Appendix F: Preliminary Water Quality Management Plan

City of Garden Grove, California

PRELIMINARY WATER QUALITY MANAGEMENT PLAN (PWQMP)

Project Name:

34-UNIT APARTMENT

13040 COAST ST, GARDEN GROVE

APN: 097-011-03

Prepared by:

DONG ENGINEERING, INC.

7661 GARDEN GROVE BLVD., GARDEN GROVE, CA 92841

TEL: (714) 617-5979, EMAIL: INFO@DONGENGINEERING.COM

4/23/2025

PRELIMINARY WATER QUALITY MANAGEMENT PLAN (PWQMP)

Project Name:

34-UNIT APARTMENT

Prepared for:

LOC TRAN

13040 Coast St,

Garden Grove, CA 92844

214-682-5559

Prepared by:

DONG ENGINEERING, INC.

7661 Garden Grove Blvd.,

Garden Grove, CA 92841

Tel: (714) 617-5979

Engineer: Truong Dong. Registration No. C75466 Exp: 03/31/2026

April 23, 2025

Project Owner's Certification			
Permit/Application No.		Grading Permit No.	
Tract/Parcel Map No.	1075	Building Permit No.	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract)		13040 COAST ST, Garden Grove, CA 92844	

This Preliminary Water Quality Management Plan (PWQMP) has been prepared for West St. Investments LLC by Dong Engineering, Inc. The WQMP is intended to comply with the requirements of the local NPDES Stormwater Program requiring the preparation of the plan, and condition numbers 40, 41, 49 and/or Site Development Permit/ Application number, requiring the preparation of a Water Quality Management 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.

Each Project WQMP will be stored within the City's files, and will continue with the property after the completion of the construction phase, and the City will require that the terms, conditions and requirements be recorded with the County Recorder's office by the property owner or any successive owner as authorized by the Final Water Quality Ordinance. The City will require the Final Project WQMP to include a Notice of Transfer Responsibility Form, which serves to notify the City that a change in ownership has occurred and notify the new owner of its responsibility to continue implementing the Final Project WQMP.

The final Project WQMP must include calculations to support the structural integrity of the selected LID or treatment control BMP as appropriate and be prepared by or under the direction of a California Registered Civil Engineer and affixed with their stamp.

Owner:			
Title	LOC TRAN		
Company			
Address	13040 Coast St, Garden Grove, CA 92844		
Email	tran.tpi@gmail.com		
Telephone#	214-682-5559		
Signature		Date	4/23/2025

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Attachments

Section I: Discretionary Permit(s) and Water Quality Conditions

Provide discretionary permit and water quality information. Refer to Section 2.1 in the Technical Guidance Document (TGD) available from the Orange County Stormwater Program (ocwatersheds.com).

Project Information			
Permit/Application No.		Tract/Parcel Map No.	
Additional Information/Comments:	This Preliminary WQMP is prepared to assess project impacts for Water Quality as required by the OCTGD and CEQA for entitlement review.		
Water Quality Conditions			
Water Quality Conditions (list verbatim)	40. Prior to the issuance of any grading or building permits, the applicant shall submit to the City for review and approval a Water Quality Management Plan that: a. Addresses Site Design BMPs based upon the geotechnical report recommendations and findings such as infiltration minimizing impervious areas, maximizing permeability, minimizing directly connected impervious areas, creating reduced or "zero discharge" areas, and conserving natural areas. b. Incorporates the applicable Routine Source Control BMPs as defined in the DAMP. c. Incorporates structural and Treatment Control BMPs as defined in the DAMP. The BMP Exhibit from the approved WQMP shall be included as a sheet in all plan sets submitted for plan check and all BMPs shall be depicted on these plans. Grading and building plans must be consistent with the approved BMP exhibit. d. Generally describes the long-term operation and maintenance requirements for the Treatment Control BMPs. e. Identifies the entity that will be responsible for long-term operation and maintenance of the Treatment Control BMPs. f. Describes the mechanism for funding the long-term operation and maintenance of the Treatment Control BMPs.		

	41. Prior to grading or building permit closeout and/or the issuance of a certificate of use or a certificate of occupancy, the applicant shall: a. Demonstrate that all structural best management practices (BMPs) described in the Project WQMP have been constructed and installed in conformance with approved plans and specifications. b. Demonstrate that applicant is prepared to implement all non-structural BMPs described in the Project WQMP. c. Demonstrate that an adequate number of copies of the approved Project WQMP are available onsite. d. Submit for review and approval by the City an Operations and Maintenance (O&M) Plan for all structural BMPs. 49. Prior to issuance of a grading permit, the applicant shall provide a hydrological analysis with scaled map and calculations and hydraulic calculations to size storm drains per the Orange County RDMD standards. Parkway culverts shall be designed per Orange County Standard Plan 1309, Type 8 or City of Garden Grove Standard Plan 8-209. 8MP's shall be sized per the requirements of the latest Technical Guidance Documents.
Watershed-Based Plan Conditions	
Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	
	There are currently no approved WIHMPs or TMDLs for the Anaheim Bay- Huntington Harbor Watershed.

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 TGD for information that must be included in the project description.*

Description of Proposed Project		
Development Category (From Model WQMP, Table 7.11-2; or -3):	This project is Preliminary Water Quality Management Plan (PWQMP) category #8: All significant redevelopment projects, where significant redevelopment is defined as the addition or replacement of 5,000 or more square feet of impervious surface on an already developed site.	
Project Area (ft2): 21,088	Number of Dwelling Units: 1	SIC Code: 1522
Narrative Project Description: (Use as much space as necessary.)	**Existing condition:**	
	The existing site includes 1 preschool building structure, asphalt concrete, concrete walkway, concrete gutter and landscapes. The whole site will be demolished for new construction.	
	Proposed condition:	
	- The proposed site includes: Proposed building structure with 14,992 sf building/garage footprint. Driveways and walkway: 3,143 sf Landscapes area: 2,953 sf	

Project Area	Pervious		Impervious	
	Area (sq ft)	Percentage	Area (sq ft)	Percentage
Pre-Project Conditions	1,653	7.84	19,435	92.16
Post-Project Conditions	2,953	14	18,135	86
Drainage Patterns/Connections	The post-development runoff will be conveyed and treat to the maximum extend practical via biofiltration areas so storm water will be filtered by biofiltration basin (Modular Wetland System). After that stormwater will be discharged into Coast Street via sump pump device. The Drainage Management Area is subdivided into 1 drainage areas as A and their associate runoff patterns as follows:			
	+ DMA-A: Storm water will be captured via onsite storm drain facilities and surface drainage, then conveyed to a biofiltration device (modular wetlands system) where the DCV will be treated. Excess storm runoff will flow to sump pump then discharged to the street, following its existing drainage path.			

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 TGD for guidance.*

Pollutants of Concern			
Pollutant	Check One for each: E=Expected to be of concern N=Not Expected to be of concern		Additional Information and Comments
Suspended-Solid/ Sediment	☑ E	☐ N	Driveway, roof-top and landscaped areas are expected to be coomon sources of sediment due to wear.
Nutrients	☑ E	☐ N	Nutrients including nitrogen, phosphorous, and other compounds can be anticipated to be generated by or organic litter, fertilizers, sewage and sediment.
Heavy Metals	☐ E	☑ N	Heavy metals are not anticipated in residential as described in Table 2.1 of Technical Guidance document (TGD).
Pathogens (Bacteria/Virus)	☑ E	☐ N	Bird, pet waste and garbage.
Pesticides	☑ E	☐ N	Landscape areas.
Oil and Grease	☑ E	☐ N	Potential sources of oil and grease include motor vehicle.
Toxic Organic Compounds	☐ E	☑ N	Toxic Organic Compounds are not anticipated in residential as described in Table 2.1 of TGD.
Trash and Debris	☑ E	☐ N	These sources include common litter, biodegradable organic matter such as leaves, from landscaping area.

II.3. Hydrologic Conditions of Concern

Determine if streams located downstream from the project area are determined to be potentially susceptible to hydromodification impacts. Refer to Section 2.2.3.1 in the TGD for NOC or Section 2.2.3.2 for <SOC>.

- ☑ No - See 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

The post-development runoff will be conveyed and treat to the maximum extend practical via biofiltration areas so storm water will be filtered by biofiltration basin (Modular Wetland System). After that stormwater will be discharged into Coast Street via sump pump device. The Drainage Management Area is subdivided into 1 drainage areas as A and their associate runoff patterns as follows:

+ DMA-A: Storm water will be captured via onsite storm drain facilities and surface drainage, then conveyed to a biofiltration device (modular wetlands system) where the DCV will be treated. Excess storm runoff will flow to sump pump then discharged to the street, following its existing drainage path.

II.5. Property Ownership/Management

The project owned by West St. Investments LLC. The owner will be responsible for the long-term maintenance of the project's storm water facilities and conformance to this Preliminary Project Water Quality Management Plan (PWQMP) after construction is complete.

Section III: Site Description

III.1. Physical Setting

Name of Planned Community/Planning Area (if applicable)	R1 - Single Family Residence
Location/Address	13040 COAST ST
	Garden Grove, CA 92844
Land Use	Medium Density Residential
Zoning	R-3
Acreage of Project Site	0.484
Predominant Soil Type	Soil Type B (Per Hydrologic Soil Map)

III.2. Site Characteristics

Site Characteristics	
Precipitation Zone	0.8” per Orange County Rainfall zones Map (Figure XVI-1 in attachment C) of the TGD.
Topography	The site is a flat area
Drainage Patterns/Connections	The Drainage Management Area is subdivided into 1 drainage areas as A and their associate runoff patterns as follows:
	+ DMA-A: Storm water will be captured via onsite storm drain facilities and surface drainage, then conveyed to a biofiltration device (modular wetlands system) where the DCV will be treated. Excess storm runoff will flow to sump pump then discharged to the street, following its existing drainage path.

Soil Type, Geology, and Infiltration Properties	According to the infiltration study constraint maps, Section XVI-2 of the T.G.D., the project is located in hydrological soil Group B. A Geotechnical Study conducted on the project site indicates the soil to be silt loams or loams. Group B consists of moderately deep to deep, moderately well to well drained soils and have a moderate rate of infiltration. Existing impervious area/ pervious area: 92.16% / 7.84%. Proposed impervious area/ pervious area: 86% / 14%. Infiltration rate: 0% (See Attachment D)
Hydrogeologic (Groundwater) Conditions	Groundwater is not expected to be encountered on this site.
Geotechnical Conditions (relevant to infiltration)	Based on the fact that it appears to have no clay or possibly expansive silt, in our opinion, the soil is non expansive.
Off-Site Drainage	There is no off-site drainage that enters the project.
Utility and Infrastructure Information	There is no existing sub-surface utilities located in the project area.

III.3. Watershed Description

Receiving Waters	Los Alamitos channel (C03).
303(d) Listed Impairments	Metals, pesticides, toxicity, pathogens and other organics (from combined 2006 & 2010 list)
Applicable TMDLs	There is currently no approved WIHMP for the Anaheim Bay Watershed.
Pollutants of Concern for the Project	Nutrients, Pathogens, pesticides.
Environmentally Sensitive and Special Biological Significant Areas	There is no Environmentally Sensitive and Special Biological Significant Areas within the Anaheim Bay Watershed.

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. The local Permittee planning or NPDES staff should be consulted regarding the existence 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.*
- Model WQMP.
- 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)	No HCOC
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	Priority Projects must infiltrate, harvest and use, evapotranspire, or biotreat/biofilter, the 85th percentile, 24-hour storm event (Design Capture Volume).

List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	LID performance criteria also fully satisfies treatment control performance criteria.

IV.2. Site Design and Drainage

- 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 plot plan.
- Calculation of Design Capture Volume (DCV) for each drainage area.
- A listing of GIS coordinates for LID and Treatment Control BMPs (unless not required by local jurisdiction).

Refer to Section 2.4.2 in the TGD.

DMA-A will have Biofiltration Basin (BMP#1) to treat storm water.
Area: 21,818 SF
BMP size: 25 SF
BMP Location: 33'46'22, 117'59'22

Table 2.7: Infiltration BMP Feasibility Work sheet

	Infeasibility Criteria	Yes	No
1	**Would Infiltration BMPs pose significant risk for groundwater related concerns?** Refer to Appendix VIII (Worksheet I) for guidance on groundwater-related infiltration feasibility criteria.		X
Provide basis: Summarize findings of studies provide reference to studies, calculation, map, 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 slops 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 risk of geotechnical hazards that cannot be mitigated to acceptable level.		X
Provide basis: Summarize findings of studies provide reference to studies, calculation, map, data sources, etc. Provide narrative discussion of study/data source applicability.			
3	**Would infiltration of the DCV from drainage area violate downstream water right?**		X
Provide basis: Summarize findings of studies provide reference to studies, calculation, map, data sources, etc. Provide narrative discussion of study/data source applicability.			
	Particial Infeasibility Criteria	Yes	No
4	**Is proposed infiltration facility located on HSG D soils** or the site geotechnical investigation identifies presence of soil characteristics with support categorization as D soils?		X
Provide basis: Summarize findings of studies provide reference to studies, calculation, map, data sources, etc. Provide narrative discussion of study/data source applicability.			
5	**Is measured infiltration rate below proposed facility less than 0.3 inches per hour?** This calculation shall be based on the methods described in Appendix VII	X	

Provide basis: Summarize findings of studies provide reference to studies, calculation, map, data sources, etc. Provide narrative discussion of study/data source applicability.			
6	**Would reduction of over predeveloped conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contamminated groundwater to surface waters?**		X
Provide citation to applicable study and summarize findings relative to the amount of infiltration that permissible: Summarize findings of studies provide reference to studies, calculation, map, 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 increase discharge of contaminated groundwater to surface waters?**		X
Provide citation to applicable study and summarize findings relative to the amount of infiltration that permissible: Summarize findings of studies provide reference to studies, calculation, map, data sources, etc. Provide narrative discussion of study/data source applicability.			
Infiltration Sreening Result (check box corresponding to result):			
8	Is there substantial evidence that infitration from the project would result in a significant increase in I&I to the sanitary sewer that cannot be sufficiently mitigated? (See Appendix XVII) Provide narrative discussion and supporting envidence: Summarize findings of studies provide reference to studies, calculation, map, data sources, etc. Provide narrative discussion of study/data source applicability.	NO	
9	If any answer from row 1-3 is yes: infiltration of any volume is not feasible within the DMA or equivalent. Provide basis: Summarize findings of infeasibility screening.	NO	
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.	Use Biofiltration basin to treat stormwater instead of Infiltration Basin	
11	If answer to row 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.	NO	

Harvest and Use Infeasibility

Harvest and use infeasibility criteria include:

* If inadequate demand exists for the use of the harvested rainwater. See Appendix X for guidance on determining harvested water demand and applicable feasibility

* 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

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 TGD for selecting LID BMPs and Section 2.4.3 in the 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:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐

IV.3.2. Infiltration BMPs

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

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.

	Area	**Impevious**
DMA -A	*sq-ft*	*sq-ft*
	21,088	18,135

*** Modular Wetlands System Calculations (DMA-A):**				
Step 1: Determine the Bioretention Design Capture Volume				
1	Enter design capture storm depth from Figure III.1, d	d=	0.80	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches)	d_{HSC}		inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.80	inches
4	Enter Project area tributary to BMP (s), A (acres)	A=	0.484	acres
5	Enter Project Imperviousness, imp (unitless)	imp=	0.86	
6	Calculate runoff coefficient, C= (0.75 x imp) + 0.15	C=	0.79	
7	Calculate runoff volume, V_{design}= (C x $d_{remainder}$ x A x 43560 x (1/12))	V_{design}	1,117.6	cubic feet

The Modular Wetlands System Linear 4 x 4 (MWS-L-4-4-V) is used to treat the water for drainage area A. *See attachment F for treatment flow and volume sizing of Stormwater Biofiltration System.*

IV.3.3. Evapotranspiration, Rainwater Harvesting BMPs

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

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

Show calculations below to demonstrate if the LID Design Strom Capture Volume can be met with evapotranspiration, rainwater harvesting BMPs in combination with infiltration 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 either of these BMPs categories.

No Evapotranspiration/Rainwater Harvesting BMPs have been used

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. Include sections for selection, suitability, sizing, and infeasibility, as applicable. <Delete or leave blank if not used>

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

Show calculations below to demonstrate if the LID Design Strom 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 either of these BMPs categories.

No Biotreatment BMPs have been used

IV.3.5. Hydromodification Control BMPs

Describe hydromodification control BMPs. See Section 5 TGD. Include sections for selection, suitability, sizing, and infeasibility, as applicable. Detail compliance with Prior Conditions of Approval.

Hydromodification Control BMPs	
BMP Name	**BMP Description**
HCOC does not exist; Hydromodification Control BMPs do not apply	

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.*

Regional/Sub-Regional LID BMPs
Smart growth goals, water conservation and groundwater recharge.

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**
No Treatment Control BMPs Used.	

IV.3.8. Non-structural Source Control BMPs

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

Non-Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**If not applicable, state brief reason**
		Included	**Not Applicable**	
N1	Education for Property Owners, Tenants and Occupants	☑	☐	
N2	Activity Restrictions	☑	☐	
N3	Common Area Landscape Management	☑	☐	
N4	BMP Maintenance	☑	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☑	No hazardous waste are expected to be anticipated
N6	Local Industrial Permit Compliance	☐	☑	Proposed residential project.
N7	Spill Contingency Plan	☐	☑	No spills are expected to be
N8	Underground Storage Tank Compliance	☐	☑	This is a residential project
N9	Hazardous Materials Disclosure Compliance	☐	☑	No storage of hazardous materials onsite
N10	Uniform Fire Code Implementation	☐	☑	No stockpile or storage of hazardous materials onsite.
N11	Common Area Litter Control	☑	☐	
N12	Employee Training	☑	☐	Owner
N13	Housekeeping of Loading Docks	☐	☑	This is a residential project, no loading docks.
N14	Common Area Catch Basin Inspection	☑	☐	
N15	Street Sweeping Private Streets and Parking Lots	☑	☐	
N16	Retail Gasoline Outlets	☐	☑	No gasoline outlets are 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.

Non-Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**If not applicable, state brief reason**
		Included	**Not Applicable**	
S1	Provide storm drain system stenciling and signage	☐	☑	No public SD.
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☑	No proposed outdoor storage.
S3	Design and construct trash and waste storage areas to reduce pollution introduction	☑	☐	
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☑	☐	
S5	Protect slopes and channels and provide energy dissipation	☐	☑	This is a flatland project.
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☐	N/A
S6	Dock areas	☐	☑	This is a residential project.
S7	Maintenance bays	☐	☑	This is a residential project.
S8	Vehicle wash areas	☐	☑	This is a residential project.
S9	Outdoor processing areas	☐	☑	This is a residential project.
S10	Equipment wash areas	☐	☑	This is a residential project.
S11	Fueling areas	☐	☑	This is a residential project.
S12	Hillside landscaping	☐	☑	This is a flatland project.
S13	Wash water control for food preparation areas	☐	☑	No food preparation proposed.

S14	Community car wash racks	☐	☑	No proposed community car washing areas.

IV.4. Alternative Compliance Plan (If Applicable)

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 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 redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface WQ if not redeveloped.	☐ Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance).
☐ Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).	☐ Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned	☐ Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).

☐ Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.	☐ Developments in a city center area.	☐ Developments in historic districts or historic preservation areas.	☐ Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.	☐ In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.
Calculation of Water Quality Credits (if applicable)	N/A			

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 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* .

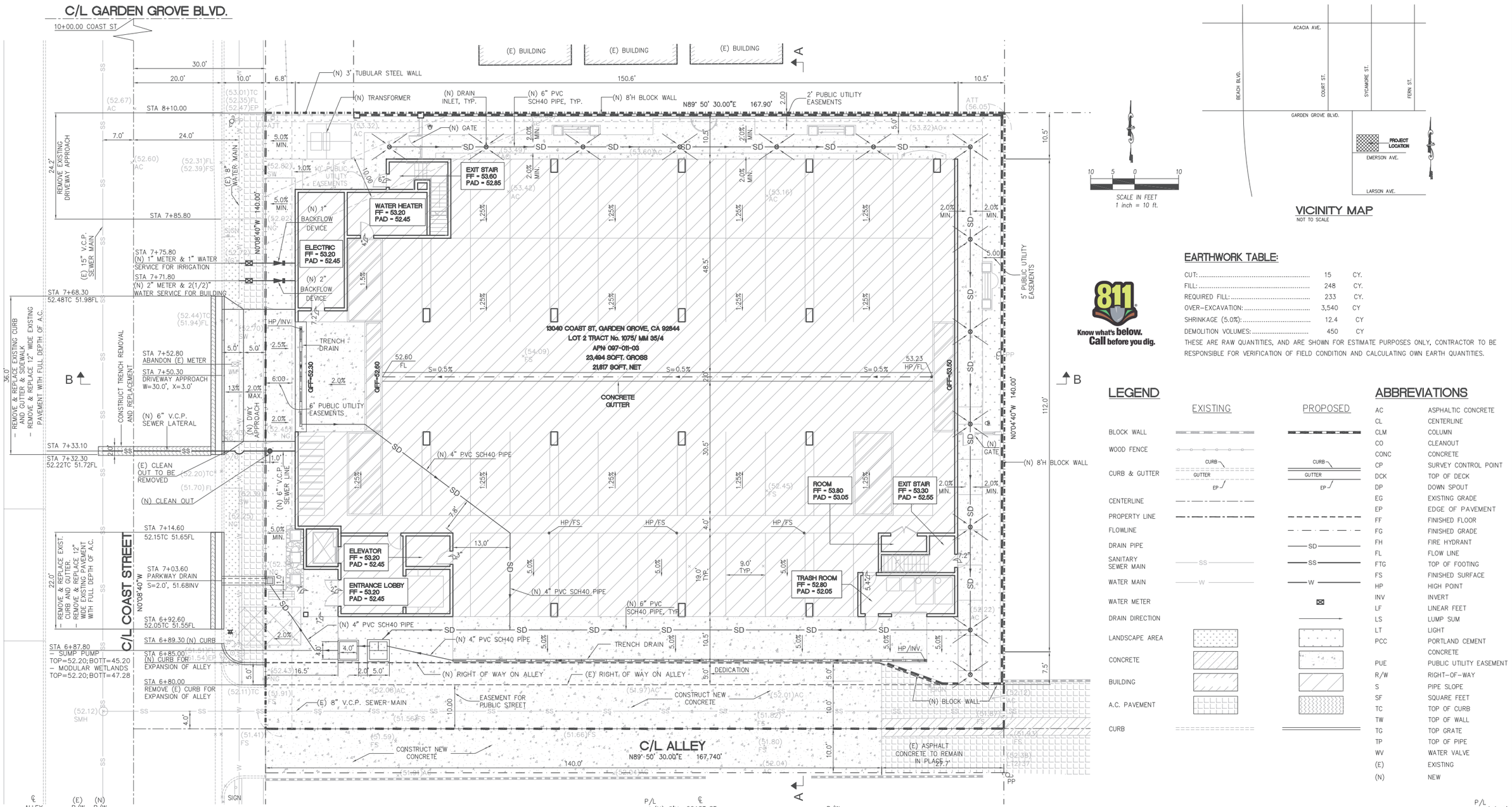
BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
Biofiltration (Modular Wetlands System)	Owner	Owner to remove any trash and tree debris to continue to filter rainwater.	Regular maintenance before rainy season. Not less than twice per year.
Landscape management	Owner	Manage landscaping in accordance with the state of California Conservation in Landscaping Act, with management guidelines for use of fertilizers and pesticides.	Regular maintenance should be conduct weekly
Storm drain system	Owner	Owner to regularly inspect the storm drain system. Trash/debris to be cleared on a monthly basis.	Monthly
Trash	Owner	Inspection and removal of debris, litter, and trash. Ensure all lids are closed and any trash/debris located on the ground are removed and disposed properly. Ensure closure is secure.	Weekly

Section VI: BMP Exhibit (Site Plan)

VI.1. Site Plan and Drainage Plan

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

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



VICINITY MAP

NOT TO SCALE

EARTHWORK TABLE:

CUT:	15	CY.
FILL:	248	CY.
REQUIRED FILL:	233	CY.
OVER-EXCAVATION:	3,540	CY
SHRINKAGE (5.0%):	12.4	CY
DEMOLITION VOLUMES:	450	CY

THESE ARE RAW QUANTITIES, AND ARE SHOWN FOR ESTIMATE PURPOSES ONLY, CONTRACTOR TO BE RESPONSIBLE FOR VERIFICATION OF FIELD CONDITION AND CALCULATING OWN EARTH QUANTITIES.

811 Know what's below. Call before you dig.

LEGEND

	EXISTING	PROPOSED
BLOCK WALL		
WOOD FENCE		
CURB & GUTTER	CURB / GUTTER / EP	CURB / GUTTER / EP
CENTERLINE		
PROPERTY LINE		
FLOWLINE		
DRAIN PIPE		SD
SANITARY SEWER MAIN	SS	SS
WATER MAIN	W	W
WATER METER		
DRAIN DIRECTION		
LANDSCAPE AREA		
CONCRETE		
BUILDING		
A.C. PAVEMENT		
CURB		

ABBREVIATIONS

AC	ASPHALTIC CONCRETE
CL	CENTERLINE
CLM	COLUMN
CO	CLEANOUT
CONC	CONCRETE
CP	SURVEY CONTROL POINT
DCK	TOP OF DECK
DP	DOWN SPOUT
EG	EXISTING GRADE
EP	EDGE OF PAVEMENT
FF	FINISHED FLOOR
FG	FINISHED GRADE
FH	FIRE HYDRANT
FL	FLOW LINE
FTG	TOP OF FOOTING
FS	FINISHED SURFACE
HP	HIGH POINT
INV	INVERT
LF	LINEAR FEET
LS	LUMP SUM
LT	LIGHT
PCC	PORTLAND CEMENT CONCRETE
PUE	PUBLIC UTILITY EASEMENT
R/W	RIGHT-OF-WAY
S	PIPE SLOPE
SF	SQUARE FEET
TC	TOP OF CURB
TW	TOP OF WALL
TG	TOP GRATE
TP	TOP OF PIPE
WV	WATER VALVE
(E)	EXISTING
(N)	NEW

REVISIONS

NO.	INIT.	DATE	DESCRIPTION	APP'D	DATE

BENCH MARK:
1G-147-70, NAVD88; ELEVATION: 66.528', YEAR LEVELED: 2005.
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SOILS ENGINEER:
ALTA CALIFORNIA GEOTECHNICAL INC
ADDRESS: 170 NORTH MAPLE STREET, CORONA, CA 92880
TEL: (951) 509-7090.
PROJECT NO.: 1-0521, REPORT DATED: MAY 1, 2024.
PREPARED BY: SCOTT A.GRAY, GE 2857.

PREPARED BY:
DONG ENGINEERING, INC.
ADDRESS: 7661 GARDEN GROVE BLVD., GARDEN GROVE, CA 92841.
TEL: (714) 617-5979.
EMAIL: INFO@DONGENGINEERING.COM

REGISTERED PROFESSIONAL ENGINEER — TRONG DONG — C75486 — EXP. 03/31/2026 — CIVIL — STATE OF CALIFORNIA

DATE SIGNED: 4/24/25

PRELIM GRADING PLAN

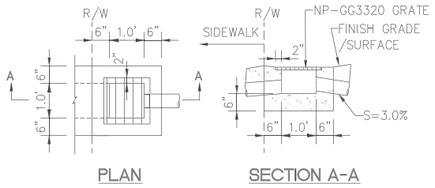
SITE ADDRESS: 13040 COAST ST, GARDEN GROVE, CA 92844

G-

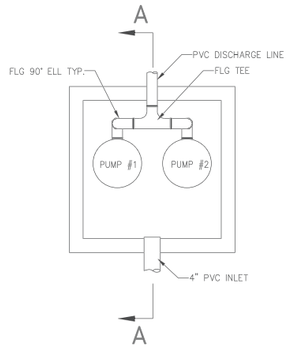
SHEET 1 OF 3

SCALE: AS NOTED | DRAWN BY: GC | CHECKED BY: TD

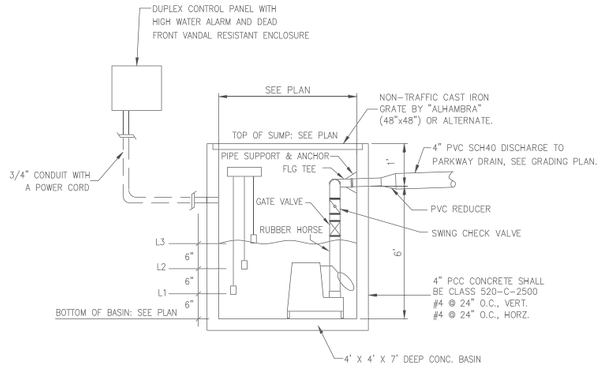
CITY OF GARDEN GROVE



DETAIL A: INLET BOX STRUCTURE
SCALE: NTS

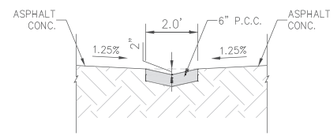


PLAN VIEW
SCALE: NTS



SECTION A-A
SCALE: NTS

DETAIL B: SUMP PUMP DETAIL
SCALE: NTS



DETAIL C: 24" WIDE CONCRETE GUTTER
NTS

NDS
WE PUT WATER IN ITS PLACE

TECHNICAL SPECIFICATIONS

5 Inch Pro Series Drain Kit With Metal Grate

Part #: 864GMTL (Includes 2 Galvanized Steel Grates , #800-Channel (1qty.), #813-End Outlet (1qty.), and #812-End Cap (1qty.)
Material: Channel (Polyolefin) Grates (Galvanized Steel)
Color: Light Gray / Galvanized Steel
Fits: 3" (Hub) and 4" (Spigot) Sewer/Drain Pipe
Rebar tie clips for easier installation: Fits #4 Rebar

Grate Opening: 0.45"x 4"

Open Surface Area: 19.32 sq. inch per linear ft.

Head Pressure / Flow Rate:
Head (inches) - Max Flow
1" = 83.58 GPM per foot
0.5" = 59.10 GPM per foot
Weight per unit: 7.70 lbs.
Screw: #829 Stainless Steel Screw, 4 per grate.
UV Inhibitors

Class B
- Loads of 61-175 psi.
- Recommended for medium-duty pneumatic tire traffic, autos and light trucks at speeds less than 20 m.p.h.

Note: Some installations may require a concrete collar to meet load rating. Loads are based on a resulting product in concrete. Product must be installed using NDS instructions.

ADA Compliance

NDS provides a full selection of grates that are compliant with the provisions with Disabilities Act: The ADA Accessibility Guidelines for Buildings and Facilities Section 4.5.4 requires that grates and their gaps have "openings no greater than 1/2" (13 mm) in one dimension."

We are pleased to provide grates that comply with these requirements, so that no individual need be limited from accessing the area safely and confidently.

To see if a grate is ADA compliant, please check the description of the product in our Grate Technical Catalog or check that load these requirements are marked "ADA compliant."

Like to find out more about ADA compliance and NDS? Email us your question and we'll be happy to help.

ADA COMPLIANT

851 N. Harvard Avenue
Lindsay, CA 93247
800.726.1994

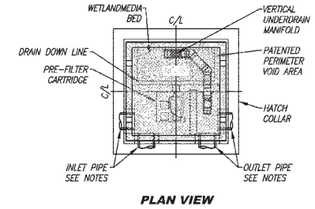
Visit ndspro.com for specs, detail drawings, and case studies

NDS WE PUT WATER IN ITS PLACE

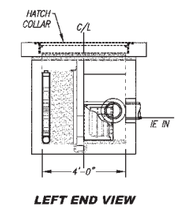
DETAIL D: 5 INCH DRAIN CHANNEL
NTS

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.052
PRETREATMENT LOADING RATE (GPM/SF)			3.0 GPM/S
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	53.42	PVC	6"
INLET PIPE 2	53.42	PVC	6"
OUTLET PIPE	52.20	PVC	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	56.00	56.00	56.00
SURFACE LOAD	PEDESTRIAN		
NOTES:			

* PRELIMINARY ONLY - NOT FOR CONSTRUCTION



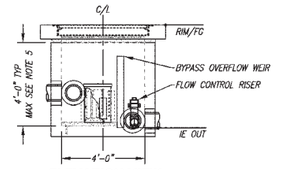
PLAN VIEW



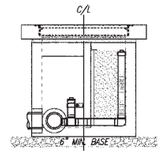
LEFT END VIEW

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
3. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
4. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.
5. VERTICAL HEIGHT VARIES BASED ON SITE SPECIFIC REQUIREMENTS.



ELEVATION VIEW



RIGHT END VIEW

MODULAR WETLANDS

PROPRIETARY AND CONFIDENTIAL:
THE INFORMATION CONTAINED IN THIS DOCUMENT IS THE SOLE PROPERTY OF CONTECH AND ITS COMPANIES. THIS DOCUMENT, NOR ANY PART THEREOF, MAY BE USED, REPRODUCED OR MODIFIED IN ANY MANNER WITH OUT THE WRITTEN CONSENT OF CONTECH.

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com

MWS-L-4-4-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

DETAIL E: BIOFILTRATION SYSTEMS
NTS

REVISIONS

NO.	INIT.	DATE	DESCRIPTION	APP'D	DATE

BENCH MARK:
1G-147-70, NAVD88; ELEVATION: 66.528', YEAR LEVELED: 2005.
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ADDRESS: 170 NORTH MAPLE STREET, CORONA, CA 92880
TEL: (951) 509-7090.
PROJECT NO.: 1-0521, REPORT DATED: MAY 1, 2024.
PREPARED BY: SCOTT A.GRAY, GE 2857.

