATE(CFS)   =       4.96
```

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============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS

♀
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****************************************************************************
                      SMALL AREA UNIT HYDROGRAPH MODEL
============================================================================
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             Ver. 21.0  Release Date: 06/01/2014  License ID 1535

                           Analysis prepared by:

                                  Stantec




****************************************************************************
----------------------------------------------------------------------------

 Problem Descriptions:
  Newport Beach Porsche
  Hydrograph - 2-Year
  Post-Development
----------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.89
    TOTAL CATCHMENT AREA(ACRES) =    2.65
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.140
    LOW LOSS FRACTION = 0.310
    TIME OF CONCENTRATION(MIN.) =  5.16
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

----------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.29
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.16

****************************************************************************
  TIME     VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
----------------------------------------------------------------------------
  0.00      0.0000      0.00  Q         .         .         .         .
  0.09      0.0002      0.05  Q         .         .         .         .
  0.18      0.0006      0.05  Q         .         .         .         .
  0.26      0.0009      0.05  Q         .         .         .         .
  0.35      0.0013      0.05  Q         .         .         .         .
  0.43      0.0017      0.05  Q         .         .         .         .
  0.52      0.0021      0.05  Q         .         .         .         .
  0.61      0.0024      0.05  Q         .         .         .         .
  0.69      0.0028      0.05  Q         .         .         .         .
```

```
 0.78       0.0032       0.05  Q          .          .          .          .
 0.86       0.0036       0.05  Q          .          .          .          .
 0.95       0.0040       0.05  Q          .          .          .          .
 1.04       0.0043       0.05  Q          .          .          .          .
 1.12       0.0047       0.05  Q          .          .          .          .
 1.21       0.0051       0.05  Q          .          .          .          .
 1.29       0.0055       0.05  Q          .          .          .          .
 1.38       0.0059       0.05  Q          .          .          .          .
 1.47       0.0063       0.06  Q          .          .          .          .
 1.55       0.0067       0.06  Q          .          .          .          .
 1.64       0.0071       0.06  Q          .          .          .          .
 1.72       0.0075       0.06  Q          .          .          .          .
 1.81       0.0079       0.06  Q          .          .          .          .
 1.90       0.0083       0.06  Q          .          .          .          .
 1.98       0.0087       0.06  Q          .          .          .          .
 2.07       0.0091       0.06  Q          .          .          .          .
 2.15       0.0095       0.06  Q          .          .          .          .
 2.24       0.0099       0.06  Q          .          .          .          .
 2.33       0.0103       0.06  Q          .          .          .          .
 2.41       0.0107       0.06  Q          .          .          .          .
 2.50       0.0111       0.06  Q          .          .          .          .
 2.58       0.0115       0.06  Q          .          .          .          .
 2.67       0.0119       0.06  Q          .          .          .          .
 2.76       0.0123       0.06  Q          .          .          .          .
 2.84       0.0128       0.06  Q          .          .          .          .
 2.93       0.0132       0.06  Q          .          .          .          .
 3.01       0.0136       0.06  Q          .          .          .          .
 3.10       0.0140       0.06  Q          .          .          .          .
 3.19       0.0144       0.06  Q          .          .          .          .
 3.27       0.0149       0.06  Q          .          .          .          .
 3.36       0.0153       0.06  Q          .          .          .          .
 3.44       0.0157       0.06  Q          .          .          .          .
 3.53       0.0162       0.06  Q          .          .          .          .
 3.62       0.0166       0.06  Q          .          .          .          .
 3.70       0.0170       0.06  Q          .          .          .          .
 3.79       0.0175       0.06  Q          .          .          .          .
 3.87       0.0179       0.06  Q          .          .          .          .
 3.96       0.0183       0.06  Q          .          .          .          .
 4.05       0.0188       0.06  Q          .          .          .          .
 4.13       0.0192       0.06  Q          .          .          .          .
 4.22       0.0197       0.06  Q          .          .          .          .
 4.30       0.0201       0.06  Q          .          .          .          .
 4.39       0.0206       0.06  Q          .          .          .          .
