Appendix F

Preliminary Water Quality Management Plan

OTH2018-01044

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

Project Name: SARKISIAN APARTMENTS 11 UNIT APARTMENT BUILDING 3175 WEST BALL ROAD, ANAHEIM, CALIFORNIA, 92804. RECORD OF SURVEY NO. 2018-1002.

R.S.B. 299/8-9

APN: 079-882-34

Prepared for:

IAN N.6 2020 SHRDIVISION SERVICES SECTION

SARKIS TATARIAN BA469 BEACH CIRCLE, CYPRESS, CALIFORNIA, 90630.

P: (714) 717-0400

E: SAKOTATARIAN@YAHOO.COM

Prepared by:

CRF ENGINEERING, INC.

6782 STANTON AVENUE, SUITE A, BUENA PARK, CALIFORNIA, 90621.

P: (714) 522-2266

E: <u>CRF@CRFENGINEERING.COM</u>

DATE PREPARED: 06/08/2018

DATE REVISED: 12/11/2019



Project Owner's Certification				
Planning Application No. (If applicable)	OTH2018-01044	Grading Permit No.		
Tract/Parcel Map and Lot(s) No.	Record of Survey No. 2018-1002 R.S.B. 299/8-9	Building Permit No.		
Address of Project Site and APN (If no address, specify Tract/Parcel Map and Lot Numbers)		3175 West Ball Road, Anaheim, California, 92804. APN: 079-882-34 Latitude: 33°49'03.44" N, Longitude: 118°00'06.42"		

This Water Quality Management Plan (WQMP) has been prepared for Sarkis Tatarian by CRF Engineering, Inc. The WQMP is intended to comply with the requirements of the County of Orange NPDES Stormwater Program requiring the preparation of the plan.

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

Preliminary Water Quality Management Plan (WQMP) SARKISIAN APARTMENTS

O-	ΓΙΟ ΤΑΤΑ DI AN		
Owner: SAK	KIS TATAKIAN		
Title			
Company			
Address	8469 Beach Circle, Cypress, California, 90630.		
Email	sakotatarian@yahoo.com		
Telephone #	(714) 717-0400		
I understand ongoing ope herein.	1 my responsibility to implement the provisions of this WQMP including the eration and maintenance of the best management practices (BMPs) described		
Owner Signature	Date 1-17-2020		

Preparer (Eng	gineer): CESAR R. RA	MIREZ		
Title			PE Registration #	78100
Company	CRF Engineering, Inc.			
Address	6782 Stanton Avenue, Suite A, Buena Park, California, 90621.			
Email	crf@crfengineering.com			
Telephone #	(714) 522-2266			
I hereby cer requirement Regional Wa	tify that this Water Q ts set forth in, Order 1 ater Quality Control 1	uality Management Pla No. R8-2009-0030/NPE Board.	an is in complian DES No. CAS6180	ce with, and meets the)30, of the Santa Ana
Preparer	10		Date	01/24/2020

Signature	C.R.F.	Date	01/24/2020.
Place Stamp Here	No. C 78100 * OF FIF OF CALIFORNIA		

Contents

Page No.

Section I	Permit(s) and Water Quality Conditions of Approval or Issuance	1
Section II	Project Description	3
Section III	Site Description	10
Section IV	Best Management Practices (BMPs)	13
Section V	Inspection/Maintenance Responsibility for BMPs	28
Section VI	BMP Exhibit (Site Plan)	31
Section VII	Educational Materials	32

Attachments

Attachment A	Project Research Material
Attachment B	Geotechnical Report Excerpts
Attachment C	Infiltration Study
Attachment D	
Attachment E	Operations & Maintenance Plan
Attachment F	Source Control BMP's
Attachment G	Preliminary Grading With WQMP Site Plan (6 Sheets)

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

Provide discretionary or grading/building permit information and water quality conditions of approval, or permit issuance, applied to the project. If conditions are unknown, please request applicable conditions from staff. *Refer to Section 2.1 in the Technical Guidance Document (TGD) available on the OC Planning website (ocplanning.net).*

Project Infomation			
Permit/Application No. (If applicable)	OTH2018-01044 Grading or Building Permit No. (If applicable)		
Address of Project Site (or Tract Map and Lot Number if no address) and APN	3175 West Ball Road, Anaheim, California, 92804. APN: 079-882-34		
Water	Quality Condition	is of Approval or Issu	ance
	This is the conceptual/preliminary priority project WQMP. No conditions of approval have been assigned at this time.		
Water Quality Conditions of Approval or Issuance applied to	At this time, in the preliminary phase, there is no Right-of-Way Construction Permit (RCP) number. An RCP number will be provided by the city when the project has moved past the preliminary phase.		
this project. (Please list verbatim.)	A full capture system is proposed on-site. The project will require the relocation of a street catch basin along Ball Road. Once relocated, the new catch basin will have a connector pipe screen (CPS) to prevent trash and debris from getting into the catch basin.		
	Concept	ual WQMP	
Was a Conceptual Water Quality Management Plan previously approved for this project?	No.		

Section I

Watershed-Based Plan Conditions		
Provide applicable	 -A Model WIHMP has been developed for the Coyote-Creek-San Gabriel	
conditions from watershed -	River watershed and has been submitted to the Executive Officer for	
based plans including	approval, but has not yet been approved. -Carbon Canyon Creek Does not have TMDLs	
WIHMPs and TMDLS.	N/A	

Section II Project Description

II.1 Project Description

Provide a detailed project description including:

- Project areas;
- Land uses;
- Land cover;
- Design elements;
- A general description not broken down by drainage management areas (DMAs).

Include attributes relevant to determining applicable source controls. *Refer to Section 2.2 in the Technical Guidance Document (TGD) for information that must be included in the project description.*

Description of Proposed Project					
	Priority Project Category #1 for North County Permit Area				
Development Category (From Model WQMP, Table 7.11-2; or -3):	"New development projects that create 10,000 square feet or more of impervious surface. This category includes commercial, industrial, residential housing subdivisions, mixed-use, and public projects on private or public property that falls under the planning and building authority or the permittees.				
Project Area (ft ²): 15,541	Number of Dwelling Units: 11 SIC Code:6513				
	Pervious		Impervious		
Project Area	Area (acres or sq ft)	Percentage	(acr	Area es or sq ft)	Percentage
Pre-Project Conditions	0.354 or 15,416	99%	0.0	003 or 125	1%
Post-Project Conditions	0.109 or 4,751	31%	0.24	8 or 10,790	69%
	Existing Drainage	Conditions:			
Drainage Patterns/Connections	Currently, the site is a vacant lot surrounded by a 9-10' width of sidewalk and driveway approaches fitted with an 8" curb & gutter. There are two city storm drain catch basins directly adjacent to the westerly & southerly right of way lines. The site is almost finished grade and is generally flat with mild slopes of up to 2% and is surrounded by a perimeter block wall along the northerly and easterly property lines directly adjacent to the neighbors. Currently, runoff is diverted in the southwesterly direction away from a highpoint on-site located in the				

northeasterly corner. From there runoff sheet flows over existing grade where some runoff is absorbed and recharges the water table and any remaining sheet flow is diverted to the curb and gutter system along Western Ave. & Ball Rd. From there runoff is directly diverted through the curb & gutter into two city concrete catch basins located directly in front of the project along Western Ave. & Ball Rd. one catch-basin per street.

Proposed Drainage On-Site:

The site will be graded to have a highpoint in the northeasterly corner and direct flows through various storm water diversion devices towards the right of way on both Ball Rd. and Western Ave. The majority of stormwater collected on-site will be retained on the roof of the structure which will then be routed to two landscape areas on the West and South sides of the building. Other surrounding area drains for landscaped and parking areas surrounding the building will also be routed into the same landscape areas. Runoff from hardscape and parking areas will be diverted by sheet flowing towards a low point fitted with a concrete catch basin.

Once runoff is collected from various areas on-site and is diverted to the previously described landscape areas on the West and South, all runoff will be diverted to the proposed 36" HDPE tank on the west side of the property. The tank should be able to handle the combined DCV of the single proposed drainage management area (DMA). Water will be stored in the tank before being pumped to a proposed biotreatment planter at a fixed rate to not overflow the planter. The bioretention planter will have a ponding depth of 6" before entering the catch basin inside the planter. After treatment from the planter, water will be diverted towards the proposed relocated catch basin on the street via a 6" pvc pipes cored into the back of the catch basin.

Although the detention tanks are sized to contain the full calculated DCV, as a precaution, a 12" pipe has been proposed that will take overflow water from the detention system to the catch basin. Both the existing catch basin on Western and the relocated catch basin on Ball will have pipe screens (BC-3) installed to prevent debris and trash from entering the public storm drain system.

(Please see the Preliminary Grading & Drainage plan set & WQMP Site plan for On-Site drainage details.)

	Project Narrative:				
	Existing conditions: The lot is vacant with the site currently flowing towards both streets.				
	The site will be used as a multifamily residential area with patio areas and				
	This site will be developed into an 11 unit two-story apartment building over a parking garage.				
	One proposed trash enclosure will be covered, and furthermore any drainage from the trash enclosure areas will be connected to the sewer line.				
	One storage area will be at garage level with enclosed with walls, a door and a roof for general building storage and mechanical items.				
	Each unit will have 100 Cubic feet of storage within the first and second floor (inside the units).				
	Paved and landscape areas are hatched on the preliminary grading and drainage plan. The parking will consist of underground parking which includes one ADA parking space.				
Narrative Project Description: (Use as much space as	The parking areas will be paved with concrete and be under the building with landscape areas surrounding said building these areas will generate the following pollutants:				
	 Pathogens. 				
necessary.)	• Metals.				
	Nutrients.				
	Organic Compounds.				
	Pesticides.				
	Sediments.				
	• Trash & Debris.				
	Oxygen demanding compounds.				
	Oil & Grease.				

II.2 Potential Stormwater Pollutants

Determine and list expected stormwater pollutants based on land uses and site activities. *Refer to Section 2.2.2 and Table 2.1 in the Technical Guidance Document (TGD) for guidance.*

Pollutants of Concern				
Pollutant	Check ea E=Expo be of c N=Not 1 to be of	One for ch: ected to concern Expected concern	Additional Information and Comments	
Suspended-Solid/ Sediment	Ε⊠	N 🗆	Expected	
Nutrients	E 🖂	N 🗆	Expected	
Heavy Metals	Е 🗆	N 🛛	Not Expected	
Pathogens (Bacteria/Virus)	E 🖂	N 🗆	Expected	
Pesticides	E 🖂	N 🗆	Expected	
Oil and Grease	E 🖂	N 🗆	Expected	
Toxic Organic Compounds	Е 🗆	N 🛛	Not Expected	
Trash and Debris	E 🖂	N 🗆	Expected	

II.3 Hydrologic Conditions of Concern

Determine if streams located downstream from the project area are potentially susceptible to hydromodification impacts. *Refer to Section 2.2.3.1 in the Technical Guidance Document (TGD) for North Orange County or Section 2.2.3.2 for South Orange County.*

 \boxtimes No – Show map

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

Describe post development drainage characteristics. *Refer to Section 2.2.4 in the Technical Guidance Document (TGD).*

Posts Development Flow Characteristics:

As previously described in the proposed project "Drainage Patters/Connections" in section II.1, all on-site runoff is diverted to city storm drain catch basins located directly in front of the project. The first catch basin is located on Western Ave. about 125 ft North of the intersection of Ball Rd. and Western Ave. on the Eastern side of the street. This catch basin diverts runoff through a 24" RCP which connects to a 63" RCP main line running West & East along Ball Rd. The second catch basin is located on Ball Rd. about 155 ft east of the intersection of Ball Rd. and Western Ave. on the Northern side of the street. This catch basin diverts runoff through a 15" RCP which connects to the same 63" RCP main mentioned previously. The 63" main storm drainage line diverts runoff in the Westerly direction along Ball Rd. for approximately 3,015 ft. At this point the 63" Mainline spillways into a 69" RCP which turns and heads in the Northwesterly direction for about 1,630 ft. Once here runoff is released into the Carbon Canyon Creek.

<u>River & Stream Flow Characteristics:</u>

Carbon Canyon Creek \rightarrow Coyote Creek \rightarrow San Gabriel River Reach $_1 \rightarrow$ San Gabriel River Estuary \rightarrow San Pedro Bay Near/Off Shore Zone \rightarrow Pacific Ocean.

II.5 Property Ownership/Management

Describe property ownership/management. *Refer to Section 2.2.5 in the Technical Guidance Document (TGD).*

The property owner is Mr. Sarkis Tatarian who will be responsible for long term maintenance of the project site's stormwater facilities, and Operations and Maintenance (O&M) plans.

Section III Site Description

III.1 Physical Setting

Fill out table with relevant information. *Refer to Section 2.3.1 in the Technical Guidance Document (TGD).*

Name of Planned Community/Planning Area (if applicable)	Two Story Apartment Building Over Parking Garage
Location/Address	3175 West Ball Road
	Anaheim, California, 92804.
General Plan Land Use Designation	Land will be developed into an 11 unit apartment building.
Zoning	C-G
Acreage of Project Site	0.364
Predominant Soil Type	Type A (See Figure XVI-2a in Attachment A)

III.2 Site Characteristics

Fill out table with relevant information and include information regarding BMP sizing, suitability, and feasibility, as applicable. *Refer to Section 2.3.2 in the Technical Guidance Document (TGD)*.

Site Characteristics		
Precipitation Zone	o.85 Inches (See Figure XVI-1 in Attachment A)	
Topography	Site is flat and tends to drain towards Ball Road and Western Avenue at around 2%.	

	Drainage will be carried to a 36" HDPE tank capable of holding the combined DCV of the DMA. From there, water is pumped at a fix rate to a proposed biotreatment planter before going into the relocated catch basin on Ball Road via a 6" PVC pipe cored into the back of said catch basin.
Drainage Patterns/Connections	 For detailed explanation of existing & proposed drainage patterns/connections see section II.1 "Proposed Drainage Patters/Connections"
	• For detailed explanation of connection to storm drainage system, downstream conveyance & receiving waters, see section II.4 "Post Development Drainage Characteristics".
	• The predominant soil type is A (Per Figure XVI-2a – Attachment A)
Soil Type, Geology, and Infiltration Properties	• The infiltration rate was found to be 2.9 in/hr. (See Infiltration Test Report Excerpt Performed by Soil Exploration Company, Inc., Project No. 16155-01, Dated: 09-12-2016 – Attachment C).
Hydrogeologic	• The current soils report states that groundwater was encountered at 16 feet below ground surface.
(Groundwater) Conditions	 (See Preliminary Soil Investigation Report Excerpt Performed by Soil Exploration Company, Inc., Project No. 16155-01, Dated: 09-12-2016 – Attachment B).
	• Three bioretention planters are being used with each one going down around 4 feet in depth. The separation of the bioretention planters to the ground water is 12 feet which exceeds the 10 feet minimum needed.
Geotechnical Conditions (relevant to infiltration) Off-Site Drainage	• Per information found from Geotracker, infiltration is not feasible due to prior contamination by gasoline from when the site used to have a gasoline station. Biotreatment BMPs are being proposed instead. Please see the Geotracker information and Worksheet I made a part of attachment D.
	• Off-site drainage consists of any overflow water being caught by catch basins on-site that drain to the streets. See detailed description of how overflow catch basins work on-site in section II.1 "Proposed Drainage Patters/Connections.
	• No off-site run-on will comingle with project site runoff. As described in previous sections the two neighboring developments to the North and the East are separated by a 6 ft tall block wall which will prevent any off-site run-on from entering the site.
Utility and Infrastructure Information	There are currently no utilities on-site.

Page 11

III.3 Watershed Description

Fill out table with relevant information and include information regarding BMP sizing, suitability, and feasibility, as applicable. *Refer to Section 2.3.3 in the Technical Guidance Document (TGD)*.

	<u>River & Stream Flow Path:</u>
	Carbon Canyon Creek →
	Coyote Creek \rightarrow
Receiving Waters	San Gabriel River Reach 1 →
	San Gabriel River Estuary \rightarrow
	San Pedro Bay Near/Off Shore Zone →
	Pacific Ocean.
	Carbon Canyon Creek: None to be listed.
	Coyote Creek: Ammonia, Copper (Dissolved), Indicator Bacteria, Lead, pH
303(d) Listed Impairments	San Gabriel River Reach 1: Coliform Bacteria, pH
	San Gabriel River Estuary: Copper, Dioxin, Nickel, Oxygen (Dissolved)
	San Pedro Bay: Chlordane, DDT, PCB's, Sediment Toxicity
	Bacteria Indicators/Pesticides
Applicable TMDI e	• Nutrients
Applicable INIDES	• Pesticides
	• Toxicity
	• Pathogens
Pollutants of Concern for	• Nutrients
the Project	Bacteria Indicators/Pesticides
Environmentally Sensitive	NT/A
Significant Areas	N/A
-8	

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

Describe project performance criteria. Several steps must be followed in order to determine what performance criteria will apply to a project. These steps include:

- If the project has an approved WIHMP or equivalent, then any watershed specific criteria must be used and the project can evaluate participation in the approved regional or sub-regional opportunities. (Please ask your assigned planner or plan checker regarding whether your project is part of an approved WIHMP or equivalent.)
- Determine applicable hydromodification control performance criteria. *Refer to Section 7.II-* 2.4.2.2 of the Model WQMP.
- Determine applicable LID performance criteria. Refer to Section 7.II-2.4.3 of the Model WQMP.
- Determine applicable treatment control BMP performance criteria. *Refer to Section 7.II-3.2.2 of the Model WQMP.*
- Calculate the LID design storm capture volume for the project. *Refer to Section 7.II-2.4.3 of the Model WQMP*.

(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.	N/A		

Project Performance Criteria		
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	Not in HCOC area.	
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	Priority projects must infiltrate, harvest and use, or biotreat/biofilter, the 85 th percentile, 24-hour storm event (Design Capture Volume). A properly designed biotreatment system may only be considered if infiltration, harvest and use, and evapotranspiration (ET) cannot be feasibly implemented for the full design capture volume. In this case, infiltration, harvest and use, and ET practices must be implemented to the greatest extent feasible and biotreatment may be provided for the remaining design capture volume.	
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	If cost of providing treatment control BMPs greatly outweighs pollution control benefits they would provide, waiver of treatment control and LID requirements can be requested, and alternative compliance approaches must be used to fulfill remaining unmet volume. BMP sizing is based on the unmet volume after claiming applicable water quality credits.	
Calculate LID design storm capture volume for Project.	Please see Worksheet B for the DCV Calculation for the entire site. DCV = 744.22 CF	

IV.2. Site Design and Drainage

Describe site design and drainage including

- A narrative of site design practices utilized or rationale for not using practices;
- A narrative of how site is designed to allow BMPs to be incorporated to the MEP
- A table of DMA characteristics and list of LID BMPs proposed in each DMA.
- Reference to the WQMP "BMP Exhibit."
- Calculation of Design Capture Volume (DCV) for each drainage area.
- A listing of GIS coordinates for LID and Treatment Control BMPs.

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

- See TGD "Worksheet B" in Attachment D for calculation derivation
- See WQMP "BMP Exhibit" for BMP locations and sizes.
- One DMA is being considered for the whole site as runoff for the whole site will be taken to underground HDPE tanks capable of holding the calculated DCV. From there, water will be pumped to a proposed biotreatment planter located along Ball Road before draining into the relocated catch basin on Ball Road via a 6" PVC pipe cored into the back of said catch basin.
- The DMA being considered is 15,541 SF with 10,790 SF of impervious area and 4,751 SF of pervious area.
- See Worksheet B in Attachment D for the simple method DCV calculation of the DMA. DCV = 744.22 CF.
- See preliminary erosion control plan for infiltration system protection from sediment during construction phase.

See section IV3.4 for Calculation

BMP LATITUDE & LONGITUDE

LAT: 33° 49' 02.99" NORTH

LON: 118° 00' 06.38" WEST

IV.3 LID BMP Selection and Project Conformance Analysis

Each sub-section below documents that the proposed design features conform to the applicable project performance criteria via check boxes, tables, calculations, narratives, and/or references to worksheets. *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.*

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:	

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:	

Show calculations below to demonstrate if the LID Design Strom Capture Volume can be met with infiltration BMPs. If not, document how much can be met with infiltration and document why it is not feasible to meet the full volume with infiltration BMPs.

The site used to serve as an E-Z Services location prior to it being demolished and cleared. Therefore, the contaminant of concern is gasoline and how this contaminant can affect water being infiltrated to replenish groundwater. Due to this prior contamination, infiltration is not feasible, and biotreatment BMPs will be proposed.

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:	

Show calculations below to demonstrate if the LID Design Storm Capture Volume can be met with evapotranspiration and/or rainwater harvesting BMPs in combination with infiltration BMPs. If not, document below how much can be met with either infiltration BMPs, evapotranspiration, rainwater harvesting BMPs, or a combination, and document why it is not feasible to meet the full volume with these BMP categories.

The site used to serve as an E-Z Services location prior to it being demolished and cleared. Therefore, the contaminant of concern is gasoline and how this contaminant can affect water being infiltrated to replenish groundwater. Due to this prior contamination, infiltration is not feasible, and biotreatment BMPs will be proposed.

Please also see Worksheet J (Lines 11-13) attached in Attachment D. Harvest and Use is not feasible.

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	\boxtimes
Rain gardens with underdrains	
Constructed wetlands	
Vegetated swales	
Vegetated filter strips	
Proprietary vegetated biotreatment systems	
Wet extended detention basin	
Dry extended detention basins	
Other:	
Other:	

Show calculations below to demonstrate if the LID Design Storm Capture Volume can be met with infiltration, evapotranspiration, rainwater harvesting and/or biotreatment BMPs. If not, document how much can be met with either infiltration BMPs, evapotranspiration, rainwater harvesting BMPs, or a combination, and document why it is not feasible to meet the full volume with these BMP categories.

The site used to serve as an E-Z Services location prior to it being demolished and cleared. Therefore, the contaminant of concern is gasoline and how this contaminant can affect water being infiltrated to replenish groundwater. Due to this prior contamination, infiltration is not feasible, and biotreatment BMPs will be proposed.

Storm water volume will be retained within an HDPE tank system capable of holding the calculated DCV and then pumped into a stormwater planter with a sump pump system at a rate which will allow the planter to work at maximum efficiency.