PREPARED BY:
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TEL: (714) 617-5979.
EMAIL: INFO@DONGENGINEERING.COM

REGISTERED PROFESSIONAL ENGINEER
TRUONG DONG
C75466
EXP. 03/31/2026
CIVIL
STATE OF CALIFORNIA

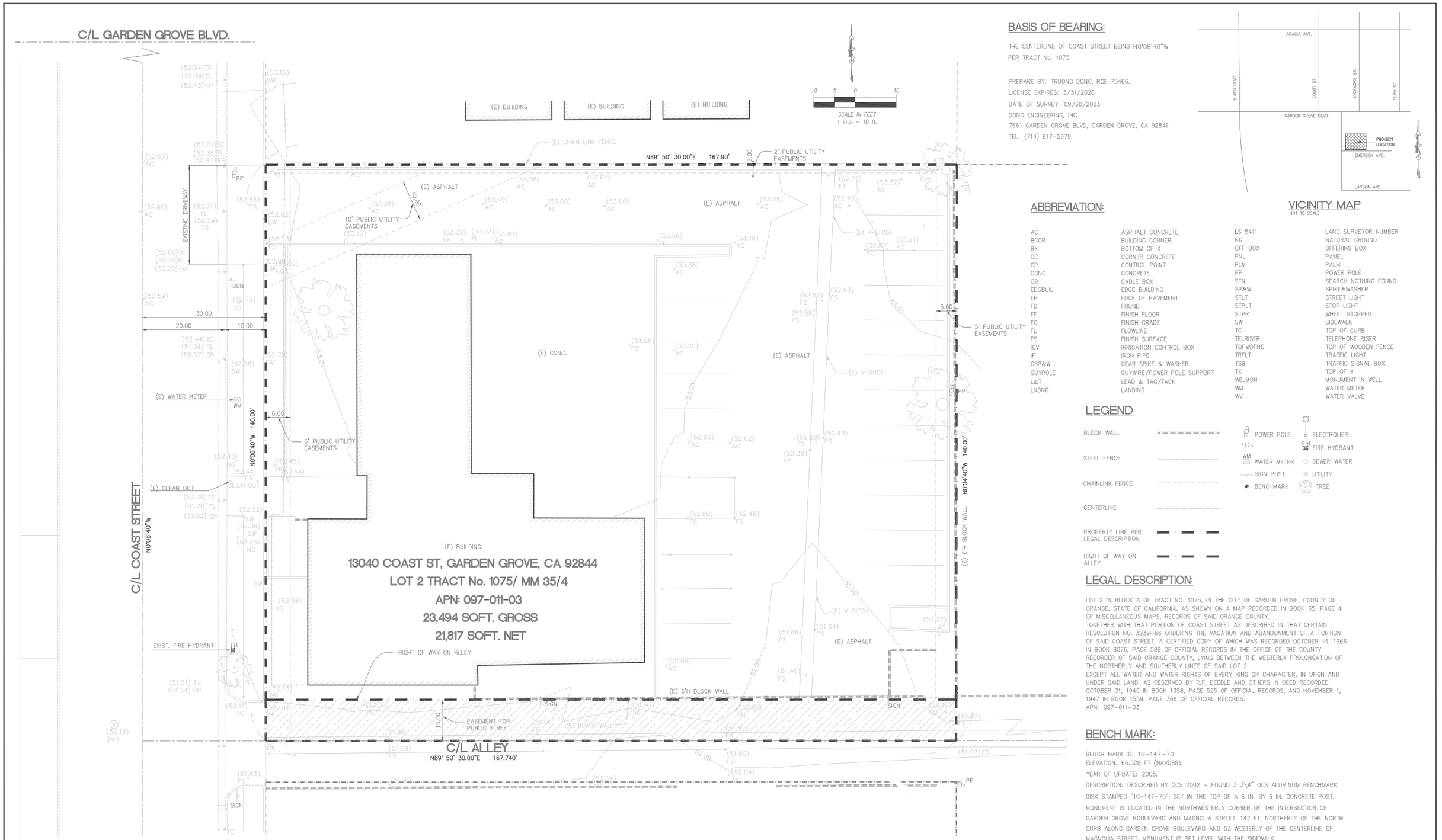
DATE SIGNED: 4/23/25

PRELIM DETAILS
SITE ADDRESS: 13040 COAST ST, GARDEN GROVE, CA 92844

G-
SHEET 2 OF 3

SCALE: AS NOTED | DRAWN BY: GC | CHECKED BY: TD

CITY OF GARDEN GROVE



BASIS OF BEARING:

THE CENTERLINE OF COAST STREET BEING N0°08'40"W PER TRACT No. 1075.

PREPARE BY: TRUONG DONG, RCE 75466.
LICENSE EXPIRES: 3/31/2026
DATE OF SURVEY: 09/30/2023
DONG ENGINEERING, INC.
7661 GARDEN GROVE BLVD, GARDEN GROVE, CA 92841.
TEL: (714) 617-5979.

VICINITY MAP

NOT TO SCALE

ABBREVIATION:

AC	ASPHALT CONCRETE	LS 5411	LAND SURVEYOR NUMBER
BCOR	BUILDING CORNER	NG	NATURAL GROUND
BX	BOTTOM OF X	OFF BOX	OFFERING BOX
CC	CORNER CONCRETE	PNL	PANEL
CP	CONTROL POINT	PLM	PALM
CONC	CONCRETE	PP	POWER POLE
CB	CABLE BOX	SFN	SEARCH NOTHING FOUND
EDGBUIL	EDGE BUILDING	SP&W	SPIKE&WASHER
EP	EDGE OF PAVEMENT	STLT	STREET LIGHT
FD	FOUND	STPLT	STOP LIGHT
FF	FINISH FLOOR	STPR	WHEEL STOPPER
FG	FINISH GRADE	SW	SIDEWALK
FL	FLOWLINE	TC	TOP OF CURB
FS	FINISH SURFACE	TELRISER	TELEPHONE RISER
ICV	IRRIGATION CONTROL BOX	TOPWDFNC	TOP OF WOODEN FENCE
IP	IRON PIPE	TRFLT	TRAFFIC LIGHT
GSP&W	GEAR SPIKE & WASHER	TSB	TRAFFIC SIGNAL BOX
GUYPOLE	GUYWIRE/POWER POLE SUPPORT	TX	TOP OF X
L&T	LEAD & TAG/TACK	WELMON	MONUMENT IN WELL
LNDNG	LANDING	WM	WATER METER
		WV	WATER VALVE

LEGEND

BLOCK WALL
STEEL FENCE
CHAINLINK FENCE
CENTERLINE
PROPERTY LINE PER LEGAL DESCRIPTION
RIGHT OF WAY ON ALLEY

POWER POLE
ELECTROLIER
FH FIRE HYDRANT
WM WATER METER
SEWER WATER
SIGN POST
UTILITY
BENCHMARK
TREE

LEGAL DESCRIPTION:

LOT 2 IN BLOCK A OF TRACT NO. 1075, IN THE CITY OF GARDEN GROVE, COUNTY OF ORANGE, STATE OF CALIFORNIA, AS SHOWN ON A MAP RECORDED IN BOOK 35, PAGE 4 OF MISCELLANEOUS MAPS, RECORDS OF SAID ORANGE COUNTY.
TOGETHER WITH THAT PORTION OF COAST STREET AS DESCRIBED IN THAT CERTAIN RESOLUTION NO. 3239-66 ORDERING THE VACATION AND ABANDONMENT OF A PORTION OF SAID COAST STREET, A CERTIFIED COPY OF WHICH WAS RECORDED OCTOBER 14, 1966 IN BOOK 8076, PAGE 589 OF OFFICIAL RECORDS IN THE OFFICE OF THE COUNTY RECORDER OF SAID ORANGE COUNTY, LYING BETWEEN THE WESTERLY PROLONGATION OF THE NORTHERLY AND SOUTHERLY LINES OF SAID LOT 2.
EXCEPT ALL WATER AND WATER RIGHTS OF EVERY KING OR CHARACTER, IN UPON AND UNDER SAID LAND, AS RESERVED BY R.F. DEEBLE AND OTHERS IN DEED RECORDED OCTOBER 31, 1945 IN BOOK 1358, PAGE 525 OF OFFICIAL RECORDS, AND NOVEMBER 1, 1947 IN BOOK 1559, PAGE 366 OF OFFICIAL RECORDS.
APN: 097-011-03

BENCH MARK:

BENCH MARK ID: 1G-147-70
ELEVATION: 66.528 FT (NAVD88).
YEAR OF UPDATE: 2005.
DESCRIPTION: DESCRIBED BY OCS 2002 – FOUND 3 3\4" OCS ALUMINUM BENCHMARK DISK STAMPED "1G-147-70", SET IN THE TOP OF A 6 IN. BY 6 IN. CONCRETE POST. MONUMENT IS LOCATED IN THE NORTHWESTERLY CORNER OF THE INTERSECTION OF GARDEN GROVE BOULEVARD AND MAGNOLIA STREET, 142 FT. NORTHERLY OF THE NORTH CURB ALONG GARDEN GROVE BOULEVARD AND 53 WESTERLY OF THE CENTERLINE OF MAGNOLIA STREET. MONUMENT IS SET LEVEL WITH THE SIDEWALK.

(FOR REFERENCE ONLY)

REVISIONS

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REGISTERED PROFESSIONAL ENGINEER
TRUONG DONG
C75466
EXP. 03/31/2026
CIVIL
STATE OF CALIFORNIA

DATE SIGNED: 4/23/25

TOPOGRAPHIC SURVEY

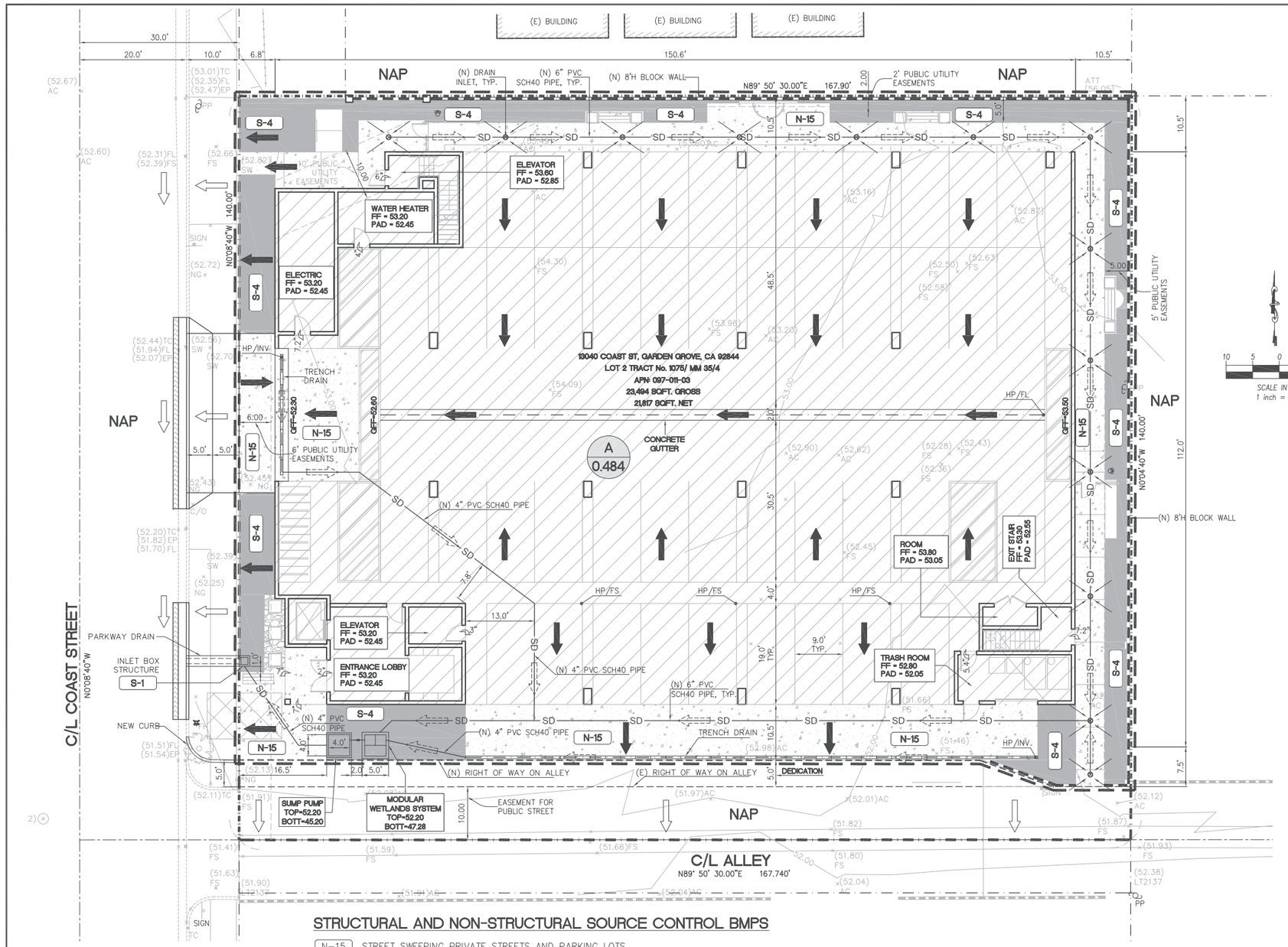
SITE ADDRESS: 13040 COAST ST, GARDEN GROVE, CA 92844

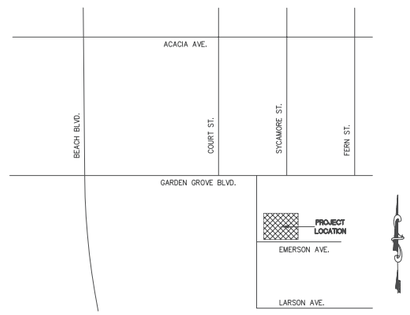
G-

SHEET 3 OF 3

SCALE: AS NOTED | DRAWN BY: GC | CHECKED BY: TD

CITY OF GARDEN GROVE





VICINITY MAP
NOT TO SCALE

10 5 0 10
SCALE IN FEET
1 inch = 10 ft.

LEGEND

	EXISTING	PROPOSED
BLOCK WALL		
WOOD FENCE		
CURB & GUTTER	CURB / GUTTER / EP	CURB / GUTTER / EP
CENTERLINE		
PROPERTY LINE		
FLOWLINE		
DRAIN PIPE		SD
DRAIN DIRECTION TO DRAIN INLET		
LANDSCAPE AREA		
CONCRETE		
BUILDING		
NOT A PART		NAP
DIRECTION OF ONSITE SURFACE FLOW		
DIRECTION OF OFFSITE SURFACE FLOW		
DIRECTION OF PIPE		
DRAINAGE AREA BOUNDARY		
DRAINAGE AREA		X / XX DRAINAGE AREA DESIGNATION / AREA IN ACRES

STRUCTURAL AND NON-STRUCTURAL SOURCE CONTROL BMPS

N-15	STREET SWEEPING PRIVATE STREETS AND PARKING LOTS.
S-1	CATCH BASIN STENCILING.
S-3	TRASH AND WASTE STORAGE AREAS.
S-4	FILTRATION: SURFACE RUNOFF SHALL BE DIRECTED TO LANDSCAPE AREAS WHEREVER PRACTICAL.
S-4	COMMON AREA EFFICIENT IRRIGATION.
S-4	COMMON AREA RUNOFF-MINIMIZING LANDSCAPE DESIGN.
	BIOFILTRATION DEVICE (MODULAR WETLANDS SYSTEM)

DMI	LATITUDE	LONGITUDE
MODULAR WETLANDS SYSTEM	33°46'22"N	117°59'23"W
SUMP PUMP	33°46'22"N	117°59'23"W
INLET BOX STRUCTURE	33°46'22"N	117°59'23"W

IMPERVIOUS AREA = 3,143 SF
PERVIOUS AREA = 2,953 SF
BUILDING AREA = 14,992 SF
TOTAL AREA = 21,088 SF/0.484 ACRES

NOTES:

- THIS PLAN PRESENTS METHODS FOR FULFILLING THE REQUIREMENTS FOR THE ORANGE COUNTY CLEAN WATER PROGRAM STORMWATER QUALITY CONTROL REQUIREMENTS.

REVISIONS

NO.	INIT.	DATE	DESCRIPTION	APP'D	DATE

BENCH MARK:
1G-147-70, NAVD88; ELEVATION: 66.528', YEAR LEVELED: 2005.
DESCRIPTION: DESCRIBED BY OCS 2002 – FOUND 3 3\4" OCS ALUMINUM BENCHMARK DISK STAMPED "1G-147-70", SET IN THE TOP OF A 6 IN. BY 6 IN. CONCRETE POST. MONUMENT IS LOCATED IN THE NORTHWESTERLY CORNER OF THE INTERSECTION OF GARDEN GROVE BOULEVARD AND MAGNOLIA STREET, 142 FT. NORTHERLY OF THE NORTH CURB ALONG GARDEN GROVE BOULEVARD AND 53 WESTERLY OF THE CENTERLINE OF MAGNOLIA STREET. MONUMENT IS SET LEVEL WITH THE SIDEWALK.

OWNER OR DEVELOPER:
OWNER: LOC TRAN.
ADDRESS: 13040 COAST ST, GARDEN GROVE, CA 92844
TEL: (214) 682-5559.

SOILS ENGINEER:
ALTA CALIFORNIA GEOTECHNICAL INC
ADDRESS: 170 NORTH MAPLE STREET, CORONA, CA 92880
TEL: (951) 509-7090.
PROJECT NO.: 1-0521, REPORT DATED: MAY 1, 2024.
PREPARED BY: SCOTT A.GRAY, GE 2857.

PREPARED BY:
DONG ENGINEERING, INC.
ADDRESS: 7661 GARDEN GROVE BLVD., GARDEN GROVE, CA 92841.
TEL: (714) 617-5979.
EMAIL: INFO@DONGENGINEERING.COM

REGISTERED PROFESSIONAL ENGINEER
TRUONG TOMMY DONG
C75466
EXP. 03/31/2026
CIVIL
STATE OF CALIFORNIA

DATE SIGNED: 4/24/25

PRELIM WQMP PLAN

SITE ADDRESS: 13040 COAST ST, GARDEN GROVE, CA 92844

G-

SHEET 1 OF 1

SCALE: AS NOTED | DRAWN BY: GC | CHECKED BY: TD

CITY OF GARDEN GROVE

VI.2. Electronic Data Submittal

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

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

Section VII: Educational Materials

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

Education Materials			
Residential Material (http://www.ocwatersheds.com)	**Check If Applicable**	**Business Material (http://www.ocwatersheds.com)**	**Check If Applicable**
The Ocean Begins at Your Front Door	☑	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☐
Homeowners Guide for Sustainable Water Use	☐	Proper Maintenance Practices for Your Business	☐
Household Tips	☑	**Other Material**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☑		
Recycle at Your Local Used Oil Collection Center (North County)	☐		☐
Recycle at Your Local Used Oil Collection Center (Central County)	☐		☐
Recycle at Your Local Used Oil Collection Center (South County)	☐		☐
Tips for Maintaining a Septic Tank System	☐		☐
Responsible Pest Control	☑		☐
Sewer Spill	☐		☐
Tips for the Home Improvement Projects	☐		☐
Tips for Horse Care	☐		☐

Tips for Landscaping and Gardening	☑		☐
Tips for Pet Care	☑		☐
Tips for Pool Maintenance	☐		☐
Tips for Residential Pool, Landscape and Hardscape Drains	☐		☐
Tips for Projects Using Paint	☐		☐

The Ocean Begins at Your Front Door

Follow these simple steps to help reduce water pollution:

Household Activities

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

Automotive

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

Pool Maintenance

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

Landscape and Gardening

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

Trash

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

Pet Care

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

Common Pollutants

Home Maintenance

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

Lawn and Garden

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

Automobile

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

The Ocean Begins at Your Front Door

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

Did You Know?

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

Where Does It Go?

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

Sources of Non-Point Source Pollution

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

The Effect on the Ocean

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

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

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

For More Information

Orange County Stormwater Program

California Environmental Protection Agency
www.calepa.ca.gov

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

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

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

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

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

Stormwater Best Management Practice Handbook
Visit www.cabmphandbooks.com

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

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

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

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

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

Printed on Recycled Paper

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Fertilizers, pesticides and other chemicals that are left on yards or driveways can be blown or washed into storm drains that flow to the ocean. Overwatering lawns can also send materials into storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never pour gardening products into the ocean, so don't let them enter the storm drains. Follow these easy tips to help prevent water pollution.

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

UCCE Master Gardener Hotline: (714) 708-1646

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

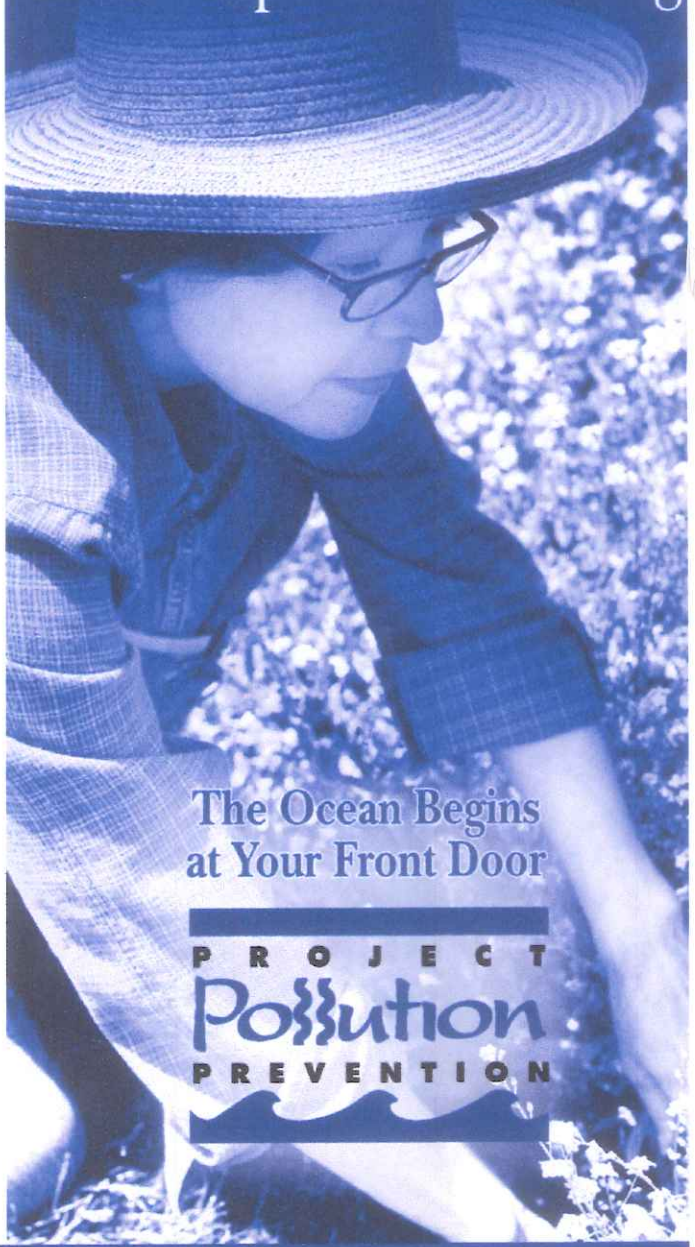
For emergencies, dial 911.

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

Printed on Recycled Paper

Help Prevent Ocean Pollution:

Tips for Landscape & Gardening



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Tips for Landscape & Gardening

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

General Landscaping Tips

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

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

Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro spray systems. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.

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

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

Household Hazardous Waste Collection Centers

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

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

The Pollution Solution

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

1 Pesticides and Fertilizer

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

2 Dirt and Sediment

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

3 Metals

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

DID YOU KNOW?

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

4 Pet Waste

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

5 Trash and Debris

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

6 Motor Oil / Vehicle Fluids

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

A TEAM EFFORT

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

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

Thank you for making water protection a priority!

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

www.mwdoc.com

www.uccemg.com

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

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

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

Homeowners Guide for Sustainable Water Use

Low Impact Development, Water Conservation & Pollution Prevention

The Ocean Begins at Your Front Door

RUNOFF, RAINWATER AND REUSE

Where Does Water Runoff Go?

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

Water Conservation

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

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

What is Low Impact Development (LID)?

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

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

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

OPTIONS FOR RAINWATER HARVESTING AND REUSE

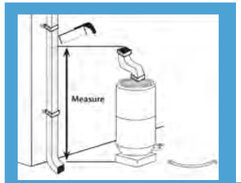
Rainwater harvesting is a great way to save money, prevent pollution and reduce potable water use. To harvest your rainwater, simply redirect the runoff from roofs and downspouts to rain barrels. Rain gardens are another option; these reduce runoff as well as encourage infiltration.

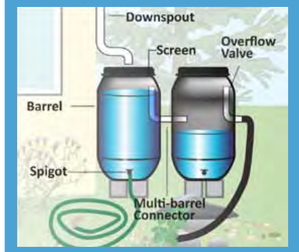
Downspout Disconnection/Redirection

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

Rain Barrels

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





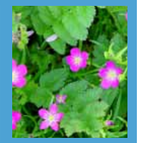
Mosquito growth prevention is very important when installing a rain barrel. The best way to prevent mosquito breeding is to eliminate entry points by ensuring all openings are sealed tightly. If these methods are unsuccessful, products are available to kill mosquito larvae, but that are harmless to animals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

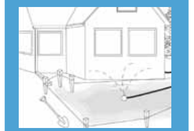
Rain Gardens

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

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

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





OTHER WATER CONSERVATION AND POLLUTION PREVENTION TECHNIQUES

Native Vegetation and Maintenance

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

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

Weed Free Yards

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

Soil Amendments

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

IRRIGATE EFFICIENTLY

Smart Irrigation Controllers

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

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

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

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

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities can lead to water pollution if you're not careful. Pet waste and pet care products can be washed into the storm drains that flow to the ocean. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never put pet waste or pet care products into the ocean, so don't let them enter the storm drains. Follow these easy tips to help prevent water pollution.

For more information,
please call the
Orange County Stormwater Program
at **(714) 567-6363**
or visit
www.ocwatersheds.com

To report a spill,
call the
Orange County 24-Hour Water Pollution Problem Reporting Hotline
at **(714) 567-6363**.

For emergencies, dial 911.

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

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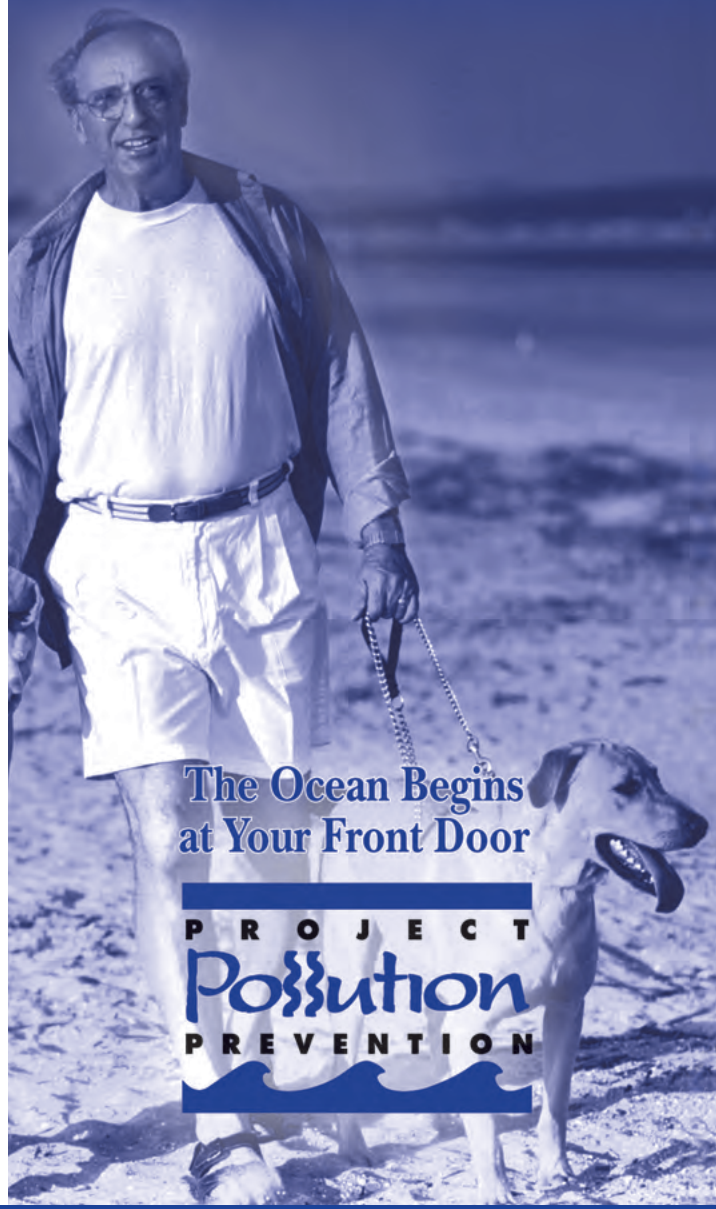
Help Prevent Ocean Pollution:

Tips for Pet Care



Tips for Pet Care

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

Washing Your Pets

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

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

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

Flea Control

- Consider using oral or topical flea control products.

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

Why You Should Pick Up After Your Pet

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

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

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

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

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

PROJECT Pollution PREVENTION

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

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

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

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

You would never pour soap, fertilizers or oil into the ocean, so don't let them enter streets, gutters or storm drains. Follow the easy tips in this brochure to help prevent water pollution.

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

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

For emergencies, dial 911.

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

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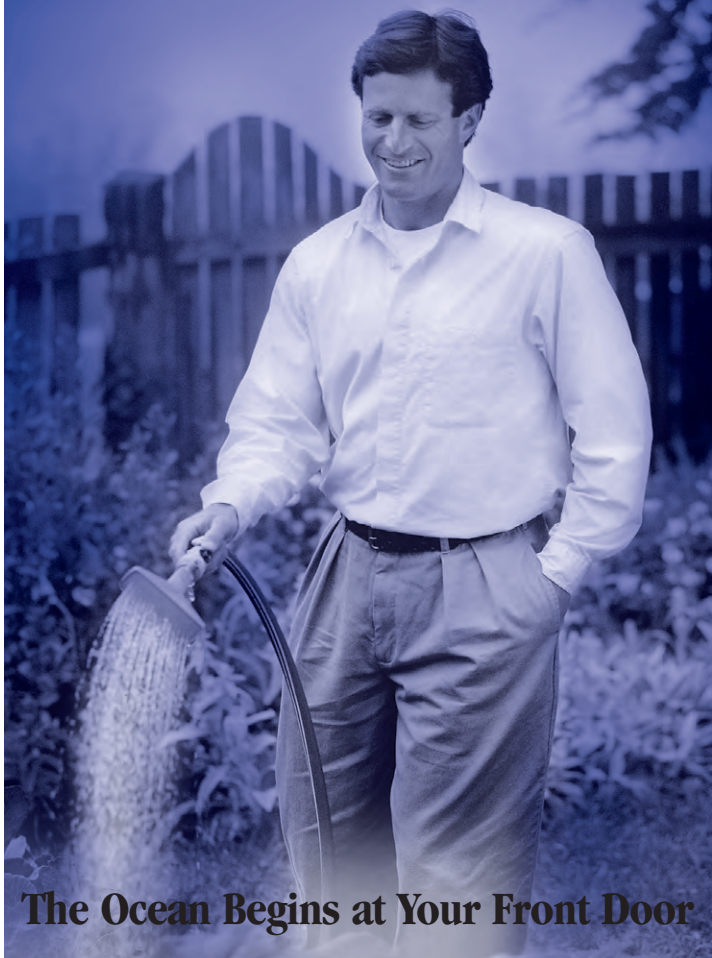
Help Prevent Ocean Pollution:

Household Tips



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Pollution Prevention

Household Activities

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

Household Hazardous Wastes include:

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

Gardening Activities

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

Washing and Maintaining Your Car

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

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

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

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

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

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

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

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

For emergencies, dial 911.

RECYCLE USED OIL

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Help Prevent Ocean Pollution:

Proper Disposal of Household Hazardous Waste

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

ORANGE COUNTY

Pollution Prevention

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

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

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

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

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

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

Common household hazardous wastes

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

Tips for household hazardous waste

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

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

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

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

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

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

For emergencies, dial 911.

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

Funding for this brochure has been provided in full or in part through an agreement with the State Water Resources Control Board (SWRCB) pursuant to the Costa-Machado Water Act of 2000 (Prop. 13).

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Help Prevent Ocean Pollution:

Responsible Pest Control

Tips for Pest Control

Key Steps to Follow:

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

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

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

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

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

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

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

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

UC CE University of California Cooperative Extension

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

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

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

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

Step 4: Wear appropriate protective clothing.

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

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

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

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

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

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

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

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

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

Step 7: Properly store and dispose of unused pesticides.

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

Store unused chemicals in a locked cabinet.

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

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

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

PROJECT Pollution PREVENTION

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many common activities such as painting can lead to water pollution if you're not careful. Paint must be used, stored and disposed of properly to ensure that it does not enter the street, gutter or storm drain. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

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

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

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

For emergencies, dial 911.

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

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Help Prevent Ocean Pollution:

Tips for Projects Using Paint

Tips for Projects Using Paint

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

Purchasing Paint

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

Painting

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

Cleaning

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

Storing Paint

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

Alternatives to Disposal

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

Disposing of Paint

- Never put wet paint in the trash.

For water-based paint:

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

For oil-based paint:

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

Aerosol paint:

- Dispose of aerosol paint cans at a HHWCC.