 4.48       0.0210       0.06  Q          .          .          .          .
 4.56       0.0215       0.06  Q          .          .          .          .
 4.65       0.0219       0.06  Q          .          .          .          .
 4.73       0.0224       0.06  Q          .          .          .          .
 4.82       0.0229       0.06  Q          .          .          .          .
 4.91       0.0233       0.07  Q          .          .          .          .
 4.99       0.0238       0.07  Q          .          .          .          .
 5.08       0.0243       0.07  Q          .          .          .          .
 5.16       0.0247       0.07  Q          .          .          .          .
 5.25       0.0252       0.07  Q          .          .          .          .
 5.34       0.0257       0.07  Q          .          .          .          .
 5.42       0.0261       0.07  Q          .          .          .          .
 5.51       0.0266       0.07  Q          .          .          .          .
 5.59       0.0271       0.07  Q          .          .          .          .
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 5.68      0.0276      0.07  Q          .         .         .         .
 5.77      0.0281      0.07  Q          .         .         .         .
 5.85      0.0286      0.07  Q          .         .         .         .
 5.94      0.0291      0.07  Q          .         .         .         .
 6.02      0.0296      0.07  Q          .         .         .         .
 6.11      0.0301      0.07  Q          .         .         .         .
 6.20      0.0306      0.07  Q          .         .         .         .
 6.28      0.0311      0.07  Q          .         .         .         .
 6.37      0.0316      0.07  Q          .         .         .         .
 6.45      0.0321      0.07  Q          .         .         .         .
 6.54      0.0326      0.07  Q          .         .         .         .
 6.63      0.0331      0.07  Q          .         .         .         .
 6.71      0.0336      0.07  Q          .         .         .         .
 6.80      0.0341      0.07  Q          .         .         .         .
 6.88      0.0347      0.07  Q          .         .         .         .
 6.97      0.0352      0.07  Q          .         .         .         .
 7.06      0.0357      0.07  Q          .         .         .         .
 7.14      0.0362      0.08  Q          .         .         .         .
 7.23      0.0368      0.08  Q          .         .         .         .
 7.31      0.0373      0.08  Q          .         .         .         .
 7.40      0.0379      0.08  Q          .         .         .         .
 7.49      0.0384      0.08  Q          .         .         .         .
 7.57      0.0390      0.08  Q          .         .         .         .
 7.66      0.0395      0.08  Q          .         .         .         .
 7.74      0.0401      0.08  Q          .         .         .         .
 7.83      0.0406      0.08  Q          .         .         .         .
 7.92      0.0412      0.08  Q          .         .         .         .
 8.00      0.0418      0.08  Q          .         .         .         .
 8.09      0.0423      0.08  Q          .         .         .         .
 8.17      0.0429      0.08  Q          .         .         .         .
 8.26      0.0435      0.08  Q          .         .         .         .
 8.35      0.0441      0.08  Q          .         .         .         .
 8.43      0.0446      0.08  Q          .         .         .         .
 8.52      0.0452      0.08  Q          .         .         .         .
 8.60      0.0458      0.08  Q          .         .         .         .
 8.69      0.0464      0.08  Q          .         .         .         .
 8.78      0.0470      0.09  Q          .         .         .         .
 8.86      0.0476      0.09  Q          .         .         .         .
 8.95      0.0483      0.09  Q          .         .         .         .
 9.03      0.0489      0.09  Q          .         .         .         .
 9.12      0.0495      0.09  Q          .         .         .         .
 9.21      0.0501      0.09  Q          .         .         .         .
 9.29      0.0508      0.09  Q          .         .         .         .
 9.38      0.0514      0.09  Q          .         .         .         .
 9.46      0.0520      0.09  Q          .         .         .         .
 9.55      0.0527      0.09  Q          .         .         .         .
 9.64      0.0533      0.09  Q          .         .         .         .
 9.72      0.0540      0.09  Q          .         .         .         .
 9.81      0.0547      0.09  Q          .         .         .         .
 9.89      0.0553      0.09  Q          .         .         .         .
 9.98      0.0560      0.10  Q          .         .         .         .