DCV =	744.22 cu-ft (Per Worksheet B)
	189.36 cu-ft (Per Worksheet C)
Drainage System:	115 lf - 36" ADS HDPE

Volume:	812.89 cu-ft	
Volume Retained:	812.89 cu-ft > 744.22 cu-ft O.K.	
Maximum flow rate into planter:	$k_{\text{design}} = 2.5 \text{ in/hr}$	
	Surface area of BMP $A_{BMP} = 231$ SF	
	Treatment Flowrate: $Q_{design} = A_{bmp} * k_{design}/FS$	
	$Q_{\text{design}} = 231 \text{sf} + 2.5 \text{in/hr} + 1/12 + 1/60^2$	
	$Q_{\text{design}} = 0.013 \text{ cfs}$	
Pump Specification:	Max Flow: 0.013 cfs	
	Total Dynamic Head: 6.97 ft	
Time it takes to treat DCV:	Q _{design} = 0.013 cfs * 60 s/min * 60 min/hr	
	$Q_{\text{design}} = 46.80 \text{ cu-ft/hr}$	
	$T_{DCV} = DCV/Q_{design}$	
	$T_{DCV} = (744.22 \text{ cu-ft}) / (46.80 \text{ cu-ft/hr})$	
	$T_{DCV} = 15.90 \text{ hr} < 48 \text{ hr.}$ (O.K.)	
Calculation for Biotreatment with	Detention and Pump:	
DCV = 744.22 cu-ft		
Detention Tank Size = 115 lf at 36"	diameter; Volume = 812.89 cu-ft	
Drawdown rate of planter box = 2 .	5 in/hr * 1hr/6omin * 1ft/12in * 231sf * 7.48 gal/cf = 6.00 gpm	
Minimum required pump rate = 744.22 * 7.48gal/cf * 1/48hr * 1hr/60min = 1.93 gpm < 6.00 gpm (ok)		
Pump that will be used has a GPM	l performance of <u>6.00 gpm</u> .	
DMA = 15,541 SF		
Impervious Area = 10,790 SF Pervious Area = 4,751 SF %Impervious = 69%		
Simple Method DCV = 744.22 CF		
Capture Efficiency Method DCV = 189.36 CF		
Bioretention Planter - BMP LATITUDE & LONGITUDE		
LAT: 33° 49' 02.99" NORTH		
LON: 118° 00' 06.38" WEST		

IV.3.5 Hydromodification Control BMPs

Describe hydromodification control BMPs. *See Section 5 of the Technical Guidance Document (TGD)*. Include sections for selection, suitability, sizing, and infeasibility, as applicable. Detail compliance with Prior Conditions of Approval (if applicable).

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

IV.3.6 Regional/Sub-Regional LID BMPs

Describe regional/sub-regional LID BMPs in which the project will participate. *Refer to Section 7.II-* 2.4.3.2 *of the Model WQMP*.



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		
Modular Connector Pipe Trash Screen (BC-3) (2 each, 1 for the catch basin on Ball Road, and 1 for the catch basin on Western Avenue)	Trash screen to be provided inside proposed relocated catch basin to prevent trash and debris from entering the public storm drain system.		

IV.3.8 Non-structural Source Control BMPs

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

Non-Structural Source Control BMPs				
	Name	Che	ck One	If not applicable, state brief
Identifier		Included	Not Applicable	reason
N1	Education for Property Owners, Tenants and Occupants			Educational brochures.
N2	Activity Restrictions			Property rules restricting littering and stenciling to protect catch basins.
N3	Common Area Landscape Management			Areas need to remain clean.
N4	BMP Maintenance			Consistent BMP check ups.
N5	Title 22 CCR Compliance (How development will comply)			N/A
N6	Local Industrial Permit Compliance			Residential Project
N7	Spill Contingency Plan			No hazardous materials
N8	Underground Storage Tank Compliance			Not proposed
N9	Hazardous Materials Disclosure Compliance			No hazardous materials
N10	Uniform Fire Code Implementation			N/A
N11	Common Area Litter Control			Keeping areas clean and organized.
N12	Employee Training			Educating on storm water pollution.
N13	Housekeeping of Loading Docks			Not proposed
N14	Common Area Catch Basin Inspection			Routine inspections enforced.
N15	Street Sweeping Private Streets and Parking Lots			Routine clean ups.
N16	Retail Gasoline Outlets			Not proposed

IV.3.9 Structural Source Control BMPs

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

Structural Source Control BMPs					
	Check One		k One	If not annlicable, state brief	
Identifier	Name	Included	Not Applicable	reason	
S1	Provide storm drain system stenciling and signage			Each catch basin will have stenciling to warn about dumping into these catch basins.	
S2	Design and construct outdoor material storage areas to reduce pollution introduction			N/A	
S3	Design and construct trash and waste storage areas to reduce pollution introduction			Keeping these areas organized and clean.	
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control			Limiting water use and educating on smart water use.	
S5	Protect slopes and channels and provide energy dissipation			Flat topography.	
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)			Less than 1 acre.	
S6	Dock areas			Not Proposed	
S7	Maintenance bays			Not Proposed	
S8	Vehicle wash areas			Not Proposed	
S9	Outdoor processing areas			Not Proposed	
S10	Equipment wash areas			Not Proposed	
S11	Fueling areas			Not Proposed	
S12	Hillside landscaping			Not Proposed	
S13	Wash water control for food preparation areas			Not Proposed	
S14	Community car wash racks			Not Proposed	

IV.4 Alternative Compliance Plan (If Applicable)

Describe an alternative compliance plan (if applicable). Include alternative compliance obligations (i.e., gallons, pounds) and describe proposed alternative compliance measures. *Refer to Section 7.II 3.0 in the WQMP*.

IV.4.1 Water Quality Credits

Determine if water quality credits are applicable for the project. *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.

Description of Proposed Project					
Project Types that Qualify for Water Quality Credits (Select all that apply):					
Redevelopment projects that reduce the overall impervious footprint of the project site.	Brownfield redev redevelopment, exp property which may presence or potentia substances, pollutar which have the pot adverse ground or redeveloped.	vnfield redevelopment, meaning opment, expansion, or reuse of real cy which may be complicated by the ce or potential presence of hazardous nees, pollutants or contaminants, and have the potential to contribute to ce ground or surface WQ if not loped.		☐ Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance).	
Mixed use development, such as a combination of residential, commercial, mixindustrial, office, institutional, or other land desuses which incorporate design principles that transcan demonstrate environmental benefits that whould not be realized through single use hal projects (e.g. reduced vehicle trip traffic with light the potential to reduce sources of water or air propollution).		Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned		Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).	
Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.	Developments in a city center area.	Developments in historic districts or historic preservation areas.	Live-w developm developm support re vocationa similar to use devel be able to both cates	vork lents, a variety of lents designed to esidential and l needs together – criteria to mixed opment; would not take credit for gories.	In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.

Calculation of Water Quality Credits (if applicable)

IV.4.2 Alternative Compliance Plan Information

Describe an alternative compliance plan (if applicable). Include alternative compliance obligations (i.e., gallons, pounds) and describe proposed alternative compliance measures. *Refer to Section 7.II 3.0 in the Model WQMP*.

N/A

Section V Inspection/Maintenance Responsibility for BMPs

Fill out information in table below. Prepare and attach an Operation and Maintenance Plan. Identify the funding mechanism through which BMPs will be maintained. Inspection and maintenance records must be kept for a minimum of five years for inspection by the regulatory agencies. *Refer to Section 7.II 4.0 in the Model WQMP*.

BMP Inspection/Maintenance				
ВМР	BMP Reponsible Maintena Party(s) Activit Requir		Minimum Frequency of Activities	
Bioretention Planter	Property Owner	Regular inspection for debris and sedimentation build up. Remove trash and inspect overflow devices.	Every 6 months.	
Modular Connector Trash Pipe Screen (BC-3) (2 each)	Property Owner	Regular inspection for debris and sedimentation build up. Remove trash and debris.	Every 6 months.	
S1 – Storm Drain System Stencilling and Signage	Property Owner	Maintain legibility of stencils and signs.	Annually	
S3 – Design and construct trash and waste storage areas to reduce pollution introduction	Property Owner	Sweep trash area at least once per week and before October 1 st each year. Maintain area clean of trash at all times.	Weekly	

S4 – Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control.	Property Owner	Check the connection on all wires.	Twice seasonally.
N1 - Education for Property Owners, Tenants, and Occupants	Property Owner	Educational materials will be provided to tenants annually.	Annually.
N2 – Activity Restrictions	Property Owner	The Owner will prescribe activity restrictions to protect surface water quality through lease terms or other equally effective measures for the property.	Ongoing.
N3 – Common Area Landscape Management	Property Owner	Appointed property management company to provide maintenance of landscaping to meet current water efficiency and keep plants healthy. Bio areas maintained with proper soil amendments.	Regular maintenance once a week and monthly inspections to determine deficiencies.
N4 – BMP Maintenance	Property Owner	Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP.	Regular maintenance once a week and monthly inspections to determine deficiencies.

N11 – Common Area Litter Control	Property Owner	Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities.	Weekly.
N12 – Employee Training	Property Owner	Education programs as it would apply to future employees managing property.	Annually
N14 – Common Area Catch Basin Inspection	Property Owner	Catch basin inlets and other drainage facilities shall be inspected after each storm event and once per year. Inlets and other facilities shall be cleaned prior to the rainy season by October 1 st of each year.	Annually.
N15 – Street Sweeping Private Streets and Parking Lots	Property Owner	Routine inspection and sweeping of parking lot area to avoid accumulation of debris.	Monthly.
36" Detention Pipe	Property Owner	Maintain a clean and obstruction-free retention system.	Annually.
Section VI BMP Exhibit (Site Plan)

VI.1 BMP Exhibit (Site Plan)

Include a BMP Exhibit (Site Plan), <u>at a size no less than 24" by 36</u>," which includes the following minimum information:

- Insert in the title block (lower right-hand corner) of BMP Exhibit: the WQMP Number (assigned by staff) and the grading/building or Planning Application permit numbers
- Project location (address, tract/lot number(s), etc.)
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural BMP locations
- Drainage delineations and flow information
- Delineate the area being treated by each structural BMP
- GIS coordinates for LID and Treatment Control BMPs
- Drainage connections
- BMP details
- Preparer name and stamp

Please do not include any areas outside of the project area or any information not related to drainage or water quality. The approved BMP Exhibit (Site Plan) shall be submitted as a plan sheet on all grading and building plan sets submitted for plan check review and approval. The BMP Exhibit shall be at the same size as the rest of the plan sheets in the submittal and shall have an approval stamp and signature prior to plan check submittal.

VI.2 Submittal and Recordation of Water Quality Management Plan

Following approval of the Final Project-Specific WQMP, three copies of the approved WQMP (including BMP Exhibit, Operations and Maintenance (O&M) Plan, and Appendices) shall be submitted. In addition, these documents shall be submitted in a PDF format.

Each approved WQMP (including BMP Exhibit, Operations and Maintenance (O&M) Plan, and Appendices) shall be recorded in the Orange County Clerk-Recorder's Office, prior to close-out of grading and/or building permit. Educational Materials are not required to be included.

Section VII Educational Materials

Refer to the Orange County Stormwater Program (ocwatersheds.com) for a library of materials available. Please only attach the educational materials specifically applicable to this project. Other materials specific to the project may be included as well and must be attached.

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

*Go to the following website online to view checked brochures. <u>https://hzoc.org/resources/view-order-brochures/resident-brochures/</u>

"ATTACHMENT A"

PROJECT RESEARCH MATERIAL

Orange County and Part of Riverside County, California

163—Metz loamy sand

Map Unit Setting

National map unit symbol: hcn8 Elevation: 30 to 2,500 feet Mean annual precipitation: 20 inches Mean annual air temperature: 57 to 61 degrees F Frost-free period: 200 to 340 days Farmland classification: Prime farmland if irrigated

Map Unit Composition

Metz and similar soils: 80 percent Minor components: 20 percent Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Metz

Setting

Landform: Alluvial fans Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Side slope Down-slope shape: Concave Across-slope shape: Convex Parent material: Alluvium derived from mixed

Typical profile

H1 - 0 to 17 inches: loamy sand *H2 - 17 to 63 inches:* stratified sand to fine sandy loam

Properties and qualities

Slope: 0 to 2 percent Depth to restrictive feature: More than 80 inches Natural drainage class: Somewhat excessively drained Runoff class: Low Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None *Frequency of ponding:* None

Calcium carbonate, maximum in profile: 5 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 2s Land capability classification (nonirrigated): 4e Hydrologic Soil Group: B

JSDA

Ecological site: SANDY (1975) (R019XD035CA) *Hydric soil rating:* No

Minor Components

Riverwash

Percent of map unit: 4 percent Landform: Fans Hydric soil rating: Yes

San emigdio, fine sandy loam Percent of map unit: 4 percent Hydric soil rating: No

Hueneme, fine sandy loam

Percent of map unit: 4 percent Hydric soil rating: No

Corralitos, loamy sand Percent of map unit: 4 percent Hydric soil rating: No

Metz, mod fine substratum Percent of map unit: 4 percent Hydric soil rating: No

Data Source Information

Soil Survey Area: Orange County and Part of Riverside County, California Survey Area Data: Version 11, Sep 12, 2017



Table 2.2: Summary of the Approved 2010 303(d) Listed Water Bodies and Associated Pollutants of Concern for North Orange County

Region	Water Body	Bacteria Indicators/ Pathogens	Metals	Nutrients	Pesticides	Toxicity	Trash	Salinity/ TDS/ Chlorides	Turbidity	Other Organics
	Anaheim Bay		Х		Х	Х				Х
	Bolsa Chica Channel		Х							
	Buck Gully Creek	Х								
	Coyote Creek	Х		Х	Х	Х				
ធ	Huntington Beach State Park		1				r			Х
Ar	Huntington Harbor	Х	Х		Х	Х				Х
ants	Los Trancos Creek (Crystal Cove Creek)	Х	r.							
s S S	Newport Bay, Lower		r.			Х				Х
Б	Newport Bay, Upper (Ecological Reserve)					Х				Х
Regi	San Diego Creek, Reach 1	Х	r.							
	San Diego Creek, Reach 2									
	San Gabriel River, Reach 1	Х								
	Seal Beach	Х				•				Х
	Silverado Creek	х						Х		

On October 11, 2011, the 2010 303(d) list was approved by USEPA Region 9. Project proponents should consult the most recent 303(d) list located on the State Water Resources Control Board website¹⁰.

¹⁰ <u>http://www.swrcb.ca.gov/water_issues/programs/#wqassessment</u>







XIV.5. Biotreatment BMP Fact Sheets (BIO)

Conceptual criteria for biotreatment BMP selection, design, and maintenance are contained in **Appendix XII**. These criteria are generally applicable to the design of biotreatment BMPs in Orange County and BMP-specific guidance is provided in the following fact sheets. ²⁴

Note: Biotreatment BMPs shall be designed to provide the maximum feasible infiltration and ET based on criteria contained in **Appendix XI.2**.

BIO-1: Bioretention with Underdrains

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, and plants. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and plants. Bioretention with an underdrain are utilized for areas with low permeability native soils or steep slopes where the underdrain system that routes the treated runoff to the storm drain system rather than depending entirely on infiltration. <u>Bioretention must be designed without an underdrain</u> in areas of high soil permeability.

Also known as:

- Rain gardens with underdrains
- Vegetated media filter
- *Downspout planter boxes*



Bioretention Source: Geosyntec Consultants

Feasibility Screening Considerations

• If there are no hazards associated with infiltration (such as groundwater concerns, contaminant plumes or geotechnical concerns), <u>bioinfiltration facilities</u>, which achieve partial infiltration, should be used to maximize infiltration.

²⁴ Not all BMPs presented in this section are considered "biofiltration BMPs" under the South Orange County Permit Area. Biofiltration BMPs are vegetated treat-and-release BMPs that filter stormwater through amended soil media that is biologically active, support plant growth, and also promote infiltration and/or evapotranspiration. For projects in South Orange County, the total volume of storage in surface ponding and pores spaces is required to be at least 75% of the remaining DCV that the biofiltration BMP is designed to address. This prevents significant downsizing of BMPs which otherwise may be possible via routing calculations. Biotreatment BMPs that do not meet this definition are not considered to be LID BMPs, but may be used as treatment control or pre-treatment BMPs. See Section III.7 and Worksheet SOC-1 for guidance.

• Bioretention with underdrain facilities should be lined if contaminant plumes or geotechnical concerns exist. If high groundwater is the reason for infiltration infeasibility, bioretention facilities with underdrains do not need to be lined.

Opportunity Criteria

- Land use may include commercial, residential, mixed use, institutional, and subdivisions. Bioretention may also be applied in parking lot islands, cul-de-sacs, traffic circles, road shoulders, road medians, and next to buildings in planter boxes.
- Drainage area is ≤ 5 acres.
- Area is available for infiltration.
- Site must have adequate relief between land surface and the stormwater conveyance system to permit vertical percolation through the soil media and collection and conveyance in underdrain to stormwater conveyance system.

OC-Specific Design Criteria and Considerations

Ponding	depth	should	not	exceed	18	inches;	fencing	may	be	required	if	ponding	depth	is
greater th	nan 6 ir	iches to	miti	gate dro	wnii	ng.								

The minimum soil depth is 2 feet (3 feet is preferred).

The maximum drawdown time of the bioretention ponding area is 48 hours. The maximum drawdown time of the planting media and gravel drainage layer is 96 hours, if applicable.

Infiltration pathways may need to be restricted due to the close proximity of roads, foundations,
or other infrastructure. A geomembrane liner, or other equivalent water proofing, may be placed
along the vertical walls to reduce lateral flows. This liner should have a minimum thickness of
30 mils.

If infiltration in bioretention location is hazardous due to groundwater or geotechnical concerns, a geomembrane liner must be installed at the base of the bioretention facility. This liner should have a minimum thickness of 30 mils.

The planting media placed in the cell shall be designed per the recommendations contained in MISC-1: Planting/Storage Media

Plant materials should be tolerant of summer drought, ponding fluctuations, and saturated soil conditions for 48 hours; native place species and/or hardy cultivars that are not invasive and do not require chemical inputs should be used to the maximum extent feasible

The bioretention area should be covered with 2-4 inches (average 3 inches) or mulch at the start and an additional placement of 1-2 inches of mulch should be added annually.

Underdrain should be sized with a 6 inch minimum diameter and have a 0.5% minimum slope.
 Underdrain should be slotted polyvinyl chloride (PVC) pipe; underdrain pipe should be more than 5 feet from tree locations (if space allows).

A gravel blanket or bedding is required for the underdrain pipe(s). At least 0.5 feet of washed aggregate must be placed below, to the top, and to the sides of the underdrain pipe(s).

An overflow device is required at the top of the bioretention area ponding depth.

Dispersed flow or energy dissipation (i.e. splash rocks) for piped inlets should be provided at basin inlet to prevent erosion.

Ponding area side slopes shall be no steeper than 3:1 (H:V) unless designed as a planter box BMP with appropriate consideration for trip and fall hazards.

Simple Sizing Method for Bioretention with Underdrain

If the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** is used to size a bioretention with underdrain facility, the user selects the basin depth and then determines the appropriate surface area to capture the DCV. The sizing steps are as follows:

Step 1: Determine DCV

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

Step 2: Verify that the Ponding Depth will Draw Down within 48 Hours

The ponding area drawdown time can be calculated using the following equation:

 $DD_P = (d_P / K_{MEDIA}) \times 12 in/ft$

Where:

 DD_P = time to drain ponded water, hours

 d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

 K_{MEDIA} = media design infiltration rate, in/hr (equivalent to the media hydraulic conductivity with a factor of safety of 2; K_{MEDIA} of 2.5 in/hr should be used unless other information is available)

If the drawdown time exceeds 48 hours, adjust ponding depth and/or media infiltration rate until 48 hour drawdown time is achieved.

Step 3: Determine the Depth of Water Filtered During Design Capture Storm

The depth of water filtered during the design capture storm can be estimated as the amount routed through the media during the storm, or the ponding depth, whichever is smaller.

 $d_{FILTERED} = Minimum [((K_{MEDIA} \times T_{ROUTING})/12), d_P]$

Where:

d_{FILTERED} = depth of water that may be considered to be filtered during the design storm event, ft

 K_{MEDIA} = media design infiltration rate, in/hr (equivalent to the media hydraulic conductivity with a factor of safety of 2; K_{MEDIA} of 2.5 in/hr should be used unless other information is available)

 $T_{ROUTING}$ = storm duration that may be assumed for routing calculations; this should be assumed to be no greater than 3 hours. If the designer desires to account for further routing effects, the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) should be used.

 d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

Step 4: Determine the Facility Surface Area

 $A = DCV/ (d_P + d_{FILTERED})$

Where:

A = required area of bioretention facility, sq-ft

DCV = design capture volume, cu-ft

d_{FILTERED} = depth of water that may be considered to be filtered during the design storm event, ft

 d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

In South Orange County, the provided ponding plus pore volume must be checked to demonstrate that it is greater than 0.75 of the remaining DCV that this BMP is designed to address. See Section III.7 and Worksheet SOC-1.

Capture Efficiency Method for Bioretention with Underdrains

If the bioretention geometry has already been defined and the user wishes to account more explicitly for routing, the user can determine the required footprint area using the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See Appendix III.3.2) to determine the fraction of the DCV that must be provided to manage 80 percent of average annual runoff volume. This method accounts for drawdown time different than 48 hours.

Step 1: Determine the drawdown time associated with the selected basin geometry

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

Where:

DD = time to completely drain infiltration basin ponding depth, hours

 d_P = bioretention ponding depth, ft (should be less than or equal to 1.5 ft)

K_{DESIGN} = design media infiltration rate, in/hr (assume 2.5 inches per hour unless otherwise proposed)

If drawdown is less than 3 hours, the drawdown time should be rounded to 3 hours or the Capture Efficiency Method for Flow-based BMPs (See **Appendix III.3.3**) shall be used.

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

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

Step 3: Determine the Basin Infiltrating Area Needed

The required infiltrating area (i.e. the surface area of the top of the media layer) can be calculated using the following equation:

A = Design Volume / d_p

Where:

A = required infiltrating area, sq-ft (measured at the media surface)

Design Volume = fraction of DCV, adjusted for drawdown, cu-ft (see Step 2)

 d_p = ponding depth of water stored in bioretention area, ft (from Step 1)

This does not include the side slopes, access roads, etc. which would increase bioretention footprint. If the area required is greater than the selected basin area, adjust surface area or adjust ponding depth and recalculate required area until the required area is achieved.

In South Orange County, the provided ponding plus pore volume must be checked to demonstrate that it is greater than 0.75 of the remaining DCV that this BMP is designed to address. See Section III.7 and Worksheet SOC-1.

Configuration for Use in a Treatment Train

- Bioretention areas may be preceeded in a treatment train by HSCs in the drainage area, which would reduce the required design volume of the bioretention cell. For example, bioretention could be used to manage overflow from a cistern.
- Bioretention areas can be used to provide pretreatment for underground infiltration systems.

Additional References for Design Guidance

 CASQA BMP Handbook for New and Redevelopment: <u>http://www.cabmphandbooks.com/Documents/Development/TC-32.pdf</u>

- SMC LID Manual (pp 68): <u>http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalL_ID_ManualN_ID_NANUALN_SoCalL_ID_ManualNANUAN_SoCalL_ID_NANUAN_SoCalL_I</u>
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 5: http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf
- San Diego County LID Handbook Appendix 4 (Factsheet 7): <u>http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf</u>

Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4: <u>http://www.laschools.org/employee/design/fs-studies-and-</u> <u>reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-</u> <u>red.pdf?version_id=76975850</u>

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

Exhibit D

Water Quality Management Plan Notice of Transfer of Responsibility

Tracking No. Assigned by the City of Anaheim:

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

I. Previous Owner/Previous Responsible Party Information

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

II. Information about Site Transferred

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

III. New Owner/New Responsible Party Information

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

IV. Ownership Transfer Information

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

Exhibit D

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. <u>Purpose of Notice of Transfer</u>

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.

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

"ATTACHMENT B"

GEOTECHNICAL REPORT EXCERPTS



Soil Engineering, Environmental Engineering, Materials Testing, Geology

September 12, 2016

Project No. 16155-01

TO: Environmental Engineering Enterprises, Inc. P.O. Box 18021 Anaheim, CA 92817-8021

ATTENTION: Doug Browne

SUBJECT: Preliminary Soil Investigation, Liquefaction Evaluation and Infiltration Test Report, Proposed Two-Story Apartment Complex with Partial Subterranean Parking, 3175 W. Ball Road, City of Anaheim, California

Introduction

In accordance with your authorization, Soil Exploration Co., Inc. has performed a preliminary soil investigation, liquefaction evaluation and infiltration test for the subject site. The accompanying report presents a summary of our findings, conclusions, recommendations and limitations of our work for construction of proposed two-story, wood frame apartment complex with partial subterranean parking.