Spills

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

PROJECT Pollution PREVENTION

ATTACHMENT B

Operation and Maintenance (O & M) Plan

BMP Operation and Maintenance

BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
N1. Education for Property Owners, Tenants and Occupants	Owner	The owner will insure that all tenants will be given a copy of the recorded WQMP which will contain a section outlining the environmental awareness education materials. The owner will establish requirements for the implementation of a community awareness program that informs tenants of the impacts of dumping oil, paints, solvents or other potentially harmful chemicals into the storm drain; the proper use and management of fertilizers, pesticides and herbicides in home landscaping and gardening practices; the impacts of littering and improper watering. Environmental awareness education materials, including, but not limited to those included in the Appendix of this WQMP, shall be provided to all tenants at the signing of the lease, and periodically thereafter by the owner.	At the signing of the lease, and periodically thereafter by the owner.
N2. Activity Restrictions	Owner	Surface water quality activities will also be conducted in conformance with the WQMP as it relates to the handling and disposal of contaminants. Wash water from private vehicle washing will be prohibited from entering the storm drain system. Driveway and parking areas will not be cleaned using wash water that is not collected. Vehicle maintenance and repair will not be permitted.	Twice a year

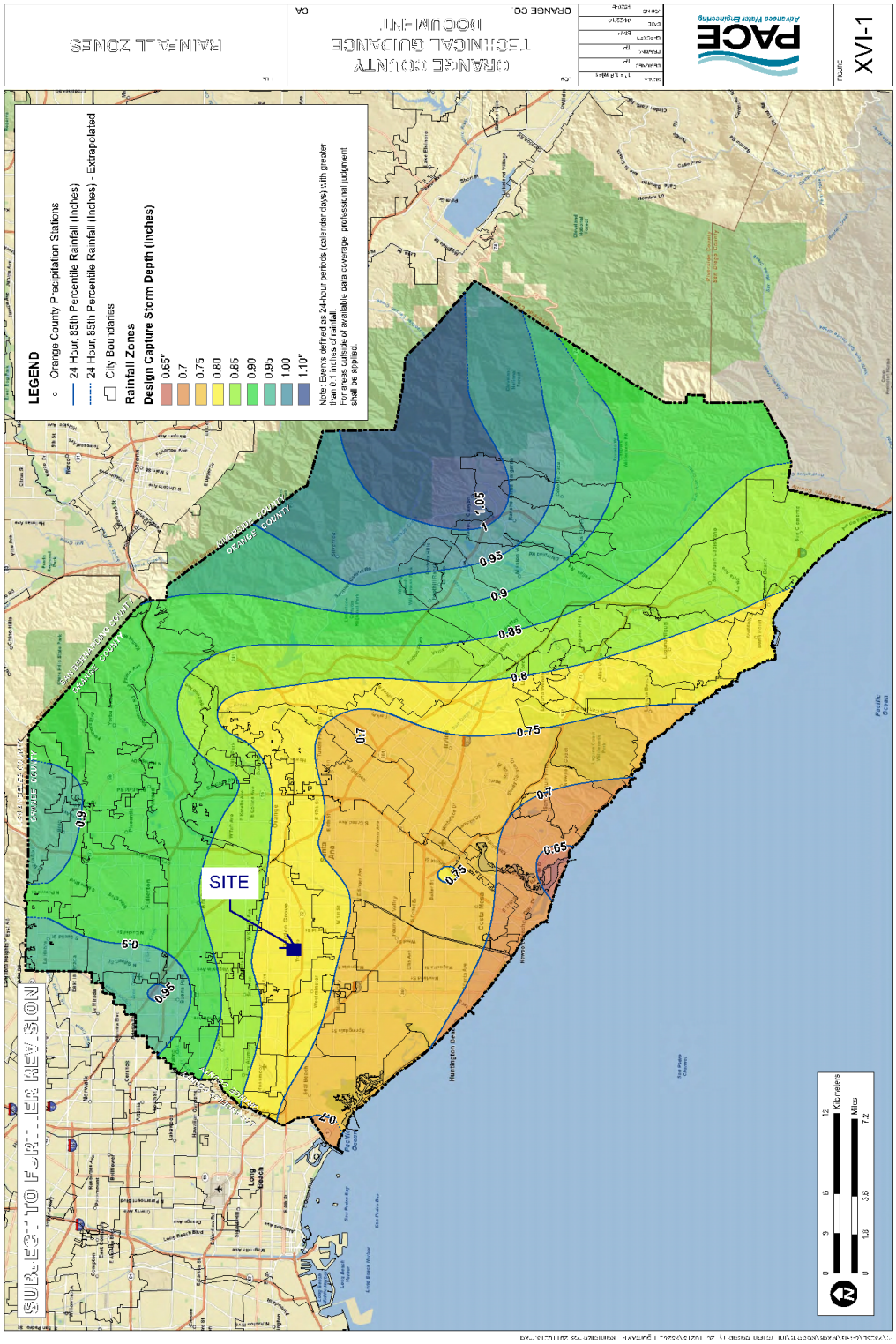
N3. Common area landscape management	Owner	Management programs will be designed and established by the owner, which will own and maintain all common areas within the project site. These programs will include how to mitigate the potential dangers of fertilizer and pesticide usage. Ongoing maintenance will be consistent with the City Landscape Requirements, the County Water Conservation Resolution (Ordinance. No.3802) and the State of California Model Water-Efficient Landscape Ordinance. Fertilizer and Pesticide usage shall be consistent with County Management Guidelines for use of Fertilizers and Pesticides.	At the signing of the lease, and periodically thereafter by the owner.
N4. BMP Maintenance	Owner	As indicated in (N2) above, the owner is being responsible for implementation of each applicable non-structural BMP as well as scheduling inspection and maintenance cleaning of all applicable structural BMP facilities. The owner, through the landscape maintenance contractor, will be responsible for inspection and maintenance activities in landscape areas. Debris and other water pollutants will be controlled, contained and disposed of in a proper manner by the maintenance contractor.	Twice a year
N11. Common Area Litter Control	Owner	The owner through the site maintenance contractor, will be required to maintain weekly sweeping and trash pick-up within the project area. Daily inspection will be made of trash receptacles to make sure lids are closed and pick-up of any excess trash on the ground has occurred. Owner shall be responsible for common area litter. Responsibility shall include the emptying of trash receptacles. Noting or disposal violations by tenants, and reporting such violations to the owner for investigation, as appropriate.	Twice a year

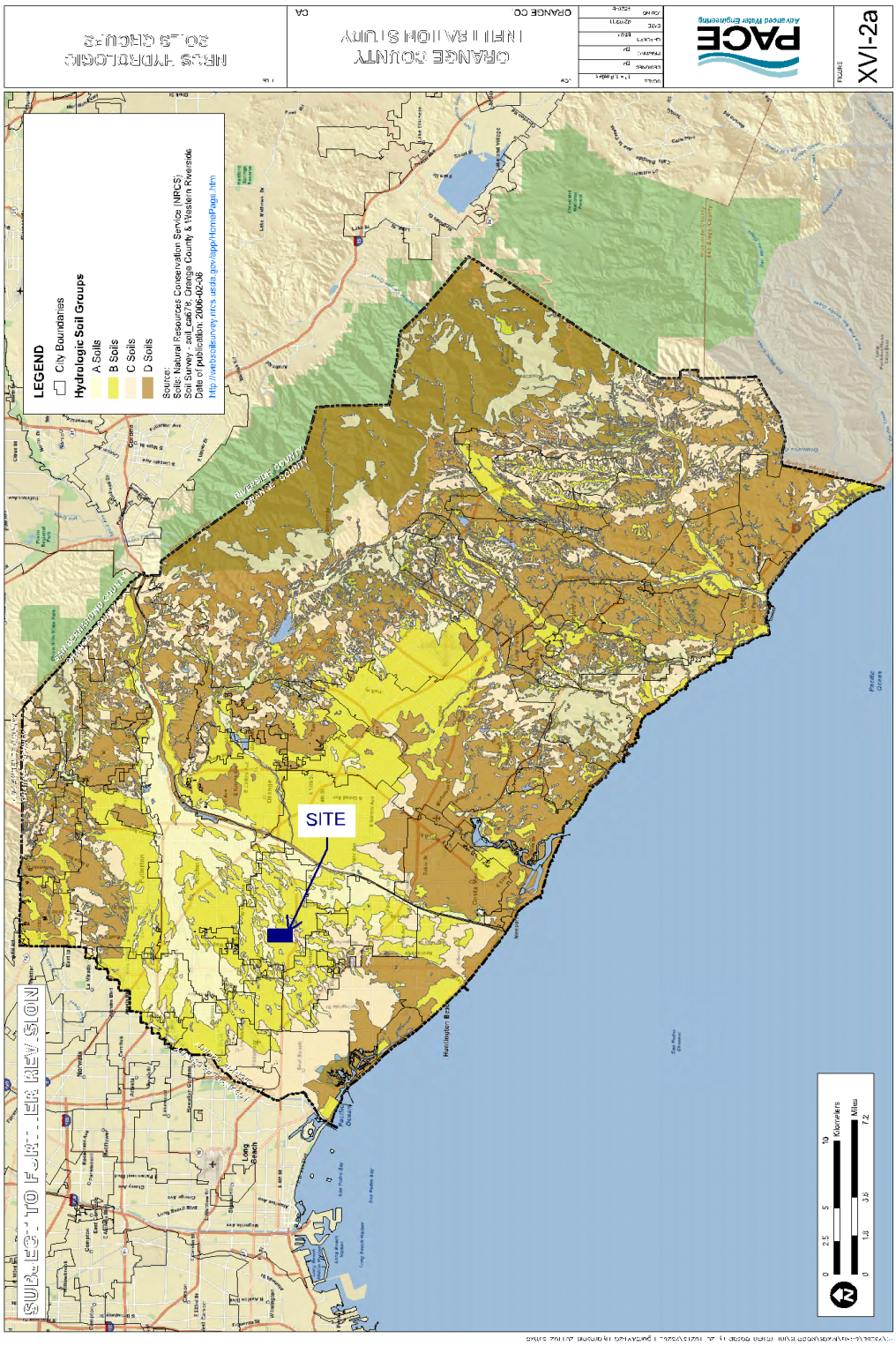
N14. Common Area Catch Basin Inspection	Owner	Area drains, swales and infiltration systems shall be inspected prior to October 1st of each year and after large storm events. If necessary, drains shall be cleaned prior to any succeeding rain events.	Twice a year
N15. Street Sweeping Private streets and Parking Lots	Owner	The access roads and drive aisles shall be swept on a regular basic to remove debris. Street and parking lot shall be swept monthly at minimum.	Weekly
Use Efficient Irrigation Systems & Landscape Design	Owner	-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). To maintain water efficiency in operations and maintenance, recommend contractors be trained in water-efficient irrigation practice through manufacture's guidance documents. The landscape plan shall be consistent with County Water Conservation Resolution or city equivalent.	

		irrigation controllers which have enough programs to break up all irrigation stations into hydrozones. If practical and feasible, rain shutoff devices shall be employed to prevent irrigation after significant precipitation. Irrigation systems shall be designed so areas which have different water use requirements are not mixed on the same station (hydrozones/smart timers). Landscape irrigation including but limited to such provisions as water sensors, programmable irrigation times will be used. Irrigation systems should be repaired and/or replaced as needed by owner.	

ATTACHMENT C

Reference Maps




XVI-2a
LEGEND
City Boundaries
Hydrologic Soil Groups
A Soils
B Soils
C Soils
D Soils
SITE
Kilometers
Miles

ATTACHMENT D

Geotechnical Investigation Report

ALTA CALIFORNIA
GEOTECHNICAL INC.

170 North Maple Street, Suite 108
Corona, CA 92880
www.altageotechnical.com

WEST STREET INVESTMENT, LLC
PO Box 17036
Anaheim, CA 92817

May 1, 2024
Project No. 1-0521

Attention: Mr. Loc Tran

Subject: **GEOTECHNICAL INVESTIGATION**
13040 Coast Street
City of Garden Grove, County of Orange, California

References: Appendix A

Dear Mr. Tran:

Alta California Geotechnical, Inc. (Alta) is pleased to present this geotechnical investigation for the proposed development located at 13040 Coast Street, located in the City of Garden Grove, Orange County, California. This report is based upon a recent subsurface investigation conducted by Alta, laboratory testing, a review of published geologic maps, and Alta's staff's experience with similar projects in this vicinity.

Alta's review of the data indicates that the proposed development is feasible, from a geotechnical perspective, provided that the recommendations presented in this report are incorporated into the grading and improvement plans and implemented during site development.

Included in this report are:

- Discussion of the site geotechnical conditions.
- Recommendations for remedial and site grading, including unsuitable soil removals.
- Geotechnical site construction recommendations.
- Liquefaction analysis.
- Foundation design parameters.

If you have any questions or should you require any additional information, please contact the undersigned at (951) 509-7090. Alta appreciates the opportunity to provide geotechnical consulting services for your project.

Sincerely,
Alta California Geotechnical, Inc.

YOUSSEF F. HIJAZI
Engineering Geology Associate

LOGAN MARQUETTE
Civil Engineering Associate

Reviewed By:

SCOTT A. GRAY/RGE 2857
Reg. Exp.: 12-31-24
Registered Geotechnical Engineer
President

THOMAS J. MCCARTHY/CEG 2080
Reg. Exp.: 9-30-24
Certified Engineering Geologist
Vice President

Distribution: (1) Addressee

YFH:LM:SAG:TJM -1-0521, May 1, 2024 (Geotechnical Investigation, 13040 Coast St, Garden Grove)

1.0 INTRODUCTION

This report presents Alta's findings, conclusions, and geotechnical recommendations for the proposed development located at 13040 Coast Street, in the City of Garden Grove, County of Orange, California.

1.1 Purpose

The purpose of this report is to examine the existing onsite geotechnical conditions and assess the impacts that the geotechnical conditions may have on the proposed development. This report is suitable for use in developing grading plans and engineer's cost estimates.

1.2 Scope of Work

Alta's *Scope of Work* for this geotechnical investigation included the following:

- Reviewing the referenced reports and aerial imagery (Appendix A).
- Site geologic mapping.
- Drilling, logging, and sampling three (3) hollow-stem auger borings to a maximum depth of 51.5-feet below the existing surface (Appendix B).
- Conducting laboratory testing on samples obtained during our investigation (Appendix C).
- Conducting two (2) infiltration tests in two (2) additional borings at a maximum depth of 5.0-feet.
- Commission of two (2) cone penetrometer tests.
- Conducting a liquefaction analysis.
- Evaluating engineering geologic and geotechnical engineering data, including laboratory data, to develop recommendations for site remedial grading including specialized grading techniques for unsuitable soil removals along the property boundaries, import soil, foundations, and utilities.
- Preparing this report and accompanying exhibits.

1.3 Report Limitations

The conclusions and recommendations presented in this report are based on the field and laboratory information generated during this investigation, and a review of the referenced reports. The information contained in this report is intended to be used for development of grading plans and preliminary construction cost estimates.

2.0 PROJECT DESCRIPTION

2.1 Site Location and Background

The rectangular-shaped, approximately 0.5-acre site is bounded to the west by Coast Street, to the south by Emerson Avenue, and to the north and east by existing properties. The site is currently occupied by a single existing structure on the western portion of the site and associated parking.

Historic aerial photographs are available as far back as 1953 and indicate that the site was originally vacant. By 1972, the single structure in the western portion of the property was constructed paved. The site has remained largely unchanged since (Historic Aerials, 2024).

2.2 Proposed Development

Alta anticipates that the existing structure and pavement will be demolished, and the site will be redeveloped to support residential development and associated improvements. Alta anticipates that conventional cut-and-fill grading techniques will be used to develop the site. This grading will support residential structures consisting of wood frame construction with shallow foundations and reinforced concrete slabs-on-grade, and associated improvements.

3.0 SITE INVESTIGATION

3.1 Investigation and Laboratory Testing

Alta conducted a subsurface investigation on March 28th and March 29th 2024, consisting of the drilling, logging and select sampling of three (3) hollow-stem auger borings up to a maximum depth of 51.5 feet, and conducting two (2) infiltration tests in two (2) additional borings up to a maximum depth of 5.0 feet. Cone penetrometer testing was conducted on two (2) locations. The locations of the exploratory borings are shown on enclosed Plate 1 and the boring logs are presented in Appendix B.

Laboratory testing was performed on ring and bulk samples obtained during the field investigation. A brief description of the laboratory test procedures and the test results are presented in Appendix C.

3.2 Infiltration Testing

It is Alta's understanding that the project may utilize infiltration systems for storm water disposal. Details of the system are not known at this time.

Infiltration testing was undertaken using two (2) borings to 3.0- and 5.0-ft. bgs (P-1 and P-2). The testing was performed in general accordance with the County of Orange Technical Guidance Document. The test wells were presoaked at least 24 hours prior to testing. During testing, the water level readings were recorded every 30 minutes until the readings stabilized.

The data was then adjusted to provide an infiltration rate utilizing the Porchet Method. The resulting infiltration rate is presented in Table 3-1. The results do not include a factor of safety. Recommendations for infiltration BMP design are presented in Section 6.2.

Table 3-1 Summary of Infiltration Testing (No Factor of Safety)		
Test Designation	P-1	P-2
Approximate Depth of Test	3.0 ft	5.0 ft
Final Time Interval	30 minutes	30 minutes
Radius of Test Hole	4 inches	4 inches
Tested Infiltration Rate	0 in/hr	0 in/hr

4.0 GEOLOGIC CONDITIONS

4.1 Geologic and Geomorphic Setting

Regionally, the subject site is located in the Peninsular Ranges geomorphic province, which characterizes the southwest portion of southern California where right lateral major active fault zones predominately trend northwest-southeast. The Peninsular Ranges province is composed of plutonic and metamorphic rock, with lesser amounts of Tertiary volcanic and sedimentary rock, Quaternary drainage in-fills and sedimentary veneers.

4.2 Stratigraphy

Based on our literature review and subsurface investigation, the site is underlain by artificial fill and young alluvium. The geologic units are briefly described below.

4.2.1 Artificial fill - Undocumented (map symbol afu)

The artificial fill present within the site consists mainly of dark brown to brown silty sand with clay and sandy silt in a slightly moist and medium dense/very stiff to dense condition. The unit was logged to a depth of 5.0 feet below the ground surface. The artificial fill overlays the young alluvium.

4.2.2 Young alluvium (map symbol Qya)

The young alluvium observed at the site consists mainly of light brown, tannish brown, grey, and greyish brown sandy silt, silty sand, sand with

silt, sand, silt, and silt with sand in a slightly moist to wet and loose/stiff to dense/very stiff condition. The unit was logged to a depth of 51.5 feet below the ground surface.

4.3 Geologic Structure

4.3.1 Tectonic Framework

Jennings (1985) defined eight structural provinces within California that have been classified by predominant regional fault trends and similar fold structure. These provinces are in turn divided into blocks and sub-blocks that are defined by "major Quaternary faults." These blocks and sub-blocks exhibit similar structural features. Within this framework, the subject site is located within Structural Province I, which is controlled by the dominant northwest trend of the San Andreas Fault and is divided into two blocks, the Coast Range Block and the Peninsular Range Block. The Peninsular Range Block, on which this site is located, is characterized by a series of parallel, northwest trending faults that exhibit right lateral dip-slip movement. These faults are terminated by the Transverse Range block to the north and extend southward into the Baja Peninsula. These northwest trending faults divide the Peninsular Range block into eight sub-blocks. The site is located on the northwest portion of the Santa Ana Sub-block, one of the eight sub-blocks, which is bound on the east by the Elsinore fault zone and on the west by the Newport-Inglewood fault zone.

4.3.2 Regionally Mapped Active Faults

Several large, active fault systems including the Elsinore-Whittier and the Newport-Inglewood occur in the region surrounding the site. These fault systems have been studied extensively and in a large part control the geologic structure of southern California.

4.3.3 Geologic Structure

Based upon our site investigation and literature review, the surficial sediments are of Quaternary age, and are not folded or faulted.

4.4 Groundwater

Groundwater was encountered at depths of 8.75, 8.75, and 8.6 feet below the ground surface at three separate locations during our subsurface investigation. Based on state-provided information, the historic-high groundwater is approximately greater than 5.0 feet below the ground surface (CGS, 1997).

4.5 Earthquake Hazards

The subject site is located in southern California, which is a tectonically active area. The type and magnitude of seismic hazards affecting a site are dependent on the distance to the causative fault and the intensity and magnitude of the seismic event. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction and/or ground lurching.

4.5.1 Local and Regional Faulting

The site is located on the northwestern portion of the Santa Ana sub-block, where the Newport-Inglewood, San Joaquin Hills, Puente Hills, Elsinore, Palos Verdes, San Jose Faults surround the site approximately 5.5, 6.3, 7.1, 12.8, 14.8, and 19.4 miles away, respectively.

4.5.2 Surface Rupture

Active faults are not known to exist within the project and a review of Special Publication 42 indicates the site is not within a California State designated earthquake fault zone. Accordingly, the potential for fault surface rupture on the subject site is very low.

4.5.3 Seismicity

Ground shaking hazards caused by earthquakes along other active regional faults do exist. The 2022 California Building Code requires use-modified spectral accelerations and velocities for most structural designs. Seismic design parameters using soil profile types identified in the 2022 California Building Code are presented in Section 7.3.

4.5.4 Liquefaction

Seismic agitation of relatively loose saturated sands, silty sands, and some silts can result in a buildup of pore pressure. If the pore pressure exceeds the overburden stresses, a temporary quick condition known as liquefaction can occur. Liquefaction effects can manifest in several ways including: 1) loss of bearing; 2) lateral spread; 3) dynamic settlement; and 4) flow failure. Lateral spreading has typically been the most damaging mode of failure.

In general, the more recent that a sediment has been deposited, the more likely it will be susceptible to liquefaction. Other factors that must be considered are groundwater, confining stresses, relative density, and the intensity and duration of seismically induced ground shaking.

Groundwater was encountered during our subsurface investigation at depths of 8.75, 8.75, and 8.6 feet below the ground surface in borings B-1, B-2, and B-3, respectively. The regional groundwater map indicates that the historic-high groundwater level is approximately greater than 5.0 feet below the ground surface (CGS, 1997).

Alta performed a liquefaction analysis utilizing data from our subsurface investigation to determine the liquefaction potential of the young alluvium. A description of Alta's analysis and calculations are presented in

Appendix D of this report. A groundwater level of greater than 5.0 feet below existing ground surface was assumed. The results of our findings are discussed below under the headings of the specific types of liquefaction which can be manifested during seismic shaking. Conclusions regarding liquefaction are presented in Section 6.3.

- **Loss of Bearing:**
  Liquefaction can potentially cause bearing failure due to ground softening and near-failure in bearing. Based on the removal recommendations presented in this report, Alta anticipates that the potential for loss of bearing will be minimal.

- **Lateral Spreading:**
  The lateral displacement of surficial blocks of sediment can occur as a result of liquefaction in a subsurface layer. The most pervasive forms of lateral spreading typically involve sites located near a "free-face" (large slopes, channels, etc.), however, it has been noted that lateral spreading can occur on sites with gently sloping (1% or more) ground, such as the subject site.

  Determination of the potential for lateral spread is based on the presence of continuous potentially liquefiable soil layers underneath the structures, the presence of lateral confinement, and various analyses such as empirical modeling. Bartlett, Hansen and Youd (2002) states that surface manifestation of lateral spread is typically limited to sites with liquefiable soils within 10 meters (32 feet) of grade, and that sites underlain by soils with $(N1)_{60}$ values 15 and greater do not experience significant displacements from earthquakes with magnitudes less than 8.

  Given the flat nature of the site, the limited liquefiable layers with $(N1)_{60}$ values less than 15, our recommended unsuitable soil removals (Section 6.1.2) and our foundation design recommendations (Section 7.1), it is our opinion that the potential for lateral spread to occur onsite is considered within design tolerances of the proposed foundation systems, upon the completion of remedial grading.

- **Settlement:**
  Settlement due to seismic shaking can occur as a result of both liquefaction of saturated sediments or rearrangement of dry sand particles. Our liquefaction analysis was performed utilizing blow count data and laboratory test results to analyze the potential amount of settlement. A description of Alta's analysis and calculations are presented in Appendix D of this report. A discussion of settlement analysis results is presented in Section 6.3. Dynamic settlement design recommendations are presented in Section 7.1.

- **Flow Failure:**
  Due to the relatively flat nature of the site, and the relatively horizontal deposition of the underlying deposits, the potential for flow failure onsite is considered minimal.

4.5.5 Dry Sand Settlement

Dry sand settlement is the process of non-uniform settlement of the ground surface during a seismic event. Based on our subsurface investigation and our removal/recompaction recommendations, the potential for dry sand settlement is anticipated to be low and within foundation design tolerances. Design dynamic settlement parameters are presented in Table 7-1.

5.0 ENGINEERING PROPERTIES AND ANALYSIS

5.1 Materials Properties

Presented herein is a general discussion of the engineering properties of the onsite materials that will be encountered during construction of the proposed project. Descriptions of the soil (Unified Soil Classification System) are presented on the boring logs in Appendix B.

5.1.1 Excavation Characteristics

Based on the data provided from the subsurface investigations, it is our opinion that the onsite materials possess favorable excavation characteristics such that conventional earth moving equipment can be utilized.

5.1.2 Compressibility

The undocumented artificial fill and upper portions of the young alluvium onsite are considered compressible and unsuitable to support the proposed improvements. Recommended removal depths are presented in Section 6.1.2.

5.1.3 Moisture

The artificial fill and young alluvium that will require removal and recompaction as discussed in Section 6.1.2 are typically over-optimum.

5.1.4 Hydro-Consolidation

Hydro-consolidation is the effect of introducing water into soil that is prone to collapse. Upon loading and initial wetting, the soil structure and apparent strength are altered resulting in almost immediate settlement. That settlement can have adverse impacts on engineered structures, particularly in areas where it is manifested differentially. Differential settlements are typically associated with differential wetting, irregularities in the subsurface soil conditions, or irregular loading patterns.

Based on our laboratory testing (Appendix C), there is potential for hydro-collapse in the young alluvium onsite. Upon completion of unsuitable soil removals, the potential for hydro-collapse shall be minimal and within foundation tolerances.

5.1.5 Expansion Potential

Expansion index testing was performed on samples taken during our subsurface investigation. Based on the results, it is anticipated that the majority of materials onsite are "very low" to "low" in expansion potential (0≤EI≤50, Appendix C) when tested per ASTM D: 4829.

5.1.6 Earthwork Adjustments

The values presented in Table 5-1 are deemed appropriate for estimating purposes and may be used in an effort to balance earthwork quantities. As is the case with every project, contingencies should be made to adjust the earthwork balance when grading is in-progress and actual conditions are better defined.

TABLE 5-1
Earthwork Adjustment Factors

Geologic Unit	Adjustment Factor Range	Average
Young Alluvium	Shrink 13% to 15%	14%

5.1.7 Chemical Analyses

Chemical testing was performed on samples of material underlying the proposed site. Soluble sulfate test results indicate that the soluble sulfate concentrations of the soils tested are classified as negligible (Category S0) per ACI 318-14.

Negligible chloride levels were detected in the onsite soils. Based on laboratory results of soluble sulfate, chloride, and pH testing as presented in Appendix C, the onsite soils are classified as "non-corrosive" to buried metals and concrete (Caltrans, 2022). Additional discussions on corrosion are presented in Section 7.9. Corrosion tests results are presented in Appendix C.

5.2 Engineering Analysis

Presented below is a general discussion of the engineering analysis methods that were utilized to develop the conclusions and recommendations presented in this report.

5.2.1 Bearing Capacity and Lateral Earth Pressures

Ultimate bearing capacity values were obtained using the graphs and formula presented in NAVFAC DM-7.1. Allowable bearing was determined by applying a factor of safety of at least 3 to the ultimate bearing capacity. Static lateral earth pressures were calculated using Rankine methods for active and passive cases. If it is desired to use Coulomb forces, a separate analysis specific to the application can be conducted.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on Alta's findings during our subsurface investigation, the laboratory test results, and our staff's previous experience in the area, it is Alta's opinion that the development of the site is feasible from a geotechnical perspective. Presented below are recommendations that should be incorporated into site development and construction plans.

6.1 Remedial Grading Recommendations

All grading shall be accomplished under the observation and testing of the project geotechnical consultant in accordance with the recommendations contained herein and the City of Garden Grove criteria.

6.1.1 Site Preparation

Significant amounts of vegetation, construction debris, and other deleterious materials are unsuitable as structural fill material and should be disposed of off-site prior to commencing grading/construction. Any septic tanks, seepage pits or wells should be abandoned as per the County of Orange Department of Health Services.

Existing concrete should be removed prior to the placement of engineered fill. The demolished concrete may be incorporated into compacted, engineered fills after it is crushed to a maximum size of six (6) inches. Prior to placement as engineered fill any protruding steel rebar should be cut from the concrete pieces and disposed of offsite.

Existing asphaltic concrete should be removed prior to the placement of engineered fill. From a geotechnical perspective, this material may be incorporated into compacted, engineered fills after it is crushed to a maximum size of six (6) inches. The crushed asphalt should not be placed under residential structures, but rather, it can be placed in approved non-residential areas, such as streets, parking areas or open space. These recommendations should be verified by the environmental consultant.

6.1.2 Unsuitable Soil Removals

The undocumented artificial fill and upper portions of young alluvium are compressible and as such, are not suitable to support the proposed structures. As such, it is anticipated that, on average, the upper five (5) to six (6) feet of existing soils will require removal and recompaction, extending a minimum of five (5) feet horizontally outside the structures. This recommended removal combined with the foundation recommendations presented in Section 7.1 should provide suitable support for the proposed structures.

Footings for structures should be underlain by a minimum of two (2) feet of compacted fill. As such, for building pads where unsuitable soil removals do not provide the minimum depth of compacted fill, or where design grades and/or remedial grading activities create cut/fill transitions, the cut and shallow fill portions of the building pads should be over-excavated during grading and replaced with compacted fill.

The Project Geotechnical Consultant should observe the removal bottom prior to placing fill. If unsuitable soils are exposed upon the completion of the removals recommended above, additional removals may be required.

For fill areas in streets, in general, a minimum removal and recompaction of the upper two (2) feet is recommended, however all undocumented artificial fill shall be removed and recompacted. For cuts greater than two (2) feet in street areas, removals are not required so long as young alluvium are exposed. For cuts less than two (2) feet, the two (2) foot removal and recompaction applies.

Material removed as part of the unsuitable soil removals can be used as artificial fill, provided it is free of deleterious materials.

6.2 General Earthwork Recommendations

6.2.1 Compaction Standards

All fill and processed natural ground shall be compacted to a minimum relative compaction of 90 percent, as determined by ASTM Test Method: D-1557. Fill material should be moisture conditioned to optimum moisture or above, and as generally discussed in Alta's Earthwork Specification Section presented in Appendix F. Compaction shall be achieved with the use of sheepsfoot rollers or similar kneading type

equipment. Mixing and moisture conditioning will be required in order to achieve the recommended moisture conditions.

6.2.2 Groundwater/Seepage

It is anticipated that groundwater may be encountered during construction. Perched water conditions could also be encountered depending on the time of year construction occurs. Depending on the depth of utilities, groundwater may be encountered during infrastructure construction. Utilizing gravel/crushed rock as backfill for utility lines below groundwater should be considered.

6.2.3 Documentation of Removals

All removal/over-excavation bottoms should be observed and approved by the project Geotechnical Consultant prior to fill placement. Consideration should be given to surveying the removal bottoms and undercuts after approval by the geotechnical consultant and prior to the placement of fill. Staking should be provided in order to verify undercut locations and depths.

6.2.4 Treatment of Removal Bottoms

At the completion of removals/over-excavation, the exposed removal bottom should be ripped to a minimum depth of eight (8) inches, moisture-conditioned to above optimum moisture content and compacted in-place to the project standards.

6.2.5 Fill Placement

After removals, scarification, and compaction of in-place materials are completed, additional fill may be placed. Fill should be placed in eight-inch bulk maximum lifts, moisture conditioned to optimum moisture content or above, compacted and tested as grading/construction progresses until final grades are attained.

6.2.6 Moisture Conditioning

The moisture content of the upper in-situ soils varies, however the majority of these soils are over-optimum, as shown on the boring logs in Appendix B. Most soils will require mixing with drier soils prior to placement as compacted fill.

6.2.7 Mixing

Mixing of materials may be necessary to prevent layering of different soil types and/or different moisture contents. The mixing should be accomplished prior to and as part of compaction of each fill lift.

6.2.8 Import Soils

Import soils, if necessary, should consist of clean, structural quality, compactable materials similar to the on-site soils and should be free of trash, debris, or other objectionable materials. The project Geotechnical Consultant should be notified not less than 72 hours in advance of the locations of any soils proposed for import. Import sources should be sampled, tested, and approved by the project Geotechnical Consultant at the source prior to the importation of the soils to the site. The project Civil Engineer should include these requirements on plans and specifications for the project.

6.2.9 Utility Trenches

6.2.9.1 Excavation

Utility trenches should be supported, either by laying back excavations or shoring, in accordance with applicable OSHA standards. In general, existing site soils are classified as Soil Type “B” and "C" per OSHA standards. Upon completion of the recommended removals and recompaction, the artificial fill will be classified as Soil Type "B". The Project

Geotechnical Consulting should be consulted if geologic conditions vary from what is presented in this report.

6.2.9.2 Backfill

Trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D-1557. Onsite soils will not be suitable for use as bedding material but will be suitable for use in backfill provided oversized materials are removed. No surcharge loads should be imposed above excavations. This includes spoil piles, lumber, concrete trucks, or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils. Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

Under-slab trenches should also be compacted to project specifications. If select granular backfill (SE > 30) is used, compaction by flooding will be acceptable.

6.2.10 Backcut Stability

Temporary backcuts, if required during unsuitable soil removals, should be made no steeper than 1:1 without review and approval of the geotechnical consultant. Flatter backcuts may be necessary where geologic conditions dictate and where minimum width dimensions are to be maintained.

Care should be taken during remedial grading operations in order to minimize risk of failure. Should failure occur, complete removal of the disturbed material will be required.

In consideration of the inherent instability created by temporary construction backcuts for removals, it is imperative that grading schedules are coordinated to minimize the unsupported exposure time of these excavations. Once started, these excavations and subsequent fill operations should be maintained to completion without intervening delays imposed by avoidable circumstances. In cases where five-day workweeks comprise a normal schedule, grading should be planned to avoid exposing at-grade or near-grade excavations through a non-work weekend. Where improvements may be affected by temporary instability, either on or offsite, further restrictions such as slot cutting, extending workdays, implementing weekend schedules, and/or other requirements considered critical to serving specific circumstances may be imposed.

6.3 Liquefaction

As discussed in Section 4.5.4 of this report, there is a potential for liquefaction to occur at the site during seismic shaking. More specifically, liquefaction could cause differential settlement. Typically, half to two thirds of that settlement should be considered differential (California Division of Mines and Geology, 2008, Special Publication 117a). If the analysis is based on multiple borings, seismic induced differential settlement may be determined as one-half the total settlement (City of Los Angeles, 2020). For lightly loaded, well-constructed structures underlain by a non-liquefiable layer over the liquefiable layers, such as will be developed at the site, the ultimate differential settlement across the structure may be more limited (Idriss and Boulinger, 2008).

In consideration of the proposed removal and recompaction of the soils below the proposed structures, the differential settlement shown in the liquefaction calculations, and the relatively uniform thickness of the liquefiable layers under the site, it is Alta's opinion that a dynamic differential settlement of 1.5-inches in 40 feet can be utilized in the design of the proposed structures onsite. It is recommended that the structures onsite be supported on a post-tensioned slab/foundation or mat slab system.

6.4 Storm Water Infiltration Systems

From a geotechnical perspective, allowing storm water to infiltrate the onsite soil in concentrated areas increases the potential for settlement, liquefaction, and water-related damage to structures/improvements, such as wet slabs or pumping subgrade, and should be avoided where possible. If infiltration systems are required on this site, care should be taken in designing systems that control the storm water as much as possible.

Preliminary infiltration testing was conducted at the site as part of this investigation, and the methodology is discussed in 3.2. The resulting infiltration rates for P-1 and P-2 were calculated to be 0-inches per hour. The results do not include a factor of safety.

Groundwater was encountered during our investigation at depths of 8.75, 8.75, and 8.6 feet below the ground surface in borings B-1, B-2, and B-3 respectively. The historic high ground water is approximately greater than 5.0 feet below the ground surface (CGS, 1997).

The WQMP designer should review the test results and determine if the proposed BMP system is appropriate for the site. The Project Geotechnical Consultant should review the final WQMP design prior to construction.

6.5 Boundary Conditions

The site is bounded to the west by Coast Street, to the south by Emerson Avenue, and to the north and east by existing structures. Construction of retaining/screen walls along these boundaries may require additional geotechnical recommendations concerning unsuitable soil removals and foundation design parameters. Boundary conditions for the project should be reviewed by the Project Geotechnical Consultant as the design progresses.

7.0 DESIGN CONSIDERATIONS

7.1 Structural Design

It is anticipated that multi-story wood-framed residential structures with slab on-grade and shallow foundations will be constructed. Upon the completion of rough grading, finish grade samples should be collected and tested in order to provide specific recommendations as they relate to the individual building pads. These test results and corresponding design recommendations should be presented in a final rough grading report. Final slab and foundation design recommendations should be made based upon specific structure sitings, loading conditions, and as-graded soil conditions.

It is anticipated that the majority of onsite soils will possess “very low” to “low” expansion potential when tested in general accordance with ASTM Test Method D: 4829. For budgeting purposes, the following foundation design requirements for a range of potential expansion characteristics are presented. Due to the potential for dynamic settlement onsite, it is recommended to utilize post-tensioned slabs for this project.

7.1.1 Foundation Design

Foundations may be preliminary designed based on the values presented in Table 7-1 below.

Table 7-1 Foundation Design Parameters*	
Allowable Bearing	2000 lbs/ft^2 (assuming a minimum embedment depth and width of 12 inches)
Lateral Bearing	250 lbs/ft^2 at a depth of 12 inches plus 250 lbs/ft^2 for each additional 12 inches of embedment to a maximum of 2000 lbs/ft^2.
Sliding Coefficient	0.30
Settlement	Static Settlement – 0.5 inch in 40 feet Dynamic Settlement – 1.5 inches in 40 feet

*These values may be increased as allowed by Code to resist transient loads such as wind or seismic. Building code and structural design considerations may govern depth and reinforcement requirements and should be evaluated.

7.1.2 Post-Tensioned Slabs/Foundation Design Recommendations

Post-tensioned slabs for the project may be designed utilizing the parameters presented in Tables 7-1 and 7-2. The parameters presented herein are based on methodology provided in the Design of Post-Tensioned Slabs-On-Ground, Third Edition, by the Post-Tensioning Institute, in accordance with the 2022 CBC.