10.07      0.0567      0.10  Q          .         .         .         .
10.15      0.0574      0.10  Q          .         .         .         .
10.24      0.0581      0.10  Q          .         .         .         .
10.32      0.0588      0.10  Q          .         .         .         .
10.41      0.0595      0.10  Q          .         .         .         .
10.50      0.0602      0.10  Q          .         .         .         .
```

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10.58      0.0609      0.10  Q         .         .         .         .
10.67      0.0616      0.10  Q         .         .         .         .
10.75      0.0624      0.10  Q         .         .         .         .
10.84      0.0631      0.10  Q         .         .         .         .
10.93      0.0639      0.11  Q         .         .         .         .
11.01      0.0646      0.11  Q         .         .         .         .
11.10      0.0654      0.11  Q         .         .         .         .
11.18      0.0662      0.11  Q         .         .         .         .
11.27      0.0669      0.11  Q         .         .         .         .
11.36      0.0677      0.11  Q         .         .         .         .
11.44      0.0685      0.11  Q         .         .         .         .
11.53      0.0693      0.11  Q         .         .         .         .
11.61      0.0702      0.12  Q         .         .         .         .
11.70      0.0710      0.12  Q         .         .         .         .
11.79      0.0718      0.12  Q         .         .         .         .
11.87      0.0727      0.12  Q         .         .         .         .
11.96      0.0735      0.12  Q         .         .         .         .
12.04      0.0744      0.12  Q         .         .         .         .
12.13      0.0754      0.15  Q         .         .         .         .
12.22      0.0765      0.15  Q         .         .         .         .
12.30      0.0776      0.16  Q         .         .         .         .
12.39      0.0787      0.16  Q         .         .         .         .
12.47      0.0798      0.16  Q         .         .         .         .
12.56      0.0810      0.16  Q         .         .         .         .
12.65      0.0821      0.16  Q         .         .         .         .
12.73      0.0833      0.17  Q         .         .         .         .
12.82      0.0845      0.17  Q         .         .         .         .
12.90      0.0857      0.17  Q         .         .         .         .
12.99      0.0869      0.17  Q         .         .         .         .
13.08      0.0882      0.18  Q         .         .         .         .
13.16      0.0894      0.18  Q         .         .         .         .
13.25      0.0907      0.18  Q         .         .         .         .
13.33      0.0920      0.19  Q         .         .         .         .
13.42      0.0934      0.19  Q         .         .         .         .
13.51      0.0947      0.19  Q         .         .         .         .
13.59      0.0961      0.20  Q         .         .         .         .
13.68      0.0975      0.20  Q         .         .         .         .
13.76      0.0989      0.20  Q         .         .         .         .
13.85      0.1004      0.21  Q         .         .         .         .
13.94      0.1019      0.21  Q         .         .         .         .
14.02      0.1034      0.22  Q         .         .         .         .
14.11      0.1050      0.23  Q         .         .         .         .
14.19      0.1067      0.24  Q         .         .         .         .
14.28      0.1084      0.24  Q         .         .         .         .
14.37      0.1101      0.25  Q         .         .         .         .
14.45      0.1119      0.25  .Q        .         .         .         .
14.54      0.1137      0.26  .Q        .         .         .         .
14.62      0.1156      0.27  .Q        .         .         .         .
14.71      0.1176      0.28  .Q        .         .         .         .
14.80      0.1196      0.29  .Q        .         .         .         .
14.88      0.1217      0.30  .Q        .         .         .         .
14.97      0.1239      0.31  .Q        .         .         .         .
15.05      0.1262      0.33  .Q        .         .         .         .
15.14      0.1285      0.34  .Q        .         .         .         .
15.23      0.1310      0.36  .Q        .         .         .         .
15.31      0.1337      0.38  .Q        .         .         .         .
15.40      0.1363      0.37  .Q        .         .         .         .
```

```
15.48      0.1390      0.37  .Q        .         .         .         .
15.57      0.1418      0.42  .Q        .         .         .         .
15.66      0.1449      0.46  .Q        .         .         .         .