Scope of Work

- Review soils, seismic, geologic, groundwater data, maps and nearby site reports in our files.
- Perform exploration of the site by means of two 8" diameter borings, 50 feet and 21.5 feet below existing ground surface, at readily accessible locations.
- Field Engineer (California Registered RCE) for logging, sampling of select soils, observation of excavation resistance, record SPT blow counts, and water seepage (if any).
- Perform basic laboratory testing on select soil samples, including moisture, sieve analysis, expansion index and water soluble sulfates.
- Perform digitized search of known faults within a 50-mile radius of the site.
- Determine California Building Code (CBC) 2013 seismic parameters for the site.
- Consult with project architect/civil engineer.
- Perform one shallow infiltration test at location of proposed retention basin.
- Prepare a report of our findings, conclusions and recommendations for site preparation, including overexcavation/removal depth, allowable bearing value, foundation/slab-on-grade depth/thickness recommendations, excavation characteristics, earth pressures for retaining walls design, <u>liquefaction</u> <u>evaluation</u>, general earthwork and grading specifications, California Building Code (2013) seismic design coefficients, Cal/OSHA soil classification and infiltration rate in inches per hour.

7535 Jurupa Ave., Unit C • Riverside, CA 92504 • Tel: (951) 688-7200 • Fax: (951) 688-7100 soilexploration@yahoo.com • www.soilexp.com

Site Conditions

The subject, square shaped, flat site is located on the northeast corner of W. Ball Road and S. Western Avenue in the City of Anaheim, California. W. Ball Road and S. Western Avenue are paved roads with curbs, gutters and sidewalks. A block wall borders the site on the north and east sides and a chain link fence on the west side. Existing apartments are located on adjacent properties to the north and east. Vegetation consists of medium dense weeds. Minor debris was noted on the site at the time of our investigation.

The approximate locations of the above and other features are shown on the Exploratory Boring and Infiltration Test Location Map, Plate 1. The base map is a copy of Site Plan provided by you.

Proposed Development

We understand that the site is proposed for a two-story, 12-unit apartment complex with partial subterranean parking. The structure will be wood frame construction. A grading plan is not yet available, however based on flat topography of the site, modest cut and fill grading and no cut or fill slopes will be proposed.

Field Work

Two exploratory borings (B-1 and B-2) were drilled on August 31, 2016, to a depth of 50 feet and 21.5 feet below existing ground surface, respectively, utilizing a B-53 mobile drill rig equipped with 8-inch diameter hollow stem augers. Refer to Plate 1 for boring locations. The borings were logged by a California Registered Civil Engineer. Standard Penetration Tests (SPT) blow counts were recorded for the earth materials. Relatively undisturbed samples of the soils were also obtained by utilizing California Ring Sampler.

In general, these borings revealed that the site area is underlain by alluvial soils consisting of interbedded silty sand, silty clayey sand, sand and sand with silt (USCS "SM", "SM-SC", "SP" and "SP-SM"). The earth materials are loose to dense. USGS Quarternary Geologic Map of the Los Alamitos Quadrangle shows the site area is underlain with younger alluvium deposits (see Figure 2). Detailed descriptions of the earth materials encountered are presented in the form of Geotechnical Boring Logs in Appendix B.

Laboratory Testing

Basic laboratory tests were performed for select soil samples. The tests consisted primarily of natural moisture contents, sieve analysis and water soluble sulfates.

Groundwater/Liquefaction

Groundwater was encountered in both of our exploratory borings at a depth of 16 feet below ground surface. Please note that a groundwater study is not within the scope of this work, however groundwater data from State well in the vicinity of the site (see Figure 1 for location) is tabulated as follows:

State Well ID No.	Depth to Water (ft)	Date Measured	Distance/Location Relative to Site		
04044044400040	34	2/7/1971	0		
04511W14Q0045	20.7	5/1/1985	See Figure 1		

Based on USGS Historically Highest Ground Water Contours map, water was at a depth of 10± feet in the vicinity of the site (see Figure 3).

Based on State of California Seismic Hazard Zones Map, the site is located within a zone of liquefaction potential (Figure 4).

Liquefaction Evaluation

Soil liquefaction is a process by which loose, saturated, fine/uniform, granular deposits lose a significant portion of their shear strength due to pore water pressure buildup resulting from cyclic loading, such as that caused by an earthquake. Soil liquefaction can lead to foundation bearing failures and excessive settlements. Liquefaction potential is greatest in poorly graded fine sand with a mean (D₅₀) grain size in the range of 0.075 to 0.20 mm.

The alluvial materials encountered in our deep boring B-1 were classified as interbedded silty sand, silty clayey with sand, sand and sand with silt (USCS "SM", "SM-SC, "SP" and "SP-SM"). In general, the earth materials have an overall compactness of loose to dense.

Depth (ft)	Class (USCS)	SPT Count (blows/foot)	Moisture (%)	Passing 200 Sieve (%)	Compactness/ Consistency
2.5	SM	41	3.6	27	Dense
5	SM	38	3.1	-	Dense
10	SM-SC	12	21.2	10	Medium dense
15	SM-SC	16	21.6	-	Medium dense
20	SP	21	24.1	2	Medium dense
25	SP	13	22.2	-	Medium dense
30	SP	8	25.4	-	Loose
35	SP	10	25.1	-	Loose
40	SP	18		-	Medium dense
45	SM	18	22.6	-	Medium dense
50	SP-SM	21	-		Medium dense

Summary of conditions for the deep boring B-1 are as follows:

Liquefaction Analysis: LiquefyPro

Liquefaction susceptibility using Standard Penetration Test data and laboratory grain size test results were analyzed using LiquefyPro software (Version 5.5g). Liquefaction analysis performed for this evaluation included: [1] evaluation of soil consistency and compactness influencing liquefaction, [2] correction of penetration resistance data to convert measured SPT N-values to standard N₆₀-values, [3] calculating the earthquake induced stress ratio (CSR), [4] calculating cyclic resistance ratio (CRR), [5] assume water table at 10 feet below the ground surface, and [6] evaluation of liquefaction potential by calculating a factor of safety against liquefaction (FS), by dividing CRR by CSR. The software output is presented in Appendix E.

The main observations of the results are as follows:

- Onsite soils at the site in general have a Safety Factor of less than 1.0 against liquefaction. Indicated total settlement of saturated and unsaturated sands is 13.19 inch, with differential settlement of 6.593 to 8.703 inch.
- Liquefaction also involves lateral or horizontal displacement (lateral spreading) of essentially intact blocks of surficial soils on slopes or toward a free-face slope such as river or canal bank. The potential for and magnitude of lateral spreading is dependent upon many conditions, including the presence of a relatively thick, continuous, potentially liquefiable sand layer and high slopes. Subsurface information obtained for this study indicates that loose sands are not present and high slopes are not anticipated. Based on currently available procedures, the site does not appear to be susceptible to (lateral spread) ground surface disruption during a moderate seismic event.

Seismicity/Faulting

A computer search of known Quaternary major faults within 50 miles of the site from USGS Earthquake Hazards Program is presented in Appendix D. Please note that it is probable that not all-active or potentially active faults in the region have been identified. Furthermore, seismic potential of the smaller and less notable faults is not sufficiently developed for assignment of maximum magnitudes and associated levels of ground shaking that might occur at the site due to these faults.

Secondary Seismic Hazards

Ground Rupture

The surface fault rupture occurs along traces of active or potentially active faults. The site is not located within any State of California fault hazard zone and no active or potentially active faults are known to exist at the site. The potential for surface fault rupture at the site is therefore considered low.

Tsunamis/Seiches/Flooding

The elevation and inland location of the site and absence of upstream dams or other nearby large bodies of water precludes these earthquake induced hazards to the site.

Landsliding/Lateral Spreading

Considering the flat topography and the absence of significant slopes in the vicinity of the site, the potential for landsliding and lateral spreading is considered very low.

Conclusions

- Vegetable matter, existing structures, old foundations, underground structures, cesspools, leach fields, seepage pits, old fills, buried utilities/irrigation lines, etc. and deleterious materials associated with any structures would require removal from the proposed building/grading areas
- Overexcavation and recompaction of the natural surficial soils should be anticipated to provide adequate and uniform support for the proposed structure.
- The onsite soils exclusive of deleterious material may be used as compacted fill materials.
- Based on observation and soil classification, the expansion potential of the near-surface soils at the site is
 expected to be very low (EI<20).
- Based on our analysis, site soils are susceptible to liquefaction, considering historic highest groundwater at 10 feet.
- The site is located approximately 4.29 miles from the Puente Hills (Coyote Hills) fault. The site is located in a region of generally high seismicity, as is all of Southern California. During its design life, the site is expected to experience moderate to strong ground motions from earthquakes on regional and/or local causative faults.
- There is a 2 percent probability in 50 years (2475 year return period) that peak ground acceleration at the site will exceed 0.5g (see Appendix D).
- Flooding potential of the site should be evaluated and considered in planning and design by civil engineering consultant.

Recommendations

Site Preparation

All grading and backfills should be performed in accordance with our General Earthwork and Grading Specifications (Appendix F), except as modified in the text of this report. Undocumented fills, trash, vegetation, trees, roots, underground/basement structures, old foundations, leach fields, seepage pits, septic tanks and any deleterious material associated with previous/current use of the site should be traced and removed offsite. Suitable soils (free from debris/deleterious materials) may be used for compacted fills.

After site clearance, as described above, residential pad, including at least 5 feet outside building lines in plan (including any canopies and extended foundations where practical) should be overexcavated to a depth of at least 4 feet below existing ground or proposed grade, whichever is deeper. Where proposed building is adjacent to existing structures or block walls, the overexcavation should be conducted safely and in sections on the order of 10 feet in length or as appropriate to protect existing structures in-place. Deeper overexcavation should not be precluded specially to expose competent soils. Vegetation roots should be traced and completely removed if encountered in bottom of the overexcavated areas.

After any overexcavation, the exposed surfaces should be further scarified to a depth of at least 12inches, watered as necessary, and recompacted to at least 95 percent of the maximum dry density, as determined by ASTM D1557-12 Test Method, prior to placement of fill. All fills should be compacted to at least 95 percent of the maximum dry density. Deeper overexcavations, specially to remove unsuitable soils, roots, remove existing deep structures or clean the bottom, may be required depending upon field observations of excavated bottoms during site preparation by the soil engineer or his representative.

The purpose of the above recommendations is to provide at least 3 feet of compacted fill below the foundation bottoms.

Foundation Design

Following site preparation and soil modification indicated below in this report, a maximum allowable bearing value of 1500 psf is recommended.

Please note that foundation design is under the purview of the structural engineer and structural considerations may require a foundation mat or the need for post-tensioned foundation system in order to mitigate the differential settlement.

Slabs-On-Grade/Moisture Barrier

Where moisture intrusion is objectionable, slabs-on-grade/foundation mat should be underlain with 10-mil Visqueen moisture barrier. The moisture barrier should be overlain by two-inch layer of clean rolled sand to aid in concrete curing and underlain by two inches of rolled clean sand.

Soil Modification/Geogrid Reinforcement

In addition to the use of foundation mat or post-tension foundation system, Geogrid reinforcement of the foundation soils may be a consideration. As indicated above, the existing soil in the building area should be overexcavated to a depth of at least 4 feet (below existing ground or pad elevation, whichever is deeper), and extend at least 5 feet beyond building lines in plan. The exposed ground should be further scarified to a depth of 12 inches and compacted to at least 95 percent relative compaction prior to placement of the Geogrid and engineered fill.

We recommend two layers of Geogrid reinforcement, one at the bottom of the overexcavation and the other 12 inches above. Geogrid should be at least Mirafi 10XT (or equivalent) and the joints should be overlapped a minimum distance of 3 feet.

Special Considerations/Excess Soils from Foundation Excavations

Excess soils generated from foundation excavations should not be placed on slabs subgrade without proper moisture and compaction. Slab subgrade should be verified to contain 1.2 times the soil optimum moisture content to a depth of 12 inches prior to placement of slab building materials. Moisture content must be tested in the field by the soil engineer. Slabs subgrade should be kept moist and the surface should not be allowed to desiccate.

In hot or windy weather, the contractor must take appropriate curing precautions after the placement of concrete. The use of mechanically compacted low slump concrete (not exceeding 4 inches at the time of placement) is recommended. We recommend that a slipsheet (or equivalent) be utilized if grouted tiles or other crack sensitive flooring (such as marble tiles) is planned directly on concrete slabs.

Lateral Earth Pressures/Retaining Walls

The following lateral earth pressures and soil parameters in conjunction with the above recommended bearing value (1500 psf), may be used for design of subterranean retaining walls with free draining compacted backfills. If passive earth pressure and friction are combined to provide required resistance to lateral forces, the value of the passive pressure should be reduced to two-thirds the following recommendations:

Active Earth Pressure with level backfill (P_a) At Rest Pressure (P_0) Passive Earth Pressure (P_p) Horizontal Coefficient of Friction (μ) Unit Soil Weight (γ_t) 40 psf (EFP), drained, yielding 50 psf (EFP), drained, non-yielding (part of building wall) 250 psf (EFP), drained, maximum of 2500 psf 0.25 120 pcf

We recommend drainage for retaining walls to be provided in accordance with Plate 2 of this report. Maximum precautions should be taken when placing drainage materials and during backfilling. <u>Retaining</u> walls should be waterproofed in accordance with project architect recommendations. All wall backfills should be properly compacted to at least 90 percent relative compaction.

Seismic Considerations

The site is located approximately 4.29 miles from the Puente Hills (Coyote Hills) fault. Moderate to strong ground shaking can be expected at the site and there is a 2 percent probability in 50 years that peak ground acceleration at the site will exceed 0.5g. The site soil profile is Class D. The structural engineer should consider city/county local codes, California Building Code (CBC) 2013, seismic data presented in this report (Appendix D), the latest requirements of the Structural Engineers Association, and any other pertinent data in selecting design parameters.

Expansion Index/Soluble Sulfates

Based on observation and soil classification, the expansion potential of the onsite sandy soils is anticipated to be very low. The results of soluble sulfate tests on a select soil sample, performed by Cal Land Engineering of Brea, California, indicate negligible sulfate exposure (less than 0.1% by weight). The laboratory test results are presented in Appendix C. The cement mix/strength should meet the ACI guidelines and recommendations of the structural design engineer. Tentatively we recommend Type II cement and concrete slump not exceeding 4 inches at the time of placement. If critical these should be further verified by your structural and/or a corrosion engineer.

Surface Drainage/Groundwater

The surface of the site should be graded to provide positive drainage away from structures and foundations. Drainage should be directed to established swales and then to appropriate drainage structures to minimize the possibility of serious erosion. Surface drainage must be directed and maintained away from the foundations. Water, either natural or by irrigation, should not be permitted to pond or saturate the foundation soils.

Groundwater was encountered during our subsurface investigation at a depth of 16 feet. Our experience indicates that surface or near surface groundwater conditions can develop in areas where near surface groundwater conditions did not exist prior to site development, especially in areas where a substantial increase in surface water infiltration results from landscape irrigation. We therefore recommend that landscape irrigation be kept to the minimum necessary to maintain plant vigor and that any leaking pipes/sprinklers, etc. should be promptly repaired. The depth to the groundwater may fluctuate with seasonal changes and from one year to the next. Subdrains, horizontal drains or other devices may be recommended for graded areas that exhibit seepage, groundwater, past evidence for shallow water, or areas with a potential for future nuisance shallow groundwater conditions.

Concrete Joints/Flatwork

The joints spacing for concrete should be determined by the project architect. Joints should be laid out to form approximately square panels (equal transverse and longitudinal joint spacing). Rectangular panels, with the long dimension no more than one-and-one-half times the short, may be used when square panels are not feasible. The depth of longitudinal and transverse joints should be one-fourth the depth of the slab thickness.

Joint layout should be adjusted so that the joints will line up with the corners of structures, small foundations and other built-in structures. Acute angles or small pieces of slab curves as a result of joints layout should not be permitted.

Concrete Curing

Fresh concrete should be cured by protecting it against loss of moisture, rapid temperature change and mechanical injury for at least 3 days after placement. Moist curing, waterproof paper, white polyethylene sheeting, white liquid membrane compound, or a combination thereof may be used. After finishing operations have been completed, the entire surface of the newly place concrete should be covered by whatever curing medium is applicable to local conditions and approved by the engineer. The edges of concrete slabs exposed by the removal of forms should be protected immediately to provide these surfaces with continuous curing treatment equal to the method selected for curing the slab surfaces. The contractor should have at hand, and ready to install before actual placement begins, the equipment needed for adequate curing of the concrete.

Cal/OSHA Classification/Trench Excavations/Backfills

In general Cal/OSHA classification of onsite soils appears to be Type B.

- Temporary trench excavations deeper than 5 feet should be shored or sloped at 1:1 or flatter in compliance with Cal/OSHA requirements:
- a.) The shoring should be designed by a qualified engineer experienced in the shoring design.
- b.) The tops of any temporary unshored excavations should be barricaded to prevent vehicle and storage loads within a 1:1 line projected upward from the bottom of the excavation or a minimum of 5 feet, whichever is greater. If the temporary construction embankments, <u>including shored</u> <u>excavations</u>, are to be maintained during the rainy season, berms are suggested along the tops of the excavations where necessary to prevent runoff from entering the excavation and eroding the slope faces.
- c.) The soils exposed in the excavations should be inspected during excavation by the soils engineer so that modifications can be made if variations in the soil conditions occur.
- d.) All unshored excavations should be stabilized within 30 days of initial excavation.

Additional Observations and Testing

The recommendations provided in this report are based on preliminary design information and subsurface conditions as interpreted from limited exploratory work. Our conclusions and recommendations should be reviewed, verified during grading and construction, and revised as necessary.

Soil Exploration Co., Inc. should review the foundation plans and observe and/or test at the following stages of construction:

- During all overexcavation and grading.
- Following foundation excavations and prior to placement of foundation materials.
- During wetting of slab subgrade and prior to placement of slab materials.
- · During all trench and retaining wall backfills.
- · When any unusual conditions are encountered.

Final Compaction Report

A final report of compaction control should be prepared subsequent to the completion of grading. The report should include a summary of work performed, laboratory test results, and the results, locations and elevations of field density tests performed during grading.

Limitation of Investigation

Our investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Geotechnical Engineers practicing in this or similar locations. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

The field and laboratory test data are believed representative of the project site; however, soil conditions can vary significantly. As in most projects, conditions revealed during grading may be at variance with preliminary findings. If this condition occurs, the possible variations must be evaluated by the Project Geotechnical Engineer and adjusted as required or alternate design recommended.

This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractor carry out such recommendations in the field.

This firm does not practice or consult in the field of safety engineering. We do not direct the contractor's operations, and we cannot be responsible for other than our own personnel on the site; therefore, the safety of others is the responsibility of the contractor. The contractor should notify the owner if he considers any of the recommended actions presented herein to be unsafe.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In additions, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge.

Closure

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

Very truly yours, Soil Exploration Co., Inc.

Gene K. Luu, PE 53417 Project Engineer

Distribution:

[3] Addressee

Attachments:	Figure 1	Site Location Map
	Figure 2	Geologic Map
	Figure 3	Historically Highest Ground Water Contours
	Figure 4	Orange County Geohazards and Fault Zones Map
	Figure 5	State of California Special Studies Zones Map
	Plate 1	Exploratory Boring and Infiltration Test Location Map
	Plate 2	Retaining Wall Backfill and Subdrain Detail
	Appendix A	References
	Appendix B	Exploratory Boring Logs
	Appendix C	Laboratory Test Results
	Appendix D	USGS Earthquake Hazards Program/Source Parameters and CBC (2013) Seismic Parameters
	Appendix E	Liguefaction Analysis
	Appendix F	General Earthwork and Grading Specifications
	Appendix G	Infiltration Test Procedure and Test Results

"ATTACHMENT C"

INFILTRATION STUDY

Infiltration Test (Percolation Test Procedure)

One 8-inch diameter, 6-feet deep test hole (I-1) was drilled at suggested location. The soil at the test location was visually classified as silty sand (USCS "SM"). To mitigate any possible caving or sloughing of the test hole, a 6-inch diameter perforated pipe was placed in the hole. The bottom of the hole was covered with 2 inches of gravel.

The testing was conducted after presoaking with water. Two consecutive measurements showed that 6 inches of water seeped away in less than 25 minutes. The tests were run an additional one hour with measurements taken at 10 minute intervals. Water level was adjusted to 20 inches above the bottom of the test hole after each measurement. The drop that occurred during the final reading was used for design rate purposes.

Infiltration Tests/Tabulated Test Results

Test No.	Depth of Test (feet)	Earth Material	Infiltration Rate (in/hr) 2.9	
1-1	E	0.111 0		
	0	Silty Sand ("SM")		

We recommend that a suitable factor of safety should be applied to the rate in design of the system.

"ATTACHMENT D"

TGD WORKSHEETS

Priority Project	General Pollutant Categories							
Categories and/or Project Features	Suspended Solid/ Sediments	Nutrients	Heavy Metals	Pathogens (Bacteria/ Virus)	Pesticides	Oil & Grease	Toxic Organic Compounds	Trash & Debris
Detached Residential Development	Е	Е	Ν	Е	Е	Е	Ν	Е
Attached Residential Development	Е	Е	Ν	Е	Е	E ⁽²⁾	Ν	Е
Commercial/ Industrial Development	E(1)	E(1)	E(5)	E(3)	E(1)	Е	Е	Е
Automotive Repair Shops	Ν	Ν	Е	Ν	Ν	Е	Е	Е
Restaurants	<u>E</u> (1)(2)	<u>E</u> (1)	E(2)	Е	<u>E</u> (1)	Е	Ν	Е
Hillside Development >5,000 ft ²	E	Е	N	Е	Е	Е	N	Е
Parking Lots	Е	E(1)	Е	E(4)	E(1)	Е	Е	Е
Streets, Highways, & Freeways	E	E (1)	Е	<u>E(4)</u>	<u>E(1)</u>	Е	Е	Е
Retail Gasoline Outlets	Ν	Ν	Е	N	Ν	Е	E	Е

Table 2.1: Anticipated and Potential Pollutants Generated by Land Use Type

E = expected to be of concern

N = not expected to be of concern

- (1) Expected pollutant if landscaping exists on-site, otherwise not expected.
- (2) Expected pollutant if the project includes uncovered parking areas, otherwise not expected.
- (3) Expected pollutant if land use involves food or animal waste products, otherwise not expected.
- (4) Bacterial indicators are routinely detected in pavement runoff.
- (5) Expected if outdoor storage or metal roofs, otherwise not expected.

Table 2.7: Infiltration BMP Feasibility Worksheet

	Infeasibility Criteria	Yes	No			
1	Would Infiltration BMPs pose significant risk for groundwater related concerns? Refer to <u>Appendix VIII</u> (Worksheet I) for guidance on groundwater-related infiltration feasibility criteria.	\checkmark				
Provide basis: From information found on Geotracker, infiltration would pose a significant risk to groundwater as there was contamination from gasoline previously. Please see Attachment D for Geotracker information and Worksheet "I". Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability						
2	 Would Infiltration BMPs pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level? (Yes if the answer to any of the following questions is yes, as established by a geotechnical expert): The BMP can only be located less than 50 feet away from slopes steeper than 15 percent The BMP can only be located less than eight feet from building foundations or an alternative setback. A study prepared by a geotechnical professional or an available watershed study substantiates that stormwater infiltration would potentially result in significantly increased risks of geotechnical hazards that cannot be mitigated to an acceptable level. 		\checkmark			
Provide basis:						
Due to limited space, the BMP would be located less than eight feet from building foundations. Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.						
3	Would infiltration of the DCV from drainage area violate downstream water rights?		\checkmark			
Provide basis: There are no downstream water right violations.						
Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.						

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

	Partial Infeasibility Criteria	Yes	No		
4	Is proposed infiltration facility located on HSG D soils or the site geotechnical investigation identifies presence of soil characteristics which support categorization as D soils?		\checkmark		
Provide basis: The site is located in an HSG A soil area. See the Soil Group Map provide					
Attachment "A". Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.					
5	Is measured infiltration rate below proposed facility less than 0.3 inches per hour? This calculation shall be based on the methods described in <u>Appendix VII</u> .		\checkmark		
Provide basis: The infiltration rate was found to be 2.9 in/hr. See the infiltration study provided in Attachment "C". Summarize findings of studies provide reference to studies, calculations, maps, data sources,					
6	Would reduction of over predeveloped conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?	\checkmark			
Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: That is permissible: Ber information found on Geotracker, infiltration would cause contamination of gasoline into groundwater. Please see Worksheet "I" in Attachment D. The site is currently an empty lot, so water either infiltrates currently or sheet flows out onto the street. Development of the project would help limit infiltration and groundwater contamination. Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.					
7	Would an increase in infiltration over predeveloped conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?	\checkmark			
 Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: Per information found on Geotracker, infiltration would cause contamination of gasoline into groundwater. Please see Worksheet "I" in Attachment D. Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability. 					
Table 2.7:	Infiltration	BMP Feasibility	Worksheet	(continued)	
------------	--------------	------------------------	-----------	-------------	
------------	--------------	------------------------	-----------	-------------	

Infiltra	Infiltration Screening Results (check box corresponding to result):				
8	Is there substantial evidence that infiltration from the project would result in a significant increase in I&I to the sanitary sewer that cannot be sufficiently mitigated? (See <u>Appendix XVII</u>) Provide narrative discussion and supporting evidence: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.	There is currently no Appendix XVII in the TGD. Currently, the sanitary sewer main lines are located on the street. There is no significant concern for I&I due to infiltration. As proposed, a full capture system will be used once the project is fully developed.			
9	If any answer from row 1-3 is yes: infiltration of any volume is not feasible within the DMA or equivalent. Provide basis: Summarize findings of infeasibility screening	Row 1 is a "yes". From to info found in Geotracker, infiltration is not feasible due to prior contamination by gasoline from when the site used to be a gas station. Please see worksheet "I" attached.			
10	If any answer from row 4-7 is yes, infiltration is permissible but is not presumed to be feasible for the entire DCV. Criteria for designing biotreatment BMPs to achieve the maximum feasible infiltration and ET shall apply. Provide basis: Summarize findings of infeasibility screening	See worksheet "I" attached. From info found on Geotracker, infiltration is not feasible due to prior contamination by gasoline.			
11	If all answers to rows 1 through 11 are no, infiltration of the full DCV is potentially feasible, BMPs must be designed to infiltrate the full DCV to the maximum extent practicable.	Infiltration not feasible. See Worksheet "I".			

Harvest and Use Infeasibility

Harvest and use infeasibility criteria include:

- If inadequate demand exists for the use of the harvested rainwater. See <u>Appendix X</u> for guidance on determining harvested water demand and applicable feasibility thresholds.
- If the use of harvested water for the type of demand on the project violates codes or ordinances most applicable to stormwater harvesting in effect at the time of project application and a waiver of these codes and/or ordinances cannot be obtained. It is noted that codes and ordinances most applicable to stormwater harvesting may change

Table 4.2 Relative Treatment Performance Ratings of Biotreatment BMPs

Unit Operations and Process	Assumed Principal Unit Operations and Processes Provided	Suspended solids / sediment/ turbidity	Nitrogen compounds	Phosphorus	Heavy metals	Microbial / viral pathogens	Oils and grease	Dissolved toxic organic compounds	Trash and debris
Bioretention system	 Particulate Settling Size Exclusion Inert Media Filtration Sorption/Ion Exchange Microbial Competition/Predation Biological Uptake Volume loss (via infiltration, ET) 	Н	L	L	Н	Μ	Н	М	Н
Bioretention system with internal water storage zone and nutrient sensitive media design	 Bioretention UOPs, <u>plus</u>: Microbially Mediated Transformations (if designed with internal water storage zone) 	н	М	М	н	М	н	Μ	н
Dry extended detention basin	 Particulate Settling Size Exclusion Floatable Capture Vegetative Filtration (with low-flow channel) Volume loss (via infiltration, ET) 		L	М	М	L	М	L	н
Dry extended detention basin with vegetated sand filter outlet structure	 Dry extended detention basin UOPs, <u>plus</u>: Inert Media Filtration 	н	L	Μ	Μ	Μ	Μ	L	Н
Vegetated Swale	 Vegetative Filtration Sorption/Ion Exchange Volume loss (via infiltration, ET) 		L	L	Μ	L	Μ	М	Μ
Vegetated Filter Strip	 Vegetative Filtration Sorption/Ion Exchange Volume loss (via infiltration, ET) 	М	L	L	Μ	L	Μ	М	L

Table 4.2 Relative Treatment Performance Ratings of Biotreatment BMPs

Unit Operations and Process	Assumed Principal Unit Operations and Processes Provided	Suspended solids / sediment/ turbidity	Nitrogen compounds	Phosphorus	Heavy metals	Microbial / viral pathogens	Oils and grease	Dissolved toxic organic compounds	Trash and debris
Wet detention basins and constructed stormwater wetlands	 Particulate Settling Size Exclusion Floatable Capture Sorption/Ion Exchange Microbially Mediated Transformations Microbial Competition/Predation Biological Uptake Solar Irradiation Volume loss (via infiltration, ET) 	н	Μ	Μ	Μ	Μ	Н	Μ	н
Proprietary Biotreatment and Treatment Control	• Varies by product.	Expect evaluat availat evaluat achiew provid averag not be proprise Geosy detern must b Approv agenc in the	ted per tion of ole test ated bar e statis ge cond used t etary B ontec C hining t be docu val is b y. Proc Techni	forma unit p ting da sed pr the BM stically ditions onsult he rations ased of luct-sp cal Gu	nce sh rocess ita. Tes imarily /IP and signifi . Perce uate th See W cants, 2 ing of p ed in th on the pecific uidance	ould be es prov sting da on the the ab cant re ent rem re perfor right W 007). To propose he Proje discret ranking Docu	e base vided b ata sho e efflue ility of moval a ormano /ater E fhe ba ed prop ect WC ion of f is may ment a	d on by BMP build be nt qual the BM under lone sh ce of nginee sis for prietary MP. he revi be put t a late	and ity IP to ould rs and BMPs ewing olished r date.

St	Step 1: Determine the design capture storm depth used for calculating volume						
1	Enter design capture storm depth from Figure III.1, <i>d</i> (inches)	d=	0.85	inches			
2	Enter the effect of provided HSCs, <i>d</i> _{HSC} (inches) (Worksheet A)	d _{HSC} =	0	inches			
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	d _{remainder} =	0.85	inches			
St	ep 2: Calculate the DCV						
1	Enter Project area tributary to BMP (s), A (acres)	A=	0.36	acres			
2	Enter Project Imperviousness, <i>imp</i> (unitless)	imp=	0.69				
3	Calculate runoff coefficient, C= (0.75 x imp) + 0.15	C=	0.67				
4	Calculate runoff volume, V _{design} = (C x d _{remainder} x A x 43560 x (1/12))	V _{design} =	744.22	cu-ft			
St	Step 3: Design BMPs to ensure full retention of the DCV						
St	ep 3a: Determine design infiltration rate						
1	Enter measured infiltration rate, $K_{observed}^{T}$ (in/hr) (Appendix VII)	K _{observed} =	N/A	In/hr			
2	Enter combined safety factor from Worksheet H, S _{total} (unitless)	S _{total} =	N/A				
3	Calculate design infiltration rate, $K_{design} = K_{observed} / S_{total}$	K _{design} =	N/A	In/hr			
St	Step 3b: Determine minimum BMP footprint						
4	Enter drawdown time, <i>T</i> (max 48 hours)	T=	N/A	Hours			
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D _{max} =	N/A	feet			
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design}/d_{max}$	A _{min} =	N/A	sq-ft			

Worksheet B: Simple Design Capture Volume Sizing Method

¹K_{observed} is the vertical infiltration measured in the field, before applying a factor of safety. If field testing measures a rate that is different than the vertical infiltration rate (for example, three-dimensional borehole percolation rate), then this rate must be adjusted by an acceptable method (for example, Porchet method) to yield the field estimate of vertical infiltration rate, K_{observed}. See Appendix VII.

Worksheet C: Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs

Step 1: Determine the design capture storm depth used for calculating volume					
1	Enter design capture storm depth from Figure III.1, <i>d</i> (inches)	d=	0.85	inches	
2	Enter calculated drawdown time of the proposed BMP based on equation provided in applicable BMP Fact Sheet, T (hours)	T=	3	hours	
3	Using Figure III.2, determine the "fraction of design capture storm depth" at which the BMP drawdown time (T) line achieves 80% capture efficiency, X_1	X ₁ =	0.25		
4Enter the effective depth of provided HSCs upstream, d_{HSC} d_{HSC} d_{HSC} 0inches) (Worksheet A)inches					
5	Enter capture efficiency corresponding to d _{HSC} , Y ₂ (Worksheet A)	Y ₂ =	0	%	
6	Using Figure III.2, determine the fraction of "design capture storm depth" at which the drawdown time (T) achieves the equivalent of the upstream capture efficiency(Y_2), X_2	X ₂ =	0		
7	Calculate the fraction of design volume that must be provided by BMP, <i>fraction</i> = $X_1 - X_2$	fraction=	0.25		
8	Calculate the resultant design capture storm depth (inches), $d_{fraction}$ = fraction × d	d _{fraction} =	0.21	inches	
9	SOC Only: When using this method for biofiltration sizing, check that the resulting volume in pre-filter detention volume plus pore spaces is at least 0.75 of the remaining DCV (See Section III.7 and Worksheet SOC-1).		Y / N (NA)	
St	ep 2: Calculate the DCV			•	
1	Enter Project area tributary to BMP (s), A (acres)	A=	0.36	acres	
2	Enter Project Imperviousness, imp (unitless)	imp=	0.69		
3	Calculate runoff coefficient, C= (0.75 x imp) + 0.15	C=	0.69		
4	Calculate runoff volume, V_{design} = (C x $d_{rfraction}$ x A x 43560 x (1/12))	V _{design} =	189.36	cu-ft	
Supporting Calculations					
De	escribe system:				





Worksheet I: Summary of Groundwater-related Feasibility Criteria

1	Is project large or small? (as defined by Table VIII.2) circle one	Large Small			
2	What is the tributary area to the BMP?	А	0.364	acres	
3	What type of BMP is proposed?	INFIL	TRATION	TRENCH	
4	What is the infiltrating surface area of the proposed BMP?	A _{BMP}	618	sq-ft	
	What land use activities are present in the tributary area (list all)				
5	MIXED RESIDENTIAL WITH COVERED PARKING. PATIO, SIDEWALKS, AND PEDESTRIAN AREAS. ROOF TOPS ENTIRELY MADE OF CONCRETE.				
6	What land use-based risk category is applicable?	L	M	Н	
	If M or H, what pretreatment and source isolation BMPs have be (describe all):	een consider	ed and are p	roposed	
7	OLD CASTLE MEDIA FILTER INSERTS WILL BE USED FOR PRETREATMENT. FILTER INSERTS WILL BE SELECTED BASED ON EXPECTED POLLUTANTS.				
8	What minimum separation to mounded seasonally high groundwater applies to the proposed BMP? See Section VIII.2 (circle one)	<u>5</u> f	t) 1	0 ft	
	Provide rationale for selection of applicable minimum separation groundwater:	n to seasonal	ly high mour	lded	
9	THE SEPARATION BETWEEN INFILTRATING SURFACE AND THE SEASONALLY HIGH GROUNDWATER TABLE SHALL NOT BE LESS THAN 5' FOR ALL BMP TYPES PER SECTION VIII.2.				
10	What is separation from the infiltrating surface to seasonally high groundwater?	SHGWT	12	ft	
11	What is separation from the infiltrating surface to mounded seasonally high groundwater?	Mounded SHGWT	6	ft	
	Describe assumptions and methods used for mounding analysis	S:			
12	THE HISTORICALLY MEASURED GROUNDWATER DEPTH IS 10 FEET BELOW EXISTING GRADE (SEE SOILS REPORT). MEASURED DEPTH TO GROUNDWATER WAS FOUND TO BE 16 FEET.				
13	Is the site within a plume protection boundary (See Figure	Y	N	N/A	

Worksheet I: Summary of Groundwater-related Feasibility Criteria

	VIII.2)?	1			
14	Is the site within a selenium source area or other natural plume area (See Figure VIII.2)?		Y	N	N/A
15	Is the site within 250 feet of a contaminated site?		Y	Ν	N/A
	If site-specific study has been prepared, provide citation and bri	efly sur	nmariz	e releva	ant findings:
	The site used to serve as an E-Z Services location pr	ior to i	t bein	g dem	olished and
16	cleared. Therefore, the contaminant of concern is gas	oline	and h	ow this	s contaminant
	can affect water being infiltrated to replenish groundw	ater. I	Due to	o this p	prior
	contamination, infiltration is not feasible, and biotreatr	nent E	SIMPS	WIII DE	proposed.
	Is the site within 100 feet of a water supply well, spring, septic				
17	system?		Y	(N)	N/A
18	8 Is infiltration feasible on the site relative to groundwater- related criteria?				N
Prov	vide rationale for feasibility determination:				
	Infiltration is not feasible due to prior contamination by	/ gasc	line. E	Biotrea	itment BMPs
	are being proposed instead.				
	Source: Geotracker made a part of Attachment D.				

Note: if a single criterion or group of criteria would render infiltration infeasible, it is not necessary to evaluate every question in this worksheet.

	GEOTRACKE	ER			
CASE SUMMARY	/				
REPORT DATE HA 6/6/1988	ZARDOUS MATERIAL INCIDENT REPORT FILED WITH	OES?			
I. REPORTED BY - UNKNOWN	CREATE UNKNO	ED BY WN			
III. SITE LOCATIONFACILITY NAMEFACILITY IDE-Z SERVE #100842FACILITY ADDRESSFACILITY ADDRESSORIENTATION OF SITE TO STREET3175 W BALL RDANAHEIM, CA 92804ANAHEIM, CA 92804CROSS STREETORANGE COUNTYWESTERN					
V. SUBSTANCES RELEA GASOLINE	<u>SED / CONTAMINANT(S) OF CONCERN</u>				
VI. DISCOVERY/ABATEM DATE DISCHARGE BEGAN	<u>1ENT</u>				
DATE DISCOVERED 5/26/1988 DATE STOPPED	HOW DISCOVERED STOP METHOD	DESCRIPTION DESCRIPTION			
VII. SOURCE/CAUSE SOURCE OF DISCHARGE	CAUSE OF DISC	CHARGE			
VIII. CASE TYPE CASE TYPE Aquifer used for drinking wate	er supply				
IX. REMEDIAL ACTION REMEDIAL BEGIN END DESCRIPTION ACTION DATE DATE Excavation 5/15/2000 5/26/2000 EXCAVATION IN TONS Other (Use 5/15/2000 5/26/2000 GROUNDWATER DEWATERED (IN GALLONS)TO STORMDRAIN UNDER NPDES Other (Use 5/15/2000 5/26/2000 GROUNDWATER DEWATERED (IN GALLONS)TO STORMDRAIN UNDER NPDES					
Description Field) 5/15/2000 In Situ Physical/Chemical Treatment (other than SVE)	her (Use scription Field) 5/15/2000 5/26/2000 ORC PLACED IN EXCAVATION PIT From August 2 to August 7 and September 20 to September 25, 2010, two 5-day HVDPE events were conducted. The mobile HVDPE unit system was used on several on-site wells (O13, O14, MW2R, MW4, MW7, and MW11). In August and September 2010, a total of approximately 45,700 gallons of groundwater were extracted and temporarily stored on-site. The extracted groundwater was transported by SC Environmental Services to Lakeland Processing Company located in Santa Fe Springs, California, for disposal. In addition, approximately 250 pounds of hydrocarbons were extracted during the 10-day event in Augu				

and September 2010.

In Situ	10/21/20101/2/2011	A series of three five-day mobile HVDPE events were completed. Wells O1-3, O1-4, MW-2R,
Physical/Chemical		and MW-11 were connected to the mobile unit. Extracted groundwater was stored on-site and
Treatment (other		then transported to an approved treatment and recycling facility.
than SVE)		
In Situ		
Physical/Chemical	1/22/2011 1/27/201	1 A five-day event
Treatment (other	1/22/2011 1/2//201	TA live-day event.
than SVE)		
In Situ		Extracted aroundwater was temporarily stored on-site and transported off-site by SC
Physical/Chemical	A/6/2011 A/11/201	1 Environmental Services to Lakeland Processing Company in Santa Fe Springs CA A HVDPF
Treatment (other	4/0/2011 4/11/201	mobile unit was used
than SVE)		mobile unit was used.

X. GENERAL COMMENTS

XI. CERTIFICATION

I HEREBY CERTIFY THAT THE INFORMATION REPORTED HEREIN IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE.

XII. REGULATORY USE ONLY

LOCAL AGENCY CASE NUMBER

REGIONAL BOARD CASE NUMBER 083000889T

LOCAL AGENCY

CONTACT NAME	<u>INITIALS</u>	ORGANIZATION_NAME	EMAIL ADDRESS			
RALPH MCCAFFREY	RM	ANAHEIM CITY	rmccaffrey@anaheim.net			
ADDRESS		CONTACT DESCRIPTION				
201 S. ANAHEIM BLVD. MS 601	Environmental Services Specialist					
ANAHEIM, CA 92805						
PHONE TYPE	PHONE N	EXTENSION				
office	(714)-765-4288					
REGIONAL BOARD						

UNKNOWN

Back to Top	Conditions of Use				
Privacy Policy	Accessibility				
Contact Us					
Copyright © 2015 State of California					

Table VIII.1: Recommendations/Requirements for BMP Selection to Minimize Groundwater Quality Impacts

Tributary Area Risk Category	Narrative Description of Category	Example Land Use Activities	BMP Selection Requirements
Low Runoff Contamination Potential	BMP receives runoff from a mix of land covers that are expected to have relatively clean runoff; significant spills in tributary area are unlikely.	 Rooftops with roofing material and downspouts free of copper and zinc Patios, sidewalks, and other pedestrian areas Mixed residential land uses with applicable source controls Institutional land uses with applicable source controls Driveways and minor streets 	 Any infiltration BMP type may be used Pretreatment for sediment is strongly (recommended, as applicable, to mitigate clogging)
Moderate Runoff Contamination Potential	BMP receives runoff from a mix of land covers, more than 10 percent of which have the potential to generate stormwater pollutants at levels that could potentially contaminate groundwater; there is potential for minor spills in the tributary area.	 Roadways greater than 5,000 ADT but less than 25,000 ADT Commercial and institutional parking lots Commercial land uses Light industrial that does not include usage of chemicals that are mobile in stormwater and groundwater Trash storage areas 	 Any infiltration BMP type may be used Pretreatment shall be used The type of pretreatment shall be selected to address potential groundwater contaminants potentially found in stormwater runoff.
High Runoff Contamination Potential	BMP receives runoff from a mix of land covers, more than 10 percent of which have significant unavoidable potential to generate stormwater pollutants in quantities that could be detrimental to groundwater quality; and/or there is significant potential for major spills that could drain to BMPs.	 Roads greater than 25,000 ADT Heavy and light industrial pollutant source areas, including areas with exposed industrial activity and high use industrial truck traffic, and any areas that cannot be isolated these areas. Does not include lower risk source sources areas within industrial zones (e.g., roofs, offices, and parking areas) that are hydrologically isolated from industrial pollutant source areas Automotive repair shops Car washes Fleet storage areas Nurseries, agriculture, and heavily managed landscape areas with extensive use of fertilizer Fueling stations (infiltration prohibited under all conditions) 	 Infiltration is prohibited unless advanced pretreatment and spill isolation can be feasibly used and enhanced monitoring and inspection are implemented. Large projects¹⁸ must evaluate feasibility of advanced pretreatment and spill isolation. Small projects¹⁸ may consider infiltration to be infeasible with narrative discussion.

¹⁸ See Table VIII.2 for definition of "Large" and "Small" projects.

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	Minimum	Required Irr	igated Area p	er Tributary Impervious Acre for		
Depth, inches		Pote	ential 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

Table X.8: Minimum Irrigated Area for Potential Partial Capture Feasibility

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			\checkmark			
3	Landscape irrigation		[
4	Other:		[
5	What is the design capture storm depth? (Figure III.1)	d	0.85	inches			
6	What is the project size?	А	0.36	ac			
7	What is the acreage of impervious area? IA		0.25	ac			
	For projects with multiple types of demand (toilet flushing, indoor demand,			demand)			
8	What is the minimum use required for partial capture? (Table X.6)			gpd			
9	What is the project estimated wet season total daily use?	gpo					
10	Is partial capture potentially feasible? (Line 9 > Line 8?)						
	For projects with only toilet flushing demand						
11	What is the minimum TUTIA for partial capture? (Table X.7) 104						
12	What is the project estimated TUTIA?	10	00				

Worksheet J: Summary of Harvested Water Demand and Feasibility

13 Is partial capture potentially feasible? (Line 12 > Line 11?)		NO	
	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?)		
Prov	vide supporting assumptions and citations for controlling demand o	calculation:	

"ATTACHMENT E"

OPERATIONS & MAINTENANCE PLAN

Operations and Maintenance (O&M) Plan

Planning Application #: OTH2018-01044

LOW IMPACT DEVELOPMENT

PROPERTY OWNER:

SARKIS TATARIAN

8469 BEACH CIRCLE

CYPRESS, CALIFORNIA, 90630.

T: 717-717-0400

E: SAKOTATARIAN@YAHOO.COM

PROJECT SITE:

3175 WEST BALL ROAD

ANAHEIM, CALIFORNIA, 92804.

APN: 079-882-34

PREPARED BY:



CRF Project No. 17-084 6782 STANTON AVENUE, SUITE - A BUENA PARK, CALIFORNIA, 90621. <u>WWW.CRFENGINEERING.COM</u> PHONE: 714-522-2266 DATE PREPARED: 06/08/2018 DATE REVISED: 12/12/2019



Required Permits

At this time the county has only required:

- WQMP Clearance.
- Grading Permit.