TABLE 7-2 POST-TENSION SLAB DESIGN PARAMETERS						
Category	**Expansion Potential**	**Minimum Embedment***	**Edge Lift**		**Center Lift**	
			Em (ft)	**Ym (inch)**	**Em (ft)**	**Ym (inch)**
I	Very Low to Low	12 inches	5.4	0.61	9.0	0.26
Slab Subgrade Moisture						
Category I	Minimum 110% of optimum moisture to a depth of 12 inches prior to pouring concrete					
Embedment*						
The minimum footing embedments presented herein are based on expansion indexes. The structural engineer should determine minimum embedments based on the number of floors supported by the footings, the structural loading, and the requirements of the latest California Building Code. If mat slabs are utilized, alternate embedment depths can be provided.						
Moisture Barrier						
A moisture barrier should be provided in accordance with the recommendations presented in Section 7.2						
The parameters presented herein are based on procedures presented in the Design of Post-Tensioned Slabs-On-Ground, Third Edition. No corrections for vertical barriers at the edge of the slab, or for adjacent vegetation have been assumed. The design parameters are based on a Constant Suction Value of 3.9 pF.						

7.2 Moisture Barrier

A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive and should be capable of effectively preventing the migration of water and reducing the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as Visqueen, placed between two to four inches of clean sand, has been used for this purpose. The use of this system or other systems can be considered, at the discretion of the designer, provided the system reduces the vapor transmission rates to acceptable levels.

7.3 Seismic Design

The site classes were determined based on the referenced reports and published geologic maps in the area in general conformance with Chapter 20 of ASCE 7-16. Based on the density of the underlying soils, a Site Class of D (shear wave velocity of 259 m/s) was selected. The seismic design parameters were calculated using a program based on the USGS website and ASCE 7-16 procedures. The resulting values are presented in Table 7-3. These values are applicable providing the exceptions presented in Supplements 2 and 3 of ASCE 7-16 are utilized in the design of the structure. If the design does not include the exception methodology, then a site-specific analysis shall be conducted.

TABLE 7-3 Seismic Ground Motion Values 2022 CBC and ASCE 7-16	
Parameter	*Value*
Site Class	D
Site Latitude	33.7730
Site Longitude	-117.9895
Spectral Response Acceleration Parameter, S_S	1.403
Spectral Response Acceleration Parameter, S_1	0.498
Site Coefficient, F_a	1.0
Site Coefficient, F_v	1.8
MCE Spectral Response Acceleration Parameter, S_{MS}	1.403
MCE Spectral Response Acceleration Parameter, S_{M1}	0.896
Design Spectral Response Acceleration Parameter, S_{DS}	0.935
Design Spectral Response Acceleration Parameter, S_{D1}	0.598
Peak Ground Acceleration, PGA_M	0.661

7.4 Fence and Garden Walls

Block walls, if used, should be embedded a minimum of 2 feet below the lowest adjacent grade. Construction joints (not more than 20 feet apart) should be included in the block wall construction. Side yard walls should be structurally separated from the rear yard wall.

7.5 Footing Excavations

Soils from the footing excavations should not be placed in slab-on-grade areas unless properly compacted and tested. The excavations should be cleaned of all loose/sloughed materials and be neatly trimmed at the time of concrete placement. The Project Geotechnical Consultant should observe the footing

excavations prior to the placement of concrete to determine that the excavations are founded in suitably compacted material.

7.6 Retaining Walls

Retaining walls should be founded on engineered fill and should be backfilled with granular soils that allow for drainage behind the wall. Foundations may be designed in accordance with the recommendations presented in Table 7-1, above. Unrestrained walls, free to horizontally move 0.0005H (for dense cohesionless backfill), may be designed to resist lateral pressures imposed by a fluid with a unit weight determined in accordance with the Table 7-4 below. The table also presents design parameters for restrained (at-rest) retaining walls. These parameters may be used to design retaining walls that may be considered as restrained due to the method of construction or location (corner sections of unrestrained retaining walls).

TABLE 7-4
Equivalent Fluid Pressures for 90% Compacted Fill (Select Material)

Backfill	Active Pressure (psf/ft)	At-Rest Pressure (psf/ft)
Level	35	55

Per the requirements of the 2022 CBC, the seismic force acting on the retaining walls with backfill exceeding 6-feet in height may be resolved utilizing the formula $13.5H^2$ lb/lineal ft (H=height of the wall). This force acts at approximately 0.6H above the base of the wall. The seismic value can be converted as required by the retaining wall engineer. Retaining walls should be designed in general accordance with Section 1807A.2 of the 2022 CBC.

- Restrained retaining walls should be designed for “at-rest” conditions.
- The design loads presented in the above table are to be applied on the retaining wall in a horizontal fashion and as such friction between wall and retained soils should not be allowed in the retaining wall analyses.

- Additional allowances should be made in the retaining wall design to account for the influence of construction loads, temporary loads, and possible nearby structural footing loads.
- Select backfill should be granular, structural quality backfill with a Sand Equivalent of 20 or better and an ASCE Expansion Index of 20 or less. The backfill must encompass the full active wedge area. The upper one foot of backfill should be comprised of native on-site soils (see Plate A).
- The wall design should include waterproofing (where appropriate) and backdrains or weep holes for relieving possible hydrostatic pressures. The backdrain should be comprised of a 4-inch perforated PVC pipe in a 1 ft. by 1 ft., ¾-inch gravel matrix, wrapped with a geofabric. The backdrain should be installed with a minimum gradient of 2 percent and should be outletted to an appropriate location. For subterranean walls this may include drainage by sump pumps.
- No backfill should be placed against concrete until minimum design strengths are achieved.

It should be noted that the allowable bearing and lateral bearing values presented in Table 7-1 are based on level conditions at the toe. Modified design parameters can be presented for retaining walls with sloping condition at the toe. Other conditions should be evaluated on a case-by-case basis.

7.7 Exterior Slabs and Walkways

Exterior concrete slabs and walkways should be designed and constructed in consideration of the following recommendations.

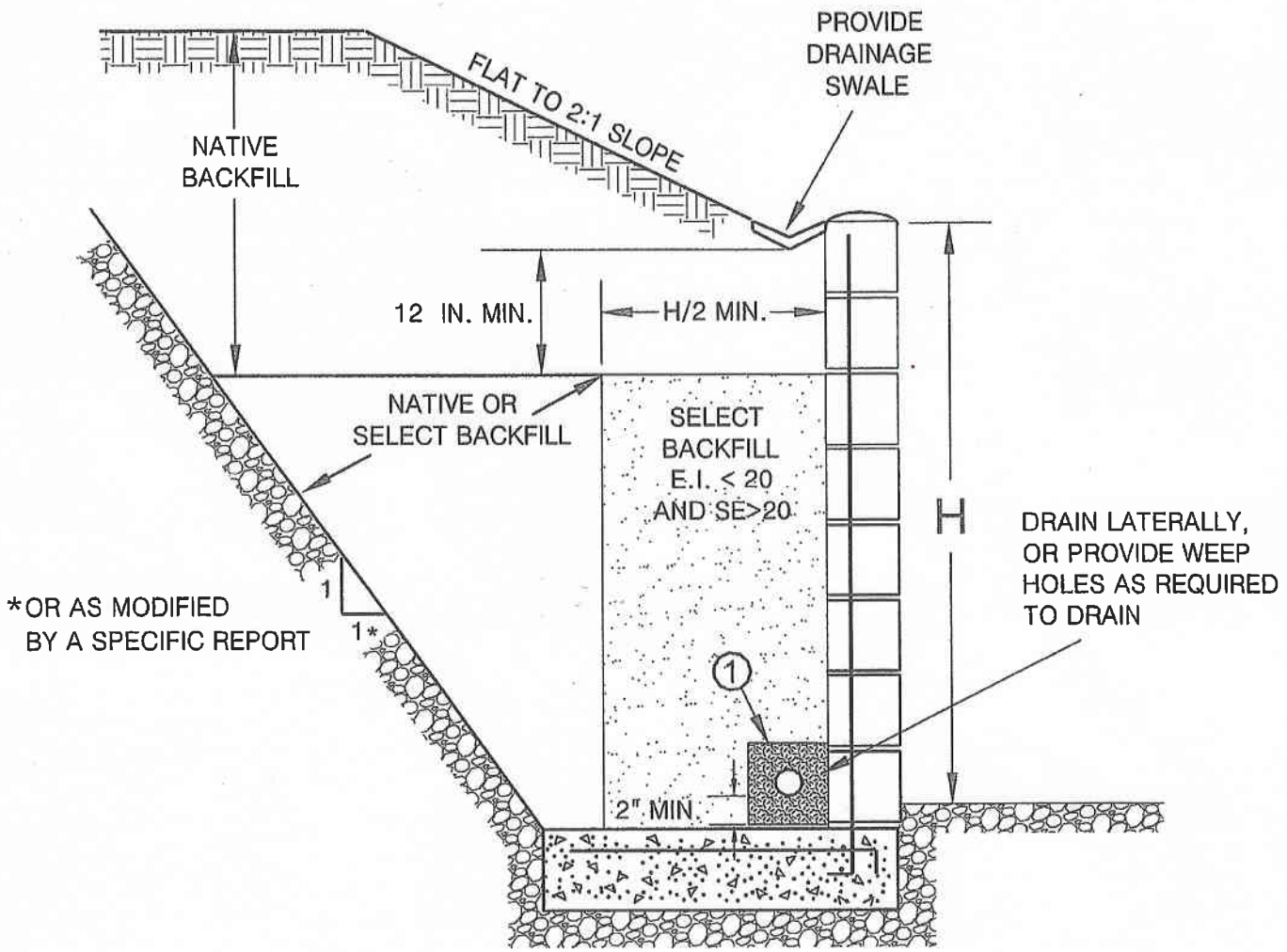
7.7.1 Subgrade Compaction

The subgrade below exterior concrete slabs should be compacted to a minimum of 90 percent relative compaction as determined by ASTM Test Method: D 1557.

7.7.2 Subgrade Moisture

The subgrade below concrete slabs should be moisture conditioned to a minimum of 110 percent of optimum moisture prior to concrete placement.

RETAINING WALL BACKFILL DETAIL



(1)

PIPE: 4-INCH PERFORATED PVC, SCHEDULE 40, SDR35 OR APPROVED ALTERNATE MINIMUM 8 PERFORATIONS (1/4-IN. DIA.) PER LINEAL FT. IN BOTTOM HALF OF PIPE

ROCK: MINIMUM VOLUME OF 1 CU. FT. OF 3/4-IN. MAX. ROCK PER. LINEAL FOOT OF PIPE, OR APPROVED ALTERNATE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT

7.7.3 Concrete Slab Thickness

Concrete flatwork and driveways should be designed utilizing four-inch minimum thickness.

7.7.4 Concrete Slab Reinforcement

Utilization of reinforcement for flatwork and driveways is subject to a cost/benefit analysis. Reinforcement will decrease the amount of cracking that may occur in flatwork, however, planning for occasional repairs may be more cost effective. Utilizing closely spaced control joints is likely more cost-effective than utilizing reinforcement. The majority of the soils onsite are classified as very low in expansion potential. Consideration should be given to reinforcing flatwork with irregular (non-square/rectangular) shapes.

7.7.5 Control Joints

Weakened plane joints should be installed on walkways at intervals of approximately eight feet (maximum) or less. Exterior slabs should be designed to withstand shrinkage of the concrete.

7.8 Concrete Design

As stated in Section 5.1.7, negligible concentrations of sulfates were detected in the onsite soils (Class S0). Therefore, the use of sulfate resistant concrete is not required per ACI 318-14 at this time. Post-grading conditions should be evaluated, and final recommendations made at that time.

7.9 Corrosion

Based on preliminary testing, the onsite soils are moderately corrosive to buried metal objects. Buried ferrous metals should be protected against the effects of corrosive soils in accordance with the manufacturer's recommendations. Typical measures may include using non-corrosive backfill, protective coatings, wrapping, plastic pipes, or a combination of these methods. A corrosion

engineer should be consulted if specific design recommendations are required by the improvement designer.

Per ACI 318-14, an exposure class of C1 would be applicable to metals encased in concrete (rebar in footings) due to being exposed to moisture from surrounding soils. Per Table 19.3.2.1 of ACI 318-14, the requirements for concrete with an exposure class of C1 are a minimum compressive strength of 2500 psi and a maximum water-soluble chloride ion content in concrete of 0.30 (percent by weight of cement).

7.10 Pavement Design

Pavement sections for the proposed streets shall be designed based on laboratory testing conducted on samples taken from the soil subgrade. Preliminarily, based on an assumed R-Value of 30, the pavement may be designed utilizing the sections presented in Table 7-5. These sections should be verified upon the completion of grading, based on R-Value testing. The ultimate pavement section design for public streets is under the City of Garden Grove's purview.

Table 7-5
Preliminary Pavement Sections

Traffic Index	Pavement Section Options OR	
5.0	3-inch AC on 6-inch AB	4-inch AC on 4-inch AB
5.5	3-inch AC on 7-inch AB	4-inch AC on 5-inch AB
6.0	3.5-inch AC on 7.5-inch AB	4-inch AC on 6.5-inch AB
AC-Asphalt Concrete AB-Caltrans Class II Base		

Construction of the streets should be accomplished in accordance with the current criteria of the City of Garden Grove. Prior to the placement of base material, the subgrade should be suitably moisture conditioned, processed and compacted to a minimum 95 percent of the laboratory maximum density (ASTM:

D 1557) to at least twelve (12) inches below subgrade. After subgrade compaction, the exposed grade should then be "proof"-rolled with heavy equipment to ensure the grade does not "pump" and is verified as non-yielding. Aggregate base material should be placed on the compacted subgrade and compacted in-place to a minimum 95 percent of the laboratory standard obtained per ASTM: D 1557.

7.11 Site Drainage

Positive drainage away from the proposed structures should be provided and maintained. Roof, pad, and lot drainage should be collected and directed away from the structures toward approved disposal areas through drainage terraces, gutters, down drains, and other devices. Design fine grade elevations should be maintained through the life of the structure or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water, away from structures.

8.0 LOT MAINTENANCE

Ongoing maintenance of the improvements is essential to the long-term performance of structures. As such, the owners must implement certain maintenance procedures. The attached " Maintenance and Improvement Considerations" presented in the Appendix E may be included as part of the sales packet to educate the owners in issues related to drainage, maintenance, improvements, etc. The following recommendations should also be implemented.

8.1 Lot Drainage

Roof, pad, and lot drainage should be collected and directed away from structures and slopes and toward approved disposal areas. Design fine grade elevations should be maintained throughout the life of the structure or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water, away from structures and slopes.

Residents should be made aware that they are responsible for maintenance and cleaning of all drainage terraces, down drains, and other devices that have been installed to promote structure and slope stability.

8.2 Burrowing Animals

Owners should undertake a program for the elimination of burrowing animals.

9.0 FUTURE PLAN REVIEWS

This report represents a geotechnical review of the site. As the project design for the project progresses, site specific geologic and geotechnical issues should be considered in the design and construction of the project. Consequently, future plan reviews may be necessary. These reviews may include reviews of:

- Grading Plans
- Foundation Plans
- Utility Plans

These plans should be forwarded to the project Geotechnical Consultant for review.

10.0 CLOSURE

10.1 Geotechnical Review

For the purposes of this report, multiple working hypotheses were established for the project, utilizing the available data and the most probable model is used for the analysis. Future information collected during the proposed grading operations is intended to evaluate the hypothesis and as such, some of the assumptions summarized in this report may need to be changed. Some modifications of the grading recommendations may become necessary, should the conditions encountered in the field differ from the conditions hypothesized in this report.

Plans and sections of the project specifications should be reviewed by Alta to evaluate conformance with the intent of the recommendations contained in this

report. If the project description or final design varies from that described in herein, Alta must be consulted regarding the applicability of the recommendations contained herein and whether any changes are required. Alta accepts no liability for any use of its recommendations if the project description or final design varies and Alta is not consulted regarding the alterations.

10.2 Limitations

This report is based on the following: 1) the project as presented on the attached plan; 2) the information obtained from Alta's laboratory testing included herein; and 3) from the information presented in the referenced reports. The findings and recommendations are based on the results of the subsurface investigation, laboratory testing, and office analysis combined with an interpolation and extrapolation of conditions between and beyond the subsurface excavation locations. However, the materials adjacent to or beneath those observed may have different characteristics than those observed, and no precise representations are made as to the quality or extent of the materials not observed. The results reflect an interpretation of the direct evidence obtained. Work performed by Alta has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession currently practicing in the same locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by a geotechnical consultant who is familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report.

The conclusions and recommendations included in this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of Alta.

Alta has no responsibility for construction means, methods, techniques, sequences, procedures, safety precautions, programs in connection with the construction, acts or omissions of the CONTRACTOR or any other person performing any of the construction, or for the failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

APPENDIX A

REFERENCES

APPENDIX A

Selected References

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APPENDIX B

Subsurface Investigation

APPENDIX B

Subsurface Investigation

Alta's subsurface investigation consisted of excavating, logging, and sampling three (3) hollow-stem auger borings. Details of the subsurface investigation are presented in Table B. The approximate location of the exploratory excavation is shown on the accompanying Plate 1 and the Geotechnical Logs are attached.

TABLE B
SURFACE INVESTIGATION DETAILS

Equipment	Range of Depths	Sampling Methods	Sample Locations
Hollow-stem auger	Up to 51.5 feet	1. Bulk 2. Ring Samples 3. SPT Samples	1. Bulk-Select Depths 2. Rings-Every 2.5 feet or 5 Feet 3. SPT-At Depths Below 10 Feet

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		grf	ltr	Description
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravel and Gravelly Soils: More than 50% of coarse fraction retained on No. 4 sieve		GW	Well-graded gravels or gravel sand mixtures, little or no fines
			GP	Poorly-graded gravels or gravel sand mixture, little or no fines
			GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sand and Sandy Soils: More than 50% of coarse fraction passes on No. 4 sieve		SW	Well-graded sands or gravelly sands, little or no fines
			SP	Poorly-graded sands or gravelly sands, little or no fines
			SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, and-clay mixtures

Major Divisions		grf	ltr	
Fine Grained Soils: More than 50% passes on No. 200 sieve	Silts And Clays LL,<50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silt-clays of low plasticity
	Silts And Clays LL,<50		MH	Inorganic silts, micaceous or diatomaceous fine or silty soils, elastic silts
			VH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat and other highly organic soils

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

PARTICLE SIZE LIMITS

U.S. STANDARD SERIES SIEVE — CLEAR SQUARE SIEVE OPENINGS

200	40	10	4	3/4"	3"	12"

Silts and Clays	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

RELATIVE DENSITY

Sands and Gravels	Blows/Foot (SPT)
Very Loose	<4
Loose	4-10
Medium Dense	11-30
Dense	31-50
Very Dense	>50

CONSISTENCY CLASSIFICATION

Silts and Clays	Criteria
Very Soft	Thumb penetrates soil >1 in.
Soft	Thumb penetrates soil 1 in.
Firm	Thumb penetrates soil 1/4 in.
Stiff	Readily indented with thumbnail
Very Stiff	Thumbnail will not indent soil

HARDNESS

Bedrock
Soft
Moderately Hard
Hard
Very Hard

LABORATORY TESTS

Symbol	Test
DS	Direct Shear
DSR	Direct Shear (Remolded)
CON	Consolidation
SA	Sieve Analysis
MAX	Maximum Density
RV	Resistance (R) Value
EI	Expansion Index
SE	Sand Equivalent
AL	Atterberg Limits
CHEM	Chemical Analysis
HY	Hydrometer Analysis

SOIL MOISTURE

Increasing Visual Moisture Content

Dry - Dry to touch

Moist - Damp, but no visible free water

wet - Visible free water

SIZE PROPORTIONS

Trace - <5%

Few - 5 to 10%

Some - 15 to 25%

KEY TO EXPLORATORY BORING LOGS

ALTA CALIFORNIA GEOTECHNICAL INC.

PLATE B

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0521	PROJECT NAME	13040 Coast Street		
DATE STARTED	3/28/24	GROUND ELEV.	53	BORING DESIG.	B-1
DATE FINISHED	3/28/24	GW DEPTH (FT)	9	LOGGED BY	LM
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	**ASPHALT**: 5 inches of asphaltic concrete over 9 inches of aggregate base.				
	50	R	18			**ARTIFICIAL FILL - UNDOCUMENTED** (afu): SILTY SAND WITH CLAY, very fine to fine grained, brown, slightly moist, medium dense.	18.6	107	90	
5		R	17		SM	**YOUNG ALLUVIUM** (Qya): SILTY SAND, light brown, slightly moist, very stiff.	18.7	94	65	CON, HY
	45					@8.75 ft. GROUNDWATER ENCOUNTERED.				
10		R	18			@10.0 ft. very fine to medium grained, tannish brown, wet, medium dense.	23.0	98	89	
	40									
15		R	28							
	35									
20		R	49		SP	@20.0 ft. SAND WITH SILT, very fine to fine grained, grey, wet, dense.	17.6	107	86	
	30									
25		R	11				28.3	92	94	
						TOTAL DEPTH: 26.0 FEET. GROUNDWATER ENCOUNTERED AT 8.75 FEET. CAVING OBSERVED BELOW 8.0 FEET.				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0521 PLATE B-1

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0521	PROJECT NAME	13040 Coast Street		
DATE STARTED	3/28/24	GROUND ELEV.	54	BORING DESIG.	B-2
DATE FINISHED	3/28/24	GW DEPTH (FT)	9	LOGGED BY	LM
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	**ASPHALT**: 4 inches of asphaltic concrete over 5 inches of aggregate base.				
						ARTIFICIAL FILL - UNDOCUMENTED (afu): SILTY SAND WITH CLAY, very fine to fine grained, brown, slightly moist, dense.				
	50	R B	30				9.7	114	57	MAX, EI, HY, CHEM
5		R	27		SM	**YOUNG ALLUVIUM** (Qya): SILTY SAND, very fine to fine grained, light brown, slightly moist, medium dense.	14.6	108	73	
	45					@8.75 ft. GROUNDWATER ENCOUNTERED				
10		R	18		SP	@10.0 ft. SAND WITH SILT, very fine to medium grained, tannish brown, wet, medium dense.	27.8	94	97	
	40									
15		S	2,4,6		SP	@15.0 ft. SAND, fine to medium grained, tannish brown, wet, loose.	23.2			
	35									
20		S	6,10,11			@20.0 ft. greyish brown, medium dense.	19.6			
	30									
25		S	2,2,3				21.3			
		S	5,6,11		SM	@27.5 ft. SILTY SAND, very fine to medium grained, greyish brown, wet, medium dense.	20.8			
	25									
30		S	3,6,6			@30.0 ft. very fine to fine grained.	23.4			
		S	3,5,5		ML	@32.5 ft. SANDY SILT, tannish brown, wet, stiff.	25.5			
	20									
35		S	3,5,8			@35.0 ft. brown, wet, stiff.	32.4			HY
		S	3,5,4				25.9			
	15					Continued;				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0521 PLATE B-2

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0521	PROJECT NAME	13040 Coast Street		
DATE STARTED	3/28/24	GROUND ELEV.	54	BORING DESIG.	B-2
DATE FINISHED	3/28/24	GW DEPTH (FT)	9	LOGGED BY	LM
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
		S	3,5,5			Continued; **YOUNG ALLUVIUM** (Qya): SILT, brown, wet, stiff.	27.7			
		S	3,4,7		ML	@42.5 ft. SILT WITH SAND, grey, wet, stiff.	29.9			
45	10	S	4,6,6				24.0			
		S	6,7,8				34.5			
50	5	S	6,7,7		ML	@50.0 ft. SILT, brown, wet, stiff.	32.8			
						TOTAL DEPTH: 51.5 FEET. GROUNDWATER ENCOUNTERED AT 8.75 FEET. CAVING OBSERVED AT 8.0 FEET.				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0521 PLATE B-2

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0521	PROJECT NAME	13040 Coast Street		
DATE STARTED	3/28/24	GROUND ELEV.	53	BORING DESIG.	B-3
DATE FINISHED	3/28/24	GW DEPTH (FT)	9	LOGGED BY	LM
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					ML	**ASPHALT**: 4 inches of asphaltic concrete; no aggregate base.				
						ARTIFICIAL FILL - UNDOCUMENTED (afu): SANDY SILT, dark brown, slightly moist, very stiff.				
	50	R	24				12.1	115	73	
5		R	20		SM	**YOUNG ALLUVIUM** (Qya): SILTY SAND, very fine to fine grained, brown, wet, medium dense.	14.4	112	80	CON, HY
	45					▼ @8.6 ft. GROUNDWATER ENCOUNTERED.				
10		R	24				21.2	98	82	
	40									
15		S	4,5,11			@15.0 ft. fine to medium grained, greyish brown.	19.7			
	35									
20		S	4,4,12		SP	@20.0 ft. SAND WITH SILT, fine to medium grained, brown, wet, medium dense.	22.3			
	30									
25		S	2,2,2				21.7			
	25									
30		S	2,3,2				26.3			
	20									
35		S	6,3,4		ML	@35.0 ft. SILT WITH SAND, brown, wet, stiff.	31.4			
	15					Continued;				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0521 PLATE B-3

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0521	PROJECT NAME	13040 Coast Street		
DATE STARTED	3/28/24	GROUND ELEV.	53	BORING DESIG.	B-3
DATE FINISHED	3/28/24	GW DEPTH (FT)	9	LOGGED BY	LM
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
		S	3,5,5		ML	Continued; **YOUNG ALLUVIUM** (Qya): SANDY SILT, brown, wet, stiff.	26.4			HY, ATTR
45	10	S	2,3,4		ML	@45.0 ft. SILT WITH SAND, brown, wet, stiff.	28.8			
50	5	S	3,3,5		ML	@50.0 ft. SILT, brown, wet, stiff.	34.8			
						TOTAL DEPTH 51.5 FEET. GROUNDWATER ENCOUNTERED AT 8.6 FEET. CAVING OBSERVED AT 8.0 FEET.				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0521 PLATE B-3

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0521	PROJECT NAME	13040 Coast Street		
DATE STARTED	3/28/24	GROUND ELEV.	53	BORING DESIG.	P-1
DATE FINISHED	3/28/24	GW DEPTH (FT)		LOGGED BY	LM
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	50				SM	**ASPHALT**: 4 inches of asphaltic concrete over 5 inches of aggregate base. **ARTIFICIAL FILL - UNDOCUMENTED** (afu): SILTY SAND WITH CLAY, very fine to fine grained, brown, slightly moist, dense. TOTAL DEPTH 4.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0521 PLATE B-4

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0521	PROJECT NAME	13040 Coast Street		
DATE STARTED	3/28/24	GROUND ELEV.	54	BORING DESIG.	P-2
DATE FINISHED	3/28/24	GW DEPTH (FT)		LOGGED BY	LM
DRILLER	2R Drilling Inc.	DRIVE WT.	140 lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	**ASPHALT**: 4 inches of asphaltic concrete over 5 inches of aggregate base.				
						ARTIFICIAL FILL - UNDOCUMENTED (afu): SILTY SAND WITH CLAY, very fine to fine grained, brown, slightly moist, dense.				
	50									
5					SM	**YOUNG ALLUVIUM** (Qya): SILTY SAND, very fine to fine grained, light brown, slightly moist, medium dense.				
						TOTAL DEPTH 6.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

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Alta California Geotechnical, Inc.

P.N. 1-0521 PLATE B-5

APPENDIX C

Laboratory Testing

LABORATORY TESTING

The following laboratory tests were performed on a representative sample in accordance with the applicable latest standards or methods from the ASTM, California Building Code (CBC) and California Department of Transportation.

Classification

Soils were classified with respect to the Unified Soil Classification System (USCS) in accordance with ASTM D-2487 and D-2488.

Particle Size Analysis

Modified hydrometer testing was conducted to aid in classification of the soil. The results of the particle size analysis are presented in Table C.

Maximum Density/Optimum Moisture

The maximum dry density and optimum moisture content of one representative bulk samples were evaluated in accordance with ASTM D-1557. The results are summarized in Table C.

Expansion Index Tests

One (1) expansion index test was performed to evaluate the expansion potential of typical on-site soil. Testing was carried out in general conformance with ASTM Test Method D-4829. The results are presented in Table C.

Consolidation Tests

Consolidation testing was performed on two (2) relatively “undisturbed” soil sample at its natural moisture content in accordance with procedures outlined in ASTM D-2435. The samples were placed in a consolidometer and loads were applied incrementally in geometric progression. The samples (2.42-inches in diameter and 1-inch in height) were permitted to consolidate under each load increment until the slope of the characteristic linear secondary compression portion of the thickness versus log of time plot was apparent. The percent consolidation for each load cycle was recorded as the ratio of the amount of vertical

compression to the original 1-inch height. The consolidation test results are shown on Plate C-1 and C-2.

Chemical Analyses

Chemical testing was performed on one select samples by Alta. The results of these tests (sulfate content, resistivity, chloride content and pH) are presented on Table C.

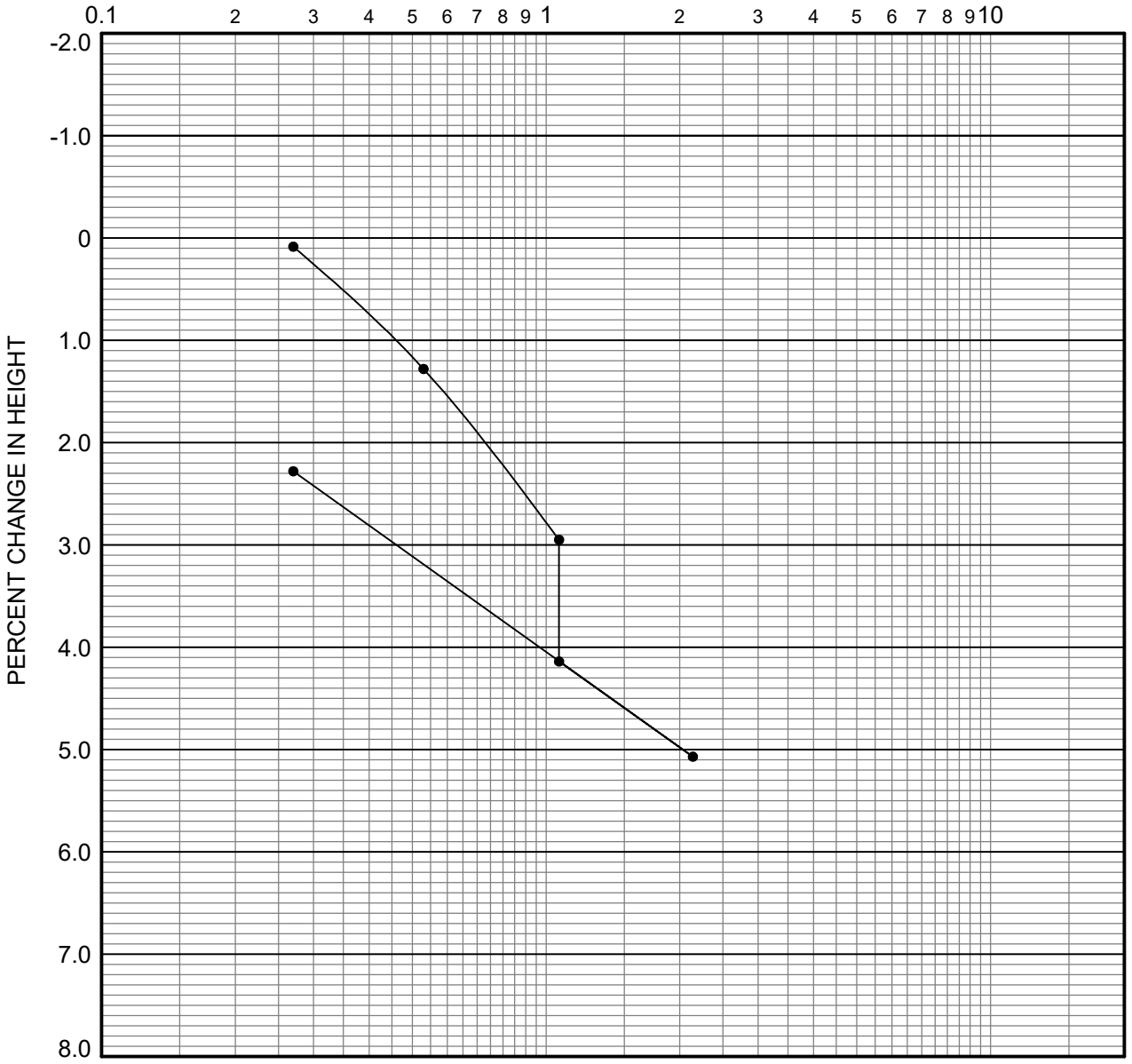
Atterberg Limits

Atterberg Limits testing was performed on two (2) select samples by Alta. The results of these tests are presented on Table C.

TABLE C
SUMMARY OF LABORATORY TEST DATA
P.N. 1-0521

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	CONSOL	OTHER TESTS REMARKS
B-1	5	Silty Sand (Qya)	SM				0	66	28	6		SEE PLATE C-1	
B-2	2.5	Silty Sand (afu)	SM	128.3	10.2		1	54	27	18	17		Sulf: 0.019% Chlr: 140 ppm pH: 8.2, Resis: 723 Ohm-cm
B-2	35	Sandy Silt (Qya)	ML				0	28	63	9			
B-3	5	Silty Sand (Qya)	SM				0	62	24	14		SEE PLATE C-2	
B-3	40	Sandy Silt (Qya)	ML				1	35	40	24			LL: 27, PL:21, PI:6

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-1	5.0	94	18.7	65	34	SM	Silty Sand (Qya)

REMARKS: WATER ADDED AT 1.07 TSF

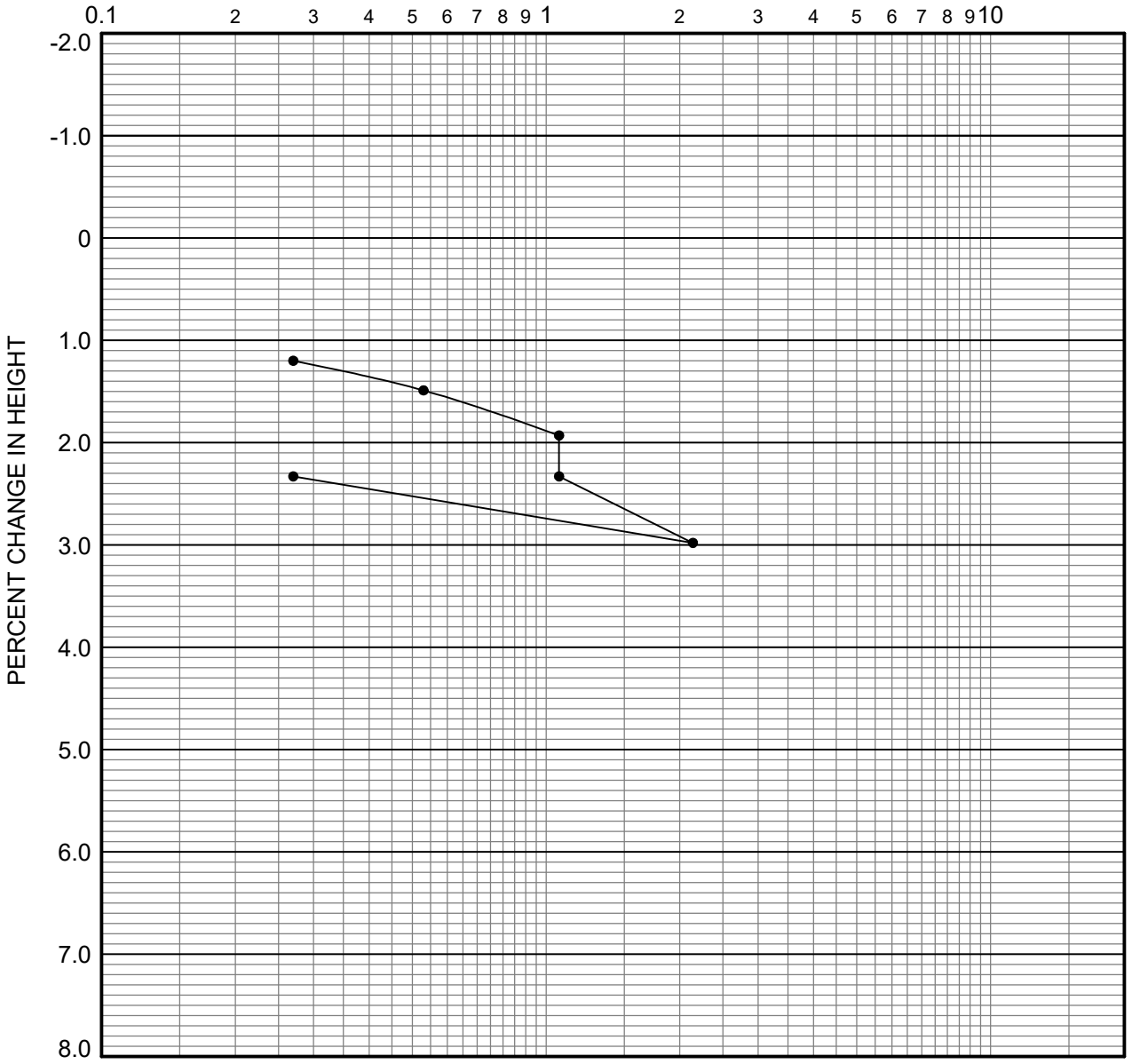
CONSOLIDATION CURVE

Alta California Geotechnical, Inc.