15.74      0.1485      0.56  . Q       .         .         .         .
15.83      0.1528      0.63  . Q       .         .         .         .
15.91      0.1584      0.96  .  Q      .         .         .         .
16.00      0.1670      1.43  .    Q    .         .         .         .
16.09      0.1897      4.96  .         .        Q.         .         .
16.17      0.2099      0.73  . Q       .         .         .         .
16.26      0.2143      0.50  .Q        .         .         .         .
16.34      0.2174      0.40  .Q        .         .         .         .
16.43      0.2202      0.39  .Q        .         .         .         .
16.52      0.2229      0.35  .Q        .         .         .         .
16.60      0.2253      0.32  .Q        .         .         .         .
16.69      0.2274      0.29  .Q        .         .         .         .
16.77      0.2295      0.28  .Q        .         .         .         .
16.86      0.2314      0.26  .Q        .         .         .         .
16.95      0.2332      0.25  Q         .         .         .         .
17.03      0.2349      0.23  Q         .         .         .         .
17.12      0.2365      0.21  Q         .         .         .         .
17.20      0.2379      0.21  Q         .         .         .         .
17.29      0.2394      0.20  Q         .         .         .         .
17.38      0.2408      0.19  Q         .         .         .         .
17.46      0.2421      0.18  Q         .         .         .         .
17.55      0.2434      0.18  Q         .         .         .         .
17.63      0.2446      0.17  Q         .         .         .         .
17.72      0.2458      0.17  Q         .         .         .         .
17.81      0.2470      0.16  Q         .         .         .         .
17.89      0.2482      0.16  Q         .         .         .         .
17.98      0.2493      0.15  Q         .         .         .         .
18.06      0.2503      0.14  Q         .         .         .         .
18.15      0.2513      0.12  Q         .         .         .         .
18.24      0.2521      0.12  Q         .         .         .         .
18.32      0.2530      0.12  Q         .         .         .         .
18.41      0.2538      0.11  Q         .         .         .         .
18.49      0.2546      0.11  Q         .         .         .         .
18.58      0.2553      0.11  Q         .         .         .         .
18.67      0.2561      0.11  Q         .         .         .         .
18.75      0.2568      0.10  Q         .         .         .         .
18.84      0.2576      0.10  Q         .         .         .         .
18.92      0.2583      0.10  Q         .         .         .         .
19.01      0.2590      0.10  Q         .         .         .         .
19.10      0.2597      0.10  Q         .         .         .         .
19.18      0.2603      0.09  Q         .         .         .         .
19.27      0.2610      0.09  Q         .         .         .         .
19.35      0.2617      0.09  Q         .         .         .         .
19.44      0.2623      0.09  Q         .         .         .         .
19.53      0.2629      0.09  Q         .         .         .         .
19.61      0.2636      0.09  Q         .         .         .         .
19.70      0.2642      0.09  Q         .         .         .         .
19.78      0.2648      0.08  Q         .         .         .         .
19.87      0.2654      0.08  Q         .         .         .         .
19.96      0.2660      0.08  Q         .         .         .         .
20.04      0.2665      0.08  Q         .         .         .         .
20.13      0.2671      0.08  Q         .         .         .         .
20.21      0.2677      0.08  Q         .         .         .         .
20.30      0.2682      0.08  Q         .         .         .         .
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  20.39       0.2688       0.08  Q         .         .         .         .
  20.47       0.2693       0.08  Q         .         .         .         .
  20.56       0.2698       0.07  Q         .         .         .         .
  20.64       0.2704       0.07  Q         .         .         .         .
  20.73       0.2709       0.07  Q         .         .         .         .
  20.82       0.2714       0.07  Q         .         .         .         .
  20.90       0.2719       0.07  Q         .         .         .         .
  20.99       0.2724       0.07  Q         .         .         .         .
  21.07       0.2729       0.07  Q         .         .         .         .
  21.16       0.2734       0.07  Q         .         .         .         .
  21.25       0.2739       0.07  Q         .         .         .         .
  21.33       0.2744       0.07  Q         .         .         .         .