Forms to Record BMP Implementation, Maintenance, and Inspection

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

Recordkeeping

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

- 1.) Maintenance for this project consists of exact instructions as delineated on attached pages below, BIO-1 (Bioretention Planter).
- 2.) Modular Connector Trash Pipe Screen (BC-3).
- 3.) 36" Detention Pipe

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's	Date:

Name of Person Performing Activity (Printed):

Signature:

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed		
Bioretention Planter #1 (BIO-1)	Per attached operation and maintenance plan attached hereon. (Property Owner to be responsible for Operation &		
	Maintenance of BMP.)		
(2) Modular Connector Trash Pipe Screen (BC-3)	Regular inspection for debris and sedimentation build up. Remove trash and debris. Also per attached operation and maintenance attached hereon.		
	(Property Owner to be responsible for Operation & Maintenance of BMP.)		
S1 – Storm Drain System Stencilling and Signage	Maintain legibility of stencils and signs.		
S3 – Design and construct trash and waste storage areas to reduce pollution introduction	Sweep trash area at least once per week and before October 1 st each year. Maintain area clean of trash at all times.		
S4 – Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control.	Check the connection on all wires.		
N1 - Education for Property Owners, Tenants, and Occupants	Educational materials will be provided to tenants annually.		
N2 – Activity Restrictions	The Owner will prescribe activity restrictions to protect surface water quality through lease terms or other equally effective measures for the property.		
N3 – Common Area Landscape Management	Appointed property management company to provide maintenance of landscaping to meet current water efficiency and keep plants healthy. Bio areas maintained with proper soil amendments.		

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed
N4 – BMP Maintenance	Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP.
N11 – Common Area Litter Control	Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities.
N12 – Employee Training	Education programs as it would apply to future employees managing property
N14 – Common Area Catch Basin Inspection	Catch basin inlets and other drainage facilities shall be inspected after each storm event and once per year. Inlets and other facilities shall be cleaned prior to the rainy season by October 1 st of each year.
N15 – Street Sweeping Private Streets and Parking Lots	Routine inspection and sweeping of parking lot area to avoid accumulation of debris.
36" Detention Pipe	Maintain a clean and obstruction-free retention system.

with a spider cap to exclude floating mulch and debris. Spider caps should be screwed in or glued (e.g., not removable). The overflow device should convey stormwater runoff in excess of the SWQDv to an approved discharge location (e.g., another stormwater quality control measure, storm drain system, or receiving water).

Maintenance Requirements

Maintenance and regular inspections are important for proper function of bioretention areas. Bioretention areas require annual plant, soil, and mulch layer maintenance to ensure optimal infiltration, storage, and pollutant removal capabilities. In general, bioretention maintenance requirements are typical landscape care procedures, which include:

- Irrigate plants as needed during prolonged dry periods. In general, plants should be selected to be drought-tolerant and not require irrigation after establishment (two to three years).
- Inspect flow entrances, ponding area, and surface overflow areas periodically, and replace soil, plant material, and/or mulch layer in areas if erosion has occurred. Properly-designed facilities with appropriate flow velocities should not cause erosion except potentially during in extreme events. If erosion occurs, the flow velocities and gradients within the bioretention area and energy dissipation and erosion protection strategies in the pretreatment area and flow entrance should be reassessed. If sediment is deposited in the bioretention area, identify the source of the sediment within the tributary area, stabilize the source, and remove excess surface deposits.
- Prune and remove dead plant material as needed. Replace all dead plants, and if specific plants have a high mortality rate, assess the cause and, if necessary, replace with more appropriate species.
- Remove weeds as needed until plants are established. Weed removal should become less frequent if the appropriate plant species are used and planting density is attained.
- Select the proper soil mix and plants for optimal fertility, plant establishment, and growth to preclude the use of nutrient and pesticide supplements. By design, bioretention facilities are located in areas where phosphorous and nitrogen levels are often elevated such that these should not be limiting nutrients. Addition of nutrients and pesticides may contribute pollutant loads to receiving waters.
- In areas where heavy metals deposition is likely (i.e., tributary areas to industrial, vehicle dealerships/repair, parking lots, roads), replace mulch annually. In areas where metals deposition is less likely (i.e., residential lots), replace or add mulch as needed to maintain a two- to three- inch depth at least once every two years.
- Analyze soil for fertility and pollutant levels if necessary. Bioretention soil media are designed to maintain long-term fertility and pollutant processing capability.
- Eliminate standing water to prevent vector breeding.

• Inspect overflow devices for obstructions or debris, which should be removed immediately. Repair or replace damaged pipes upon discovery.

A summary of potential problems that may need to be addressed by maintenance activities is presented in Table E-2.

The County requires execution of a maintenance agreement to be recorded by the property owner for the on-going maintenance of any privately-maintained stormwater quality control measures. The property owner is responsible for compliance with the maintenance agreement. A sample maintenance agreement is presented in Appendix H.

Problem	Conditions When Maintenance Is Needed	Maintenance Required
Vegetation	Overgrown vegetation	Mow and prune vegetation as appropriate.
	Presence of invasive, poisonous, nuisance, or noxious vegetation or weeds	Remove this vegetation and plant native species as needed.
Trash and Debris	Trash, plant litter, and dead leaves present	Remove and properly dispose of trash and debris.
Irrigation (if applicable)	Not functioning correctly	Check irrigation system for clogs or broken lines and repair as needed.
Flow Entrance/Overflow Device	Flow entrance/overflow areas clogged with sediment and/or debris	Remove material.
	Overflow device blocked or broken	Clean and/or repair as needed.
Erosion/Sediment Accumulation	Presence of erosion or sediment accumulation	Check flow entrance to ensure proper function. Repair, or replace if necessary, the flow entrance. Repair eroded areas with gravel as needed. Re-grade the bioretention area as needed.
Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants	Remove any evidence of visual contamination from floatables such as oil and grease.
Standing water	Standing water observed more than 96 hours after storm event	Remove and replace plant media (sand, gravel, topsoil, mulch) and vegetation

Table E-2. Bioretention Troubleshooting Summary

Catchbasin Insert, Full Capture Device

BC-3 Modular Connector Pipe Screen Catchbasin connector pipe screen (CPS), removable





Company Contact: Bio Clean Environmental Services, Inc., Oceanside, CA Sales contacts: Greg Kent, (760) 433-7640 or Kirk Vallejo, (760) 681-9583 gkent@biocleanenvironmental.net kvallejo@biocleanenvironmental.net http://www.biocleanenvironmental.com	
Storage capacity: depends on size of catchbasin	Replacement Parts: Available
Vendor's maintenance estimate: Between May 1 and Sept. 30, clean filter when over 40% full	Warranty: 5 yrs
Material: Type 316 stainless steel	Delivery Time: 50 or fewer 4 weeks; 50-100 6 weeks; 100-250 10 weeks; call for more than 250
Pricing: See over. Have uninstalled price.Traffic control n	ot included in pricing

No reference information available

BIO CLEAN MODULAR CPS

TABLE 2

Prices Include Installation

Size	Price per System Installed	Price per Systen Installed - Vendor Measure	Discounted Price Installed - 50 to 200 units	Discounted Price Installed - 50 to 200 - Vendor Measure	Discounted Price Installed 200 Plus	Discounted Price Installed 200 Plus - Vendor Measure
26" Wide x 12" ⊺all	\$409.00	\$474.00	\$389.00	\$449.00	\$404.00	\$454.00
26" Wide x 18" ⊺all	\$656.00	\$721.00	\$685.00	\$745.00	\$670.00	\$720.00
26" Wide x 24" ⊺all	\$728.00	\$793.00	\$753.00	\$813.00	\$731.00	\$781.00
26" Wide x 30" ⊺all	\$975.00	\$1,040.00	\$988.00	\$1,048.00	\$943.00	\$993.00
26" wide x 36" ⊤all	\$1,047.00	\$1,112.00	\$1,056.00	\$1,116.00	\$1,004.00	\$1,054.00
32" Wide x 12" ⊺all	\$503.00	\$568.00	\$539.00	\$599.00	\$539.00	\$589.00
32" Wide x 18" ⊺all	\$820.00	\$885.00	\$840.00	\$900.00	\$810.00	\$860.00
32" Wide x 24" Tall	\$906.00	\$971.00	\$922.00	\$982.00	\$883.00	\$933.00
32" Wide x 30" ⊺all	\$1,243.00	\$1,308.00	\$1,242.00	\$1,302.00	\$1,171.00	\$1,221.00
32" wide x 36" ⊤all	\$1,329.00	\$1,394.00	\$1,324.00	\$1,384.00	\$1,245.00	\$1,295.00
36" Wide x 12" ⊺all	\$525.00	\$590.00	\$560.00	\$620.00	\$558.00	\$608.00
36" Wide x 18" Tall	\$868.00	\$933.00	\$886.00	\$946.00	\$851.00	\$901.00
36" Wide x 24" ⊺all	\$960.00	\$1,025.00	\$973.00	\$1,033.00	\$929.00	\$979.00
36" Wide x 30" ⊺all	\$1,293.00	\$1,358.00	\$1,240.00	\$1,350.00	\$1,215.00	\$1,301.00
36" wide x 36" ⊤all	\$1,400.00	\$1,465.00	\$1,391.00	\$1,451.00	\$1,305.00	\$1,355.00
42" Wide x 12" Tall	\$639.00	\$704.00	\$668.00	\$728.00	\$655.00	\$705.00
42" Wide x 18" ⊺all	\$1,042.00	\$1,107.00	\$1,051.00	\$1,111.00	\$999.00	\$1,049.00
42" Wide x 24" Tall	\$1,148.00	\$1,213.00	\$1,152.00	\$1,212.00	\$1,090.00	\$1,140.00
42" Wide x 30" ⊺all	\$1,551.00	\$1,616.00	\$1,535.00	\$1,595.00	\$1,435.00	\$1,485.00
42" wide x 36" ⊤all	\$1,657.00	\$1,722.00	\$1,635.00	\$1,695.00	\$1,525.00	\$1,575.00
48" Wide x 12" ⊺all	\$671.00	\$736.00	\$699.00	\$759.00	\$683.00	\$733.00
48" Wide x 18" Tall	\$1,080.00	\$1,146.00	\$1,088.00	\$1,148.00	\$1,033.00	\$1,083.00
48" Wide x 24" Tall	\$1,192.00	\$1,257.00	\$1,194.00	\$1,254.00	\$1,128.00	\$1,178.00
48" Wide x 30" ⊤all	\$1,601.00	\$1,666.00	\$1,582.00	\$1,642.00	\$1,477.00	\$1,527.00
48" wide x 36" Tall	\$1,713.00	\$1,778.00	\$1,689.00	\$1,749.00	\$1,574.00	\$1,624.00

Catch Basins Must Be Cleaned Prior To Installation

Installation is Based Upon Prevailing Wage Rates

5 Year Warranty



Southern California

2972 San Lus Rey Rd.

Oceanside, CA 92058

Phone 760-433-7640

Northern California 690 Sunlow St. San Jose, CA 95126 Phone 760-579-1584

The preceding information is confidential. It is not intended for transmission to, or receipt by, any unauthorized persons. If you have received this message in error, please (i) do not read it, (ii) reply to the sender that you received the fax and following information in error, and (iii) erase or destroy the message. Information contained in the preceding pages is solely for the recipient addressed in this cover letter. This fax (including all following pages) contains confidential information intended for the specific individual named above and the firm that person represents. This information has been provided in privacy and is protected by law. If you are not the intended recipient, you should delete this message. Any disclosure, copying, or distribution of this information is illegal unless approved by Bio Clean Environmental Services, Inc.

BC-3 Prices Include Installation

Device ID	Size	Size Price per System Installed	Price per Systen Installed - Vendor Measure	Discounted Price Installed - 50 to 200 units	Discounted Price Installed - 50 to 200 - Vendor Measure	Discounted Price Installed 200 Plus	Discounted Price Installed 200 Plus - Vendor Measure
BC-3a	26" Wide x 12" Tall	\$409.00	\$474.00	\$389.00	\$449.00	\$404.00	\$454.00
BC-3b	26" Wide x 18" Tall	\$656.00	\$721.00	\$685.00	\$745.00	\$670.00	\$720.00
BC-3c	26" Wide x 24" Tall	\$728.00	\$793.00	\$753.00	\$813.00	\$731.00	\$781.00
BC-3d	26" Wide x 30" Tall	\$975.00	\$1,040.00	\$988.00	\$1,048.00	\$943.00	\$993.00
BC-3e	26" wide x 36" Tall	\$1,047.00	\$1,112.00	\$1,056.00	\$1,116.00	\$1,004.00	\$1,054.00
BC-3f	32" Wide x 12" Tall	\$503.00	\$568.00	\$539.00	\$599.00	\$539.00	\$589.00
BC-3g	32" Wide x 18" Tall	\$820.00	\$885.00	\$840.00	\$900.00	\$810.00	\$860.00
BC-3h	32" Wide x 24" Tall	\$906.00	\$971.00	\$922.00	\$982.00	\$883.00	\$933.00
BC-3i	32" Wide x 30" Tall	\$1,243.00	\$1,308.00	\$1,242.00	\$1,302.00	\$1,171.00	\$1,221.00
BC-3j	32" wide x 36" Tall	\$1,329.00	\$1,394.00	\$1,324.00	\$1,384.00	\$1,245.00	\$1,295.00
BC-3k	36" Wide x 12" Tall	\$525.00	\$590.00	\$560.00	\$620.00	\$558.00	\$608.00
BC-3I	36" Wide x 18" Tall	\$868.00	\$933.00	\$886.00	\$946.00	\$851.00	\$901.00
BC-3m	36" Wide x 24" Tall	\$960.00	\$1,025.00	\$973.00	\$1,033.00	\$929.00	\$979.00
BC-3n	36" Wide x 30" Tall	\$1,293.00	\$1,358.00	\$1,240.00	\$1,350.00	\$1,215.00	\$1,301.00
BC-3o	36" wide x 36" Tall	\$1,400.00	\$1,465.00	\$1,391.00	\$1,451.00	\$1,305.00	\$1,355.00
BC-3p	42" Wide x 12" Tall	\$639.00	\$704.00	\$668.00	\$728.00	\$655.00	\$705.00
BC-3q	42" Wide x 18" Tall	\$1,042.00	\$1,107.00	\$1,051.00	\$1,111.00	\$999.00	\$1,049.00
BC-3r	42" Wide x 24" Tall	\$1,148.00	\$1,213.00	\$1,152.00	\$1,212.00	\$1,090.00	\$1,140.00
BC-3s	42" Wide x 30" Tall	\$1,551.00	\$1,616.00	\$1,535.00	\$1,595.00	\$1,435.00	\$1,485.00
BC-3t	42" wide x 36" Tall	\$1,657.00	\$1,722.00	\$1,635.00	\$1,695.00	\$1,525.00	\$1,575.00
BC-3u	48" Wide x 12" Tall	\$671.00	\$736.00	\$699.00	\$759.00	\$683.00	\$733.00
BC-3v	48" Wide x 18" Tall	\$1,080.00	\$1,146.00	\$1,088.00	\$1,148.00	\$1,033.00	\$1,083.00
BC-3w	48" Wide x 24" Tall	\$1,192.00	\$1,257.00	\$1,194.00	\$1,254.00	\$1,128.00	\$1,178.00
BC-3x	48" Wide x 30" Tall	\$1,601.00	\$1,666.00	\$1,582.00	\$1,642.00	\$1,477.00	\$1,527.00
BC-3y	48" wide x 36" Tall	\$1,713.00	\$1,778.00	\$1,689.00	\$1,749.00	\$1,574.00	\$1,624.00

Catch Basins Must Be Cleaned Prior To Installation Installation is Based Upon Prevailing Wage Rates



This document is provided for informational purposes only and is meant only to be a guide. Individuals using this information should make their own decisions as to suitability of this guideline for their individual projects and adjust accordingly.

Introduction

A retention/detention system is comprised of a series of pipes and fittings that form an underground storage area, which retains or detains storm water runoff from a given area. As sediment and debris settle out of the detained stormwater, build up occurs that requires the system to be regularly inspected and cleaned in order for the system to perform as originally designed. The following provides the available fittings and guidelines for inspection and maintenance of an HDPE underground storage system.

System Accessories and Fittings

Concentric Reducers

Concentric Reducers are fittings that transition between two pipes, either in line with one another or at perpendicular angles. The centerlines of the two pipes are at the same elevation. When a concentric reducer is used to connect the manifold pipe to the lateral pipes, most debris will be trapped in the manifold pipe.



Eccentric Reducers

Eccentric Reducers are fittings that transition between two pipes, either in line with one another or at perpendicular angles. The inverts of the two pipes are at the same elevations. When an eccentric reducer is used to connect the manifold pipe to the lateral pipes, most debris will follow the flow of the storm water into the lateral pipes.





SECTION VIEW





SIDE VIEW

SECTION VIEW

4640 TRUEMAN BLVD. HILLIARD, OH 43026. (800) 821-6710 - www.ads-pipe.com





Riser

Each retention/detention system typically has risers strategically placed for maintenance and inspection of the system. These risers are typically 24" in diameter or larger and are placed on the manifold fittings.

Cleanouts

Cleanout ports are usually 4-, 6-, or 8-in diameter pipe and are placed on the manifold fittings. They are used for entrance of a pipe from a vacuum truck or a water-jetting device.



For a complete listing of available fittings and components please refer to the ADS Fittings Manual.

Maintenance Overview of a Retention/Detention System

Maintaining a clean and obstruction-free retention/detention system helps to ensure the system performs the intended function of the primary design. Build up of debris may obstruct flow through the laterals in a retention system or block the entranceway of the outlet pipe in a detention system. This may result in ineffective operation or complete failure of the system. Additionally, surrounding areas may potentially run the risk of damage due to flooding or other similar issues.

Inspection/Maintenance Frequency

All retention/detention systems must be cleaned and maintained. Underground systems may be maintained more cost effectively if these simple guidelines are followed. Inspection should be performed at a minimum of once per year. Cleaning should be done at the discretion of individuals responsible to maintain proper storage and flow. While maintenance can generally be performed year round, it should be scheduled during a relatively dry season.

Pre-Inspection

A post-installation inspection should be performed to allow the owner to measure the invert prior to accumulation of sediment. This survey will allow the monitoring of sediment build-up without requiring access to the retention/detention system.

The following is the recommended procedure for pre-inspections:

- 1) Locate the riser section or cleanouts of the retention/detention system. The riser will typically be 24" in diameter or larger and the cleanouts are usually 4", 6" or 8" in diameter.
- 2) Remove the lid of the riser or clean outs.
- Insert a measuring device into the opening and make note to a point of reference on the stick or string. (This is done so that sediment build up can be determined in the future without having to enter the system.)



Inspection/Maintenance

A retention/detention system should be inspected at a minimum of one time a year or after major rain events if necessary.

The following is the recommended procedure to inspect system in service:

- 1) Locate the riser section of the retention/detention system. The riser will typically be 24" in diameter or larger.
- 2) Remove the lid from the riser.
- 3) Measure the sediment buildup at each riser and cleanout location. Only certified confined space entry personnel having appropriate equipment should be permitted to enter the retention/detention System.
- 4) Inspect each manifold, all laterals, and outlet pipes for sediment build up, obstructions, or other problems. Obstructions should be removed at this time.
- 5) If measured sediment build up is between 5% 20% of the pipe diameter, cleaning should be considered; if sediment build up exceeds 20%, cleaning should be performed at the earliest opportunity. A thorough cleaning of the system (manifolds and laterals) shall be performed by either manual methods or by a vacuum truck.

"ATTACHMENT F"

SOURCE CONTROL BMP'S

SECTION 6. SOURCE CONTROL MEASURES

This section provides guidance on the selection and design of structural source control measures.

6.1. Introduction

Source Control BMPs reduce the potential for stormwater runoff and pollutants from coming into contact with one another. Source Control BMPs are defined as any administrative action, design of a structural facility, usage of alternative materials, and operation, maintenance, inspection, and compliance of an area to eliminate or reduce stormwater pollution. Each new development and significant redevelopment project is required to implement appropriate Source Control BMP(s) pursuant to Section 2.4.5 of the <u>Model WQMP</u>.

Applicable Source Control BMPs (which includes subcategories of routine non-structural BMPs, routine structural BMPs and BMPs for individual categories/project features) are required to be incorporated into all new development and significant redevelopment projects regardless of their priority, including those identified in an applicable regional or watershed program, unless they do not apply due to the project characteristics. California Stormwater Quality Association (CASQA) BMP Fact Sheet numbers are included in parentheses where applicable.

6.2. Non-Structural Measures

N1 Education for Property Owners, Tenants and Occupants

For developments with no Property Owners Association (POA) or with POAs of less than fifty (50) dwelling units, practical information materials will be provided to the first residents/occupants/tenants on general housekeeping practices that contribute to the protection of stormwater quality. These materials will be initially developed and provided to first residents/occupants/tenants by the developer. Thereafter such materials will be available through the Permittees' education program. Different materials for residential, office commercial, retail commercial, vehicle-related commercial and industrial uses will be developed.

For developments with POA and residential projects of more than fifty (50) dwelling units, project conditions of approval will require that the POA periodically provide environmental awareness education materials, made available by the municipalities, to all of its members. Among other things, these materials will describe the use of chemicals (including household type) that should be limited to the property, with no discharge of wastes via hosing or other direct discharge to gutters, catch basins and storm drains. Educational materials available from the County of Orange can be downloaded here:

http://www.ocwatersheds.com/PublicEd/resources/default.aspx

N2 Activity Restrictions

If a POA is formed, conditions, covenants and restrictions (CCRs) must be prepared by the developer for the purpose of surface water quality protection. An example would be not allowing car washing outside of established community car wash areas in multi-unit complexes. Alternatively, use restrictions may be developed by a building operator through lease terms, etc. These restrictions must be included in the Project WQMP.

N3 (SC-73) Common Area Landscape Management

Identify on-going landscape maintenance requirements that are consistent with those in the County Water Conservation Resolution (or city equivalent) that include fertilizer and/or pesticide usage consistent with Management Guidelines for Use of Fertilizers (DAMP Section 5.5). Statements regarding the specific applicable guidelines must be included in the Project WQMP.

N4 BMP Maintenance

The Project WQMP shall identify responsibility for implementation of each non-structural BMP and scheduled cleaning and/or maintenance of all structural BMP facilities.

N5 Title 22 CCR Compliance

Compliance with Title 22 of the California Code of Regulations (CCR) and relevant sections of the California Health & Safety Code regarding hazardous waste management is enforced by County Environmental Health on behalf of the State. The Project WQMP must describe how the development will comply with the applicable hazardous waste management section(s) of Title 22.

N6 Local Water Quality Permit Compliance

The Permittees, under the Water Quality Ordinance, may issue permits to ensure clean stormwater discharges from fuel dispensing areas and other areas of concern to public properties.

N7 (SC-11) Spill Contingency Plan

A Spill Contingency Plan is prepared by building operator or occupants for use by specified types of building or suite occupancies. The Spill Contingency Plan describes how the occupants will prepare for and respond to spills of hazardous materials. Plans typically describe stockpiling of cleanup materials, notification of responsible agencies, disposal of cleanup materials, documentation, etc.

N8 Underground Storage Tank Compliance

Compliance with State regulations dealing with underground storage tanks, enforced by County Environmental Health on behalf of State.

N9 Hazardous Materials Disclosure Compliance

Compliance with Permittee ordinances typically enforced by respective fire protection agencies for the management of hazardous materials. The Orange County, health care agencies, and/or other appropriate agencies (i.e., Department of Toxics Substances Control) are typically responsible for enforcing hazardous materials and hazardous waste handling and disposal regulations.

N10 Uniform Fire Code Implementation

Compliance with Article 80 of the Uniform Fire Code enforced by fire protection agency.

N11 (SC-60) Common Area Litter Control

For industrial/commercial developments and for developments with POAs, the owner/POA should be required to implement trash management and litter control procedures in the common areas aimed at reducing pollution of drainage water. The owner/POA may contract with their landscape maintenance firms to provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations by tenants/homeowners or businesses and reporting the violations to the owner/POA for investigation.

N12 Employee Training

Education program (see N1) as it would apply to future employees of individual businesses. Developer either prepares manual(s) for initial purchasers of business site or for development that is constructed for an unspecified use makes commitment on behalf of POA or future business owner to prepare. An example would be training on the proper storage and use of fertilizers and pesticides, or training on the implementation of hazardous spill contingency plans.

N13 (SD-31) Housekeeping of Loading Docks

Loading docks typically found at large retail and warehouse-type commercial and industrial facilities should be kept in a clean and orderly condition through a regular program of sweeping and litter control and immediate cleanup of spills and broken containers. Cleanup procedures should minimize or eliminate the use of water if plumed to the storm sewer. If wash water is used, it must be disposed of in an approved manner and not discharged to the storm drain system. If there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer must be at an acceptable discharge point such as a cleanout, oil/water separator, grease interceptor, or industrial sewer connection. All sewer discharges shall be in accordance with the Orange County Sanitation District's Wastewater Discharge Regulations and/or Washwater Disposal Guidelines.

N14 (SC-74) Common Area Catch Basin Inspection

For industrial/commercial developments and for developments with privately maintained drainage systems, the owner is required to have at least 80 percent of drainage facilities inspected, cleaned and maintained on an annual basis with 100 percent of the facilities included in a two-year period. Cleaning should take place in the late summer/early fall prior to the start of the rainy season. 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 (SC-43, SC-70) 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.

N16 (SD-30, SC-20) Retail Gasoline Outlets

Retail gasoline outlets (RGOs) are required to follow the guidelines of this TGD and Model WQMP and non-structural source control operations and maintenance BMPs shown in the CASQA Structural Source Control Fact Sheet SD-30, and Non-structural Source Control Fact Sheet (SC-20).

Other Non-structural Measures for Public Agency Projects

As required by the Model WQMP other non-structural measures shall be implemented and included in the Project WQMP as applicable for new public agency Priority Projects as described in the Municipal Activity fact sheets

http://www.ocwatersheds.com/MunicipalActivities.aspx. These include BMPs FF-1 through FF-13 for Fixed Facilities and DF-1 for Drainage Facilities. These are listed in **Section 6.4**, below.

6.3. Structural Measures

The following measures are applicable to all project types. CASQA BMP Fact Sheet numbers are included in parentheses where applicable; these fact sheets provide further detail on these BMPs.

S1 (SD-13) Provide Storm Drain System Stenciling and Signage

Storm drain stencils are highly visible source control messages, typically placed directly adjacent to storm drain inlets. The stencils contain a brief statement that prohibits the dumping of improper materials into the municipal storm drain system. Graphical icons, either illustrating anti-dumping symbols or images of receiving water fauna, are effective supplements to the anti-dumping message. Stencils and signs alert the public to the destination of pollutants discharged into stormwater. The following requirements should be included in the project design and shown on the project plans:

- 1. Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language (such as: "NO DUMPING-DRAINS TO OCEAN") and/or graphical icons to discourage illegal dumping.
- 2. Post signs and prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.
- 3. Maintain legibility of stencils and signs.

See CASQA Stormwater Handbook BMP Fact Sheet SD-13 for additional information.

S2 (SD-34) Design Outdoor Hazardous Material Storage Areas to Reduce Pollutant Introduction

Improper storage of materials outdoors may increase the potential for toxic compounds, oil and grease, fuels, solvents, coolants, wastes, heavy metals, nutrients, suspended solids, and other pollutants to enter the municipal storm drain system. Where the plan of development includes outdoor areas for storage of hazardous materials that may contribute pollutants to the municipal storm drain system, or include transfer areas where incidental spills often occur, the following stormwater BMPs are required:

- Hazardous materials with the potential to contaminate urban runoff shall either be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with storm water or spillage to the municipal storm drain system; or (2) protected by secondary containment structures (not double wall containers) such as berms, dikes, or curbs.
- 2. The storage area shall be paved and sufficiently impervious to contain leaks and spills.
- 3. The storage area shall have a roof or awning to minimize direct precipitation and collection of stormwater within the secondary containment area.
- 4. Any stormwater retained within the containment structure must not be discharged to the street or storm drain system.
- 5. Location(s) of installations of where these preventative measures will be employed must be included on the map or plans identifying BMPs.

See CASQA Stormwater Handbook Section 3.2.6 and BMP Fact Sheet SD-34 for additional information.

S3 (SD-32) Design Trash Enclosures to Reduce Pollutant Introduction

Design trash storage areas to reduce pollutant introduction. All trash container areas shall meet the following requirements (limited exclusion: detached residential homes):

- 1. Paved with an impervious surface, designed not to allow run-on from adjoining areas, designed to divert drainage from adjoining roofs and pavements diverted around the area, screened or walled to prevent off-site transport of trash; and
- 2. Provide solid roof or awning to prevent direct precipitation.

Connection of trash area drains to the municipal storm drain system is prohibited.

Potential conflicts with fire code and garbage hauling activities should be considered in implementing this source control.

See CASQA Stormwater Handbook Section 3.2.9 and BMP Fact Sheet SD-32 for additional information.

S4 (SD-12) Use Efficient Irrigation Systems and Landscape Design

Projects shall design the timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the municipal storm drain system. (Limited exclusion: detached residential homes.) The following methods to reduce excessive irrigation runoff shall be considered, and incorporated on common areas of development and other areas where determined applicable and feasible by the Permittee:

- 1. Employing rain shutoff devices to prevent irrigation after precipitation.
- 2. Designing irrigation systems to each landscape area's specific water requirements.
- 3. Using flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- 4. Implementing landscape plan consistent with County Water Conservation Resolution or city equivalent, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.
- 5. The timing and application methods of irrigation water shall be designed to minimize the runoff of excess irrigation water into the municipal storm drain system.
- 6. Employing other comparable, equally effective, methods to reduce irrigation water runoff.
- 7. Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider other design features, such as:
 - Use mulches (such as wood chips or shredded wood products) in planter areas without ground cover to minimize sediment in runoff.
 - Install appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant material where possible and/or as recommended by the landscape architect.
 - Leave a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible.
 - Choose plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth.

Irrigation practices shall comply with local and statewide ordinances related to irrigation efficiency.

S5 Protect Slopes and Channels

Projects shall protect slopes and channels as described in **Section 3.4** of this TGD.

S6 (SD-31) Loading Dock Areas

Loading /unloading dock areas shall include the following:

- 1. Cover loading dock areas, or design drainage to preclude run-on and runoff, unless the material loaded and unloaded at the docks does not have potential to contribute to stormwater pollution, and this use is ensured for the life of the facility.
- 2. Direct connections to the municipal storm drain system from below grade loading docks (truck wells) or similar structures are prohibited. Stormwater can be discharged through a permitted connection to the storm drain system with a treatment control BMP applicable to the use.
- 3. Other comparable and equally effective features that prevent unpermitted discharges to the municipal storm drain system.
- 4. Housekeeping of loading docks shall be consistent with N13.

See CASQA Stormwater Handbook Section 3.2.8 for additional information.

S7 (SD-31) Maintenance Bays

Maintenance bays shall include the following:

- 1. Repair/maintenance bays shall be indoors; or, designed to preclude urban run-on and runoff in an equally effective manner.
- 2. Design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters from entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the municipal storm drain system is prohibited. If there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered only if allowed by the local sewerage agency through permitted connection.

Other features which are comparable and equally effective that prevent discharges to the municipal storm drain system without appropriate permits.

See CASQA Stormwater Handbook Fact Sheet SD-31 for additional information.

S8 (SD-33) Vehicle Wash Areas

Projects that include areas for washing / steam cleaning of vehicles shall use the following:

1. Self-contained or covered with a roof or overhang.
- 2. Equipped with a wash racks, and with the prior approval of the sewerage agency (Note: Discharge monitoring may be required by the sewerage agency).
- 3. Equipped with a clarifier or other pretreatment facility.
- 4. If there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered only allowed by the local sewerage agency through permitted connection. Alternately, non-storm water discharges may require a separate NPDES permit in order to discharge to the MS4. Some local jurisdictions also have permitting systems in place for these situations.
- 5. Other features which are comparable and equally effective that prevent unpermitted discharges, to the municipal storm drain system.

See CASQA Stormwater Handbook Sections 3.2.7 and 3.2.10 and Fact Sheet SD-33 for additional information.

S9 (SD-36) Outdoor Processing Areas

Outdoor process equipment operations, such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, landfills, waste piles, and wastewater and solid waste handling, treatment, and disposal, and other operations determined to be a potential threat to water quality by the Permittee shall adhere to the following requirements.

- 1. Cover or enclose areas that would be the sources of pollutants; or, slope the area toward a sump that will provide infiltration or evaporation with no discharge; or, if there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered only allowed by the local sewerage agency through permitted connection.
- 2. Grade or berm area to prevent run-on from surrounding areas.
- 3. Installation of storm drains in areas of equipment repair is prohibited.
- 4. Other features which are comparable or equally effective that prevent unpermitted discharges to the municipal storm drain system.
- 5. Where wet material processing occurs (e.g. Electroplating), secondary containment structures (not double wall containers) shall be provided to hold spills resulting from accidents, leaking tanks or equipment, or any other unplanned releases (Note: If these are plumbed to the sanitary sewer, the structures and plumbing shall be in accordance with Section 7.II 8, Attachment D, and with the prior approval of the sewerage agency). Design of secondary containment structures shall be consistent with "Design of Outdoor Material Storage Areas to Reduce Pollutant Introduction".

Some of these land uses (e.g. landfills, waste piles, wastewater and solid waste handling, treatment and disposal) may be subject to other permits including Phase I Industrial Permits that may require additional BMPs.

See CASQA Stormwater Handbook Section 3.2.5 for additional information.

S10 Equipment Wash Areas

Outdoor equipment/accessory washing and steam cleaning activities shall use the following:

- 1. Be self-contained or covered with a roof or overhang.
- 2. Design an equipment wash area drainage system to capture all wash water. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around equipment wash areas to prevent wash -down waters from entering the storm drain system. Connect drains to a sump for collection and disposal. Discharge from equipment wash areas to the municipal storm drain system is prohibited. If there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered, but only when allowed by the local sewerage agency through a permitted connection.
- 3. Other comparable or equally effective features that prevent unpermitted discharges to the municipal storm drain system.

S11 (SD-30) Fueling Areas

Fuel dispensing areas shall contain the following:

- 1. At a minimum, the fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.
- 2. The fuel dispensing area shall be paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited.
- 3. The fuel dispensing area shall have an appropriate slope (2% 4%) to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of stormwater.
- 4. An overhanging roof structure or canopy shall be provided. The cover's minimum dimensions must be equal to or greater than the area of the fuel dispensing area in the first item above. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. The fueling area shall drain to the project's Treatment Control BMP(s) prior to discharging to the municipal storm drain system.

See CASQA Stormwater Handbook Section 3.2.11 and BMP Fact Sheet SD-30 for additional information.

S12 (SD-10) Site Design and Landscape Planning (Hillside Landscaping)

Hillside areas that are disturbed by project development shall be landscaped with deep-rooted, drought tolerant plant species selected for erosion control, satisfactory to the local permitting authority.

S13 Wash Water Controls for Food Preparation Areas

Food establishments (per State Health & Safety Code 27520) shall have either contained areas or sinks, each with sanitary sewer connections for disposal of wash waters containing kitchen and food wastes. If located outside, the contained areas or sinks shall also be structurally covered to prevent entry of stormwater. Adequate signs shall be provided and appropriately placed stating the prohibition of discharging washwater to the storm drain system.

S14 Community Car Wash Racks

In complexes larger than 100 dwelling units where car washing is allowed, a designated car wash area that does not drain to a storm drain system shall be provided for common usage. Wash waters from this area may be directed to the sanitary sewer (with the prior approval of the sewerage agency); to an engineered infiltration system; or to an equally effective alternative. Pre-treatment may also be required.

6.4. Municipal Non-Structural Source Control Measures

The following measures are applicable to fixed facility municipal projects such as maintenance yards, schools, and libraries. Generally, these controls are more applicable to municipal projects than the fact sheets contained in **Section 6.2**, however other structural and nonstructural controls described in **Section 6.2** and **6.3** shall be used where applicable. The links below contain the most recent versions of the Fixed Facility fact sheets, which can also be found at http://www.ocwatersheds.com/MunicipalActivities.aspx.

- FF-1, Bay/Harbor Activities
- FF-2, Building Maintenance and Repair
- FF-3 Equipment Maintenance and Repair
- <u>FF-4, Fueling</u>
- <u>FF-5, Landscape Maintenance</u>
- FF-6, Material Loading and Unloading
- FF-7, Material Storage, Handling, and Disposal
- FF-8, Minor Construction
- <u>FF-9, Parking Lot Maintenance</u>
- FF-10, Spill Prevention and Control
- FF-11, Vehicle and Equipment Cleaning
- FF-12, Vehicle and Equipment Storage
- FF-13, Waste Handling and Disposal

Landscape Maintenance



Objectives

- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

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

Approach

Pollution Prevention

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

Targeted Constituents

Sediment	
Nutrients	\checkmark
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	
Oxygen Demanding	



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

Suggested Protocols

Mowing, Trimming, and Weeding

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

Planting

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

Waste Management

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

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

Irrigation

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

Fertilizer and Pesticide Management

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

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

Inspection

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

Training

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

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

Spill Response and Prevention

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

Other Considerations

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

Requirements

Costs

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

Maintenance

Not applicable

Supplemental Information Further Detail of the BMP

Waste Management

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

Contractors and Other Pesticide Users

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

References and Resources

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

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

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

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

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

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

Housekeeping Practices

SC-60

Description

Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals. Related information is provided in BMP fact sheets SC-11 Spill Prevention, Control & Cleanup and SC-34 Waste Handling & Disposal.

Approach

Pollution Prevention

- Purchase only the amount of material that will be needed for foreseeable use. In most cases this will result in cost savings in both purchasing and disposal. See SC-61 Safer Alternative Products for additional information.
- Be aware of new products that may do the same job with less environmental risk and for less or the equivalent cost. Total cost must be used here; this includes purchase price, transportation costs, storage costs, use related costs, clean up costs and disposal costs.

Suggested Protocols

General

- Keep work sites clean and orderly. Remove debris in a timely fashion. Sweep the area.
- Dispose of wash water, sweepings, and sediments, properly.
- Recycle or dispose of fluids properly.
- Establish a daily checklist of office, yard and plant areas to confirm cleanliness and adherence to proper storage and security. Specific employees should be assigned specific inspection responsibilities and given the authority to remedy any problems found.
- Post waste disposal charts in appropriate locations detailing for each waste its hazardous nature (poison, corrosive, flammable), prohibitions on its disposal (dumpster, drain, sewer) and the recommended disposal method (recycle, sewer, burn, storage, landfill).
- Summarize the chosen BMPs applicable to your operation and post them in appropriate conspicuous places.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents		
Sediment		
Nutrients		
Trash		
Metals		
Bacteria		
Oil and Grease		
Organics		
Oxygen Demanding		



SC-60

- Require a signed checklist from every user of any hazardous material detailing amount taken, amount used, amount returned and disposal of spent material.
- Do a before audit of your site to establish baseline conditions and regular subsequent audits to note any changes and whether conditions are improving or deteriorating.
- Keep records of water, air and solid waste quantities and quality tests and their disposition.
- Maintain a mass balance of incoming, outgoing and on hand materials so you know when there are unknown losses that need to be tracked down and accounted for.
- Use and reward employee suggestions related to BMPs, hazards, pollution reduction, work place safety, cost reduction, alternative materials and procedures, recycling and disposal.
- Have, and review regularly, a contingency plan for spills, leaks, weather extremes etc. Make sure all employees know about it and what their role is so that it comes into force automatically.

Training

- Train all employees, management, office, yard, manufacturing, field and clerical in BMPs and pollution prevention and make them accountable.
- Train municipal employees who handle potentially harmful materials in good housekeeping practices.
- Train personnel who use pesticides in the proper use of the pesticides. The California Department of Pesticide Regulation license pesticide dealers, certify pesticide applicators and conduct onsite inspections.
- Train employees and contractors in proper techniques for spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and Countermeasure (SPCC) plant up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- There are no major limitations to this best management practice.
- There are no regulatory requirements to this BMP. Existing regulations already require municipalities to properly store, use, and dispose of hazardous materials

Requirements

Costs

Minimal cost associated with this BMP. Implementation of good housekeeping practices
may result in cost savings as these procedures may reduce the need for more costly BMPs.

Maintenance

 Ongoing maintenance required to keep a clean site. Level of effort is a function of site size and type of activities.

Supplemental Information

Further Detail of the BMP

 The California Integrated Waste Management Board's Recycling Hotline, 1-800-553-2962, provides information on household hazardous waste collection programs and facilities.

Examples

There are a number of communities with effective programs. The most pro-active include Santa Clara County and the City of Palo Alto, the City and County of San Francisco, and the Municipality of Metropolitan Seattle (Metro).

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000. <u>http://www.nalms.org/bclss/bmphome.html#bmp</u>

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

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities, Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July, 1998, Revised by California Coastal Commission, February 2002.

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

San Mateo STOPPP - (http://stoppp.tripod.com/bmp.html)

Drainage System Maintenance



Objectives

- Contain
- Educate
- Reduce/Minimize

Photo Credit: Geoff Brosseau

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Approach

Suggested Protocols Catch Basins/Inlet Structures

- Municipal staff should regularly inspect facilities to ensure the following:
 - Immediate repair of any deterioration threatening structural integrity.
 - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
 - Stenciling of catch basins and inlets (see SC-75 Waste Handling and Disposal).
- Clean catch basins, storm drain inlets, and other conveyance structures in high pollutant load areas just before the wet season to remove sediments and debris accumulated during the summer.

Targeted Constituents Sediment Nutrients Trash Metals Bacteria Oil and Grease Organics Oxygen Demanding



SC-74 Drainage System Maintenance

- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Record the amount of waste collected.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed of. Do not dewater near a storm drain or stream.
- Except for small communities with relatively few catch basins that may be cleaned manually, most municipalities will require mechanical cleaners such as eductors, vacuums, or bucket loaders.

Storm Drain Conveyance System

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

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge from cleaning a storm drain pump station or other facility to reach the storm drain system.
- Conduct quarterly routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.
- Sample collected sediments to determine if landfill disposal is possible, or illegal discharges in the watershed are occurring.

Open Channel

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

(SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS

Illicit Connections and Discharges

- During routine maintenance of conveyance system and drainage structures field staff should look for evidence of illegal discharges or illicit connections:
 - Is there evidence of spills such as paints, discoloring, etc.
 - Are there any odors associated with the drainage system
 - Record locations of apparent illegal discharges/illicit connections
 - Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of up gradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
 - Once the origin of flow is established, require illicit discharger to eliminate the discharge.
- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain
 inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to
 them to warn against ignorant or intentional dumping of pollutants into the storm drainage
 system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

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

SC-74 Drainage System Maintenance

- The State Department of Fish and Game has a hotline for reporting violations called Cal TIP (1-800-952-5400). The phone number may be used to report any violation of a Fish and Game code (illegal dumping, poaching, etc.).
- The California Department of Toxic Substances Control's Waste Alert Hotline, 1-800-69TOXIC, can be used to report hazardous waste violations.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Only properly trained individuals are allowed to handle hazardous materials/wastes.
- Train municipal employees from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report illegal dumping.
- Train municipal employees and educate businesses, contractors, and the general public in proper and consistent methods for disposal.
- Train municipal staff regarding non-stormwater discharges (See SC-10 Non-Stormwater Discharges).

Spill Response and Prevention

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

Other Considerations

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

 Requirements of municipal ordinance authority for suspected source verification testing for illicit connections necessary for guaranteed rights of entry.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget. A careful study of cleaning effectiveness should be undertaken before increased cleaning is implemented. Catch basin cleaning costs are less expensive if vacuum street sweepers are available; cleaning catch basins manually can cost approximately twice as much as cleaning the basins with a vacuum attached to a sweeper.
- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary. Encouraging reporting of illicit discharges by employees can offset costs by saving expense on inspectors and directing resources more efficiently. Some programs have used funds available from "environmental fees" or special assessment districts to fund their illicit connection elimination programs.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Identifying illicit discharges requires teams of at least two people (volunteers can be used), plus administrative personnel, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Requires technical staff to detect and investigate illegal dumping violations, and to coordinate public education.

Supplemental Information Further Detail of the BMP

Storm Drain flushing

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

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to

cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, releasing the backed up water and resulting in the cleaning of the storm drain segment.

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

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

Flow Management

Flow management has been one of the principal motivations for designing urban stream corridors in the past. Such needs may or may not be compatible with the stormwater quality goals in the stream corridor.

Downstream flood peaks can be suppressed by reducing through flow velocity. This can be accomplished by reducing gradient with grade control structures or increasing roughness with boulders, dense vegetation, or complex banks forms. Reducing velocity correspondingly increases flood height, so all such measures have a natural association with floodplain open space. Flood elevations laterally adjacent to the stream can be lowered by increasing through flow velocity.

However, increasing velocity increases flooding downstream and inherently conflicts with channel stability and human safety. Where topography permits, another way to lower flood elevation is to lower the level of the floodway with drop structures into a large but subtly excavated bowl where flood flows we allowed to spread out.

Stream Corridor Planning

Urban streams receive and convey stormwater flows from developed or developing watersheds. Planning of stream corridors thus interacts with urban stormwater management programs. If local programs are intended to control or protect downstream environments by managing flows delivered to the channels, then it is logical that such programs should be supplemented by management of the materials, forms, and uses of the downstream riparian corridor. Any proposal for steam alteration or management should be investigated for its potential flow and stability effects on upstream, downstream, and laterally adjacent areas. The timing and rate of flow from various tributaries can combine in complex ways to alter flood hazards. Each section of channel is unique, influenced by its own distribution of roughness elements, management activities, and stream responses. Flexibility to adapt to stream features and behaviors as they evolve must be included in stream reclamation planning. The amenity and ecology of streams may be enhanced through the landscape design options of 1) corridor reservation, 2) bank treatment, 3) geomorphic restoration, and 4) grade control.

<u>Corridor reservation</u> - Reserving stream corridors and valleys to accommodate natural stream meandering, aggradation, degradation, and over bank flows allows streams to find their own form and generate less ongoing erosion. In California, open stream corridors in recent urban developments have produced recreational open space, irrigation of streamside plantings, and the aesthetic amenity of flowing water.

<u>Bank treatment</u> - The use of armoring, vegetative cover, and flow deflection may be used to influence a channel's form, stability, and biotic habitat. To prevent bank erosion, armoring can be done with rigid construction materials, such as concrete, masonry, wood planks and logs, riprap, and gabions. Concrete linings have been criticized because of their lack of provision of biotic habitat. In contrast, riprap and gabions make relatively porous and flexible linings. Boulders, placed in the bed reduce velocity and erosive power.

Riparian vegetation can stabilize the banks of streams that are at or near a condition of equilibrium. Binding networks of roots increase bank shear strength. During flood flows, resilient vegetation is forced into erosion-inhibiting mats. The roughness of vegetation leads to lower velocity, further reducing erosive effects. Structural flow deflection can protect banks from erosion or alter fish habitat. By concentrating flow, a deflector causes a pool to be scoured in the bed.

<u>Geomorphic restoration</u> – Restoration refers to alteration of disturbed streams so their form and behavior emulate those of undisturbed streams. Natural meanders are retained, with grading to gentle slopes on the inside of curves to allow point bars and riffle-pool sequences to develop. Trees are retained to provide scenic quality, biotic productivity, and roots for bank stabilization, supplemented by plantings where necessary.

A restorative approach can be successful where the stream is already approaching equilibrium. However, if upstream urbanization continues new flow regimes will be generated that could disrupt the equilibrium of the treated system.

<u>Grade Control</u> - A grade control structure is a level shelf of a permanent material, such as stone, masonry, or concrete, over which stream water flows. A grade control structure is called a sill, weir, or drop structure, depending on the relation of its invert elevation to upstream and downstream channels.

A sill is installed at the preexisting channel bed elevation to prevent upstream migration of nick points. It establishes a firm base level below which the upstream channel can not erode.

A weir or check dam is installed with invert above the preexisting bed elevation. A weir raises the local base level of the stream and causes aggradation upstream. The gradient, velocity, and erosive potential of the stream channel are reduced. A drop structure lowers the downstream invert below its preexisting elevation, reducing downstream gradient and velocity. Weirs and drop structure control erosion by dissipating energy and reducing slope velocity. When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to be reclaimed.

Examples

The California Department of Water Resources began the Urban Stream Restoration Program in 1985. The program provides grant funds to municipalities and community groups to implement stream restoration projects. The projects reduce damages from streambank aid watershed instability arid floods while restoring streams' aesthetic, recreational, and fish and wildlife values.

In Buena Vista Park, upper floodway slopes are gentle and grassed to achieve continuity of usable park land across the channel of small boulders at the base of the slopes.

The San Diego River is a large, vegetative lined channel, which was planted in a variety of species to support riparian wildlife while stabilizing the steep banks of the floodway.

References and Resources

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

Los Angeles County Stormwater Quality. Public Agency Activities Model Program. On-line: <u>http://ladpw.org/wmd/npdes/public_TC.cfm</u>

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

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

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

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) Municipal Activities Model Program Guidance. 2001. Project Clean Water. November.

United States Environmental Protection Agency (USEPA). 1999. Stormwater Management Fact Sheet Non-stormwater Discharges to Storm Sewers. EPA 832-F-99-022. Office of Water, Washington, D.C. September.

United States Environmental Protection Agency (USEPA). 1999. Stormwater O&M Fact Sheet Catch Basin Cleaning. EPA 832-F-99-011. Office of Water, Washington, D.C. September.

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Illegal Dumping Control. On line: <u>http://www.epa.gov/npdes/menuofbmps/poll_7.htm</u>

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

Parking/Storage Area Maintenance SC-43



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The following protocols are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook).
- Keep accurate maintenance logs to evaluate BMP implementation.

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low concentrations.

CASQA

January 2003

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	
Oxygen Demanding	

SC-43 Parking/Storage Area Maintenance

- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel and dispose of litter in the trash.

Surface cleaning

- Use dry cleaning methods (e.g. sweeping or vacuuming) to prevent the discharge of
 pollutants into the stormwater conveyance system.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- If water is used follow the procedures below:
 - Block the storm drain or contain runoff.
 - Wash water should be collected and pumped to the sanitary sewer or discharged to a pervious surface, do not allow wash water to enter storm drains.
 - Dispose of parking lot sweeping debris and dirt at a landfill.
- When cleaning heavy oily deposits:
 - Use absorbent materials on oily spots prior to sweeping or washing.
 - Dispose of used absorbents appropriately.

Surface Repair

- Pre-heat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination form contacting stormwater runoff.
- Cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc., where applicable. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.

Parking/Storage Area Maintenance SC-43

- Use only as much water as necessary for dust control, to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of the parking facilities and stormwater conveyance systems associated with them on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, nad implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

 Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

Requirements

Costs

Cleaning/sweeping costs can be quite large, construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot to minimize cleaning with water.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Clean parking facilities on a regular basis to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination form contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Use only as much water as necessary for dust control, to avoid runoff.

References and Resources

http://www.stormwatercenter.net/

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

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

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

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

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA)<u>http://www.basma.org</u>

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Storm Drain Signage



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

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

Designing New Installations

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

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



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

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

Redeveloping Existing Installations

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

Additional Information

Maintenance Considerations

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

Placement

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

Supplemental Information

Examples

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

Other Resources

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

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

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

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

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

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

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

Design Objectives Maximize Infiltration

Provide Retention

Slow Runoff

Minimize Impervious Land

Coverage

- Prohibit Dumping of Improper Materials
- Contain Pollutants

Collect and Convey



- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

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

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

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

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

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

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

Efficient Irrigation



Design Objectives

SD-12

- Maximize Infiltration
- Provide Retention
- Slow Runoff

Minimize Impervious Land Coverage Prohibit Dumping of Improper Materials

Contain Pollutants

Collect and Convey

Description

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

Approach

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

Suitable Applications

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

Design Considerations

Designing New Installations

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

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



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

Redeveloping Existing Installations

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

Other Resources

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

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

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

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

"ATTACHMENT G"

PRELIMINARY GRADING WITH WQMP SITE PLAN (6 SHEETS)

GENERAL GRADING NOTES

- 1. ALL WORK SHALL CONFORM TO TITLE 17 OF THE ANAHEIM MUNICIPAL CODE, THE STATE CONSTRUCTION SAFETY ORDERS, AND ANY SPECIAL REQUIREMENTS OF THE PERMIT
- 2. NO GRADING SHALL COMMENCE WITHOUT FIRST OBTAINING A GRADING PERMIT AND NOTIFYING FIELD ENGINEERING AT (714) 765-5126 48 HOURS IN ADVANCE FOR GRADING INSPECTION.
- 3. ALL IMPROVEMENTS WITHIN THE PUBLIC RIGHT-OF-WAY WILL REQUIRE A RIGHT-OF-WAY CONSTRUCTION PERMIT
- 4. ALL IMPROVEMENTS TO BE CONSTRUCTED PER CITY OF ANAHEIM STANDARD DETAILS, UNLESS OTHERWISE NOTED ON
- 5 THIS PLAN IS APPROVED FOR CONFORMANCE WITH THE PUBLIC WORKS DEPARTMENT'S REQUIREMENTS FOR THE CRADING DRDINANCE ONLY. APPROVAL OF ALL WALLS AND SOUND ATTENUATION DEVICES SHOWN HEREON SHALL BE OBTAINED FROM THE PLANNING DEPARTMENT
- 6. THIS PLAN HAS BEEN EXAMINED AND IS APPROVED ONLY AS TO CONFORMANCE TO TITLE 17 OF THE ANAHEIM MUNICIPAL CODE AND IS NOT APPROVED FOR HORIZONTAL OR VERTICAL ALIGNMENT OF STREET OR UTILITY GRADES. REVISIONS TO THIS GRADING PLAN MAY BE REQUIRED PRIOR TO APPROVAL OF THE FINAL SUBDIVISION MAP OR IMPROVEMENT PLANS IN ORDER TO CONFORM TO CITY STANDARDS AND POLICIES. THE DEVELOPER IS RESPONSIBLE FOR THE COST OF MODIFICATIONS DUE TO FINAL UTILITY OR STREET LOCATIONS.
- 7 REFORE THE FORMS HAVE BEEN SET AND 24 HOURS PRIOR TO PLACEMENT OF ANY CONCRETE FOR SIDEWALK OR DRIVI APPROACH CONSTRUCTION THE CONTRACTOR SHALL ADJUST ALL NECESSARY LITUTES WITHIN THE PARKWAY TO GRADE AND OBTAIN APPROVAL FROM FIELD ENGINEERING, (714) 765-5126.
- 8. NO CUTS OR REMOVALS PERMITTED UNTIL THE FIELD ENGINEER MARKS DRIVEWAY LOCATION (S). CONTACT FIELD ENGINEER, AT (714) 765-5126, 24 HOURS PRIOR TO COMMENCING WORK WITHIN THE RIGHT-OF-WAY
- 9. ANY EXISTING IRRIGATION LINES FOUND DURING CONSTRUCTION TO BE LOCATED WITHIN THE FUTURE RIGHT-OF-WAY ARE TO BE MAINTAINED IN SERVICE AND ENCASED IN A STEEL SLEEVE OR REPLACED WITH CASTRON PIPE.
- 10. THE FOLLOWING APPLIES ONLY TO COMMERCIAL/INDUSTRIAL OPERATIONS DISTURBING LAND AREAS OF ONE TO FIVE
- A. CONSTRUCTION SITES SHALL BE MAINTAINED IN SUCH A CONDITION THAT AN ANTICIPATED STORM DOES NOT CARRY CONSTRUCTION STIES SHALL BE MAINTAINED IN SUCH A CONDITION THAT AN ANTICIPATED STORM DOES NOT CARRY WASTES OR POLILITANTS OF THE SITE, DISCHARGES OF MATERIAL, OTHER THAN STORMWATER ARE ALLOWED ONLY WHEN RECESSARY FOR PERFORMANCE AND COMPLETION OF CONSTRUCTION PRACTICES AND WHERE THEY DO NOT: CAUSE OR CONTRIBUTE TO A VOLATION OF ANY WATER QUALITY STANDARD; CAUSE OR THREATEN TO CAUSE POLILITION, CONTAMINATION, OR NUISANCE; OR CONTAN A HAZARDOUS SUBSTANCE IN A QUANTITY REPORTABLE UNDER FEDERAL REGULATIONS 40 CFR PARTS 117 AND 302. POTENTIAL POLILITANTS INCLUDE BUIT ARE NOT LIMITED TO: SOLID OR LUODID CHEMICAL SPILLS; WASTES FROM PAINTS, STAINS, STAINS, SEALANT; CAUSE, MES, PESTICIDES, HERBICIDES, WOOD PRESERVATIVES AND SOLVENTS; ASSESTOS FIBERS, PAINT FLAKES OR STUCCO FRAMEWINS; FUELS, OILS, LUBRICANTS, AND HYDRAULIC, RADIATOR OR BATTERY FLUIDS; FERTILIZERS, VEHICLE/EQUIPMENT WASH WATER AND CONCRETE WASH WATER: CONCRETE, DETERGENT OR FLOATABLE WASTES: WASTES FROM ANY WALEN AND CONCELEE MASH WALEN, CONCELE, DELENGENT OF LOARIDEL MASIES, WASHES TWALEN, AND ANT EGGINE/EQUIPMENT STEAM CLEANING OR CHENCAL DEGREASING; AND SUPERALIORINATED POTABLE WATER LINE FLUSHINGS. DURING CONSTRUCTION, DISPOSAL OF SUCH MATERIALS SHOULD OCCUR IN SPECIFIED AND CONTROLL TEMPORARY AREAS ON-SITE, PHYSICAL SEPARATED FROM POTENTIAL STORM WATER RUN-OFF, WITH ULTIMATE DISPOSAL IN ACCORDANCE WITH LOCAL, STATE AND FEBRAL STORM WATER RUN-OFF, WITH ULTIMATE ROLLED
- B. DEWATERING OF CONTAMINATED GROUNDWATER, OR DISCHARGING CONTAMINATED SOILS VIA SURFACE EROSION IS PROHIBITED. DEWATERING OF NON-CONTAMINATED GROUNDWATER REQUIRES A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT FROM THE RESPECTIVE STATE REGIONAL WATER QUALITY CONTROL BOARD.
- 11. PRIVATE STREETS SHALL BE MONUMENTED BY A REGISTERED CIVIL ENGINEER OR LICENSED LAND SURVEYOR IN THE SAME MANNER AS WOULD BE REQUIRED FOR THE MONUMENTATION OF A PUBLIC STRE
- 12. ANY VIOLATIONS WILL RESULT IN STOPPING OF ALL WORK UNTIL THE VIOLATIONS ARE CORRECTED.
- THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALTER AT 1-800-422-4133 A MINIMUM OF 48 HOURS PRIOR TO START OF CONSTRUCTION WITHIN THE RIGHT-OF-WAY.
- 14. BUILDING PERMITS SHALL NOT BE ISSUED PRIOR TO (FINAL MAP, LOT LINE ADJUSTMENT, CERTIFICATE OF COMPLIANCE) RECORDATION
- 15. PRIOR TO CONSTRUCTION, ALL SURVEY POINTS THAT MAY BE DISTURBED SHALL BE TIED OUT AND A CORNER RECORD OF EACH POINT SHALL BE FILED WITH THE COUNTY SURVEYOR. A COPY OF THE RECORDED CORNER RECORD SHALL BE SUBMITTED TO THE CITY'S FIELD SERVICES DIVISION, FOLLOWING THE CONDELETION OF THE CONSTRUCTION, A COPY OF THE RECORD OF EACH POINT THAT WAS DISTURBED SHALL BE FILED WITH THE COUNTY SURVEYOR. A COPY OF THE RECORDED CORNER RECORD SHALL BE SUBMITTED TO THE CITY'S FIELD SERVICES DIVISION PRIOR TO THE RECORDING OF A CERTIFICATE OF COMPLETION OR RELEASE OF BONDS.
- PUBLIC WORKS/CITY ENGINEER.
- 17. PRIOR TO ISSUANCE OF A BUILDING PERMIT, ANY REVISIONS TO THE PAD MUST BE MADE ON THE ORIGINAL GRADING PLAN AND A LETTER OF "AS-GRADED" PAD CERTIFICATION MUST BE APPROVED BY THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER.
- 18. BEFORE THIS GRADING PLAN IS "AS-GRADED," THE SOIL ENGINEER SHALL ATTEST IN THE "AS-GRADED" SOIL REPORT THAT HE HAS APPROVED THE DESIGN OF ALL CRIBWALLS, THAT HE HAS FIELD INSPECTED THE CONSTRUCTION OF THE CRIBWALLS AND HE SHALL CERTIFY THAT THE OVERALL SLOPE IS STABLE WITH THE CRIBWALL(S) IN PLACE.
- 19. PRIOR TO ISSUANCE OF CERTIFICATION OF OCCUPANCY, AN "AS-GRADED" CERTIFICATION MUST BE MADE ON THE ORIGINAL GRADING PLAN AND SUBMITTED WITH FINAL SOIL REPORTS, INCLUDING SOIL FERTILITY REPORTS, TO BE APPROVED BY THE DIRECTOR OF PUBLIC WORKS/AND CITY ENGINEER.

ELECTRIC UTILITY NOTE

1. PLEASE SHOW AND PROTECT ALL EXISTING UNDERGROUND AND OVERHEAD ELECTRICAL STRUCTURES IN PLACE AND MAINTAIN PROPER 3. BEFORE FORMS HAVE BEEN SET AND 24 HOURS PRIOR TO THE PLACEMENT OF ANY CONCRETE IN THE RIGHT-OF-WAY THE CONTRACTOR WORKING CLEARANCE PER GO128 AND GO95 AND ANAHEIM STANDARD CO550-12. IT IS THE DEVELOPER'S RESPONSIBILITY TO ASCERTAIN ALL EXISTING UNDERGROUND AND OVERHEAD ELECTRICAL FACILITIES INCLUDING UNDERGROUND DUCT BANK, SECONDARY CABLE AND CONDUITS, PRIMARY UNES, STREET LIGHTS, VAULTS, AND PROTECT IN-PLACE OR RELOCATE PER APU ELECTRICAL ENGINEERING CONSTRUCTION STANDARDS AT THE DEVELOPERS EXPENSE. IF RELOCATION OR REMOVAL OF EXISTING FACILITIES IS REQUIRED. THE DEVELOPER MUST CONTACT ELECTRICAL ENGINEERING (714)-765-4211 FOR ASSISTANCE.

EROSION CONTROL NOTES

- 1. A STAND-BY CREW FOR EMERGENCY WORK SHALL BE AVAILABLE AT ALL TIMES DURING THE RAINY SEASONS (OCTOBER 15 TO APRIL 15). NECESSARY MATERIAL SHALL BE AVAILABLE ONSITE AND STOCKPILED AT CONVENIENT LOCATIONS TO INSURE THE RAPID CONSTRUCTION OF EMERGENCY DEVICES. IN CASE OF AN EMERGENCY, CONTACT: SARKIS TATARIAN AT (714) 717-0400, 24 HOURS
- 2. EROSION CONTROL DEVICES SHOWN ON THIS PLAN MAY ONLY BE REMOVED WHEN APPROVED BY THE CITY ENGINEER IF THE GRADING OPERATION HAS PROGRESSED TO THE POINT WHERE THEY ARE NO LONGER REQUIRED
- 3. EXCEPT AS OTHERWISE APPROVED BY THE CITY ENGINEER, ALL DEVICES SHOWN ON THE PLAN SHALL BE IN PLACE AT THE END OF KING DAY OR ON WEEKENDS WHEN THE 5 DAY RAIN PROBABILITY FORECAST EXCEEDS 409
- 4. GRADED AREAS ADJACENT TO SLOPES MUST DRAIN AWAY FROM THE TOP OF SLOPE AT THE CONCLUSION OF EACH WORKING DAY WHEN THERE IS A FORECAST OF RAIN.
- 5. ALL LOOSE SOIL AND DEBRIS, WHICH MAY CREATE A POTENTIAL HAZARD TO OFFSITE PROPERTY, SHALL BE REMOVED FROM THE
- 6, ALL SILT AND DEBRIS SHALL BE REMOVED FROM BEHIND ALL SANDBAGS AND PROPERLY DISPOSED OF WITHIN 24 HOURS AFTER EACH RAINSTORM
- 7. DESILTING BASINS SHALL BE DRAINED OR PUMPED DRY WITHIN 24 HOURS AFTER EACH RAINSTORM. SILT AND DEBRIS SHALL BE REMOVED AND PROPERLY DISPOSED OF WHEN THE STORAGE CAPACITY IS ME
- THE PLACEMENT OF ADDITIONAL DEVICES TO REDUCE EROSION DAMAGE WITHIN THE SITE IS LEFT TO THE DISCRETION OF THE FIELD
- 9. DESILTING BASINS MAY NOT BE REMOVED OR MADE INOPERABLE BETWEEN OCTOBER 15 AND APRIL 15 WITHOUT PRIOR APPROVAL OF THE CITY ENGINEER.
- 10.THE UNDERSIGNED CIVIL ENGINEER WILL SUPERVISE EROSION CONTROL WORK IN ACCORDANCE WITH THE APPROVED PLANS. THIS INCLUDES, BUT IS NOT LIMITED TO, INSPECTION OF EROSION CONTROL MEASURES BEFORE RAINSTORMS WHEN THERE IS A 5-DAY FORECAST OF RAIN

GENERAL NOTES FOR IMPROVEMENT PLANS

- 1. ALL WORK WITHIN THE RIGHT-OF WAY WILL REQUIRE A RIGHT-OF-WAY CONSTRUCTION PERMIT
- 2. CONTACT THE CONSTRUCTION SERVICES INSPECTOR AT (714) 765-5126 AT LEAST 48 HOURS PRIOR TO ANY OF THIS WORK.
- 3 ALL WORK SHALL BE IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CITY OF ANALEMIN STANDARD PLANS, CONTRACT DOCUMENTS AND STANDARD SPECIFICATIONS UPPLEMENT AND THE LATEST REVISIONS THEREOF.
- 4. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT AT 1-800-422-4133 A MINIMUM OF 48 HOURS PRIOR TO START OF CONSTRUCTION WITHIN THE RIGHT-OF-WAY
- 5. ALL PAVING REMOVAL SHALL BE SAWCUT AT THE CONSTRUCTION SERVICES INSPECTOR'S DIRECTION. MINIMUM DEPTH OF CUT:
- 6. PAVING SHALL BE SAWCUT AND REMOVED A MINIMUM OF 1' FROM CURB AND GUTTER CONSTRUCTION OR RECONSTRUCTION.
- 7. THE PROTECTION AND ADJUSTMENT OF ALL UTILITIES SHALL BE THE RESPONSIBILITY OF THE DEVELOPER
- IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT AND/OR RELOCATE ALL TRAFFIC SIGNS, TRAFFIC SIGNALS AND TRAFFIC EQUIPMENT AS SHOWN ON THE PLANS OR AS REQUIRED BY THE CONSTRUCTION SERVICES INSPECTOR.
- IRRIGATION LINES SHALL BE REMOVED, RELOCATED OUT OF THE STREET RIGHT-OF-WAY, ENCASED IN A GALVANIZED SLEEVE, OR REPLACED WITH PVC SCH 80 AS DIRECTED BY THE PUBLIC WORKS LANDSCAPE INSPECTOR. NOTIFY THE PUBLIC WORKS OPERATIONS DIVISION AT (714) 765-6860 AT LEAST 48 HOURS PRIOR TO WORK.
- 10. REPORTS OF COMPACTION WITHIN THE RIGHT-OF-WAY SHALL BE SUBMITTED IN A TIMELY MANNER FOR REVIEW AND APPROVAL TO THE CONSTRUCTION SERVICES INSPECTOR PRIOR TO PLACING ANY PAVING.
- 11. IN THE EVENT THAT EXISTING STRIPING IS OBLITERATED BY CONSTRUCTION, IT WILL BE THE RESPONSIBILITY OF THE DEVELOPER TO REPLACE SAID STRIPING TO THE SATISFACTION OF THE CONSTRUCTION SERVICES INSPECTOR.
- . PRIOR TO CONSTRUCTION, ALL SURVEY MONUMENTS THAT MAY BE DISTURBED SHALL BE TIED OUT AND A CORNER RECORD OF EACH POINT SHALL BE FILED WITH THE COUNTY SURVEYOR. A COPY OF THE RECORDED CORNER RECORD SHALL BE SUBMITTED TO THE CITY'S CONSTRUCTION SERVICES DIVISION. FOLLOWING THE COMPLETION OF THE CONSTRUCTION, A CORNER RECORD OF EACH POINT THAT WAS DISTURBED SHALL BE FILED WITH THE COUNTY SURVEYOR. A COPY OF THE RECORDED CORNER RECORD SHALL BE SUBMITTED TO THE CITY'S CONSTRUCTION SERVICES DIVISION PRIOR TO THE RECORDING OF A CERTIFICATE OF COMPLETION OR RELEASE OF IMPROVEMENT BONDS.

GENERAL NOTES FOR STREET IMPROVEMENTS

- 1. THE CONSTRUCTION OF IMPROVEMENTS IN THE AREA OF TRAFFIC SIGNALS TO BE COORDINATED WITH THE TRAFFIC ENGINEERING DIVISION, SYSTEMS SECTION (714) 765-5183.
- 2. THE CONTRACTOR SHALL ALSO NOTIFY PUBLIC UTILITIES INSPECTORS (BOTH WATER ENGINEERING AT 714-765-4591 OR 765-4220 AND ELECTRICAL LITULITES INSPECTION AT 714-765-6846) 48 HOURS PRIOR TO START OF WORK

- SHALL ADJUST ALL NECESSARY UTILITIES TO GRADE AND OBTAIN APPROVAL FROM THE CONSTRUCTION SERVICES INSPECTOR
- PRIOR TO CONSTRUCTION OF FULL WIDTH SIDEWALKS, CONTACT PUBLIC WORKS OPERATIONS 714-765-6860 FOR THE SIZE, PLACEMENT AND
- 5. 4" THICK SAND BLANKET UNDER ALL SIDEWALKS AND 4" THICK AGGREGATE BASE SECTION UNDER ALL CURB AND GUTTER IS REQUIRED. UNLESS & REPORT FROM & REGISTERED SOILS ENGINEER IS SUBMITTED AND APPRO OVED STATING THE SOIL HAS AN EXPANSION INDEX OF 20 OR LESS AND THAT THE SAND BLANKET AND/OR AGGREGATE BASE IS NOT REQUIRED.
- ALL REGULATORY SIGNS SHALL BE PLACED WITHIN 24 HOURS AFTER CURBS HAVE BEEN CONSTRUCTED.
- 7. ALL NECESSARY UTILITY CONSTRUCTION WITHIN THE STREET RIGHT-OF-WAY SHALL BE COMPLETED PRIOR TO PAVING PER THIS PLAN
- 8. ADJUST ALL STORM DRAIN AND SEWER MANHOLES AND WATER VALVES TO GRADE AFTER PLACING FINAL LIFT OF ASPHALT.
- 9. STAKES SHALL BE SET PRIOR TO THE CONSTRUCTION OF THE SUB-GRADE AND THE ROCK GRADE. THE FINISH-SURFACE A.C. FILLS ARE TO BE PAINTED ON THE BASE COURSE OF THE A.C. 24 HOURS PRIOR TO FINISH PAVING.
- 10. NO EXPANSIVE SOIL MAY BE USED WITHIN THE PUBLIC RIGHT-OF-WAY.
- 11, SEAL COAT OR SLURRY SEAL IS REQUIRED IF THE CONSTRUCTION SERVICES INSPECTOR DEEMS THE FINISHED SURFACE IS TOO ROUGH AND
- 12. LANDSCAPE AND IRRIGATION FOR THE MEDIAN ISLAND AND/OR PARKWAY SHALL BE INSTALLED PER PLANS APPROVED BY THE PUBLIC WORKS DEPARTMENT CALL PUBLIC WORKS OPERATIONS 714-765-6860 FOR TREE APPROVAL AT LEAST 24 HOURS PRIOR TO PLANTING TREES IN THE PUBLIC RIGHT OF WAY.
- 13. CENTERLINE MONUMENTS SHALL BE SET AT ALL POINTS OF INTERSECTING STREETS, BEGINNING OF CURVES, POINTS OF REVERSE CURVE, END OF CURVES, CENTER OF CUL-DE-SACS AND ANY OTHER POINTS SO DESIGNATED BY THE CONSTRUCTION SERVICES INSPECTOR. CENTERLINE THES TO SURVEY MONUMENTS SHALL BE SUBMITED FOR NEVEW AND APPROVAL TO THE CONSTRUCTION SERVICES INSPECTOR.
- 14 PRIVATE STREETS SHALL BE MONIMENTED IN THE SAME MANNER AS REQUIRED FOR THE DEVELOPMENT OF A PUBLIC STREET

WATER UTILITY NOTES

- 1. ALL EXISTING PUBLIC WORKS FACILITIES SHALL BE PROTECTED IN PLACE. THE CONTRACTOR PERFORMING THIS WORK SHALL BE RESPONSIBLE FOR ALL COSTS MESA RESULT WATER FACILITIES.
- 2. IN CASE OF AN EMERGENCY, THE CONTRACTOR SHALL IMMEDIATELY CONTACT WATER FIELD/OPERATIONAST (714) 765-4560.
- 3. SMALL WATER SERVICE LATERALS (I.E.2" AND SMALLER) ARE TYPICALLY NOT SHOWN ON PLANS, BUT MUST BE PROTECTED IN PLACE. THE NORMAL DEPTH OF COVER FOR WATER SERVICE LATERALS IS 30".
- 4. ALL PUBLIC WATER SYSTEM APPURTENANCES INCLUDING METERS, SERVICE LATERALS, FIRE LINES, HYDRANTS, AND WATER MAINS SHOWN ON THIS PLAN SET ARE FOR CONCEPTUAL PURPOSES ONLY AND HAVE NOT BEEN APPROVED BY ANAHEIM PUBLIC UTILITIES DEPARTMENT FOR INSTALLATION, CONSTRUCTION, RELOCATION, OR ABANDONMENT.
- 5. THE OWNER, DEVELOPER, OR CONTRACTOR RESPONSIBLE FOR THE PROJECT SHALL PREPARE A SEPARATE PLAN SET FOR PUBLIC WATER SYSTEM IMPROVEMENTS OR COMPLETE A METER APPLICATION FOR ALL NEW, ABANDONED OR MODIFIED DOMESTIC WATER SERVICES, IRRIGATION SERVICES, OR FIRE LINE SERVICES AND SUBMIT THEM TO THE ANAHEIM PUBLIC UTLITED DEPARTMENT, WATER ENGINEERING DIVISION FOR NEVEW AND APPROVAL PRIOR TO START THE DEMOLITION OR GRADING WORK.
- 6 WATER ENGINEERING WILL NOT APPROVE ANY PROPOSED DR OMESTICLE RIGATION O R FIRE LINE SERVICE INSTALLATIONS LINTIL THE OWNER DEVELOPER, OR CONTRACTOR COMPLETES A WATER SERVICE METER APPLICATION, PAYS ALL APPLICABLE DEVELOPMENT RELATED FEES AND OBTAINS A UWM PERMIT. CONTACT WATER ENGINEERING AT (714) 765-5196TO APPLY FOR THE UWM PERMIT.
- 7. UNLESS OTHERWISE APPROVED, THE FOLLOWING CLEARANCES SHALL BE MAINTAINED BETWEEN EXISTING WATER FACILITIES AND ANY OTHER PROPOSED IMPROVEMENTS: A. A MINIMUM SEPARATION OF 12-INCHES FOR VERTICAL CROSSINGS.
- A minimum of parameter of the inductor of the construction of the constru 8. ALL UNUSED WATER FACILITIES SHALL BE ABANDONED AT THE MAIN AS DIRECTED BY THE ENGINEER. PRIOR TO ANY ABANDONMENT OF
- SERVICES, THE CONTRACTOR SHALL ENSURE SERVICE LINE IS CLOSED AND RESTRAINED TO THE MAINS. THE SERVICE INDUCTION SHALL BE CONTRACTOR SHALL BE CONTR SERVICES INSPECTO
- 9. A SEPARATE CONSTRUCTION PERMIT IS REQUIRED FOR ALL WORK WITHIN THE PUBLIC RIGHT OF WAY. CONTACT THE ENGINEERING REPRESENTATIVE OF THE PUBLIC WORKS DEPARTMENT FRONT COUNTER OR CALL (714) 765-4431 TO OBTAIN INFORMATION.
- 10 A PLUMBING PERMIT IS REQUIRED FOR FROM ANAHEIM BUILDING DIVISION FOR ANY NEW ALTERED OR REPAIRED PLUMBING SYSTEM ON . A LEWINGING FEARING IN ACQUIRED FOR FROM ANAPTEM BUILDING DIVISION FOR ANY NEW, ALTERED OR REPAIRED PLUMBING SYSTEM ON PRIVATE PROPERTY. THE BUILDING DIVISION IS LOCATED ON THE FIRST FLOOR OF CITY HALL EAST, 200 S, ANAHEIM BLVD. OR CALL (714) 756-5753 EXTENSION 0.
- 11. CONTRACTOR SHALL CONTACT CITY OF ANAHEIM WATER INSPECTION AT (714) 765-4591 PRIOR TO BEGINNING WORK, ALL EXCAVATION AROUND EXISTING PUBLIC WATER FACILITIES SHALL BE OBSERVED BY CITY WATER INSPECTOR,
- ALL ONSITE WATER LINES (DOMESTIC, FIRE AND IRRIGATION) SHALL BE PRIVATELY OWNED AND MAINTAINED BEGINNING AT THE CUSTOMER SIDE OF EACH METER AND ONTO THE PRIVATE PROPERTY.
- 13. ANY STRUCTURAL INFILTRATION BMP'S SHALL MEET THE FOLLOWING MINIMUM SEPARATION REQUIREMENTS:
- THE INFILTRATION SYSTEMS MUST BE LOCATED AT LEAST 100 FEET HORIZONTALLY FROM ANY WATER SUPPLY WELLS 3. THE VERTICAL DISTANCE FROM THE BOTTOM OF THE INFILTRATION SYSTEM TO THE SEASONAL HIGH GROUNDWATER LEVEL MUST BE AT

LEAST 10 FEE APPROVED: ASIS OF BEARINGS EGAL DESCRIPTION: ate Printed: ARCHITECT: PROPERTY OWNER OR DEVELOPER: 02-06-202 OFESS SARKIS TATARIAN 714-717-0400 8469 BEACH CIRCLE CYPRESS, CA., 90630. CENTERLINE OF WEST HE WILY 170 ET OF THE S 12-19-201 RAM A&D DESIGN, ALI DAVASLIGIL THE S.W. ¼ OF THE S.W. THE S.E. ¼ OF THE CTION 14 TOWNSHIP 4 S., NGE 11 W. IN THE RANCHO S COYOTES PER P.M.B. ALL ROAD HAVING A BEARIN ect number BUILDING OFFICIAL C: 714-584-7178 0: 714-894-8960 14122 SAWSTON CIRCLE OF N89'37'35"E, AS SHOWN ON RECORD OF SURVEY NO. No 78100 17-084 ECOMMEND APPROVAL: ted B R.1 007-1051, BOOK 231, PAGE WESTMINISTER CA 92683 SOILS ENGINEER: 4 RECORDED IN THE COUNTY U.I 35-372 PG'S. 19-22. ORANGE RECORDER'S SOIL EXPLORATION COMPANY, INC. FFICE. RAUL GARCIA, DEVELOPME APN: 079-882-34 C.R., RCE 951-688-7200 7535 JURUPA AVE., UNIT C RIVERSIDE CA., 92504 REVISIONS CITY BENCHMARK: PREPARED BY: These plans have been prepared under my superv NO. INITIAL DATE DESCRIPTIO APP'D DATE DESIGNATION: 7A-03 The grading shown hereon will not divert drainage downstream course or obstruct the drainage of a FOUND CITY OF ANAHEIM BENCHMARK, BRASS CAP MARKED CITY OF ANAHEIM BENCHMARK #300 B, IN THE TOP OF CURB AT THE SOUTHWEST END OF CURVE ON THE NTERSECTION OF BALL ROAD AND WESTERN AVENUE CIVIL ENGINEERING + LAND SURVEYING + NPDES COMPLIANCE NAVD88 Stanton Avenue, Suite A,
Buena Park, California 522.2266
F: 714.752.5384
www.CRFengin ENGINEER YEAR LEVELED: CESAR R RAMIREZ GENE K. LUU, PE 53417 ELEVATION: 63.52 ET EXP. DATE: 06/30/19

PRELIMINARY GENERAL GRADING NOTES



UTILITY SERVICE PROVIDERS

- ANAHEIM PUBLIC UTILITIES 201 S. ANAHEIM BLVD. ANAHEIM, CA. 92805 PH: 714-765-3300 WATER ANAHEIM PUBLIC UTILITIES SEWER:
- 201 S. ANAHEIM BLVD ANAHEIM, CA. 92805 PH: 714-765-3300
- ELECTRIC: ANAHEIM PUBLIC UTILITIES 201 S. ANAHEIM BLVD. ANAHEIM, CA. 92805 PH: 714-765-3300
- SOUTHERN CALIFORNIA GAS CO. GAS: 716 S. STATE COLLEGE BLVD ANAHEIM, CA. 92806 PH: 877-238-0092

NO OFFSITE OR STREET IMPROVEMENTS ARE PART OF THESE PLANS OR PERMIT

SHEET C1	PRELIMINARY GENERAL GRADING NOTES		
SHEET C2	T C2 TOPOGRAPHIC SURVEY MAP		
SHEET C3	PRELIMINARY GRADING & DRAINAGE PLAN		
SHEET C4	PRELIMINARY GRADING & DRAINAGE CROSS SECTIONS		
SHEET C5	PRELIMINARY WOMP PLAN		
SHEET C6	PRELIMINARY ADA PLAN		



AT LEAST TWO DAYS BEFORE YOU DIG FOR REVIEW PURPOSES ONLY. NOT FOR CONSTRUCTION APPROVED: PLANNING SERVICES DIVISION MANAGER DATE APPROVED FOR GRADING ONLY:

INT SERVICES MANAGER DATE	RUDY EMAMI P.W.	CITY ENGINEER	DATE	FOR CITY USE ONL'
sion: from its natural jacent properties:	PRELIMINARY GRADING PLAN site address: 3175 WEST BALL ROAD		GRA 2017-XXXXX SHEET_C1_ OF _6_	
	scale: 1"=10'	drawn by: R.T.	CHECKED BY: C.R.	
DATE: EXP. DATE: 09/30/17	CITY	OF ANA	HEIM	

DATE



A	BBREVIATIONS	L	LINE LEGEND
FG TX BX FL SS SD MH WV	FINISHED GRADE ELEVATION TOP OF RAMP BOTTOM OF RAMP FLOW LINE SANITARY SEWER STORM DRAIN MANHOLE WATEP VALVE		PROPERTY LINE RIGHT OF WAY LINE STREET CENTERLINE WOOD FENCE IRON FENCE
TC TS LP	TOP OF CURB TRAFFIC SIGNAL LAMP POST	FEA	TURES LEGEND
EB FS TW AC PP GW WM	ELECTRIC BOX FINISHED SURFACE ELEVATION TOP OF WALL ASPHALT CONCRETE POWER POLE GUY WIRE WATER METER WATER METER		EXISTING UTILITY AS NOTED
TSB INV PLM SLB	TRAFFIC SIGNAL BOX INVERT PIPE ELEVATION PALM TREE STREET LIGHTING BOX	*	PALM TREE
ULF	CHAIN LINK FENCE	¥	FIRE HYDRANT


	-		
		ABBREVIA	ATIONS
		TC TOP OF CUR EX EXISTING ELE FL FLOW LINE FS FINISHED SUI EG EDGE OF GU CF CURB FACE EC END OF CUR BX BOTTOM OF TX TOP OF RAM LF LINEAR FEET TS TOP OF GRA GB GRADE BREA BCB BOTTOM OF INV PIPE INVERT INF LITRATION MIN MINIMUM TYP TYPICAL	B VATION RFACE TTER VE RAMP P S S S S TE K CATCH BASIN ELEVATION
		LANDSCA = 2,882 CONCRET = 12,98 DRAINAG DRAINAG	APE AREAS SF OR 0.066 ACRES E AREAS I SF OR 0.298 E ARROWS FOR E PATTERN
EASEMENT:	INT FOR EITHER OR BOT	TH POLE LINES, CONDUITS	AND INCIDENTAL
PURPOSES RECORDS. PLEASE SEE	IN THE DOCUMENT RECOP	RDED IN BOOK 1651, PAG HER EASEMENTS.	E 209 OF OFFICIAL
EARTHWORK VOLUMES	<u>.</u>		
CUT: 1865 CY.			
FILL: 1845 CY.			
EXCLUSION NOTE: EARTHWORK QUANTITIES SHOW OF MATERIAL DUE TO SITE PR DETERMINING HIS OWN EARTHW TREATMENT.	N HEREON DO NOT TAKE INTO . PARATION. THE GRADING CONT YORK, COMPACTION, OVER EXCA	ACCOUNT SUBSIDENCE & SURFA RACTOR SHALL BE HELD RESPC VATION OR OTHER SOILS ENGINE	ACE REMOVAL OR LOSS INSIBLE FOR EER MANDATED SOIL
CIVIL ENGINEE	R NOTES:		
 COORDINATE BIORE COORDINATE REQUID CATCH BASIN. 	FENTION PLANTERS WITH L REMENTS FOR THE REMOVAL	ANDSCAPE PLANS & REALIGNMENT OF	
3 PRELIMINARY PLANS PROVIDED JUNE 1.	S DESIGNED BASED ON NEW 2018.	SITE PLAN	
ROOF WILL BE MADE POLLUTANTS WILL BE	E OF PURE CONCRETE THER	EFORE NO	
5 ANY DAMAGE, BROKI OF THE PROPERTY S WITH CITY STANDA	EN, AND LIFTED SIDEWALK SHALL BE RECONSTRUCTED RD DETAIL 110-B.	IN THE PERIMETER IN ACCORDANCE	
6 IF MANY UTILITY O BE RESURFACED VIA TO EDGE OF GUTTER	CUTS ARE DONE, THE ENTI A 2" GRIND AND CAP FROM R.	RE STREET SHALL EDGE OF GUTTER	
(7) EXISTING PERIMETE PREVENT ANY RUN O PROPERTIES.	R WALLS TO RECEIVE FLO OFF FROM DISCHARGING IN	OD PROOFING TO TO NEIGHBORING	
8 GEOTECHNICAL ENG CLEARANCE OF DETE FOOTINGS/FOUNDAT	INEER TO REVIEW AND APP ENTION PIPES TO BUILDIN ION DURING FINAL ENGINE	ROVE PROPOSED G ERING PLANS.) 3
DIGALER	D IAL TOLL FREE 1-800-422-4133	Ċ	Nover Ferry
K I	AT LEAST TWO DAYS BEFORE YOU DIG	10' 0'	- 5 10' 20'
			1"=10'
EOB DEVIEW	DI IR DOCEC ONI	V NOT FOD CO	I = IU ISTRUCTION
Date Printed: 02-06-2020	PRELIMINARY GRA	DING PLAN	GRA
Date Surveyed: 12-19-2017	SITE ADDRESS:		2017-XXXXX
Drafted By:	JI/5 WEST E	BALL KUAD	SHEET_C3_OF_6
R.T. Surveyed By:	scale: 1"=10'	drawn by: R.T.	CHECKED BY: C.R.

hecked By: C.R., RCE

CITY

OF

ANAHEIM

PRELIMINARY GRADING & DRAINAGE CROSS SECTIONS & SEWER PROFILE

SOILS REPORT EXCERPT:

- AFTER SITE CLEARANCE, AS DESCRIBED ABOVE, RESIDENTIAL PAD, INCLUDING AT LEAST 5 FEET OUTSIDE BUILDING LINES IN PLAN. (INCLUDING ANY CANOPIES AND EXTENDED FOUNDATIONS WHERE PRACTICAL) SHOULD BE OVEREXCAVATED TO A DEPTH OF AT LEAST 4 FEET BELOW EXISTING GROUND OR PROPOSED GRADE, WHICHEVER IS DEEPER. WHERE PROPOSED BUILDING IS ADJACENT TO EXISTING STRUCTURES OR BLOCK WALLS, THE OVEREXCAVATION SHOULD BE CONDUCTED SAFELY AND IN SECTIONS ON THE ORDER OF 10 FEET IN LENGTH OR AS APPROPRIATE TO PROTECT EXISTING STRUCTURES IN-PLACE. DEEPER OVEREXCAVATION SHOULD NOT BE PRECLUDED SPECIALLY TO EXPOSE COMPETENT SOLS. VEGETATION ROOTS SHOULD BE TRACED AND COMPLETELY REMOVED IF ENCOUNTERED IN BOTTOM OF THE OVEREXCAVATED AREAS.
- EXCERPT TAKEN FROM A REPORT PREPARED BY (SOIL EXPLORATION COMPANY, INC., DATED 09-12-2016, PROJECT NO. 16155-01)

105'																105
100'	<u>Е</u>			RIGHT OF		R	DOF RIDGELINE						EASEMENT FOR POL LINES, CONDUITS, A INCIDENTAL PURPOS	E ND ES.		
95'				I WAY LINE		/ EL					<u>Para</u>					
90'	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	45'		- 16.1'										18'	-	90
85'				13.1'	-				COLUMN SEE	TION						¹ 85
80'	н Н N								IS TON DETAILS							
70'		(63.67)TC			570 FC	65.17 TC								 f	(70.22)TW (64.22)FG	
65'	(64.11)AC 3.4%	(62.93)FL (63.16)EG	(64.09)FS	6' CLF (64.1)FG	5%	(63.8)FG			(63.8)FG	GARAGE FLOOR 64.67 FS	(64.3)FG	<u>64</u> . 64.	<u>17 TC</u> 67 FS <u>5.0%</u>	5.0%	(63.97)FS	65
60'		LOCAL DEPRESSION	PER CITY STANDARD 110-B	J-Q-C	Q								(64.9)FG	[*] '	1	
55'			DETENTION PIPE	59.55		GEOTECHNICAL EN	NGINEER TO REVIEW	AND APPROVE F	ROPOSED CLEAR	ANCE OF DETENTION			62.62 INV			
50'			501			PIPES TO BUILDIN	IG FOOTINGS/FOUND	ATION DURING F	NAL ENGINEERING	FLANS.						50
0.	10 20	50 40 [°]	50	60 7	/0	80	90 100	r 110) 120 ⁻	130	140	150 160) 170 [°]	180	190	200







ROFESSIONAL CHORNER + CHOR	BASIS OF BEARINGS: THE CENTERLINE OF WEST BALL ROAD HAVING A BEARING OF N89'37'35"E, AS SHOWN ON RECORD OF SURVEY NO. 2007-1051, BOOK 231, PAGE 14 RECORDED IN THE COUNTY OF ORANGE RECORDER'S OFFICE.	ARCHITECT: A&D DESIGN ALI DAVASLIGIL 14122 SAWSTON CIF WESTMINISTER, CA., 0: 714–894–8960 C: 714–584–7178
C	OFFICE.	C: 714-894-8980 C: 714-584-7178 E: ALI@ARCHITECT1.

			CITY BENCHMARK:	
NO.	INT.	DATE	DESCRIPTION	DESIGNATION: 7A-03
				FOUND CITY OF ANAHEIM BENCHMARK, BRASS
				B, IN THE TOP OF CURB AT THE SOUTHWEST EN
				AND WESTERN AVENUE.
				DATUM: NAVD88
				ELEVATION: 63.52 FT.

				SCALE	E: 1"=10'		OR CITY SE ONLY		
	FOR	REVIEW	PURPOSES ONL	Y. NOT I	FOR CON	ISTRUCTION	23		
	Date Printed:	02-06-2020	PRELIMINARY GRA	PRELIMINARY GRADING PLAN GRA					
	Date Surveyed:	12-19-2017	SITE ADDRESS: 2017-XXXXX						
ROLE	Project Number:	17-084	3175 WEST 6	SHEET <u>C4</u> OF <u>6</u>					
, 92683.	Drafted By:	R.T.	scale: 1"=10'	DRAWN BY:	R.T.	CHECKED BY: C.R.			
	Surveyed By:	U.L.							
.US	Checked By:	C.R., RCE	CLEY	OF	ANA	.HEIM			

10'



ONLY S S

	FOR	REVIEW	_PURPOSES ONL	<u>Y. NOT F</u>	OR CON	ISTRUCTION	<u> </u>
	Date Printed:	02-06-2020	PRELIMINARY GRA	GRA			
	Date Surveyed:	12-19-2017	SITE ADDRESS:	2017-XXXXX			
RCLE	Project Number:	17-084	3175 WEST E	SHEET <u>C5</u> OF <u>6</u>			
92683.	Drafted By: Surveved By:	R.T.	scale: 1"=10'	DRAWN BY:	R.T.	CHECKED BY: C.R.	
		U.L.					
.US	Checked By:	C.R., RCE	CITY	OF	ANA	.HEIM	