P.N. 1-0521

PLATE C-1

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-3	5.0	112	14.4	80	38	SM	Silty Sand (Qya)

REMARKS: WATER ADDED AT 1.07 TSF

CONSOLIDATION CURVE

Alta California Geotechnical, Inc.

P.N. 1-0521

PLATE C-2

APPENDIX D

Liquefaction Analysis

APPENDIX D

LIQUEFACTION ANALYSIS

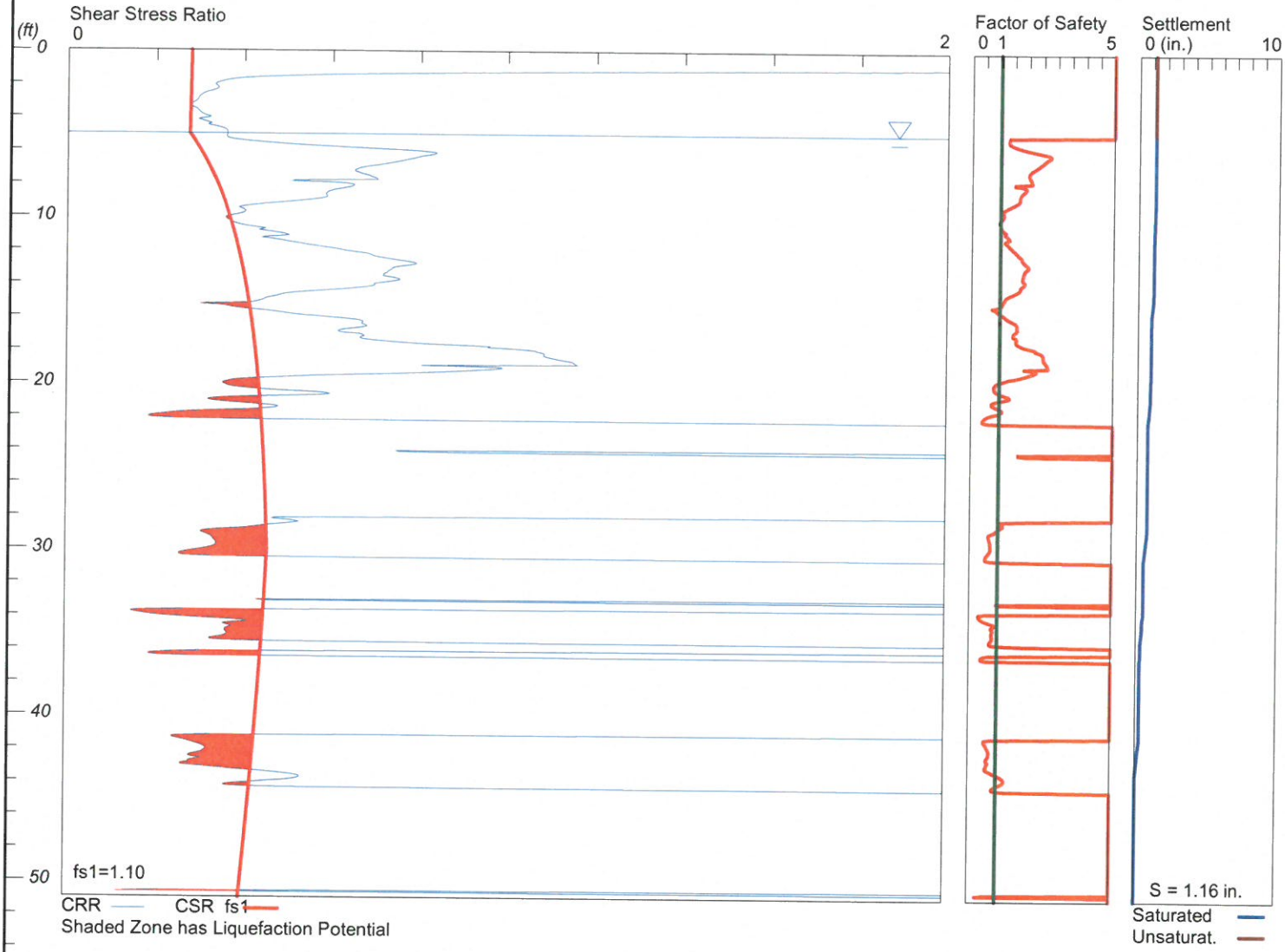
A liquefaction analysis was performed for the site based on CPT data obtained during our subsurface investigation. Our analysis was based on City of Garden Grove guidelines (City of Garden Grove, 2020) and utilized two methods. Method 1 utilized 2/3 of the PGA_M, the predominant earthquake magnitude assuming a 10% probability of exceedance in 50 years, and a factor of safety of 1.1. Method 2 utilized the PGA_M, the predominant earthquake magnitude assuming a 2% probability of exceedance in 50 years, and a factor of safety of 1.0. The results for Method 1 are presented on Plates D-1 and D-3, and the results for Method 2 are presented on Plates D-2 and D-4.

LIQUEFACTION ANALYSIS

Method 1

Hole No.=CPT-1 ***Water Depth=5 ft***

Magnitude=6.7
Acceleration=0.39g

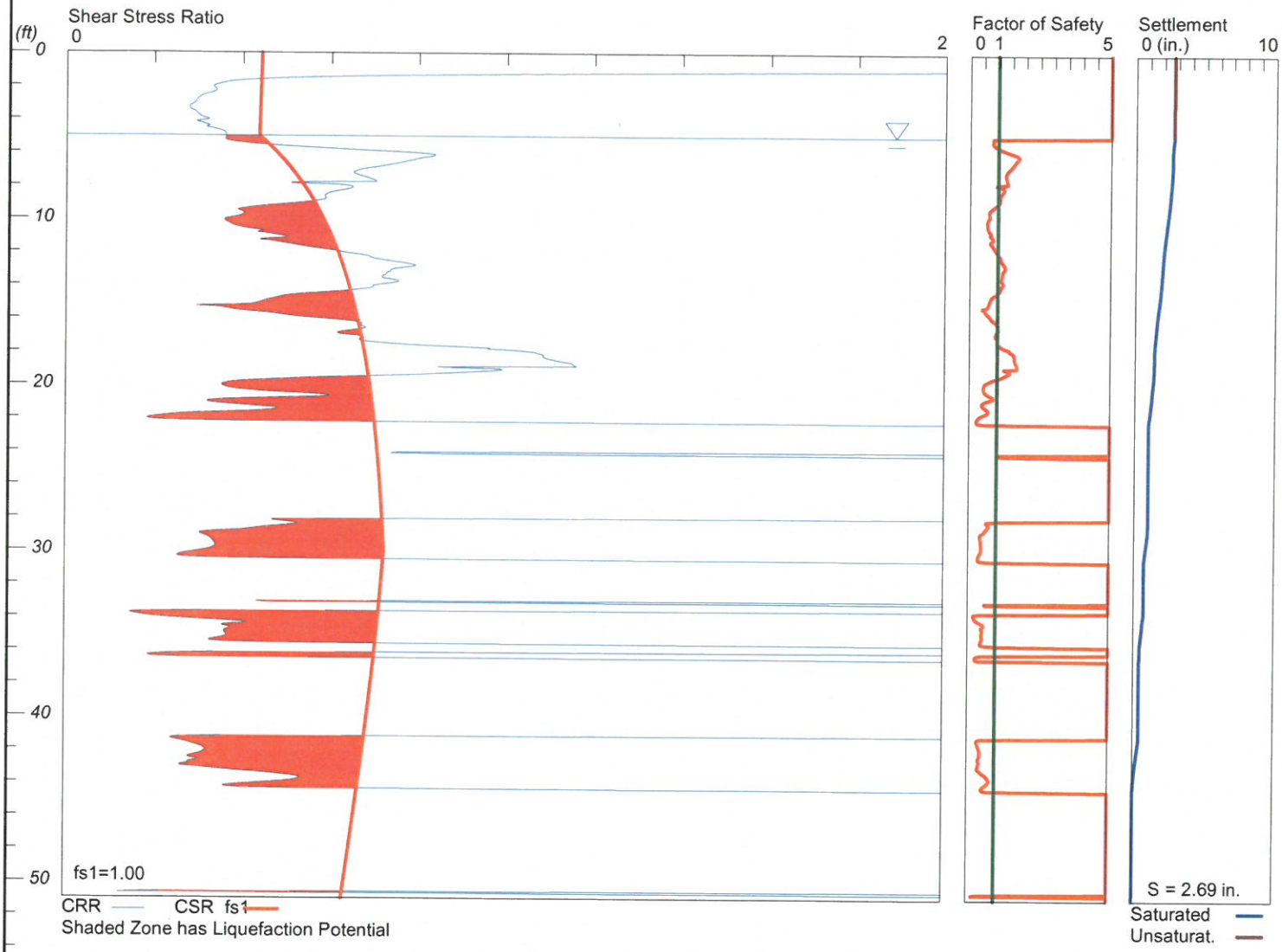


LIQUEFACTION ANALYSIS

Method 2

Hole No.=CPT-1 Water Depth=5 ft

Magnitude=6.7
Acceleration=0.68g

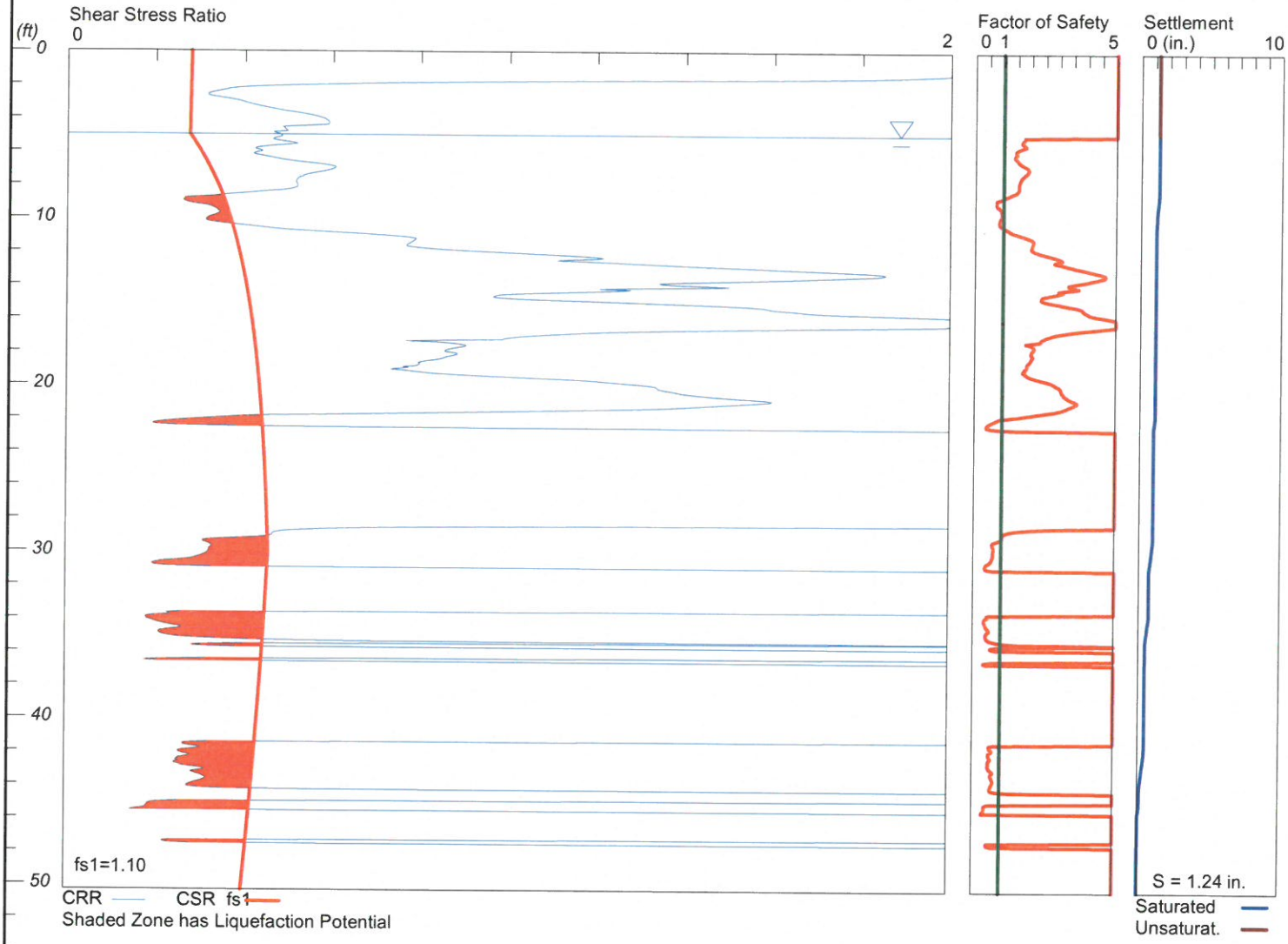


LIQUEFACTION ANALYSIS

Method 1

Hole No.=CPT-2 Water Depth=5 ft

Magnitude=6.7
Acceleration=0.39g

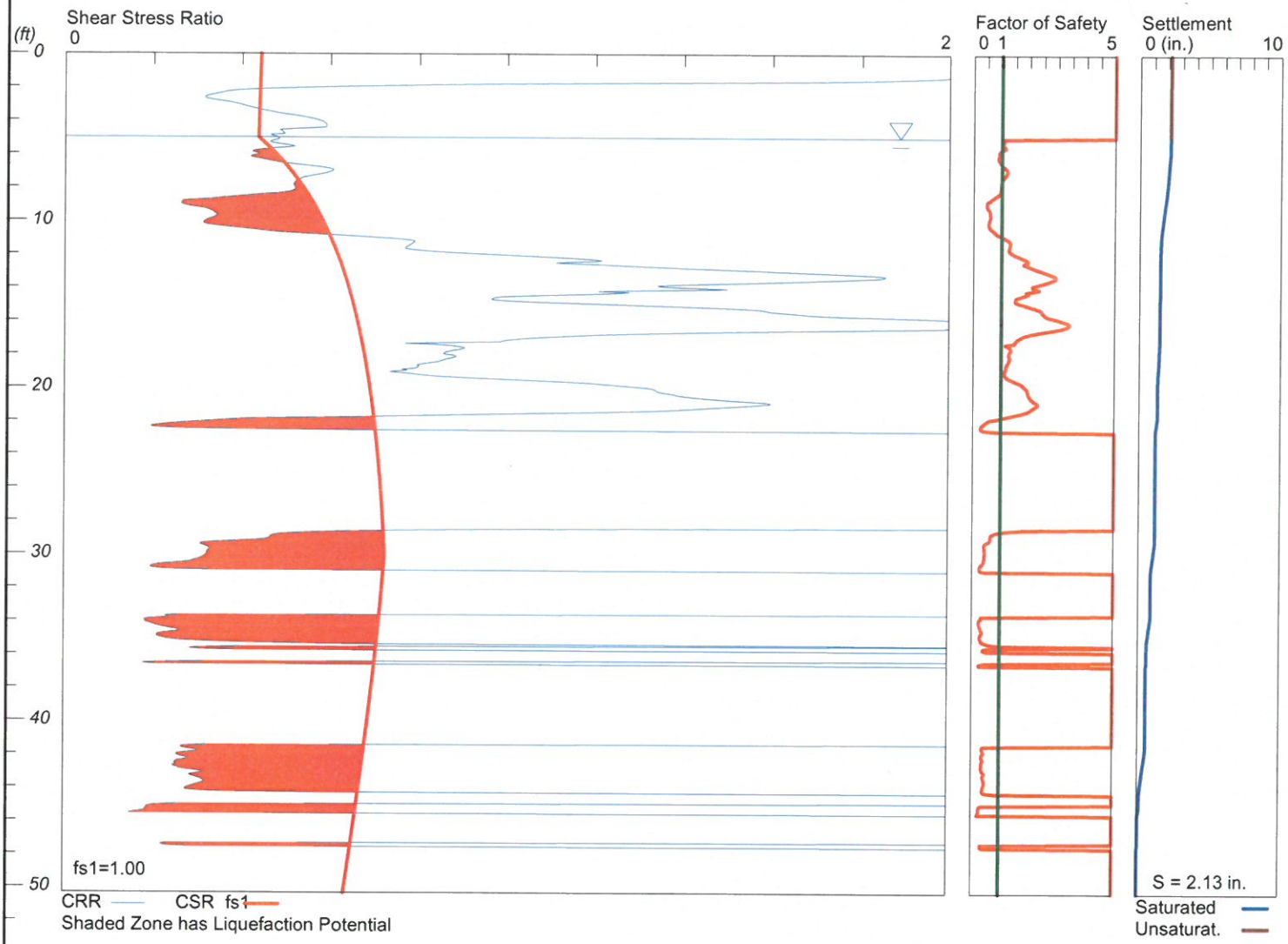


LIQUEFACTION ANALYSIS

Method 2

Hole No.=CPT-2 Water Depth=5 ft

Magnitude=6.7
Acceleration=0.68g



APPENDIX E

Maintenance and Improvement Considerations

MAINTENANCE AND IMPROVEMENT CONSIDERATIONS

General

Owners purchasing property must assume a certain degree of responsibility for improvements and for maintaining conditions around their home. Of primary importance from a geotechnical standpoint are maintaining drainage patterns and minimizing the soil moisture variation below all improvements. Such design, construction and owner maintenance provisions may include:

- Employing contractors for improvements who design and build in recognition of local building codes and specific site soils conditions.
- Establishing and maintaining positive drainage away from all foundations, walkways, driveways, patios, and other improvements.
- Avoiding the construction of planters adjacent to structural improvements. Alternatively, planter sides/bottoms can be sealed with an impermeable membrane and drained away from the improvements via subdrains into approved disposal areas.
- Sealing and maintaining construction/control joints within concrete slabs and walkways to reduce the potential for moisture infiltration into the subgrade soils.
- Utilizing landscaping schemes with vegetation that requires minimal watering. Watering should be done in a uniform manner, as equally as possible on all sides of the foundation, keeping the soil "moist" but not allowing the soil to become saturated.
- Maintaining positive drainage away from structures and providing roof gutters on all structures with downspouts that are designed to carry roof runoff directly into area drains or discharged well away from the foundation areas.
- Avoiding the placement of trees closer to the proposed structures than a distance of one-half the mature height of the tree.
- Observation of the soil conditions around the perimeter of the structure during extremely hot/dry or unusually wet weather conditions so that modifications can be made in irrigation programs to maintain relatively uniform moisture conditions.

Sulfates

Owners should be cautioned against the import and use of certain inorganic fertilizers, soil amendments, and/or other soils from offsite sources in the absence of specific information relating to their chemical composition. Some fertilizers have been known to leach sulfate compounds into soils and increase the sulfate concentrations to potentially detrimental levels.

Site Drainage

- The owners should be made aware of the potential problems that may develop when drainage is altered through construction of hardscape improvements. Ponded water, drainage over the slope face, leaking irrigation systems, overwatering, or other conditions which could lead to ground saturation must be avoided.
- No water should be allowed to flow over the slopes. No alteration of pad gradients should be allowed that would prevent pad and roof runoff from being directed to approved disposal areas.
- Drainage patterns have been established at the time of the fine grading should be maintained throughout the life of the structure. No alterations to these drainage patterns should be made unless designed by qualified professionals in compliance with local code requirements and site-specific soils conditions.

Slope Drainage

- Residents should be made aware of the importance of maintaining and cleaning all interceptor ditches, drainage terraces, down drains, and any other drainage devices, which have been installed to promote slope stability.
- Subsurface drainage pipe outlets may protrude through slope surfaces and/or wall faces. These pipes, in conjunction with the graded features, are essential to slope and wall stability and must be protected in-place. They should not be altered or damaged in any way.

Planting and Irrigation of Slopes

- Seeding and planting of the slopes should be planned to achieve, as rapidly as possible, a well-established and deep-rooted vegetal cover requiring minimal watering.
- It is the responsibility of the landscape architect to provide such plants initially and of the residents to maintain such planting. Alteration of such a planting scheme is at the resident's risk.
- The resident is responsible for proper irrigation and for maintenance and repair of properly installed irrigation systems. Leaks should be fixed immediately.

- Sprinklers should be adjusted to provide maximum uniform coverage with a minimum of water usage and overlap. Overwatering with consequent wasteful runoff and serious ground saturation must be avoided.
- If automatic sprinkler systems are installed, their use must be adjusted to account for seasonal and natural rainfall conditions.

Burrowing Animals

- Residents must undertake a program to eliminate burrowing animals. This must be an ongoing program in order to promote slope stability.

Owner Improvement

Owner improvements (pools, spas, patio slabs, retaining walls, planters, etc.) should be designed to account for the terrain of the project, as well as expansive soil conditions and chemical characteristics. Design considerations on any given lot may need to include provisions for differential bearing materials, ascending/descending slope conditions, bedrock structure, perched (irrigation) water, special geologic surcharge loading conditions, expansive soil stresses, and long-term creep/settlement.

All owner improvements should be designed and constructed by qualified professionals utilizing appropriate design methodologies, which account for the on-site soils and geologic conditions. Each lot and proposed improvement should be evaluated on an individual basis.

Setback Zones

Manufactured slopes maybe subject to long-term settlement and creep that can manifest itself in the form of both horizontal and vertical movement. These movements typically are produced as a result of weathering, erosion, gravity forces, and other natural phenomenon. A setback adjacent to slopes is required by most building codes, including the California Building Code. This zone is intended to locate and support the residential structures away from these slopes and onto soils that are not subject to the potential adverse effects of these natural phenomena.

The owner may wish to construct patios, walls, walkways, planters, swimming pools, spas, etc. within this zone. Such facilities may be sensitive to settlement and creep and should not be

constructed within the setback zone unless properly engineered. It is suggested that plans for such improvements be designed by a professional engineer who is familiar with grading ordinances and design and construction requirements. In addition, we recommend that the designer and contractor familiarize themselves with the site specific geologic and geotechnical conditions on the specific lot.

APPENDIX F

Earthwork Specifications

ALTA CALIFORNIA GEOTECHNICAL, INC.
EARTHWORK SPECIFICATIONS

These specifications present the generally accepted standards and minimum earthwork requirements for the development of the project. These specifications shall be the project guidelines for earthwork except where specifically superseded in preliminary geology and soils reports, grading plan review reports or by the prevailing grading codes or ordinances of the controlling agency.

A. GENERAL

1. The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications.

2. The project Geotechnical Engineer and Engineering Geologist, or their representatives, shall provide observation and testing services, and Geotechnical consultation for the duration of the project.

3. All clearing, grubbing, stripping and site preparation for the project shall be accomplished by the Contractor to the satisfaction of the Geotechnical Engineer/Engineering Geologist.

4. It is the Contractor's responsibility to prepare the ground surface to receive fill to the satisfaction of the Geotechnical Engineer and to place, spread, mix, moisture condition, and compact the fill in accordance with the job specifications and as required by the Geotechnical Engineer. The Contractor shall also remove all material considered by the Geotechnical Engineer to be unsuitable for use in the construction of engineered fills.

5. The Contractor shall have suitable and sufficient equipment in operation to handle the amount of fill being placed. When necessary, equipment will be shut down temporarily in order to permit the proper preparation of fills.

B. PREPARATION OF FILL AREAS

1. Excessive vegetation and all deleterious material should be disposed of offsite as required by the Geotechnical Engineer.

   Existing fill, soil, alluvium or rock materials determined by the Geotechnical Engineer as being unsuitable for placement in compacted fills shall be removed and hauled from the site. Where applicable, the Contractor may obtain the

approval of the Soils Engineer and the controlling authorities for the project to dispose of the above described materials, or a portion thereof, in designated areas onsite.

After removal of the deleterious materials have been accomplished, earth materials deemed unsuitable in their natural, in-place condition, shall be removed as recommended by the Geotechnical Engineer/Engineering Geologist.

2. Upon achieving a suitable bottom for fill placement, the exposed removal bottom shall be disced or bladed by the Contractor to the satisfaction of the Geotechnical Engineer. The prepared ground surfaces shall then be brought to the specified moisture content mixed as required, and compacted and tested as specified. In localities where it is necessary to obtain the approval of the controlling agency prior to placing fill, it will be the Contractor's responsibility to contact the proper authorities to visit the site.

3. Any underground structure such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines or other structures not located prior to grading are to be removed or treated in a manner prescribed by the Geotechnical Engineer and/or the controlling agency for the project.

C. ENGINEERED FILLS

1. Any material imported or excavated on the property may be utilized as fill, provided the material has been determined to be suitable by the Geotechnical Engineer. Deleterious materials shall be removed from the fill as directed by the Geotechnical Engineer.

2. Rock or rock fragments less than twelve inches in the largest dimension may be utilized in the fill, provided they are not placed in concentrated pockets and the distribution of the rocks is approved by the Geotechnical Engineer.

3. Rocks greater than twelve inches in the largest dimension shall be taken offsite, or placed in accordance with the recommendations of the Geotechnical Engineer in areas designated as suitable for rock disposal.

4. All materials to be used as fill, shall be tested in the laboratory by the Geotechnical Engineer. Proposed import materials shall be approved by the Geotechnical Engineer 48 hours prior to importation.

5. The fill materials shall be placed by the Contractor in lifts, that when compacted, shall not exceed six inches. Each lift shall be spread evenly and shall be

thoroughly mixed to achieve a near uniform moisture condition and a uniform blend of materials.

All compaction shall be achieved at or above the optimum moisture content, as determined by the applicable laboratory standard. The Contractor will be notified if the fill materials are too wet or too dry to achieve the required compaction standard.

6. When the moisture content of the fill material is below the limit specified by the Geotechnical Engineer, water shall be added and the materials shall be blended until a uniform moisture content, within specified limits, is achieved. When the moisture content of the fill material is above the limits specified by the Geotechnical Engineer, the fill materials shall be aerated by discing, blading, mixed with dryer fill materials, or other satisfactory methods until the moisture content is within the specified limits.

7. Each fill lift shall be compacted to the minimum project standards, in compliance with the testing methods specified by the controlling governmental agency, and in accordance with recommendations of the Geotechnical Engineer.

   In the absence of specific recommendations by the Geotechnical Engineer to the contrary, the compaction standard shall be the most recent version of ASTM:D 1557.

8. Where a slope receiving fill exceeds a ratio of five-horizontal to one-vertical, the fill shall be keyed and benched through all unsuitable materials into sound bedrock or firm material, in accordance with the recommendations and approval of the Geotechnical Engineer.

9. Side hill fills shall have a minimum key width of 15 feet into bedrock or firm materials, unless otherwise specified in the soil report and approved by the Geotechnical Engineer in the field.

10. Drainage terraces and subdrainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency and/or with the recommendations of the Geotechnical Engineer and Engineering Geologist.

11. The Contractor shall be required to maintain the specified minimum relative compaction out to the finish slope face of fill slopes, buttresses, and stabilization fills as directed by the Geotechnical Engineer and/or the governing agency for the project. This may be achieved by either overbuilding the slope and cutting

back to the compacted core; by direct compaction of the slope face with suitable equipment; or by any other procedure which produces the required result.

12. The fill portion of fill-over-cut slopes shall be properly keyed into rock or firm material; and the fill area shall be stripped of all soil or unsuitable materials prior to placing fill.

    The design cut portion of the slope should be made first and evaluated for suitability by the Engineering Geologist prior to placement of fill in the keyway above the cut slope.

13. Pad areas in cut or natural ground shall be approved by the Geotechnical Engineer. Finished surfaces of these pads may require scarification and recompaction, or over excavation as determined by the Geotechnical Engineer.

D. CUT SLOPES

1. The Engineering Geologist shall observe all cut slopes and shall be notified by the Contractor when cut slopes are to be started.

2. If, during the course of grading, unforeseen adverse or potentially adverse geologic conditions are encountered, the Engineering Geologist and Soil Engineer shall investigate, analyze and make recommendations to remediate these problems.

3. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the superjacent, prevailing drainage.

4. Unless otherwise specified in specific geotechnical reports, no cut slopes shall be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies.

5. Drainage terraces shall be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the Geotechnical Engineer or Engineering Geologist.

E. GRADING CONTROL

1. Fill placement shall be observed and tested by the Geotechnical Engineer and/or his representative during grading.

   Field density tests shall be made by the Geotechnical Engineer and/or his representative to evaluate the compaction and moisture compliance of each fill lift. Density tests shall be conducted at intervals not to exceed two feet of fill

height. Where sheepsfoot rollers are used, the fill may be disturbed to a depth of several inches. Density determinations shall be taken in the compacted material below the disturbed surface at a depth determined by the Geotechnical Engineer or his representative.

2. Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction, or improper moisture content is in evidence, that particular layer or portion thereof shall be reworked until the required density and/or moisture content has been attained. Additional fills shall not be placed over an area until the previous lift of fill has been tested and found to meet the density and moisture requirements for the project and the previous lift is approved by the Geotechnical Engineer.

3. When grading activities are interrupted by heavy rains, fill operations shall not be resumed until field observations and tests by the Geotechnical Engineer indicate the moisture content and density of the fill are within the specified limits.

4. During construction, the Contractor shall properly grade all surfaces to maintain good drainage and prevent the ponding of water. The Contractor shall take remedial action to control surface water and to prevent erosion of graded areas until such time as a permanent drainage and erosion devices have been installed.

5. Observation and testing by the Geotechnical Engineer and/or his representative shall be conducted during filling and compacting operations in order that he will be able to state in his opinion that all cut and filled areas are graded in accordance with the approved specifications.

6. Upon the completion of grading activities and after the Geotechnical Engineer and Engineering Geologist have finished their observations of the work, final reports shall be submitted. No further excavation or fill placement shall be undertaken without prior notification of the Geotechnical Engineer and/or Engineering Geologist.

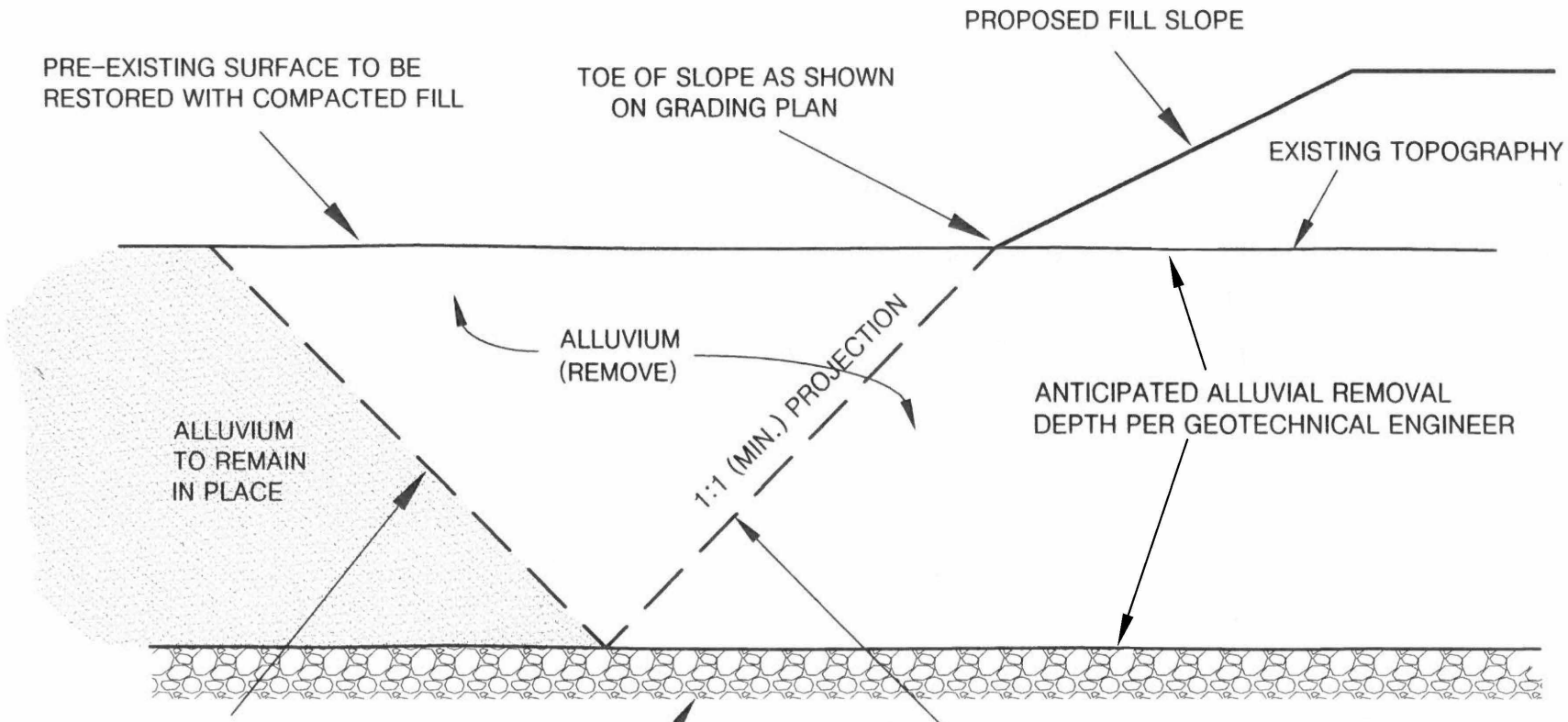
F. FINISHED SLOPES

All finished cut and fill slopes shall be planted and irrigated and/or protected from erosion in accordance with the project specifications, governing agencies, and/or as recommended by a landscape architect.