  21.42       0.2749       0.07  Q         .         .         .         .
  21.50       0.2754       0.07  Q         .         .         .         .
  21.59       0.2758       0.07  Q         .         .         .         .
  21.68       0.2763       0.07  Q         .         .         .         .
  21.76       0.2768       0.06  Q         .         .         .         .
  21.85       0.2772       0.06  Q         .         .         .         .
  21.93       0.2777       0.06  Q         .         .         .         .
  22.02       0.2781       0.06  Q         .         .         .         .
  22.11       0.2786       0.06  Q         .         .         .         .
  22.19       0.2790       0.06  Q         .         .         .         .
  22.28       0.2794       0.06  Q         .         .         .         .
  22.36       0.2799       0.06  Q         .         .         .         .
  22.45       0.2803       0.06  Q         .         .         .         .
  22.54       0.2807       0.06  Q         .         .         .         .
  22.62       0.2811       0.06  Q         .         .         .         .
  22.71       0.2816       0.06  Q         .         .         .         .
  22.79       0.2820       0.06  Q         .         .         .         .
  22.88       0.2824       0.06  Q         .         .         .         .
  22.97       0.2828       0.06  Q         .         .         .         .
  23.05       0.2832       0.06  Q         .         .         .         .
  23.14       0.2836       0.06  Q         .         .         .         .
  23.22       0.2840       0.06  Q         .         .         .         .
  23.31       0.2844       0.06  Q         .         .         .         .
  23.40       0.2848       0.06  Q         .         .         .         .
  23.48       0.2852       0.05  Q         .         .         .         .
  23.57       0.2856       0.05  Q         .         .         .         .
  23.65       0.2860       0.05  Q         .         .         .         .
  23.74       0.2863       0.05  Q         .         .         .         .
  23.83       0.2867       0.05  Q         .         .         .         .
  23.91       0.2871       0.05  Q         .         .         .         .
  24.00       0.2875       0.05  Q         .         .         .         .
  24.08       0.2878       0.05  Q         .         .         .         .
  24.17       0.2880       0.00  Q         .         .         .         .
 ----------------------------------------------------------------------------
-----------------------------------------------------------------------------
---
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                            1444.8
              10%                              36.1
```

20%	10.3
30%	5.2
40%	5.2
50%	5.2
60%	5.2
70%	5.2
80%	5.2
90%	5.2

SMALL AREA UNIT HYDROGRAPH INPUT DATA

<u>Composite Curve Number (CN) of Watershed for 25-YR Storm</u>

		CN value from Orange County Hydrology Manual
Watershed Area (Ac) =	2.65	
Impervious Area (Ac) =	1.415	98
Pervious Area (Ac) =	1.235	75

$$\text{Composite CN} = \frac{\sum(\text{impervious CN value})(\text{impervious area}) + (\text{pervious CN value})(\text{pervious area})}{\text{watershed area}}$$

$= 87$

<u>$\bar{Y}$ Calculation for Watershed Losses</u>

CN = 87

$S = (1000/CN)-10 =$ 1.46

$Ia = 0.2S =$ 0.29

$P_{24} =$ 4.49

$Y = (P_{24} - Ia)^2 / ((P_{24} - Ia + S)P_{24}) =$ 0.694161

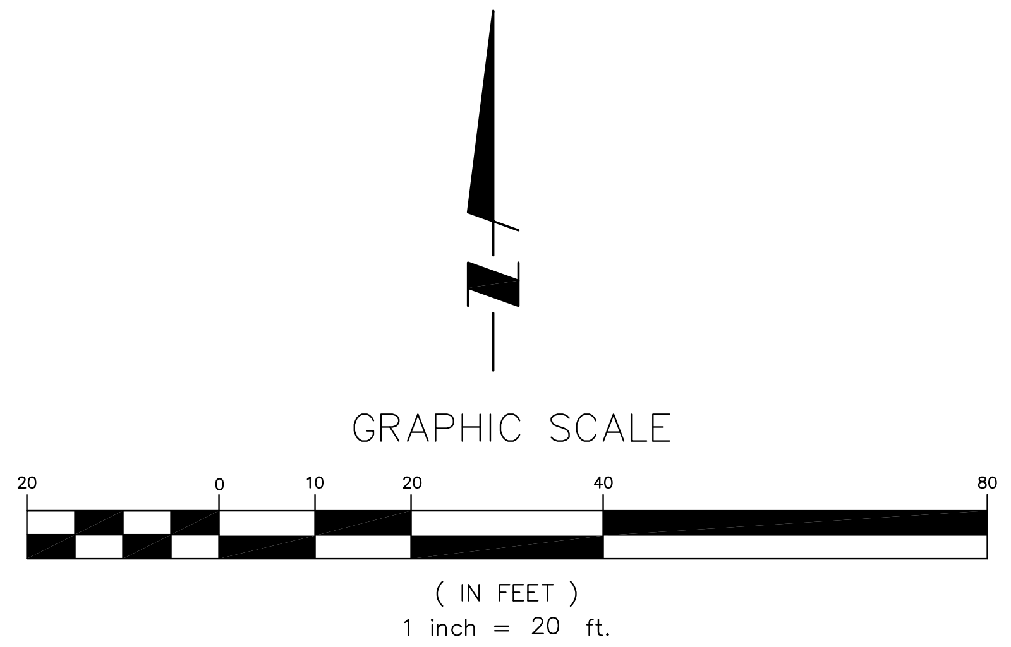
$\bar{Y} = 1 - Y =$ 0.31

Input $\bar{Y}$, watershed area, T_C, and F_M values into CH1 module of HydroWin computer program.

T_C and F_M values from rational method hydrology study of watershed.

LEGEND

▬ ▪ ▪ ▬	PROPOSED SITE BOUNDARY
━━━	DRAINAGE BOUNDARY
– – –	SUB-DRAINAGE AREA BOUNDARY
—·—·—	FLOWLINE
═══	EXISTING STORM DRAIN
A1 / 1.39	DRAINAGE AREA NUMBER ACREAGE FOR CONTRIBUTING AREA
⬡101	NODE NUMBER
←	DRAINAGE DIRECTION



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PREPARED FOR:

AutoNation
200 SW 1ST AVE., 14TH FLOOR
FORT LAUDERDALE, FL 33301

PORSCHE OF NEWPORT BEACH
550 WEST COAST HIGHWAY
NEWPORT BEACH, CA

HYDROLOGY MAP
PRE-DEVELOPMENT

DATE:
5/31/2016

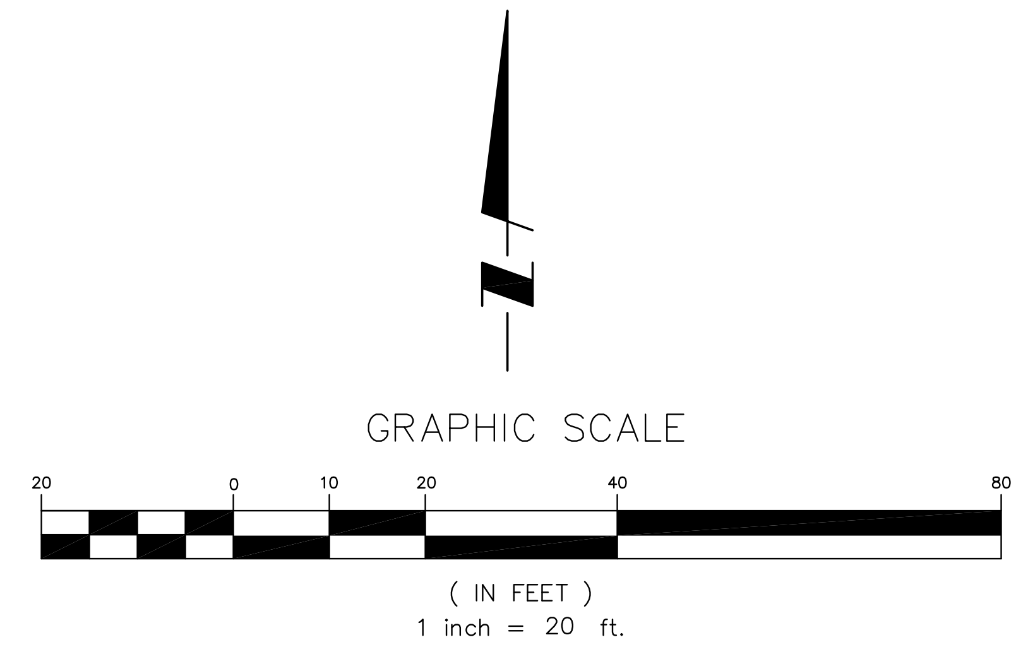
SHEET 1
OF 1

JOB NO. 2007 105003

DRAWING: v:\2007\active\2007105003\civil\design\drawing\exhibits\105003c-ex7003_hydrology_map_ex.dwg PLOTTED: 6/1/2016 10:25 AM BY: Ito, Vicky

LEGEND

▬ ▪ ▪ ▬	PROPOSED SITE BOUNDARY
━━━	DRAINAGE BOUNDARY
▬ ▬ ▬	SUB-DRAINAGE AREA BOUNDARY
— · —	FLOWLINE
═══	EXISTING STORM DRAIN