APPENDIX G

Grading Details

DETAIL FOR FILL SLOPE TOEING OUT ON FLAT ALLUVIATED CANYON

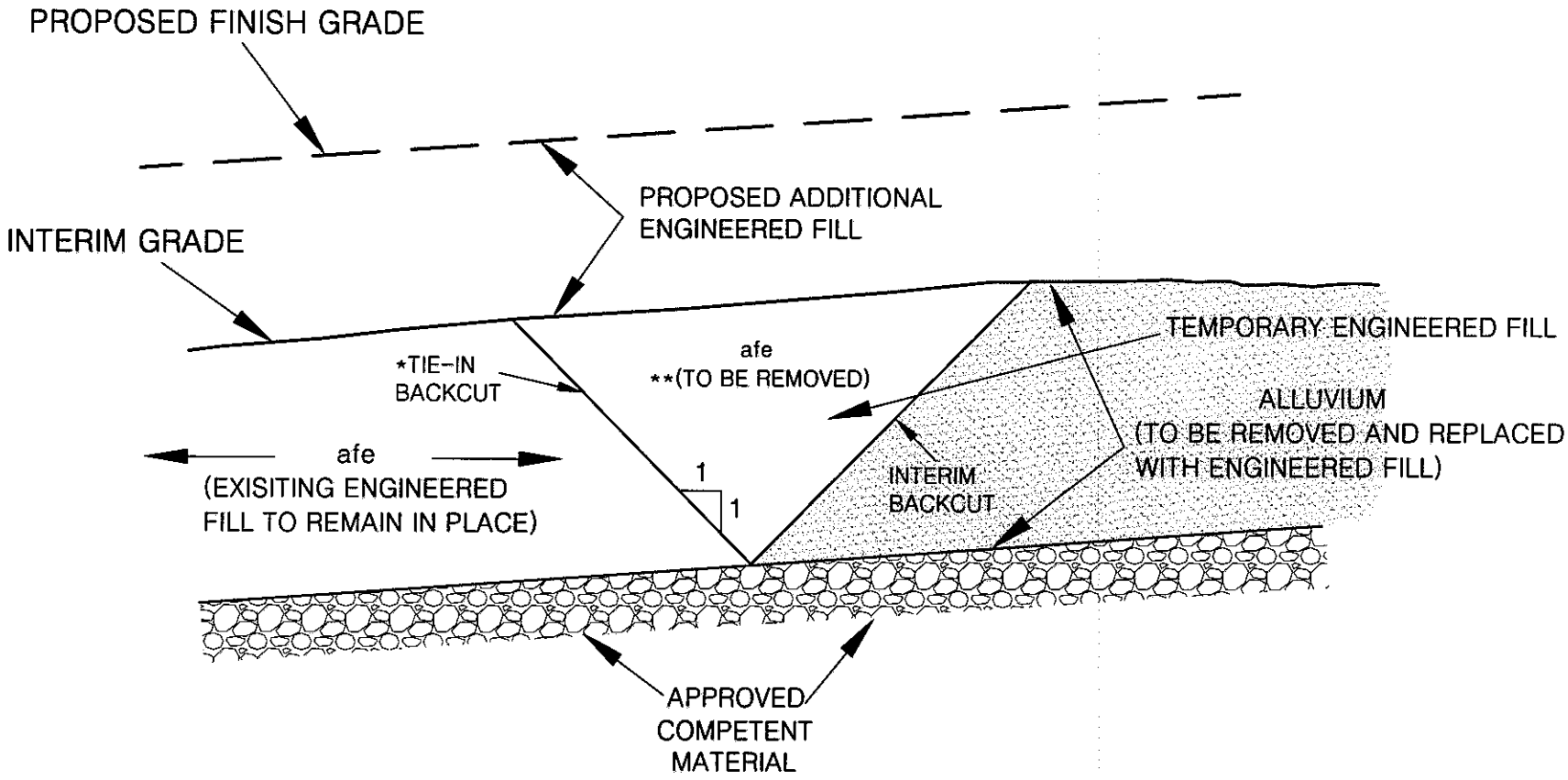


ALTA CALIFORNIA GEOTECHNICAL, INC.
VER. 3/12

PLATE G-1

PATH: C:\Users\Jinks\Desktop\Drafting\GRADING DETAILS\G-1.dwg

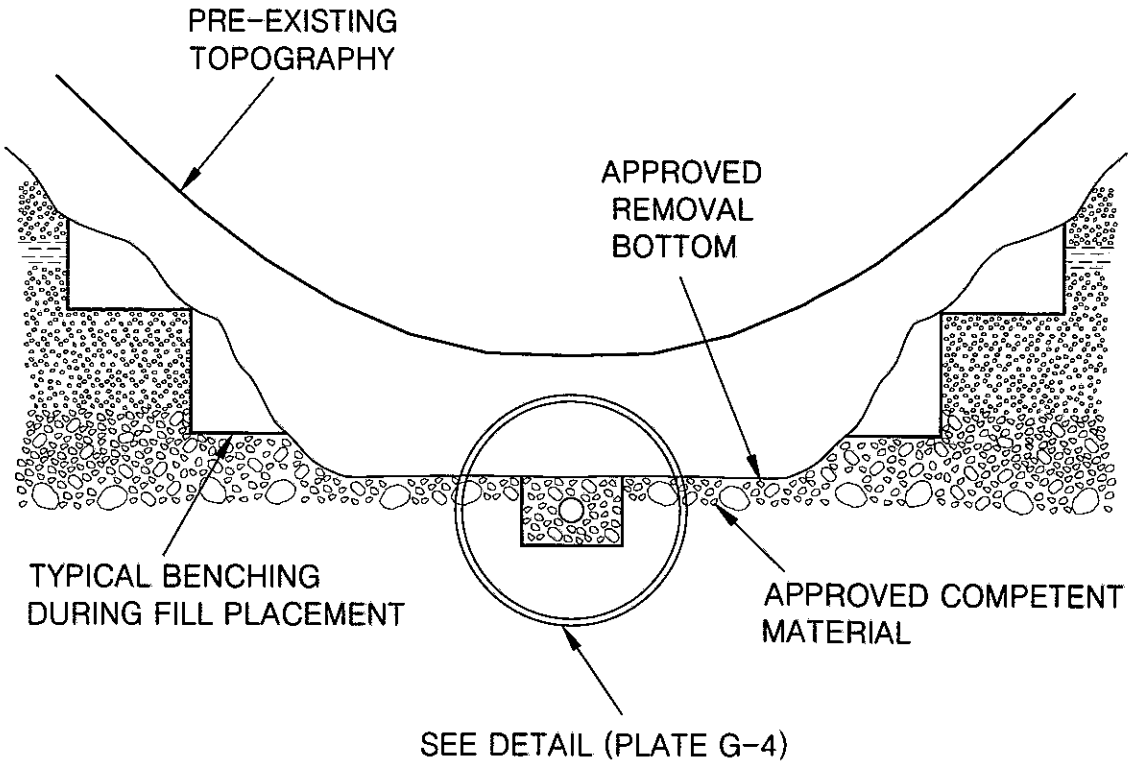
REMOVAL ADJACENT TO EXISTING FILL



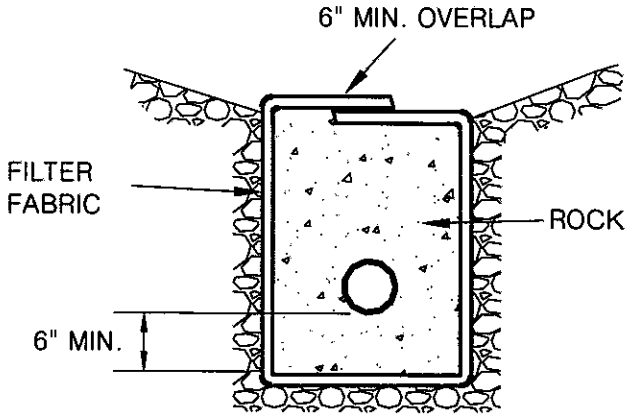
*INITIATE 1:1 TIE-IN BACKCUT TO INTERCEPT TOE OF INTERIM BACKCUT

**AS PART OF TIE-IN FOR ADDITIONAL ENGINEERED FILL

CANYON SUBDRAIN



CANYON SUBDRAIN DETAIL



PERFORATED PIPE SURROUNDED WITH ROCK AND FILTER FABRIC

ROCK: MIN. VOLUME OF 9 CU.FT. PER LINEAR FT. OF 3/4 IN. MAX. ROCK

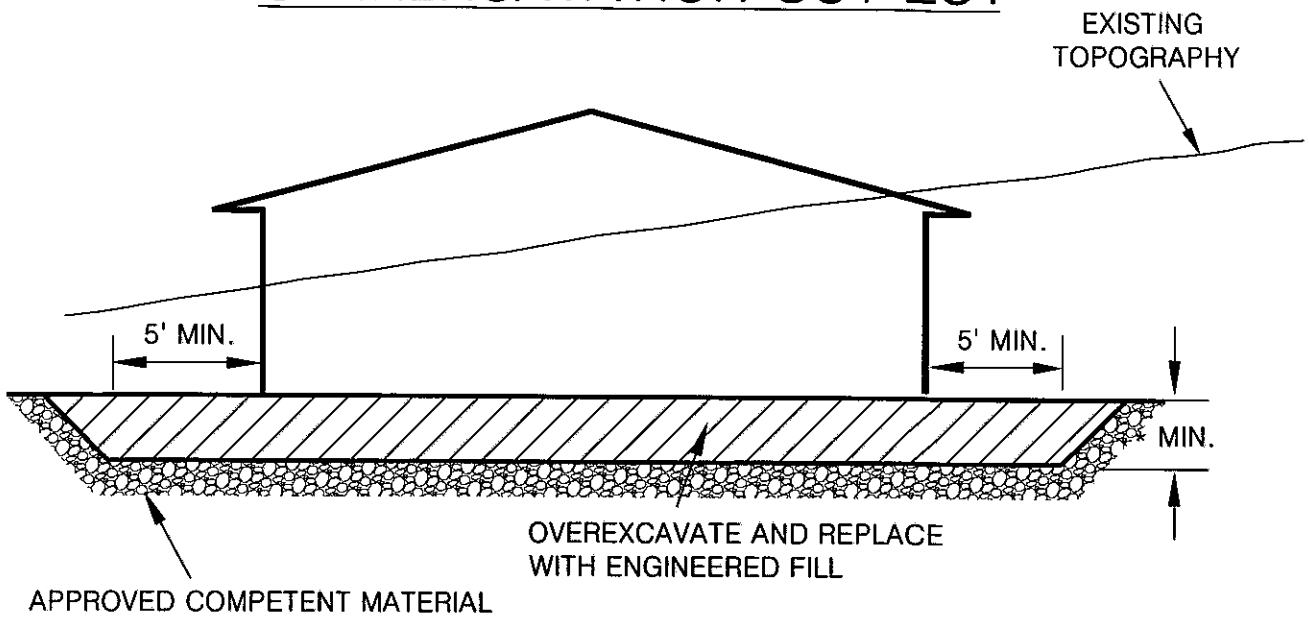
PIPE: 6 IN. ABS OR PVC PIPE WITH A MINIMUM OF 8 PERFORATIONS (1/4-IN. DIA.) PER LINEAL FT. IN BOTTOM HALF OF PIPE ASTM D2751, SDR 35, OR ASTM D3034 OR ASTM D1527, SCHD. 40 ASTM D1785, SCHD. 40

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT

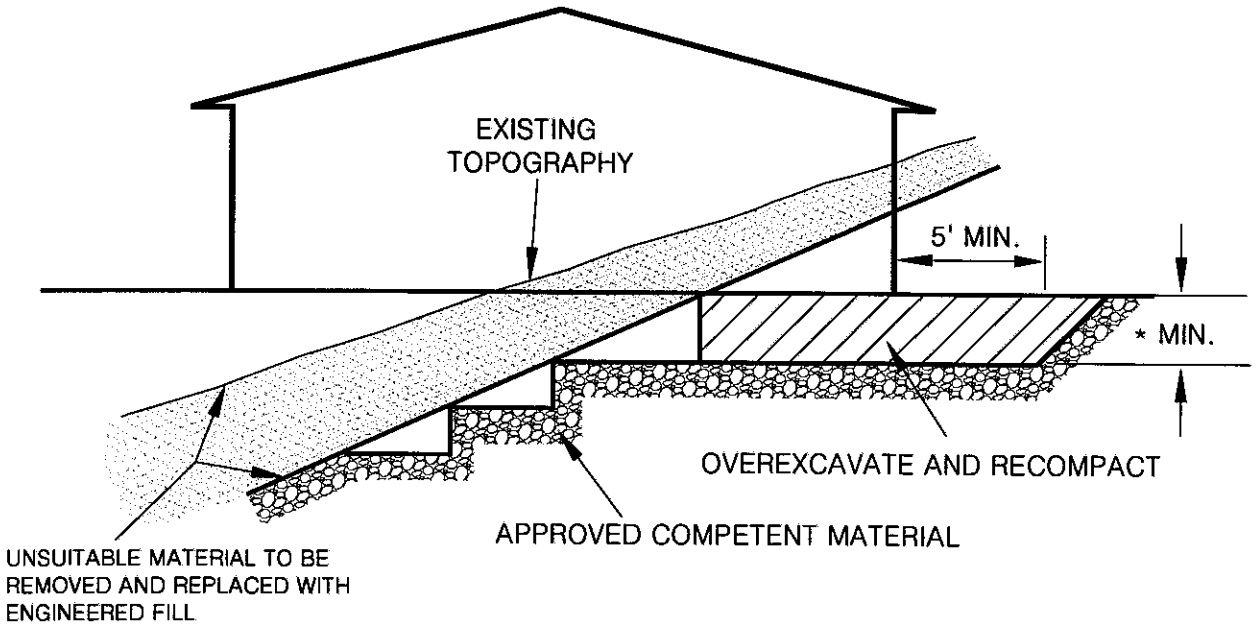
NOTES:

1. FOR CONTINUOUS RUN IN EXCESS OF 500. FT USE 8 IN. DIA. PIPE
2. ENGINEERED FILL PLACED BELOW DRAINS SHALL BE COMPACTED TO 93% OF THE LABORATORY MAXIMUM DRY DENSITY (ASTM:D1557)

OVEREXCAVATION CUT LOT



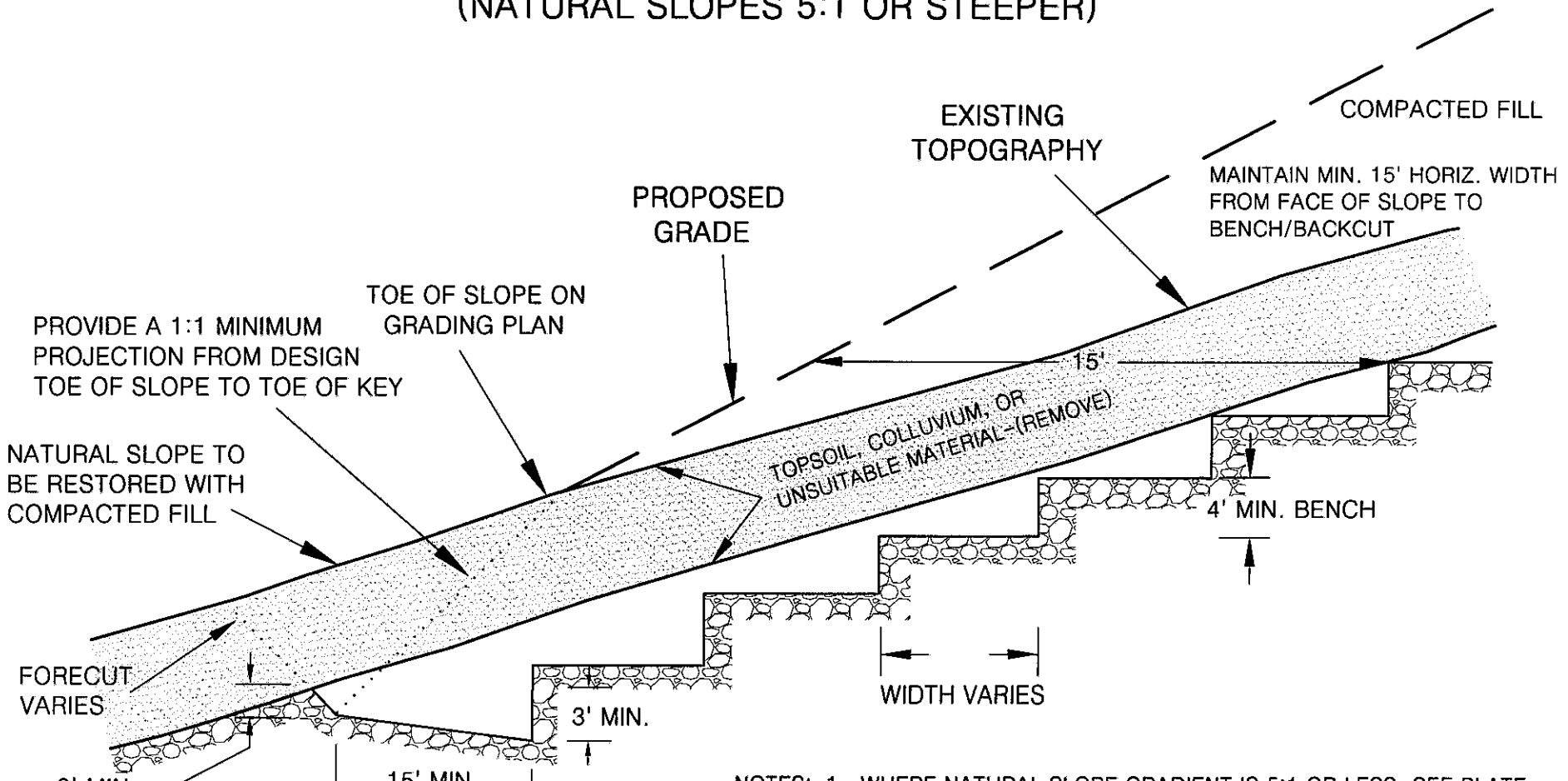
CUT-FILL LOT (TRANSITION)



*NOTE ALL BUILDING PADS SHALL BE OVER EXCAVATED TO A MINIMUM OF 1/3 OF THE MAXIMUM DEPTH OF FILL BELOW THE BUILDING PAD TO A MAXIMUM OF 17 FEET (SEE PLATE G-16)

SIDE HILL SLOPE FILL DETAIL

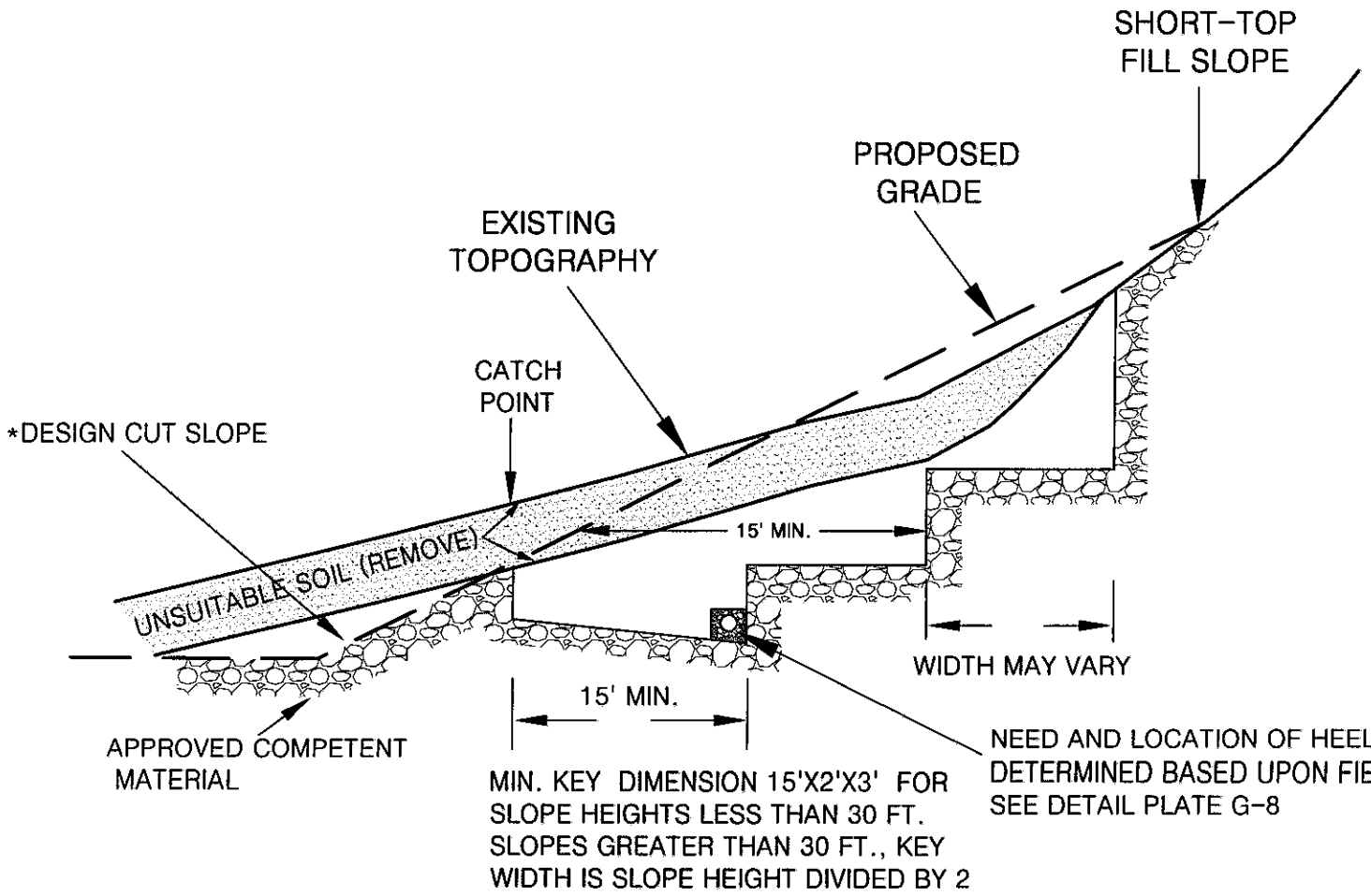
(NATURAL SLOPES 5:1 OR STEEPER)



NOTES:

1. WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, SEE PLATE G-1. WHERE THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN SLOPE RATIO, SPECIAL RECOMMENDATIONS WILL BE PROVIDED BY THE GEOTECHNICAL ENGINEER.
2. THE NEED FOR AND PLACEMENT OF DRAINS WILL BE DETERMINED BY THE GEOTECHNICAL ENGINEER OR GEOLOGIST BASED UPON EXPOSED FIELD CONDITIONS.

FILL OVER CUT SLOPE DETAIL

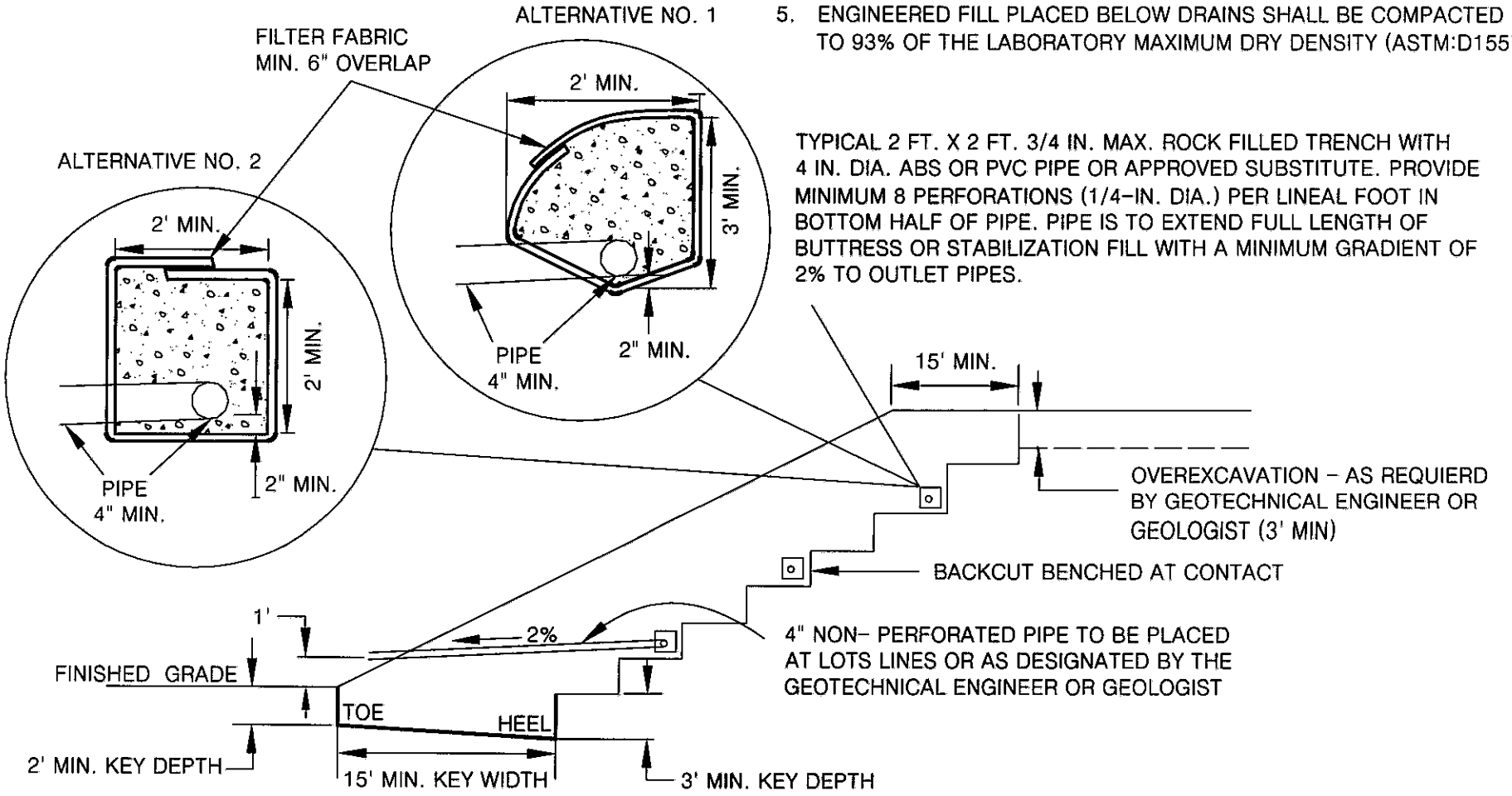


*THE CUT PORTION OF THE SLOPE SHOULD BE EXCAVATED AND EVALUATED BY THE ENGINEERING GEOLOGIST/GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTING THE FILL SLOPE

STABILIZATION/BUTTRESS FILL BACKDRAIN

NOTE:

1. ASTM D2751, SDR 35, OR ASTM D3034 OR ASTM D1527, SCHD. 40 ASTM D1785, SCHD. 40
2. SOLID PIPE OUTLETS TO BE PROVIDED EVERY 100 FT. AND JOINED TO PERFORATED BACKDRAIN PIPE WITH "L" OR "T"s. MIN. 2% GRADIENT.
3. GRAVEL TRENCH TO BE FILLED WITH 3/4 IN. MAXIMUM ROCK
4. THE NECESSITY FOR UPPER TIER BACKDRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL ENGINEER OR GEOLOGIST. UPPER TIER OUTLETS SHOULD DRAIN INTO PAVED TERRACE DRAINS.
5. ENGINEERED FILL PLACED BELOW DRAINS SHALL BE COMPACTED TO 93% OF THE LABORATORY MAXIMUM DRY DENSITY (ASTM:D1557)



ALTA CALIFORNIA GEOTECHNICAL, INC.
VER. 3/12

PLATE G-8

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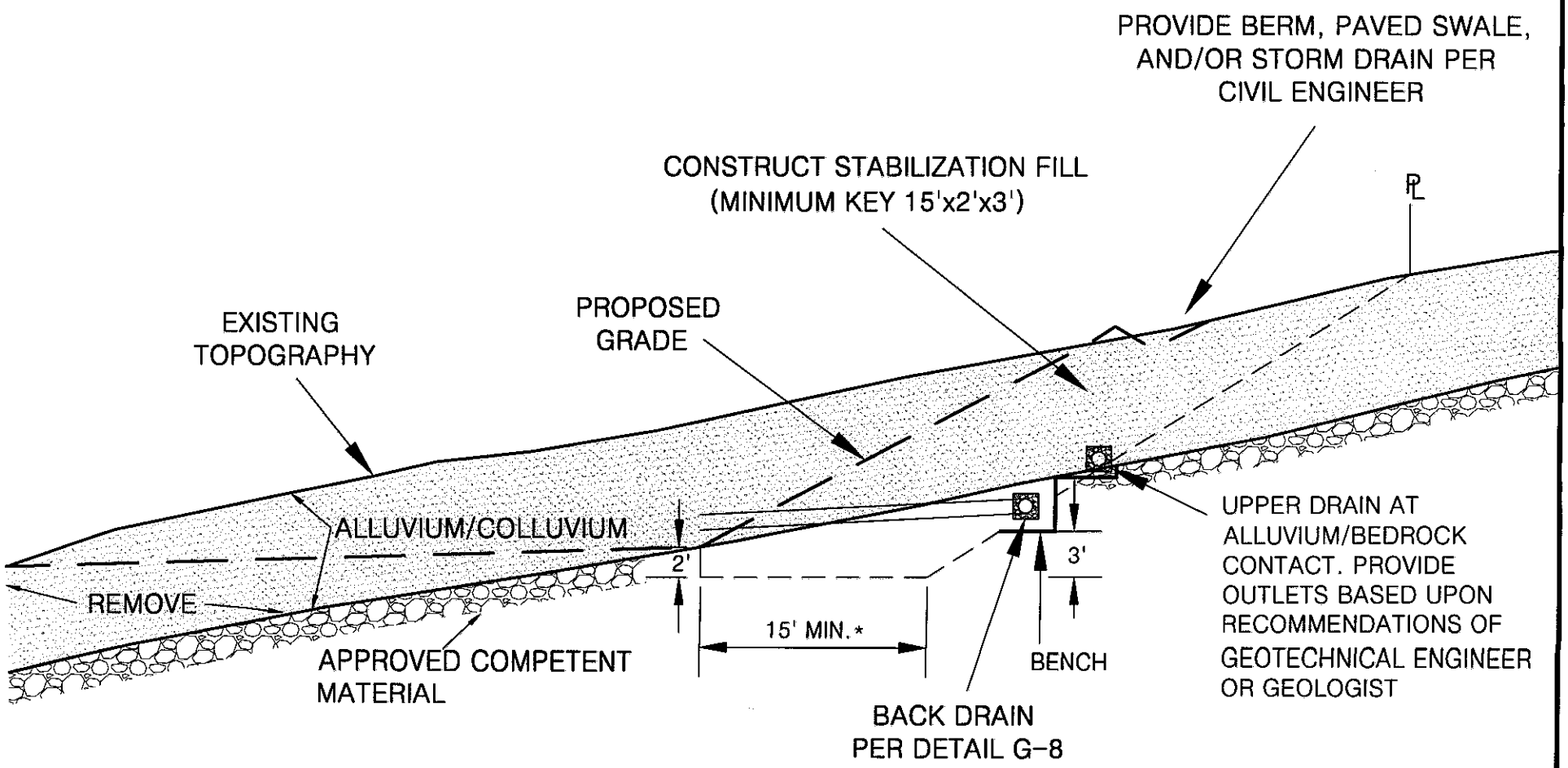
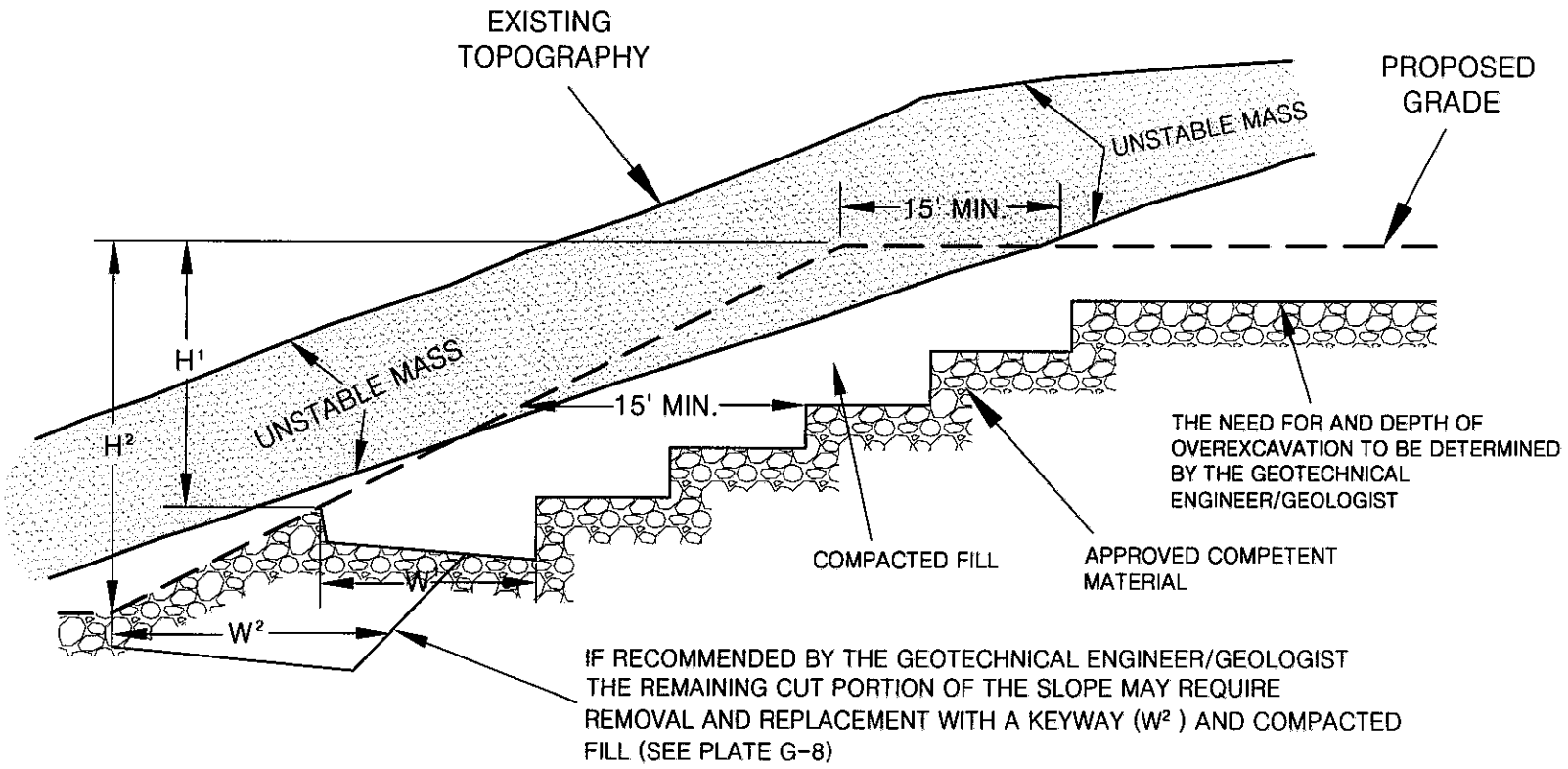
STABILIZATION FILL

(UPSLOPE ALLUVIATED AREA)



* FOR SLOPE HEIGHTS LESS THAN 30 FT. SLOPES GREATER THAN 30 FT., KEY WIDTH IS SLOPE HEIGHT DIVIDED BY 2

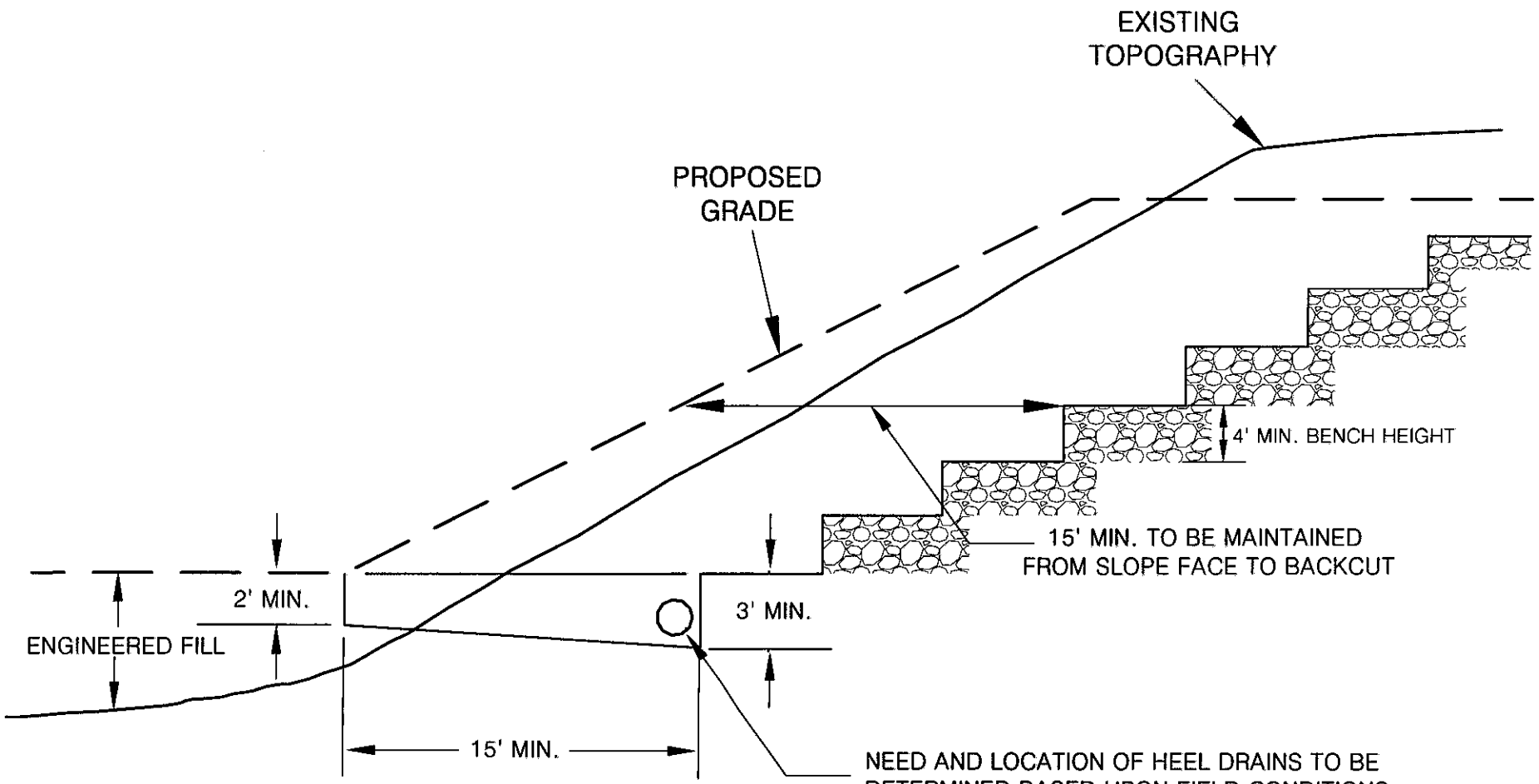
SELECTIVE GRADING DETAIL FOR STABILIZATION FILL
UNSTABLE MATERIAL EXPOSED IN PORTION OF CUT SLOPE



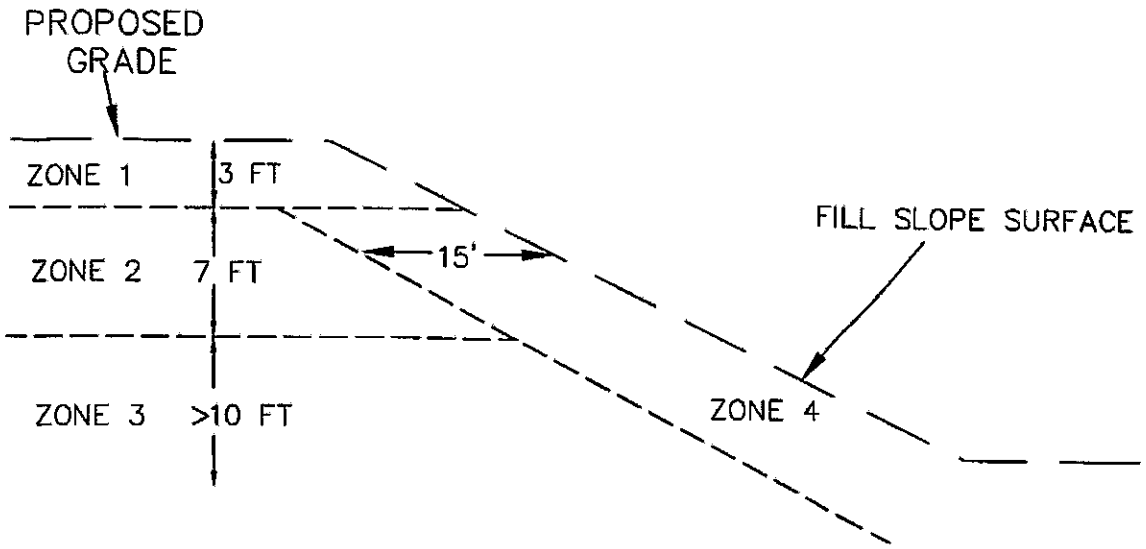
NOTES: 1. BACKDRAINS ARE NOT REQUIRED UNLESS SPECIFIED.

2. "W" SHALL BE EQUIPMENT WIDTH (15') FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE PROJECT GEOTECHNICAL ENGINEER/GEOLOGIST. AT NO TIME SHALL "W" BE LESS THAN H/2.

SKIN FILL SLOPE OVER NATURAL GROUND



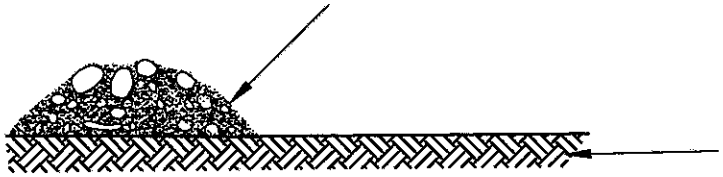
DETAIL FOR MAXIMUM PARTICLE DIMENSION



ZONE	DEPTH	PARTICLE MAX. DIMENSION	PLACEMENT METHOD
1	0-3 ft.	≤1.0 ft.	STANDARD OR CONVENTIONAL COMPACTION METHODS (SEE EARTHWORK SPECIFICATIONS)
2	3-10 ft.	≤2.0 ft.	ROCK BLANKETS (SEE PLATE G-13)
3	>10 ft.	≤8.0 ft.	ROCK BLANKETS (PLATE G-13) ROCK WINDROW (PLATE G-14) INDIVIDUAL ROCK BURIED (PLATE G-15)
4	15 HORIZONTAL FEET FROM FILL SLOPE FACE	≤1.0 ft.	STANDARD OR CONVENTIONAL COMPACTION METHODS (SEE EARTHWORK SPECIFICATIONS)

ROCK BLANKET DETAILS

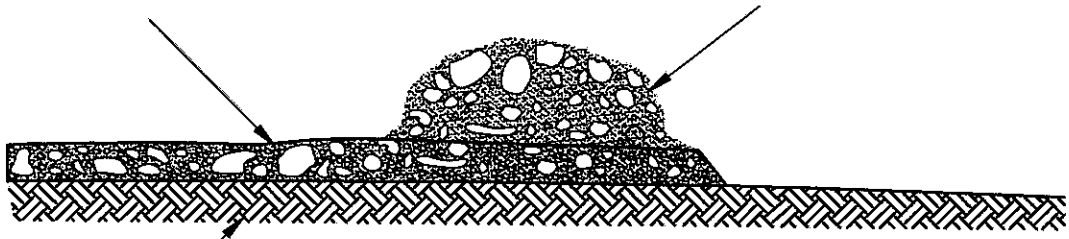
LOOSE PILE 1
LOOSE, DUMPED ROCK, GRAVEL AND SAND MIXTURE REMOVE FRAGMENTS LARGER THAT 2 FEET FOR ISOLATED BURIAL (PLATE G-15) OR WINDROW (PLATE G-10)



APPROVED BOTTOM, OR TOP OF PREVIOUSLY APPROVED BLANKET FILL

COMPACT PILE 1
SPREAD LOOSE PILE FORWARD WITH HEAVY TRACKED DOZER (D-8 OR LARGER). HEAVILY WATER, TRACK, AND APPLY ADDITIONAL SAND AND GRAVEL AS NECESSARY TO FILL VOIDS AND CREATE A DENSE MATRIX OF ROCK, COBBLES, GRAVEL AND SAND (2 FOOT MAXIMUM THICKNESS)

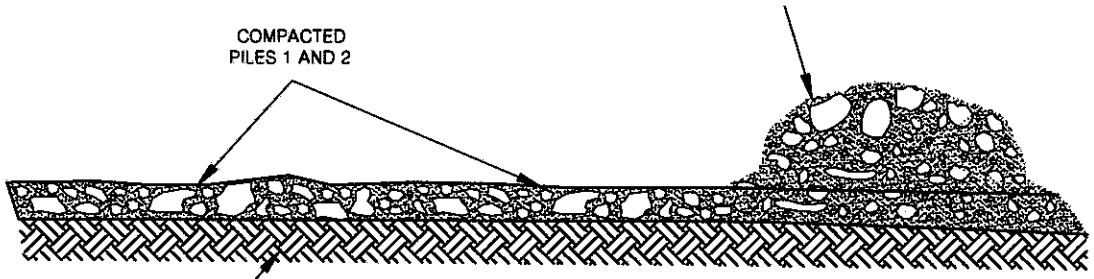
LOOSE PILE 2
DUMP SUCCESSIVE PILES OF LOOSE ROCK, GRAVEL AND SAND MIXTURE ON FORWARD EDGE OF PREVIOUSLY COMPACTED LIFT WITH TRUCKS AND/OR SCRAPERS. USE PREVIOUS LIFT TO ACCESS AND FURTHER COMPACT PILE 1.



APPROVED BOTTOM, OR TOP OF PREVIOUSLY APPROVED BLANKET FILL

LOOSE PILE 3
DUMP SUCCESSIVE PILES OF LOOSE ROCK, GRAVEL AND SAND MIXTURE ON FORWARD EDGE OF PREVIOUSLY COMPACTED LIFT WITH TRUCKS AND/OR SCRAPERS. USE PREVIOUS LIFT TO ACCESS AND FURTHER COMPACT EXISTING BLANKET.

COMPACTED PILES 1 AND 2

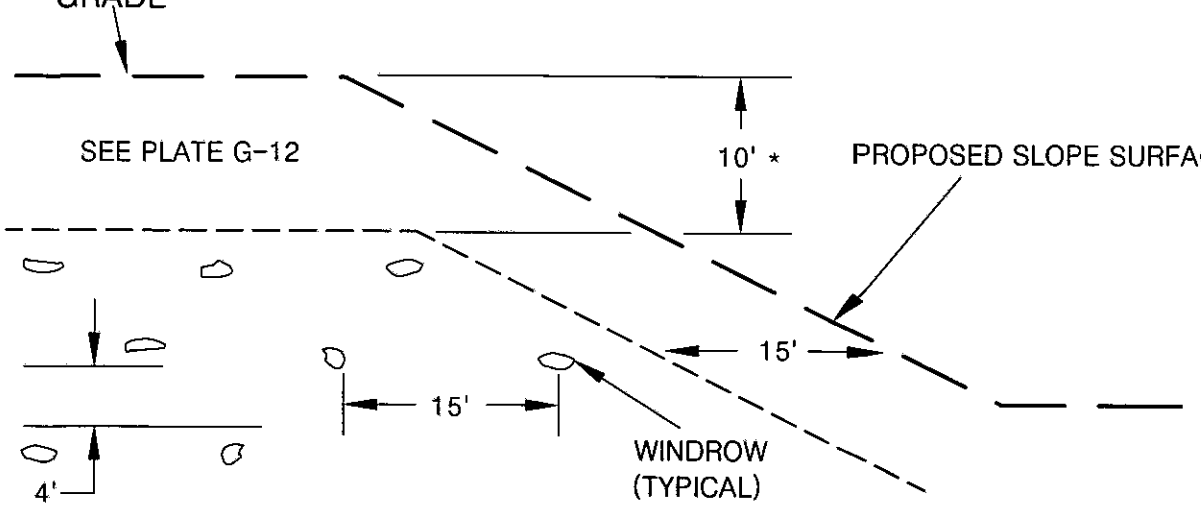


APPROVED BOTTOM, OR TOP OF PREVIOUSLY APPROVED BLANKET FILL

OBSERVATION TESTING AND APPROVAL PROCEDURES

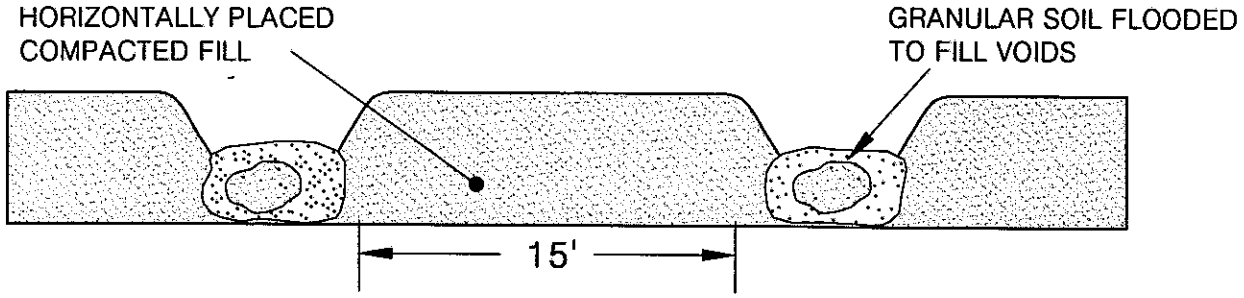
OBSERVE EQUIPMENT. SCRAPERS AND TRUCKS SHOULD BE FULLY SUPPORTED ON BLANKET WITHOUT SIGNIFICANT YIELDING. EXCAVATE TEST/OBSERVATION PITS TO CONFIRM EXISTENCE OF MIXTURE OF VARIOUS PARTICLE SIZES, WITHOUT SIGNIFICANT VOIDS, AND FORMING A DENSE, COMPACTED FILL MATRIX. TEST BY ASTM D1556, D2922 AND/OR D3017 WHEN APPROPRIATE. RECORD LIMITS AND ELEVATION OF BLANKET. ALL FILL AND COMPACTION OPERATIONS TO BE CONDUCTED UNDER THE OBSERVATION OF THE GEOTECHNICAL ENGINEER. SUBSEQUENT LIFTS TO BE APPLIED ONLY AFTER OBSERVATION AND CONFIRMATION OF SUITABILITY OF FILL AND RELEASE BY THE GEOTECHNICAL ENGINEER. BLANKETS TO BE CONSTRUCTED IN ACCORDANCE WITH PLATE G-12.

ROCK WINDROW DETAIL



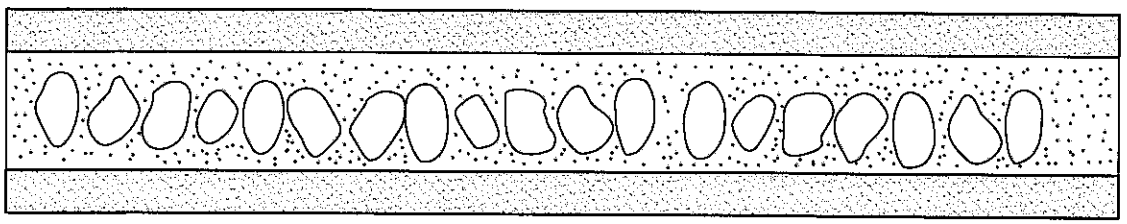
NOTE: OVERSIZED MATERIAL SHOULD BE REMOVED FROM THE 15' CLEAR ZONES WITH SPECIAL EQUIPMENT, SUCH AS A ROCK RAKE, PRIOR TO PLACING THE NEXT FILL LIFT.
*VARIANCES TO THE ABOVE ROCK HOLD DOWN MAY BE GRANTED SUBJECT TO APPROVAL BY THE OWNER, GEOTECHNICAL ENGINEER, AND GOVERNING AGENCY

TYPICAL WINDROW DETAIL (END VIEW)

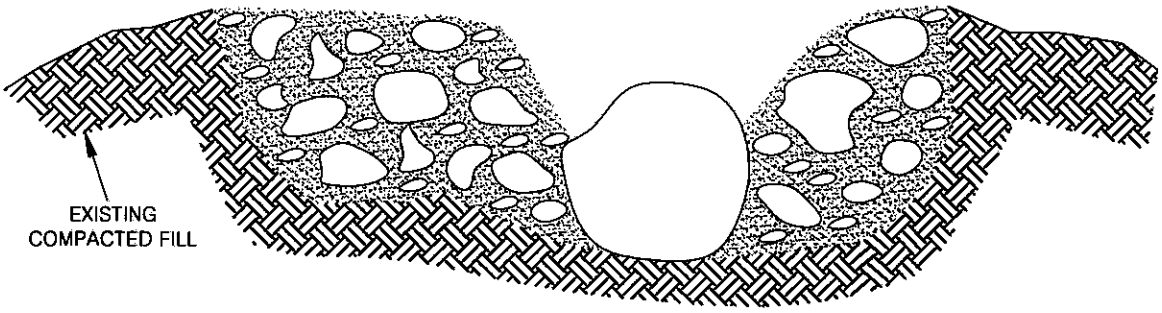


NOTE: COMPACTED FILL SHALL BE BROUGHT UP TO A HIGHER ELEVATION ALONG EACH WINDROW SO GRANULAR SOIL CAN BE FLOODED IN A "TRENCH CONDITION".

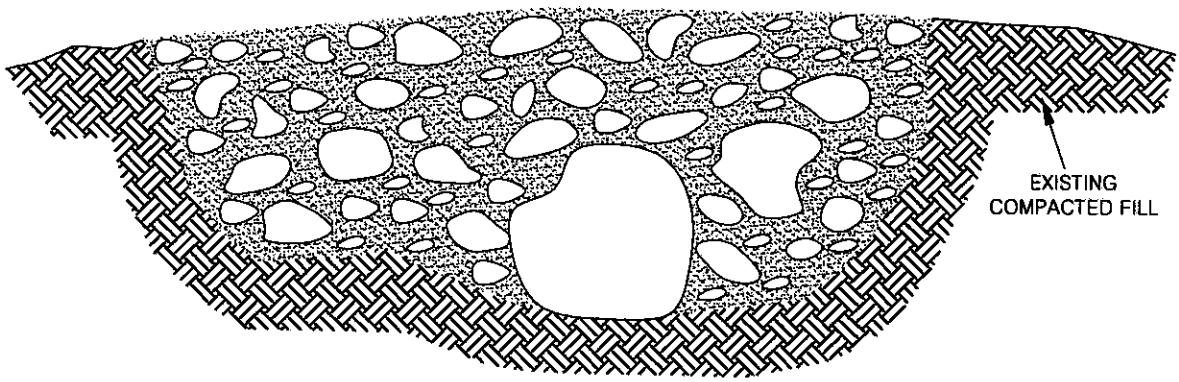
PROFILE VIEW



ISOLATED ROCK BURIAL DETAILS

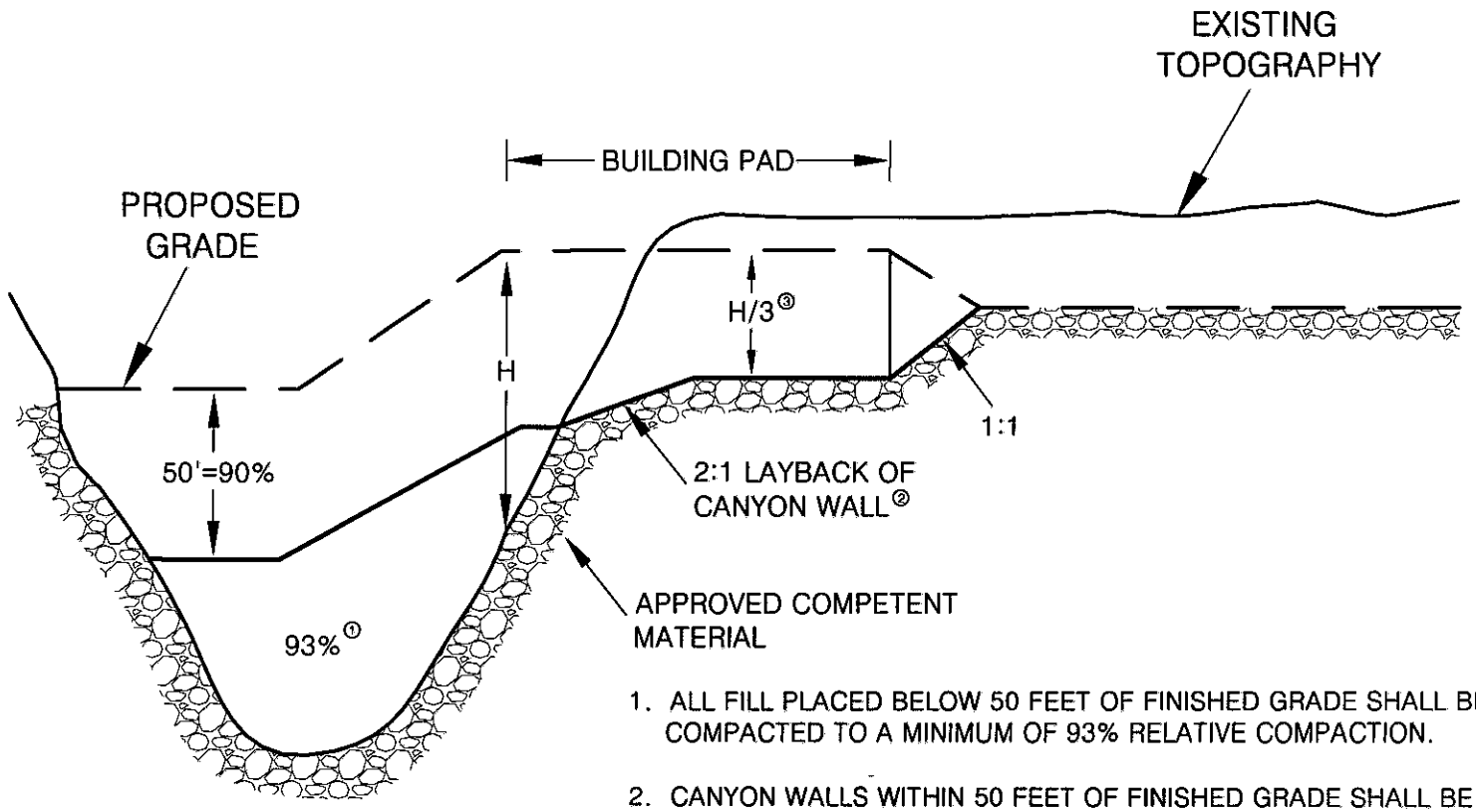


EXCAVATE HOLE INTO EXISTING FILL PRISM, PLACE BOULDER (< 8 feet in maximum dimension) INTO EXISTING COMPACTED FILL. SURROUND WITH SAND, GRAVEL, COBBLES AND WATER HEAVILY. TRACK WITH D8 OR LARGER EQUIPMENT UNTIL RESULTING FILL FULLY SUPPORTS EQUIPMENT. OBSERVE AND/OR TEST IN ACCORDANCE WITH ASTM D1556, D2922 OR D3017. ROCKS LARGER THAN 8 FEET SHALL BE FURTHER REDUCED IN SIZE BY SECONDARY BREAKING.



RELATIVE COMPACTION VS. DEPTH

CANYON WALL LAY BACK
DIFFERENTIAL FILL OVEREXCAVATION DETAILS



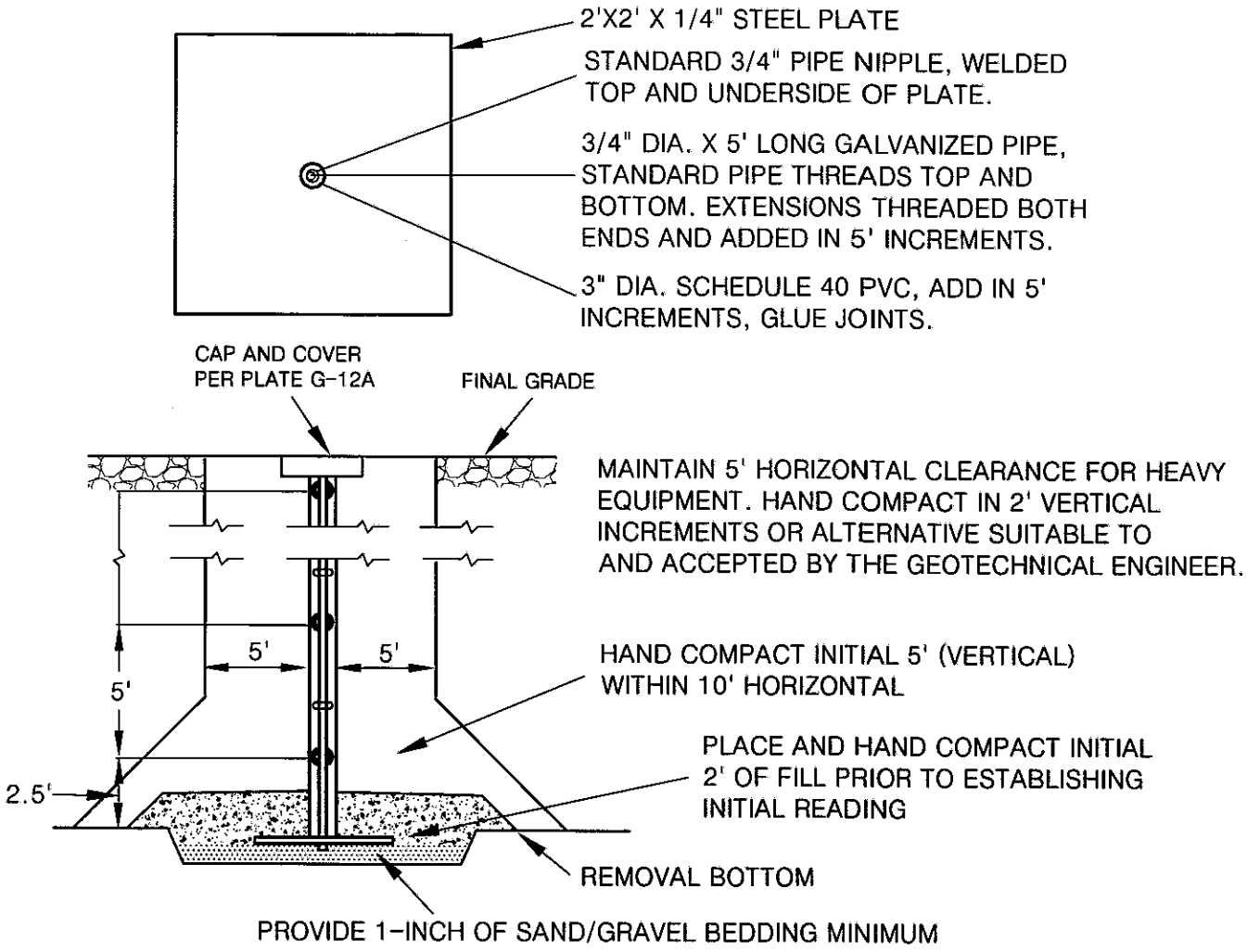
1. ALL FILL PLACED BELOW 50 FEET OF FINISHED GRADE SHALL BE COMPACTED TO A MINIMUM OF 93% RELATIVE COMPACTION.

2. CANYON WALLS WITHIN 50 FEET OF FINISHED GRADE SHALL BE LAID BACK TO A SLOPE RATIO OF 2:1 OR FLATTER.

3. ALL BUILDING PADS SHALL BE OVER EXCAVATED TO A MINIMUM OF 1/3 OF THE MAXIMUM DEPTH OF FILL BELOW THE BUILDING PAD TO A MAXIMUM OF 17 FEET.

4. IF THE 2:1 LAY BACK OF THE CANYON WALL IS IMPRACTICAL, THEN AS AN ALTERNATIVE THE INCREASED COMPACTION STANDARDS IN NOTE 1 SHOULD BE EXTENDED UP TO H/3 AND THE LAY BACK WILL NOT BE REQUIRED.

SETTLEMENT PLATE DETAIL



NOTES:

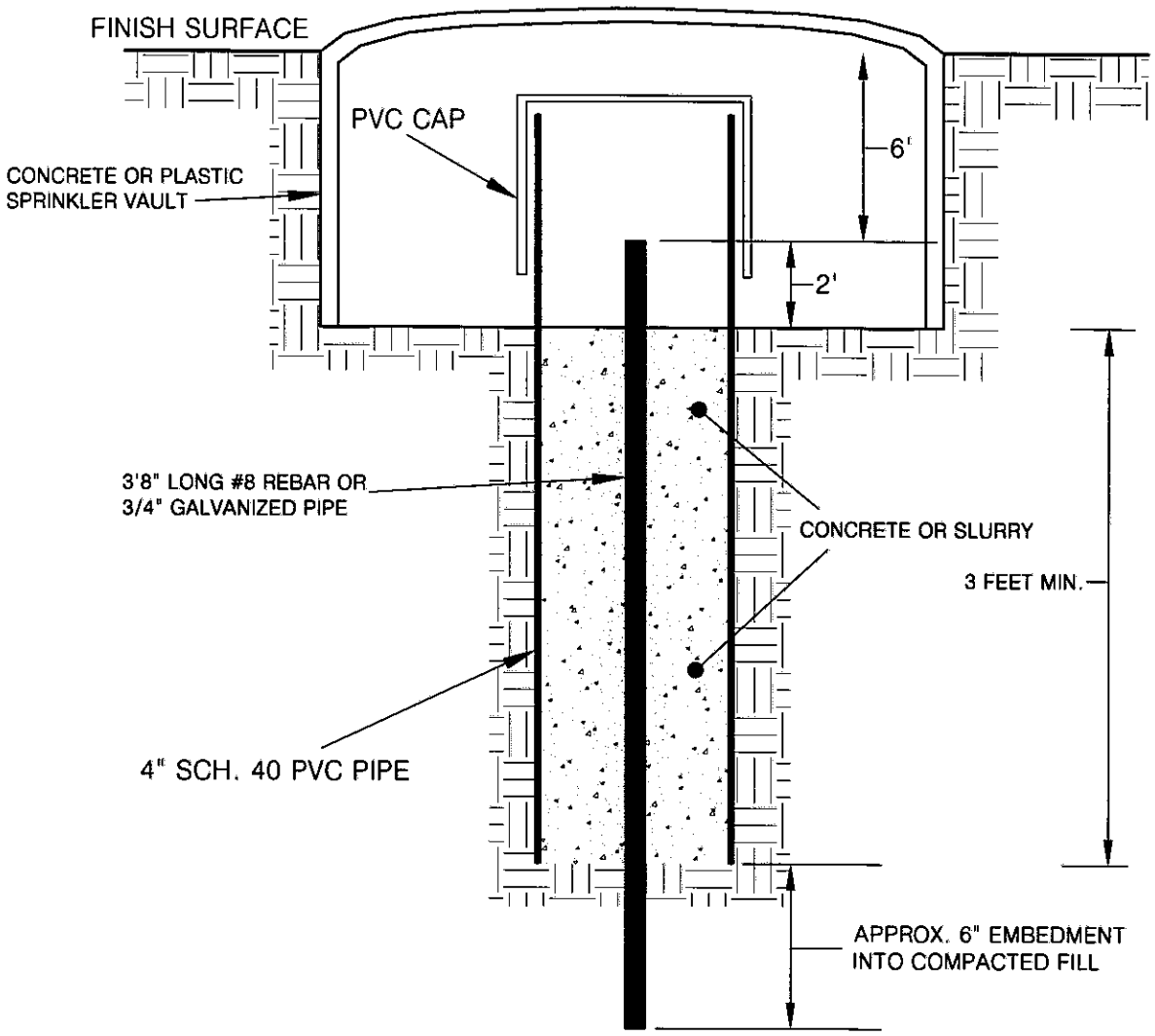
1) LOCATIONS OF SETTLEMENT PLATES SHALL BE CLEARLY MARKED AND READILY VISIBLE (RED FLAGGED) TO EQUIPMENT OPERATORS.

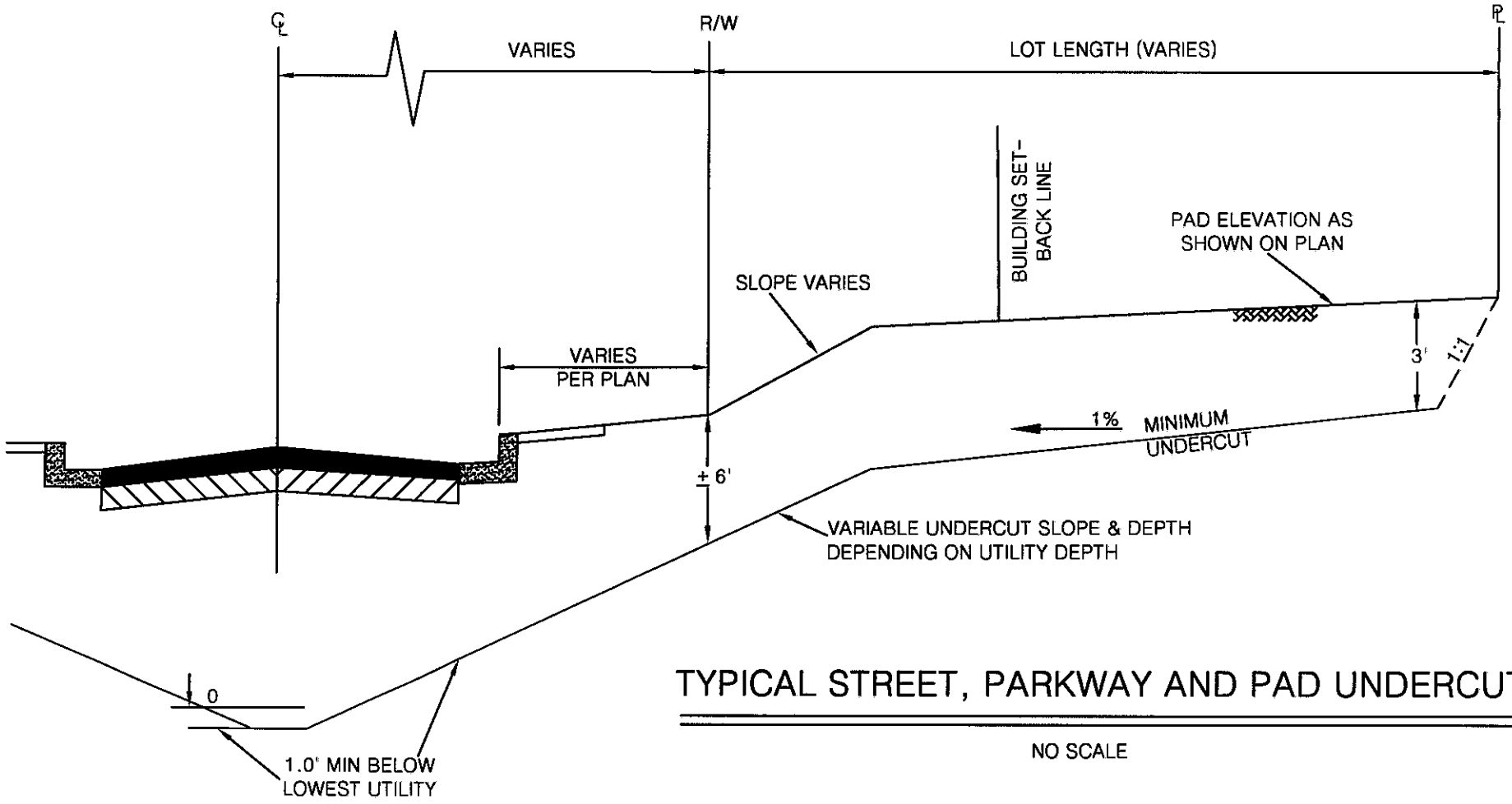
2) CONTRACTOR SHALL MAINTAIN 10' HORIZONTAL CLEARANCE FOR HEAVY EQUIPMENT WITHIN 5' (VERTICAL) OF PLATE BASE. FILL WITHIN CLEARANCE AREA SHALL BE HAND COMPACTED TO PROJECT SPECIFICATIONS OR COMPACTED BY ALTERNATIVE APPROVED BY THE GEOTECHNICAL ENGINEER.