— — —	PROPOSED STORM DRAIN
DMA#2 1.39	DRAINAGE AREA NUMBER ACREAGE FOR CONTRIBUTING AREA
101	NODE NUMBER
←	DRAINAGE DIRECTION
✱	CONNECT TO EXISTING STORM DRAIN
▪	STORM DRAIN INLET



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PORSCHE OF NEWPORT BEACH
550 WEST COAST HIGHWAY
NEWPORT BEACH, CA

HYDROLOGY MAP
POST-DEVELOPMENT

DATE: 5/31/2016

SHEET 1 OF 1

JOB NO. 2007 105003

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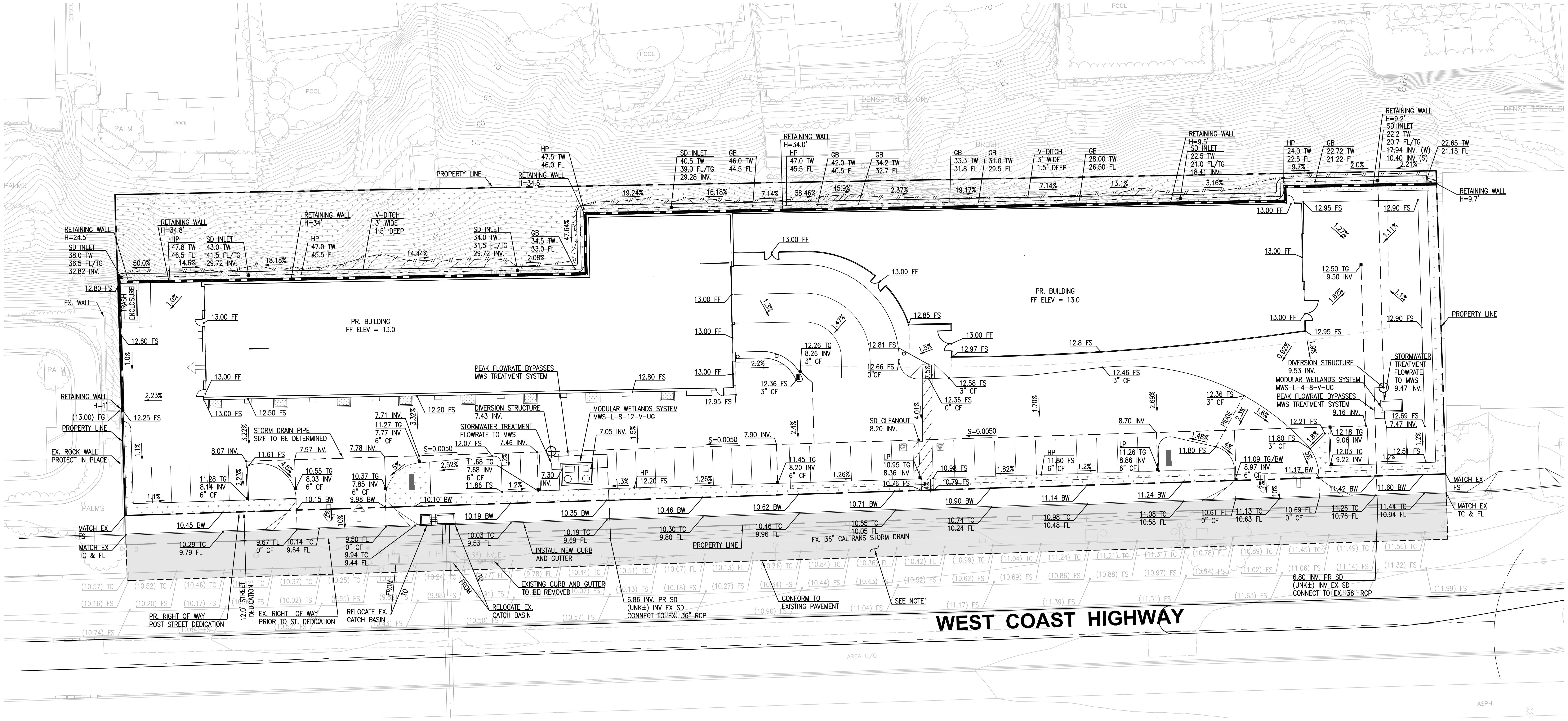
Reference Plan(s)

- **Conceptual Grading Plan dated 5/27/16**

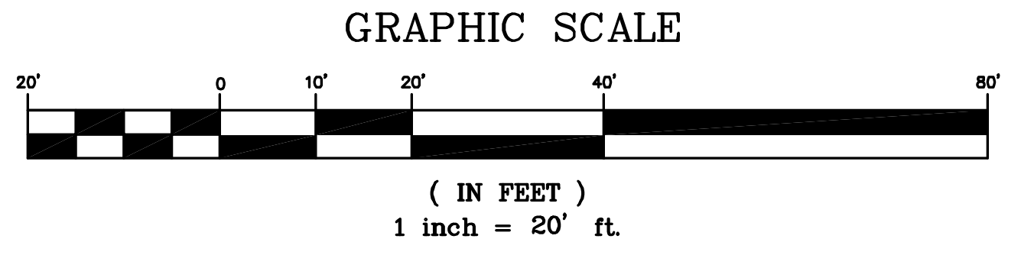


EARTHWORK QUANTITIES

CUT = 9,349 C.Y.
FILL = 252 C.Y.
NET = 9,097 C.Y. (EXPORT)

NOTES

1. ABOVE GROUND FEATURES AND UTILITIES INCLUDING BUT NOT LIMITED TO PIPES, STREET LIGHTS, UTILITY BOXES AND FIRE HYDRANTS TO BE RELOCATED OR ADJUSTED TO ACCOMMODATE THE STREET DEDICATION.



(IN FEET)
1 inch = 20' ft.

NO.	DATE	REVISIONS	ENG.	APPR.	DATE

DESIGNED BY:
VSYI
DRAFTED BY:
VSYI
CHECKED BY:
VSYI

DEVELOPER:
AutoNation
200 SW 1ST AVE., 14TH FLOOR
FORT LAUDERDALE, FL 33301

REGISTERED PROFESSIONAL ENGINEER
VICKY S.Y. ITO
No. 73766
Exp. 06/30/15
CIVIL
STATE OF CALIFORNIA

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VICKY S.Y. ITO R.C.E. 73766 (EXP. 6/30/17)

CONCEPTUAL GRADING PLAN

PORSCHE OF NEWPORT BEACH
550 WEST COAST HIGHWAY, NEWPORT BEACH, CA

CITY OF NEWPORT BEACH
COMMUNITY DEVELOPMENT DEPARTMENT

PLAN CHECK NO.
-
PERMIT NO.
-
SHEET
G-1

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AMENDMENTS