3) AFTER 5' (VERTICAL) OF FILL IS IN PLACE, CONTRACTOR SHALL MAINTAIN 5' HORIZONTAL EQUIPMENT CLEARANCE. FILL IN CLEARANCE AREA SHALL BE HAND COMPACTED (OR APPROVED ALTERNATIVE) IN VERTICAL INCREMENTS NOT TO EXCEED 2 FEET.

4) IN THE EVENT OF DAMAGE TO SETTLEMENT PLATE OR EXTENSION RESULTING FROM EQUIPMENT OPERATING WITHIN PRESCRIBED CLEARANCE AREA, CONTRACTOR SHALL IMMEDIATELY NOTIFY GEOTECHNICAL ENGINEER AND SHALL BE RESPONSIBLE FOR RESTORING THE SETTLEMENT PLATE AND EXTENSION RODS TO WORKING ORDER.

SURFACE SETTLEMENT MONUMENT DETAIL





TYPICAL STREET, PARKWAY AND PAD UNDERCUT

NO SCALE

ALTA CALIFORNIA GEOTECHNICAL, INC .
VER. 3/13

PLATE G-19

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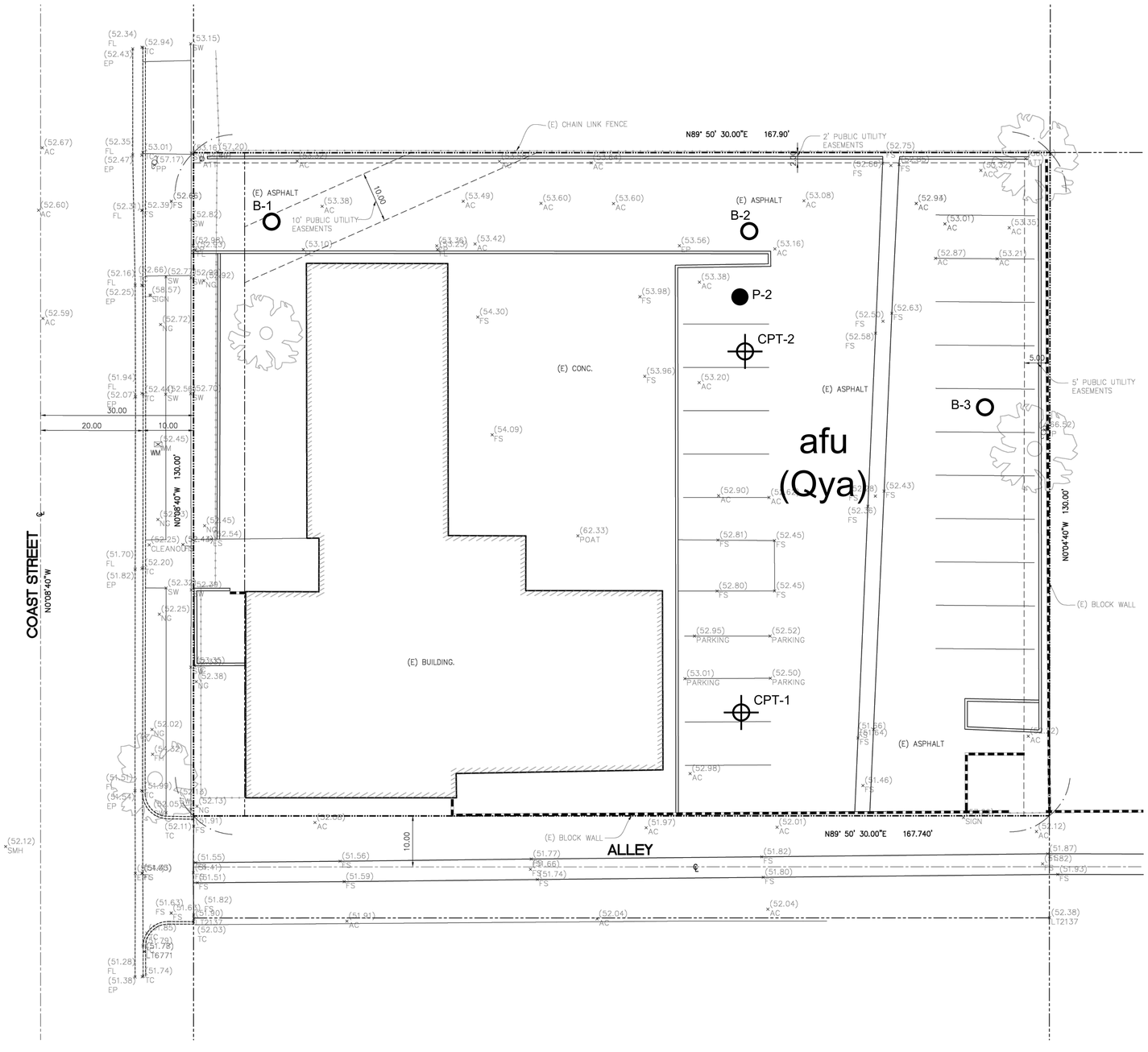


SCALE IN FEET
1 inch = 10 ft.

ABBREVIATION:

AC	ASPHALT CONCRETE
BCOR	BUILDING CORNER
BX	BOTTOM OF X
CC	CORNER CONCRETE
CP	CONTROL POINT
CONC	CONCRETE
CB	CABLE BOX
EDGBUIL	EDGE BUILDING
EP	EDGE OF PAVEMENT
FD	FOUND
FF	FINISH FLOOR
FG	FINISH GRADE
FL	FLOWLINE
FS	FINISH SURFACE
ICV	IRRIGATION CONTROL BOX
IP	IRON PIPE
GSP&W	GEAR SPIKE & WASHER
GUYPOLE	GUYWIRE/POWER POLE SUPPORT
L&T	LEAD & TAG/TACK
TSB	TRAFFIC SIGNAL BOX
TX	TOP OF X
WELMON	MONUMENT IN WELL
WM	WATER METER
WV	WATER VALVE

LEGEND

afu	ARTIFICIAL FILL-UNDOCUMENTED
Qya	YOUNG ALLUVIUM (BRACKETED WHERE BURIED)
B-3	APPROXIMATE LOCATION OF HOLLOW STEM BORING
P-2	APPROXIMATE LOCATION OF INFILTRATION TEST
CPT-2	APPROXIMATE LOCATION CPT BORING

LEGEND

BLOCK WALL		ASPHALT CONCRETE	
STEEL FENCE		CONCRETE	
CHAINLINK FENCE			
CENTERLINE			
BOUNDARY LINE			
PROPERTY LINE			

LEGAL DESCRIPTION:

LOT 2 IN BLOCK A OF TRACT NO. 1075, IN THE CITY OF GARDEN GROVE, COUNTY OF ORANGE, STATE OF CALIFORNIA, AS SHOWN ON A MAP RECORDED IN BOOK 35, PAGE 4 OF MISCELLANEOUS MAPS, RECORDS OF SAID ORANGE COUNTY.
TOGETHER WITH THAT PORTION OF COAST STREET AS DESCRIBED IN THAT CERTAIN RESOLUTION NO. 3239-66 ORDERING THE VACATION AND ABANDONMENT OF A PORTION OF SAID COAST STREET, A CERTIFIED COPY OF WHICH WAS RECORDED OCTOBER 14, 1966 IN BOOK 8076, PAGE 589 OF OFFICIAL RECORDS IN THE OFFICE OF THE COUNTY RECORDER OF SAID ORANGE COUNTY, LYING BETWEEN THE WESTERLY PROLONGATION OF THE NORTHERLY AND SOUTHERLY LINES OF SAID LOT 2.
EXCEPT ALL WATER AND WATER RIGHTS OF EVERY KING OR CHARACTER, IN UPON AND UNDER SAID LAND, AS RESERVED BY R.F. DEEBLE AND OTHERS IN DEED RECORDED OCTOBER 31, 1945 IN BOOK 1358, PAGE 525 OF OFFICIAL RECORDS, AND NOVEMBER 1, 1947 IN BOOK 1559, PAGE 366 OF OFFICIAL RECORDS.
APN: 097-011-03

BENCH MARK:

BENCH MARK ID: 1G-147-70
ELEVATION: 66.528 FT (NAVD88).
YEAR OF UPDATE: 2005.
DESCRIPTION:

BASIS OF BEARING:

THE CENTERLINE OF COAST STREET BEING N0°08'40"W PER TRACT No. 1075.

PREPARE BY: TRUONG DONG, RCE 75466.
LICENSE EXPIRES: 3/31/2024
DATE OF SURVEY: 09/30/2023
DONG ENGINEERING, INC.
12682 HOOVER ST, GARDEN GROVE, CA 92841.
TEL: (714) 204-2874.

PLATE 1

ALTA CALIFORNIA GEOTECHNICAL, INC.
170 N. MAPLE STREET, STE 108, CORONA, CA 92880
TELEPHONE: (951) 509-7090
PROJECT NUMBER: 1-0521 DATE: MAY 1, 2024

DONG ENGINEERING, INC.
ATTN: TROY DONG
12682 HOOVER ST.,
GARDEN GROVE, CA 92841
TEL- 714-204-2874
TRUONGDONG@GMAIL.COM

REVISIONS

NO:	DATE	REVISIONS

PROJECT OWNER

PROJECT ADDRESS

TOPOGRAPHIC SURVEY
13040 Coast St, Garden Grove, CA 92844

STAMP

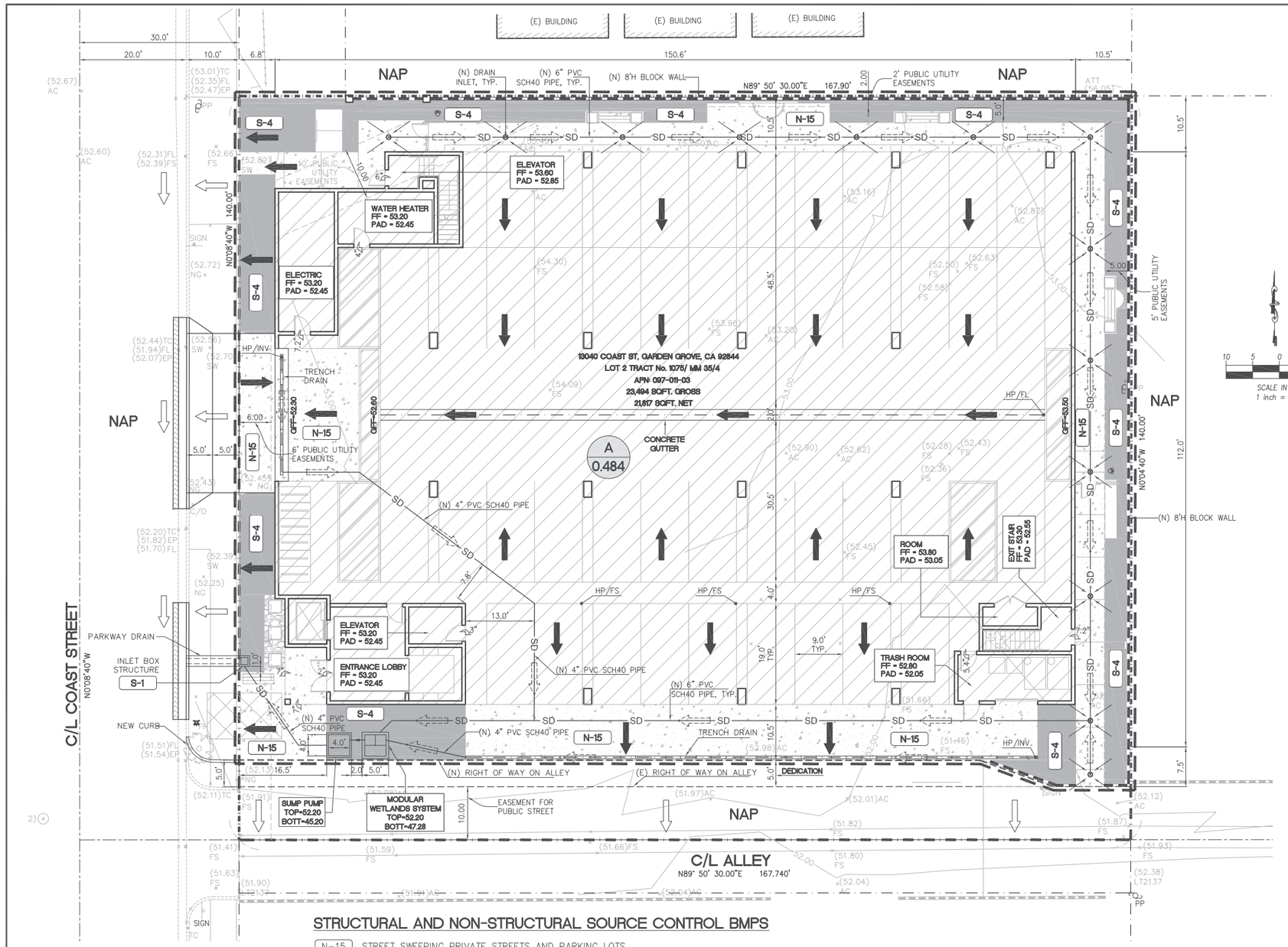
DATE SIGNED: 10/26/23

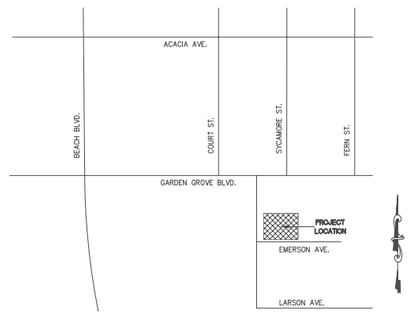
SHEET DESCRIPTION

DE#: 230447
SHEET

ATTACHMENT E

WQMP Plot Plan





VICINITY MAP
NOT TO SCALE

10 5 0 10
SCALE IN FEET
1 inch = 10 ft.

LEGEND

	EXISTING	PROPOSED
BLOCK WALL		
WOOD FENCE		
CURB & GUTTER	CURB / GUTTER / EP	CURB / GUTTER / EP
CENTERLINE		
PROPERTY LINE		
FLOWLINE		
DRAIN PIPE		SD
DRAIN DIRECTION TO DRAIN INLET		
LANDSCAPE AREA		
CONCRETE		
BUILDING		
NOT A PART		NAP
DIRECTION OF ONSITE SURFACE FLOW		
DIRECTION OF OFFSITE SURFACE FLOW		
DIRECTION OF PIPE		
DRAINAGE AREA BOUNDARY		
DRAINAGE AREA		X / XX DRAINAGE AREA DESIGNATION / AREA IN ACRES

STRUCTURAL AND NON-STRUCTURAL SOURCE CONTROL BMPS

N-15	STREET SWEEPING PRIVATE STREETS AND PARKING LOTS.
S-1	CATCH BASIN STENCILING.
S-3	TRASH AND WASTE STORAGE AREAS.
S-4	FILTRATION: SURFACE RUNOFF SHALL BE DIRECTED TO LANDSCAPE AREAS WHEREVER PRACTICAL.
S-4	COMMON AREA EFFICIENT IRRIGATION.
S-4	COMMON AREA RUNOFF-MINIMIZING LANDSCAPE DESIGN.
	BIOFILTRATION DEVICE (MODULAR WETLANDS SYSTEM)

DMI	LATITUDE	LONGITUDE
MODULAR WETLANDS SYSTEM	33°46'22"N	117°59'23"W
SUMP PUMP	33°46'22"N	117°59'23"W
INLET BOX STRUCTURE	33°46'22"N	117°59'23"W

IMPERVIOUS AREA = 3,143 SF
PERVIOUS AREA = 2,953 SF
BUILDING AREA = 14,992 SF
TOTAL AREA = 21,088 SF/0.484 ACRES

NOTES:

- THIS PLAN PRESENTS METHODS FOR FULFILLING THE REQUIREMENTS FOR THE ORANGE COUNTY CLEAN WATER PROGRAM STORMWATER QUALITY CONTROL REQUIREMENTS.

REVISIONS

NO.	INIT.	DATE	DESCRIPTION	APP'D	DATE

BENCH MARK:
1G-147-70, NAVD88; ELEVATION: 66.528', YEAR LEVELED: 2005.
DESCRIPTION: DESCRIBED BY OCS 2002 – FOUND 3 3\4" OCS ALUMINUM BENCHMARK DISK STAMPED "1G-147-70", SET IN THE TOP OF A 6 IN. BY 6 IN. CONCRETE POST. MONUMENT IS LOCATED IN THE NORTHWESTERLY CORNER OF THE INTERSECTION OF GARDEN GROVE BOULEVARD AND MAGNOLIA STREET, 142 FT. NORTHERLY OF THE NORTH CURB ALONG GARDEN GROVE BOULEVARD AND 53 WESTERLY OF THE CENTERLINE OF MAGNOLIA STREET. MONUMENT IS SET LEVEL WITH THE SIDEWALK.

OWNER OR DEVELOPER:
OWNER: LOC TRAN.
ADDRESS: 13040 COAST ST, GARDEN GROVE, CA 92844
TEL: (214) 682-5559.

SOILS ENGINEER:
ALTA CALIFORNIA GEOTECHNICAL INC
ADDRESS: 170 NORTH MAPLE STREET, CORONA, CA 92880
TEL: (951) 509-7090.
PROJECT NO.: 1-0521, REPORT DATED: MAY 1, 2024.
PREPARED BY: SCOTT A.GRAY, GE 2857.

PREPARED BY:
DONG ENGINEERING, INC.
ADDRESS: 7661 GARDEN GROVE BLVD., GARDEN GROVE, CA 92841.
TEL: (714) 617-5979.
EMAIL: INFO@DONGENGINEERING.COM

REGISTERED PROFESSIONAL ENGINEER
TRUONG TOMMY DONG
C75466
EXP. 03/31/2026
CIVIL
STATE OF CALIFORNIA

DATE SIGNED: 4/24/25

PRELIM WQMP PLAN

SITE ADDRESS: 13040 COAST ST, GARDEN GROVE, CA 92844

G-

SHEET 1 OF 1

SCALE: AS NOTED | DRAWN BY: GC | CHECKED BY: TD

CITY OF GARDEN GROVE

ATTACHMENT F

BMPs Fact Sheet

MODULAR WETLANDS™

*Advanced **Stormwater** Biofiltration*

MWS Linear

Contents

The Urban Impact

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

Plant A Wetland

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

MWS Linear

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

Applications

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

Industrial

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

Residential

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

Streets

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

Parking Lots

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

Commercial

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

Mixed Use

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

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

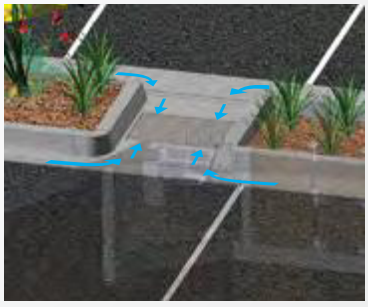
- Agriculture
- Reuse
- Low Impact Development
- Waste Water

Configurations

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

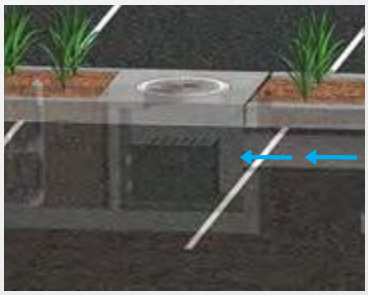
Curb Type

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



Grate Type

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



Vault Type

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

Downspout Type

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

Advantages & Operation

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

Featured Advantages

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

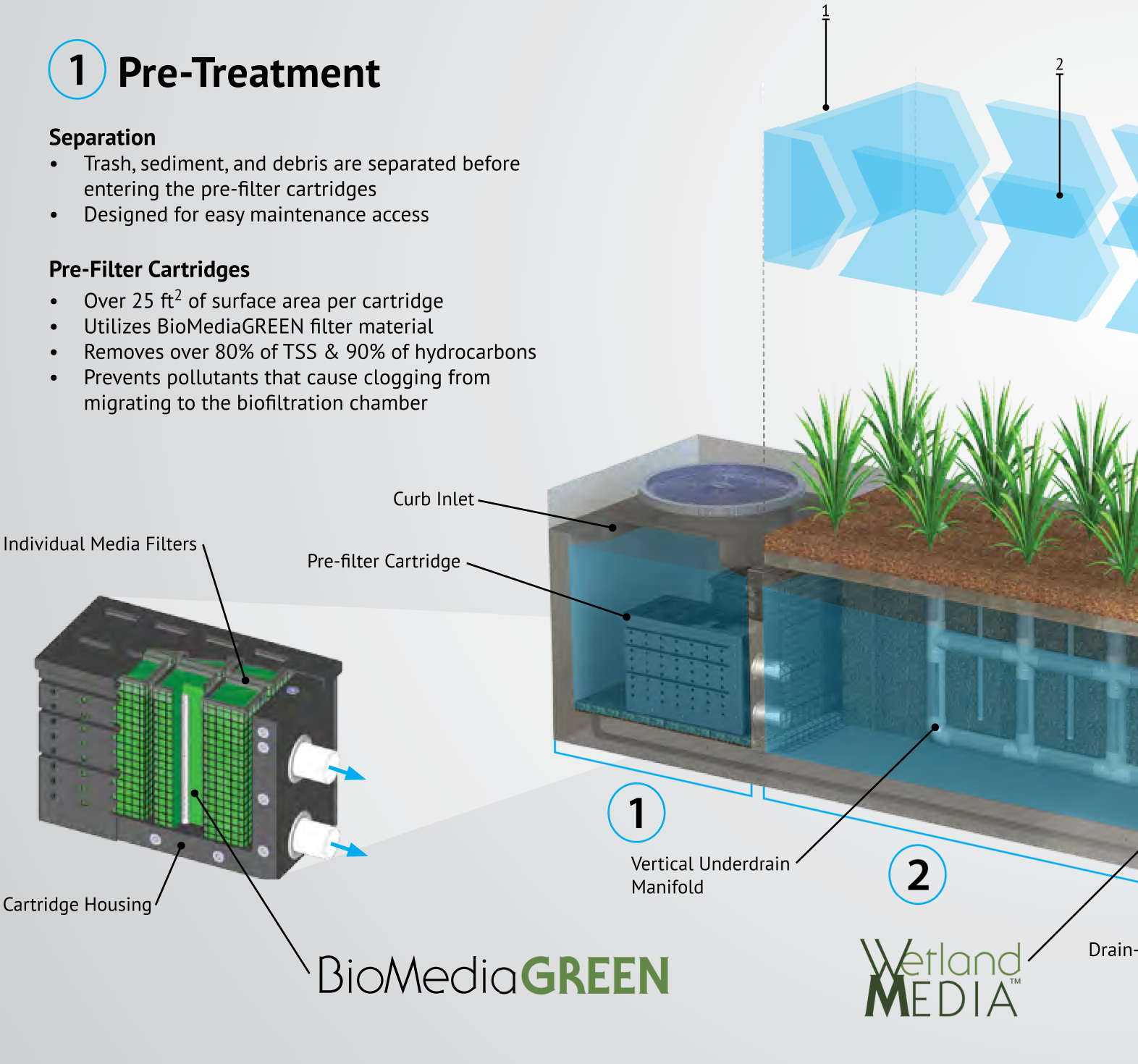
1 Pre-Treatment

Separation

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

Pre-Filter Cartridges

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



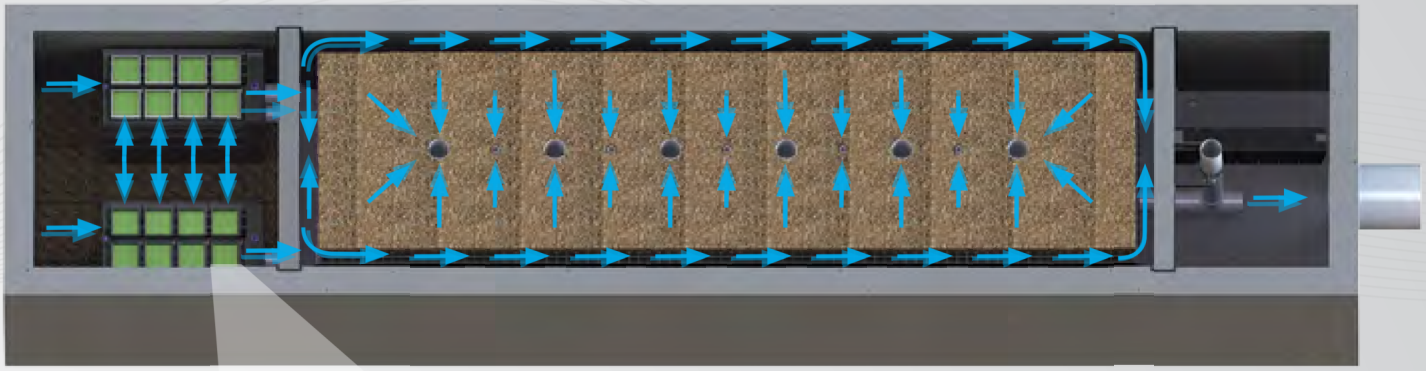


Fig. 2 - Top View

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

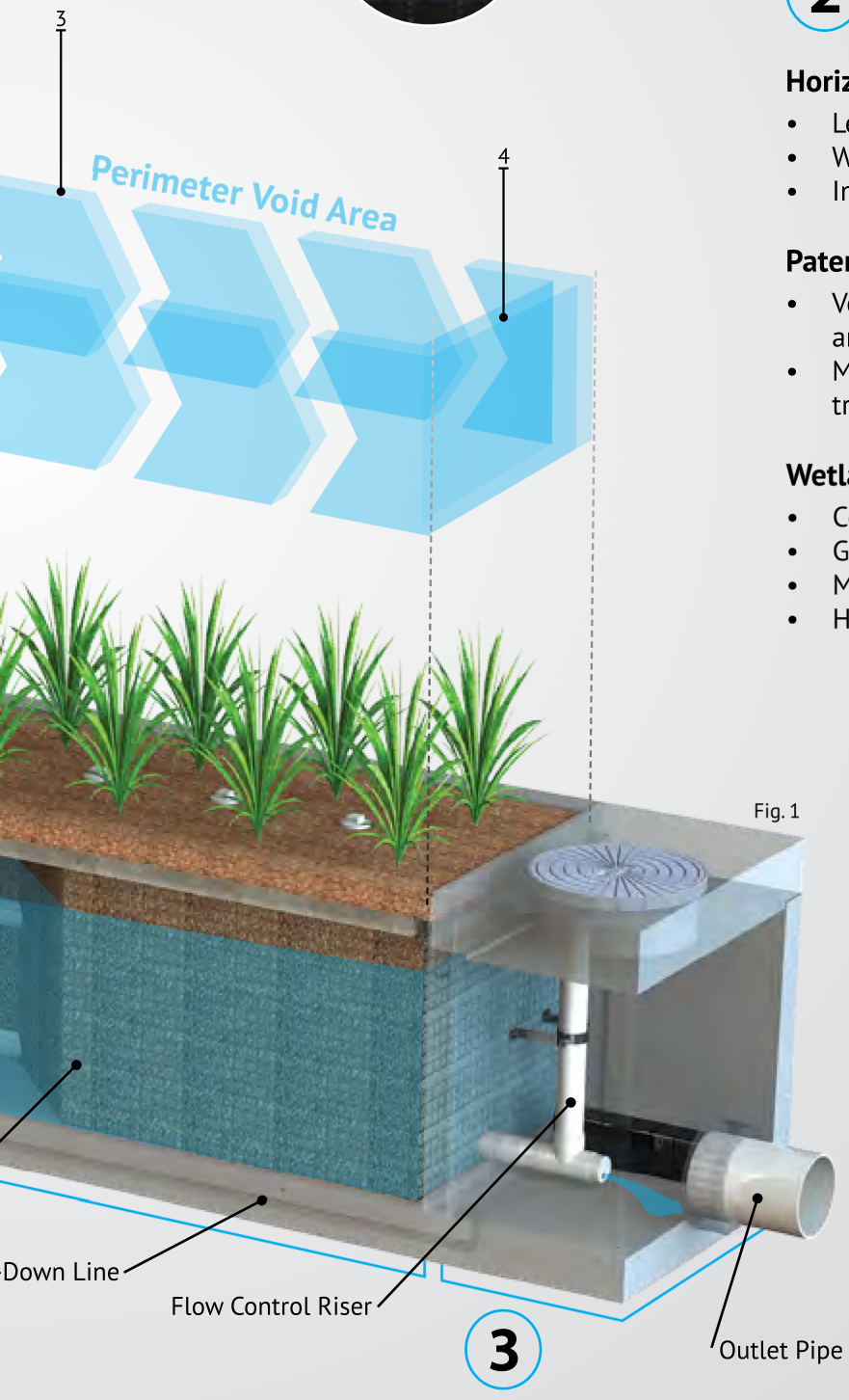


Fig. 1

2 Biofiltration

Horizontal Flow

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

Patented Perimeter Void Area

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

WetlandMEDIA

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

3 Discharge

Flow Control

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

Drain-Down Filter

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

Orientations

Side-By-Side

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

End-To-End

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

Bypass

Internal Bypass Weir (Side-by-Side Only)

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

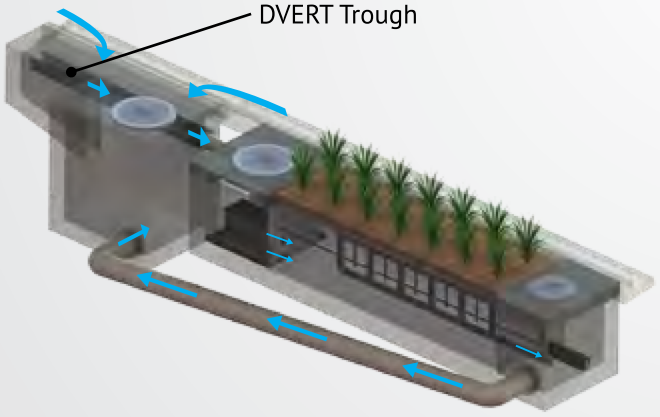
External Diversion Weir Structure

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

Flow By Design

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

DVERT Low Flow Diversion



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

Performance

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

Approvals

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

Washington State DOE Approved

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

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

DEQ Assignment

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

MASTEP Evaluation

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

Rhode Island DEM Approved

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

Flow Based Sizing

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

Treatment Flow Sizing Table

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

Volume Based Sizing

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

Treatment Volume Sizing Table

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

Installation

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

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

Maintenance

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

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

Plant Selection

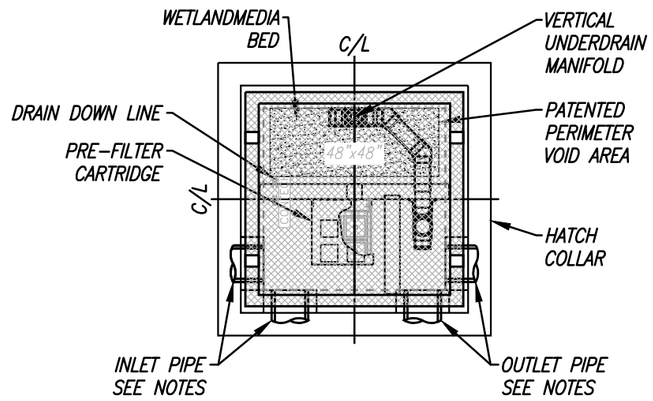
Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the MWS Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade the stormwater runoff/flow is being subjected to nature's secret weapon: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

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

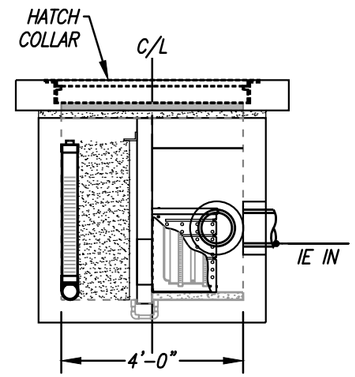
Please visit www.ModularWetlands.com/Plants for more information and various plant lists.

SITE SPECIFIC DATA			
PROJECT NUMBER		230447	
PROJECT NAME		34-UNIT APARTMENT	
PROJECT LOCATION		13040 COAST ST	
STRUCTURE ID			
TREATMENT REQUIRED			
TREATMENT FLOW (CFS)			0.052
PRETREATMENT LOADING RATE (GPM/SF)			3.0 GPM/SF
WETLAND MEDIA LOADING RATE (GPM/SF)			1.0
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			_____ (CF
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	48.42	PVC	8"
INLET PIPE 2	48.42	PVC	8"
OUTLET PIPE	47.08	PVC	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	52.00	52.00	52.00
SURFACE LOAD	PEDESTRIAN		
NOTES:			

* PRELIMINARY ONLY - NOT FOR CONSTRUCTION



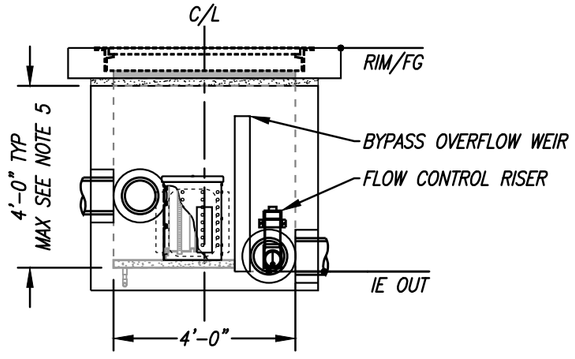
PLAN VIEW



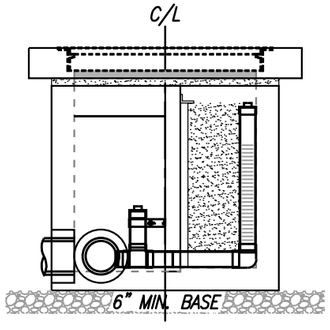
LEFT END VIEW

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
3. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
4. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.
5. VERTICAL HEIGHT VARIES BASED ON SITE SPECIFIC REQUIREMENTS.



ELEVATION VIEW



RIGHT END VIEW

MWS-L-4-4-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL