PRIORITY
WATER QUALITY MANAGEMENT PLAN
(WQMP)

For:

Batavia Self-Storage
630 N. Batavia St.
Orange, CA 92864

Prepared for:
SCIND Batavia Point, LLC
11150 Santa Monica Blvd, Suite 700
Los Angeles, CA 90025
(310) 929-8097

Prepared by:
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Patric de Boer, RCE 83583
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San Diego, CA 92123
(858) 634-8620

(06/27/2023)

_____ _____
Public Works Director **Date**

_____ _____
City Engineer **Date**

OWNER'S CERTIFICATION

WATER QUALITY MANAGEMENT PLAN

FOR

Batavia Self-Storage

This Water Quality Management Plan (WQMP) for the Batavia Self-Storage has been prepared for SCIND Batavia Point, LLC. This WQMP is intended to comply with the requirements of the City of Orange's [Tract/Parcel Map #__, Conditional Use Permit # TBD, and/or Site Development Permit/Application #TBD] 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 and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the City of Orange Local Implementation Plan (LIP), and the intent of NPDES Permit and Waste Discharge Requirements for the City of Orange, County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region.

This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party having responsibility for implementing portions of this WQMP. Maintenance requirements within Section V and Appendix D will be adhered to with particular emphasis on maintaining the BMPs described within Sections IV and V. The Owner's Annual Self Certification Statement along with a BMP maintenance implementation table will be submitted by June 30th every year following project completion. At least one copy of the approved WQMP shall be available on the subject property in perpetuity.

Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. The City of Orange will be notified of the change of ownership and the new owner will submit a new certification.

Signature: _____ Date: _____

Name: _____

Title: _____

Company: __SCIND Batavia Point, LLC_____

Address: __11150 Santa Monica Blvd., Suite 700_____

Telephone Number: _(310) 929-8097____

Notice of Transfer of Responsibility

Water Quality Management Plan (WQMP)

WQMP Number – As assigned by the City of Orange: TBD

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

I. Owner/ Responsible Party Information

Company/ Individual:_____ Contact Person:_____

Street Address:_____ Title:_____

City _____State____ Zip_____ Phone:_____

II. Information about Site Relevant to WQMP

Name of Project: _____
Title of WQMP applicable to site: _____
Street Address of the site: _____
Date of Transfer of Responsibility: _____

III. New Owner (Upon Transfer)/ Responsible Party Information

Company/ Individual:_____ Contact Person:_____

Street Address:_____ Title:_____

City _____State____ Zip_____ Phone:_____

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Appendices

List of Tables

I. Discretionary Permit Number(s), Water Quality Condition Number(s) and Conditions of Approval

Tract No_TBD_ Lot No.__TBD__

GPS Coordinates: _33°47’50.96”N__ _117°51’46.08”W__

Water Quality Conditions (WQMP conditions listed below)

A complete copy of the signed Conditions of Approval, Resolution Number ____TBD_____ Dated ____TBD____ are included as Appendix A

Conditions of Approval:

Insert text providing the discretionary permit numbers and the conditions of approval related to water quality (stated verbatim).

TBD

II. Project Description

Refer to Section 2.2 of the Technical Guidance Document for completion of this section.

Planning Area (Location): Orange

Project Site Area (ac): 3.06

Project Disturbed Area (ac): 3.06

Percent Change in Impermeable Surfaces: - 3%

SIC Code : 42259903

Project Description

Describe general characteristics including land cover, land use, project areas, landscaping, paved areas, material or wastes stored on site and other project features

The project proposes to construct two single story building around the perimeter of the site and a two-story building in the middle of the site. The project will include building roofs, asphalt pavement, concrete pavement and landscape areas.

Project Purpose and Activities

Identify purpose of project and proposed activities

The proposed activities will be limited to parking vehicles, loading and unloading.

Potential Storm Water Pollutants

List expected pollutants. See Section 2.2.2.2 and Table 2.1 of the Technical Guidance Document for information on expected project pollutants

Suspended solid/sediments, Nutrients, Pesticides, Oil & Grease, Toxic Organic Compounds and Trash and Debris

Hydrologic Conditions of Concern

Describe applicable hydrologic conditions of concern. Post Development conditions must meet pre-development conditions, including time of concentration, volume, velocity and matching 2-year hydrographs. See Section 2.2.3 of Technical Guidance Document for additional information.

$V_{2\text{-yr, Post}} = 19{,}301$ CF
$V_{2\text{-yr, Pre}} = 19{,}526$ CF

$V_{2\text{-yr, Post}} / V_{2\text{-yr, Pre}} \leq 1.05$

$0.99 \leq 1.05$

$T_{c\ 2\text{-yr, Post}} = 10.5$ min
$T_{c\ 2\text{-yr, Pre}} = 10$ min

$T_{c\ 2\text{-yr, Post}} / V_{2\text{-yr, Pre}} \leq 1.05$

$1.05 \leq 1.05$

Post Development Drainage Characteristics

Describe onsite and affected offsite post development drainage characteristics.

The site will drain via gutter flow towards the northwesterly corner of the site. A series of grated inlets will be installed along the westerly, southerly and northerly gutters to capture and store the volume of stormwater generated by the site in an underground 48” HDPE storage pipe and a 18” pipe. The proposed pump vault on the northwesterly corner of the site will pump the stormwater to a Modular Wetland System for treatment purposes. After treatment, the Modular Wetland System will discharge to the brow ditch parallel to the northerly property line and ultimately drain to the northwesterly corner of the site, this being Discharge Point # 1 in the Drainage Study. This point is the same discharge point as the existing conditions. In the event that a large storm event over-capacitates the pump for treatment flow, stormwater will spill over the pump vault grated inlet and flow within the ribbon gutter to the northwest corner of the site, over the proposed curb, into the vegetated swale, and out to Discharge Point # 1 as stated in the Drainage Study. From here, the offsite flow path matches the existing conditions.

Commercial Projects

Describe food preparation and eating areas, where materials will be stored or delivered, outdoor storage areas, materials exposed to rain, any onsite vehicle washing and other information not included in Project Description. (Delete if not used or note as NA).

N/A

Residential Projects

Describe lots and lot size, home size and note whether attached or detached and their number, total number of buildings or units. Describe any pools, tot lots, open space, etc. (Delete if not used or note as NA)

N/A

Site Ownership and any Easements

Describe any easements and ownership of Project by others and identify in Site Plan Section VI. Identify entity and contact information.

Owner Information:

SCIND Batavia Point LLC

11150 Santa Monica Blvd., Suite 700

Los Angeles, CA 90025

(310) 929-8097

Easements:

1) An easement for public utilities in favor of Southern California Edison Company
2) An easement for pole lines in favor of Southern California Edison Company
3) Rights of the public to any portion of the land lying within the area commonly known as Batavia Street.

III. Site Description

Refer to Section 2.3 of the Technical Guidance Document for completion of this section

Reference Location Map: Orange

Site Address: 630 N. Batavia St., Orange, CA 92864

Zoning: C-2

Predominant Soil type: Soil Group B

Pre-project percent pervious: 6% **Post-project percent pervious: 7%**

Pre-project percent impervious: 94% **Post-project percent impervious: 93%**

Site Characteristics

Describe the existing site, whether developed, undeveloped, vacant, built upon, existing buildings, topography, soils, geology, geotechnical conditions, depth to groundwater and its condition (polluted), infiltration capacity, existing utilities, other features and existing site drainage conditions.

The location of the site is currently developed with two existing one- and two-story industrial buildings with associated asphalt and concrete pavement. The existing topography is nearly level, with the site draining via sheet flow toward the northeasterly corner of the site. Per the Geotechnical Report, groundwater was not encountered at a depth of approximately 50 feet below ground surface. The Geotechnical Report does not recommend infiltration as the infiltration rate obtained from field testing was found to be 0.1 and 0.2 inches per hour.

Watershed Characteristics

Watershed: Santa Ana River

Downstream Receiving Waters: Lower Santa Ana River

Water Quality Impairments (if applicable): N/A

Identify hydromodification susceptibility: Site drains to an earthen stabilized channel See attached Susceptibility Analysis Map.

Identify watershed management priorities: N/A

IV. Best Management Practices

This section describes the selection of BMPs for the project and how they are able to treat the pollutants targeted. Refer to Section 2.4 of the Technical Guidance Document for additional information.

For any selected BMP with the potential to have nuisance water (standing water) within the BMP please discuss the process to address this potential problem in the vector control paragraph IV.6

IV.1 Site Design and Drainage Characteristics

Complete Table 1.

Table 1

Site Design BMPs

Technique	Included?		If no, state justification.
	Yes	No	
Minimize Directly Connected Impervious Areas (DCIAs) (C-Factor Reduction)		X	
Create Reduced or "Zero Discharge" Areas (Runoff Volume Reduction)[1]		X	
Minimize Impervious Area/Maximize Permeability (C-Factor Reduction)[2]		X	
Conserve Natural Areas (C-Factor Reduction)		X	No natural areas to conserve in the existing conditions.

1 Detention and retention areas incorporated into landscape design provide areas for retaining and detaining stormwater flows, resulting in lower runoff rates and reductions in volume due to limited infiltration and evaporation. Such Site Design BMPs may reduce the size of Treatment Control BMPs.

2 The "C Factor" is a representation of the ability of a surface to produce runoff. Surfaces that produce higher volumes of runoff are represented by higher C Factors. By incorporating more pervious, lower C Factor surfaces into a development, lower volumes of runoff will be produced. Lower volumes and rates of runoff translate directly to lowering treatment requirements.

Insert narrative discussion of each Site Design BMP selected and how its implementation will reduce runoff and the pollutants affected.

IV.2 Source Control BMPs

IV.2.1 Routine Non-Structural BMPs

Complete Table 2.

Table 2

Routine Non-Structural BMPs

BMP No.	Name	Check One		If not applicable, state brief reason.
		Included	Not Applicable	
N1	Education for Property Owners, Tenants and Occupants	X		
N2	Activity Restriction	X		
N3	Common Area Landscape Management	X		
N4	BMP Maintenance	X		
N5	Title 22 CCR Compliance		X	
N6	Local Water Quality Permit Compliance		X	This BMP is not applicable. The City of Orange does not issue water quality permits.
N7	Spill Contingency Plan	X		
N8	Underground Storage Tank Compliance		X	
N9	Hazardous Materials Disclosure Compliance		X	
N10	Uniform Fire Code Implementation	X		
N11	Common Area Litter Control	X		
N12	Employee Training	X		
N13	Housekeeping of Loading Docks		X	No loading docks proposed
N14	Common Area Catch Basin Inspection	X		
N15	Street Sweeping Private Streets and Parking Lots	X		

Insert narrative discussion of how each Routine Nonstructural BMP selected is to be implemented to reduce runoff and minimize pollutants in the project.

N1: Practical information will be provided to the first residents/occupants/tenants on general housekeeping practices that contribute to the protection of stormwater quality.

N2: If a POA is formed, conditions, CCRs must be prepared by the developer for the purpose of surface water quality protection.

N3: On-going landscape maintenance requirements consistent with those in the County Water Conservation Resolution (or city equivalent) will be implemented.

N7: A Spill Contingency Plan will be prepared by building operator or occupants for use by specified types of buildings or suite occupancies.

N10: The site will comply with Article 80 of the Uniform Fire Code enforced by the fire protection agency.

N11: The owner will implement trash management and little control procedures in the common areas aimed at reducing pollution of drainage water.

N12: An education program will be provided (per BMP No. N1) to future employees of individual businesses. Developer either prepares manual(s) for initial purchasers of business site or for development that is constructed for an unspecified use makes commitment on behalf of a POA or future business owner to prepare.

N14: The owner will inspect at least 80 percent of the drainage facilities, cleaned and maintained on an annual basin with 100 percent of the facilities included in a two-year period. Cleaning will be done in the late summer/ early fall prior to the start of the rainy season. Records will be kept to document the annual maintenance.

N15: Streets and parking lots will be swept prior to the storm season, in late summer or early fall, prior to the start of the rainy season or equivalent a required by the governing jurisdiction.

IV.2.2 Routine Structural BMPs

Complete Table 3.

Table 3

Routine Structural BMPs

Name	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Provide storm drain system stenciling and signage- "No Dumping – Drains to Ocean"	X		
Design and construct outdoor material storage areas to reduce pollution introduction		X	No outdoor material storage proposed
Design and construct trash and waste storage areas to reduce pollution introduction	X		
Use efficient irrigation systems & landscape design	X		
Protect slopes and channels and provide energy dissipation	X		
Incorporate requirements applicable to individual project features		X	
a. Dock areas		X	No dock areas proposed
b. Maintenance bays		X	No maintenance areas proposed
c. Vehicle or community wash areas		X	No wash areas proposed
d. Outdoor processing areas		X	No outdoor processing areas proposed
e. Equipment wash areas		X	No equipment wash areas proposed
f. Fueling areas		X	No fueling areas proposed
g. Hillside landscaping		X	No hillside landscaping proposed
h. Wash water control for food preparation areas		X	No food preparation areas proposed

Insert narrative discussion of how each Routine Structural BMP selected is to be implemented to reduce runoff and minimize pollutants in the project.

Stenciling will be provided on the on-site storm drain inlet.

A trash enclosure will be constructed to reduce pollution introduction to the storm drain system.

An efficient irrigation system will be used in the landscape areas.

Rip rap will be provided on the northeasterly corner of the site along the path of the brow ditch.

IV.3 Low Impact Development BMP Selection

Refer to Section 2.4.2.3 and 4.1 in the TGD for selecting LID BMPs.

IV.3.1 Hydrologic Source Controls

Select from the following table all hydrologic source control BMPs that are used by the project and identify in Site Plan. See Section 4.2 of Technical Guidance Document for additional information.

Table 4

Hydrologic Source Control BMPs

Name	Check If Used
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	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐
Other:	☐

Describe how each of the BMPs checked above is used in the project and how it will reduce project runoff.

N/A

IV.3.2 Infiltration BMPs

Identify infiltration BMPs to be used in project. See Section 2.4.2.4 of the Technical Guidance Document for infiltration infeasibility criteria and 4.3 for information of BMP selection.

Table 5

Infiltration BMPs

Name	Check If Used
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:	☐

Describe how each BMP checked above is used in the project. Identify if the LID Design Storm Capture Volume is fully met.

Indicate the effectiveness of the chosen BMP(s) to remove the specific project pollutants.

*Infiltration BMP(s), i.e. infiltration trenches and basins, etc., require pre-treatment prior to infiltration

The measured infiltration rates per the geotechnical report (Appendix E of PWQMP, section 1.3) were 0.2 in/hr and 0.1 in/hr. Allowing for a factor of safety of 2, the measured infiltration rates are 0.1 in/hr and 0.05 in/hr, thus the average infiltration rate for the site is 0.075 in/hr. Per *Section 2.3.1.3 Soil and Geologic Infiltration Characteristic*, Areas with an observed infiltration rate less than 0.1 inches per hour – these areas likely do not support appreciable levels of incidental infiltration. Infiltration has been deemed infeasible.

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

Identify any evapotranspiration and/or, rainwater harvesting BMPs used by the project See Section 4.4 and 4.4 of the Technical Guidance Document for additional information. (Delete if not used).

Table 6

Evapotranspiration, Rainwater Harvesting BMP

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

Describe how each BMP checked above is used in the project. Identify the LID Design Storm Volume captured.

N/A

IV.3.4 Biotreatment BMPs

Describe any biotreatment BMPs used in the project and include separate sections for selection, suitability, sizing, and infeasibility, as applicable. See Section 4.6 of the Technical Guidance Document for additional information. (Delete if not used).

Table 7
Biotreatment BMPs

Bioretention with underdrains	☐
Storm water planter boxes with underdrains	☐
Rain gardens with underdrains	☐
Constructed wetlands	☐
Vegetated swales	☐
Vegetated filter strips	☐
Proprietary vegetated biotreatment systems	☒
Wet extended detention basin	☐
Dry extended detention basins	☐
Other:	☐
Other:	☐

Describe how each BMP checked above is used in the project. Identify the portion of the LID Design Storm Volume captured. Identify the infeasibility constraints that do not allow the use of infiltration BMPs, evaporation, rainwater harvesting or a combination and document in narrative form below and the information required in Appendix XI of the Technical Guidance Document.

Indicate the effectiveness of the chosen BMP(s) to remove the specific project pollutants.

A modular wetland system (Model # MWS-L-6-6-3.5) will be used as a biotreatment BMP for the DCV generated by the site.

BIO-7: Proprietary Biotreatment

Proprietary biotreatment devices are devices that are manufactured to mimic natural systems such as bioretention areas by incorporating plants, soil, and microbes engineered to provide treatment at higher flow rates or volumes and with smaller footprints than their natural counterparts. Incoming flows are typically filtered through a planting media (mulch, compost, soil, plants, microbes, etc.) and either infiltrated or collected by an underdrain and delivered to the storm water conveyance system. Tree box filters are an increasingly common type of proprietary biotreatment device that are installed at curb level and filled with a bioretention type soil. For low to moderate flows they operate similarly to bioretention systems and are bypassed during high flows. Tree box filters are highly adaptable solutions that can be used in all types of development and in all types of soils but are especially applicable to dense urban parking lots, street, and roadways.

Also known as:

- *Catch basin planter box*
- *Bioretention vault*
- *Tree box filter*

Proprietary biotreatment
Source: http://www.americastusa.com /index.php/filterra/

Feasibility Screening Considerations

- Proprietary biotreatment devices that are unlined may cause incidental infiltration. Therefore, an evaluation of site conditions should be conducted to evaluate whether the BMP should include an impermeable liner to avoid infiltration into the subsurface.

Opportunity Criteria

- Drainage areas of 0.25 to 1.0 acres.
- Land use may include commercial, residential, mixed use, institutional, and subdivisions. Proprietary biotreatment facilities may also be applied in parking lot islands, traffic circles, road shoulders, and road medians.
- Must not adversely affect the level of flood protection provided by the drainage system.

OC-Specific Design Criteria and Considerations

☑ Frequent maintenance and the use of screens and grates to keep trash out may decrease the likelihood of clogging and prevent obstruction and bypass of incoming flows.

☑ Consult proprietors for specific criteria concerning the design and performance.

☑ Proprietary biotreatment may include specific media to address pollutants of concern. However, for proprietary device to be considered a biotreatment device the media must be capable of supporting rigorous growth of vegetation.

☑ Proprietary systems must be acceptable to the reviewing agency. Reviewing agencies shall have the discretion to request performance information. Reviewing agencies shall have the discretion to deny the use of a proprietary BMP on the grounds of performance, maintenance considerations, or other relevant factors.

N/A In right of way areas, plant selection should not impair traffic lines of site. Local jurisdictions may also limit plant selection in keeping with landscaping themes.

Computing Sizing Criteria for Proprietary Biotreatment Device

- Proprietary biotreatment devices can be volume based or flow-based BMPs.
- Volume-based proprietary devices should be sized using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** or the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs described in **Appendix III.3.2**.
- The required design flowrate for flow-based proprietary devices should be computed using the Capture Efficiency Method for Flow-based BMPs described in **Appendix III.3.3)**.

In South Orange County, the provided ponding plus pore volume must be checked to demonstrate that it is greater than 0.75 of the remaining DCV that this BMP is designed to address. Many propretary biotreatment BMPs will not be able to meet the definition of "biofiltration" that applies in South Orange County. See Section III.7 and Worksheet SOC-1.

Additional References for Design Guidance

- Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4: **http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850**
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 9: **http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf**
- Santa Barbara BMP Guidance Manual, Chapter 6: **http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf**

IV.3.5 Hydromodification Control BMPs

Describe any hydromodification control BMPs used in project. Refer to Section 5 of the= Technical Guidance Document for additional information. Include sections for selection,= suitability, sizing, and infeasibility, as applicable. Detail compliance with Conditions of= Approval (if applicable). (Delete if not used or note NA).

$V_{2\text{-yr, Post}}$ = 19,301 CF
$V_{2\text{-yr, Pre}}$ = 19,526 CF

$V_{2\text{-yr, Post}} / V_{2\text{-yr, Pre}} \leq 1.05$

$0.98 \leq 1.05$

$T_{c\ 2\text{-yr, Post}}$ = 10.5 min
$T_{c\ 2\text{-yr, Pre}}$ = 10 min

$T_{c\ 2\text{-yr, Post}} / V_{2\text{-yr, Pre}} \leq 1.05$

$1.05 \leq 1.05$

The post-development runoff volume and the time of concentration for the 2-year, 24-hour storm do not exceed by more than 5% than that of the pre-development conditions, however, due to the existing conditions containing a detention basin at the northwesterly corner of the site, storage had to be provided. A proposed 48” HDPE storage pipe is provided along the westerly and northerly drive aisles while a 18” pipe is provided along the northerly drive aisle. These pipes will store the entire DCV of the site. The DCV is then pumped to a Modular Wetland System for treatment purposes.

DCV = 7,491 CF

Volume Provided by BMP-1 = 7,521 CF

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 for assistance in completing section. (Delete if not used or note NA).
N/A

IV.3.7 Treatment Control BMPs

Describe any Treatment control BMPs used in project. 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. Include sections for selection,= sizing, and infeasibility, as applicable. (Delete if not used or note NA).

Indicate the effectiveness of the chosen BMP(s) to remove the specific project pollutants.

N/A

IV. 4 Water Quality Credits

Describe any water quality credits applicable to project (credits can only be taken if proposed LID BMPs cannot capture entire Design Storm Volume). Refer to Section 7.II-3.1 of the Model WQMP. (Delete if not used or note NA).

N/A

IV.5 Alternative Compliance Plan

Describe the alternative compliance plan (if applicable). Include alternative compliance obligations (i.e., gallons, pounds) and describe proposed alternative compliance measures. Refer to Section 7.II 3.0 in the Model WQMP. (Delete if not used or note NA).

N/A

IV.6 Vector Control

For each BMP with the potential for standing nuisance water describe how vector control issues will be addressed.

N/A

IV.7 Drainage Management Area (DMA)

Describe each DMA used in project, the BMPs in each DMA and the area treated.

DMA Number	BMPs	Area Treated
1	48” HDPE Storage Pipe & 18” Pipe (BMP-1) & Modular Wetland System (BMP-2)	Building roofs, asphalt drive aisle & portions of landscape
2	N/A	Northeasterly landscape & brow ditch are fully pervious
Total Area	133,454 SF (3.06 acres)	

Total Project Area= 133,454 SF (3.06 acres)

(Note if all project design storm volume is captured by these BMPs).

BMP-1 captures the entire DCV generated by DMA-1 and treats the stormwater via BMP-2.

DMA-1:

DCV = 7,491 CF

Volume Provided by BMP-1 = 7,521 CF

The entire DCV will be pumped at a rate of 0.10 cfs to a proprietary biofiltration Modular Wetland System. The entire DCV will drawdown in approximately entirely 21.2 hours.

DCV = 7,491 CF

Discharge Flowrate = 0.10 CFS

Total drawdown time = (7,491 CF/0.10 CFS) * (1 hr/3600 sec)

= 20.8 hours

IV.8 Calculations

Provide calculations for all LID, Structural and Treatment BMPs selected. All calculations must be signed by a registered civil engineer. Individual or worksheets provided in Technical Guidance Document (if applicable) may be used.

Worksheet B: Simple Design Capture Volume Sizing Method

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.80	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.80	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	3.06	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	0.96	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.87	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	7,491	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{observed}$[1] (in/hr) (**Appendix VII**)	$K_{observed}$=	0	In/hr
2	Enter combined safety factor from Worksheet H, S_{total} (unitless)	S_{total}=	N/A	
3	Calculate design infiltration rate, $K_{design} = K_{observed} / S_{total}$	K_{design}=	0	In/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=		Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=		feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=		sq-ft

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

The site proposes 7,521 CF of volume on 2 - 48" HDPE storage pipes and a 18" pipe that will store the entire DCV generated by the site. The DCV of 7,491 CF will then be pumped to a Modular Wetland System for treatment.

The drawdown will be calculated based on the performance of the proposed Liberty FL30 series pumps. At a total head of 3.5', the pumps will discharge at a rate of 0.10 cfs.

Total drawdown time = 7,491 CF / 0.10 cfs
= 74,910 sec x (1 hr / 3600 sec)
= 20.8 hours

STORAGE CALCULATIONS

Storage Description	Location	Volume (cf)
48" HDPE Storage Pipe, 298 L.F.	Southerly drive aisle	3745
48" HDPE Storage Pipe, 235 L.F.	Westerly drive aisle	2953
18" Storage Pipe, 318 L.F.	Northerly drive aisle	562
3'x3'x4.22' CB	NE corner of drive aisle	38
5'x5'x2.5' CB	SE corner of drive aisle	62.5
5'x5'x2.68' CB	SW corner of drive aisle	67
5'x5'x3.73' CB	NE corner of drive aisle	93
	Total Proposed Volume (cf) =	7521
	DCV (cf) =	7491

The volume of the storage pipes has been calculated with the volume formula for a circle:
Volume = π * r^2 * Length.
The volume of the catch basins has been calculated with the volume formula for a rectangle:
Volume = Base x Height x Length

Size a Pump

CLIENT:	Batavia Self-Storage	COUNTY:	Orange	DATE:	12/8/22
DSN BY:	Patric de Boer	CHK BY:	_____	DATE:	_____
COMMENTS:					

Elevation at Highest Point	165.0	ft
Elevation at Low Point	161.5	ft

CLEAR CELLS

DISCHARGE PIPE

Discharge Pipe Length	110.0	ft
Equivalent Length of Pipe Fittings	10.4	ft (see tables) ==========>
Discharge Pipe Inside Diameter	2.00	in
Hazen-Williams Roughness, C	130	==========>
Other Losses	0.0	ft
Static Head	3.5	ft
Total Discharge Pipe Length	120.4	ft (includes equivalent length of fittings)

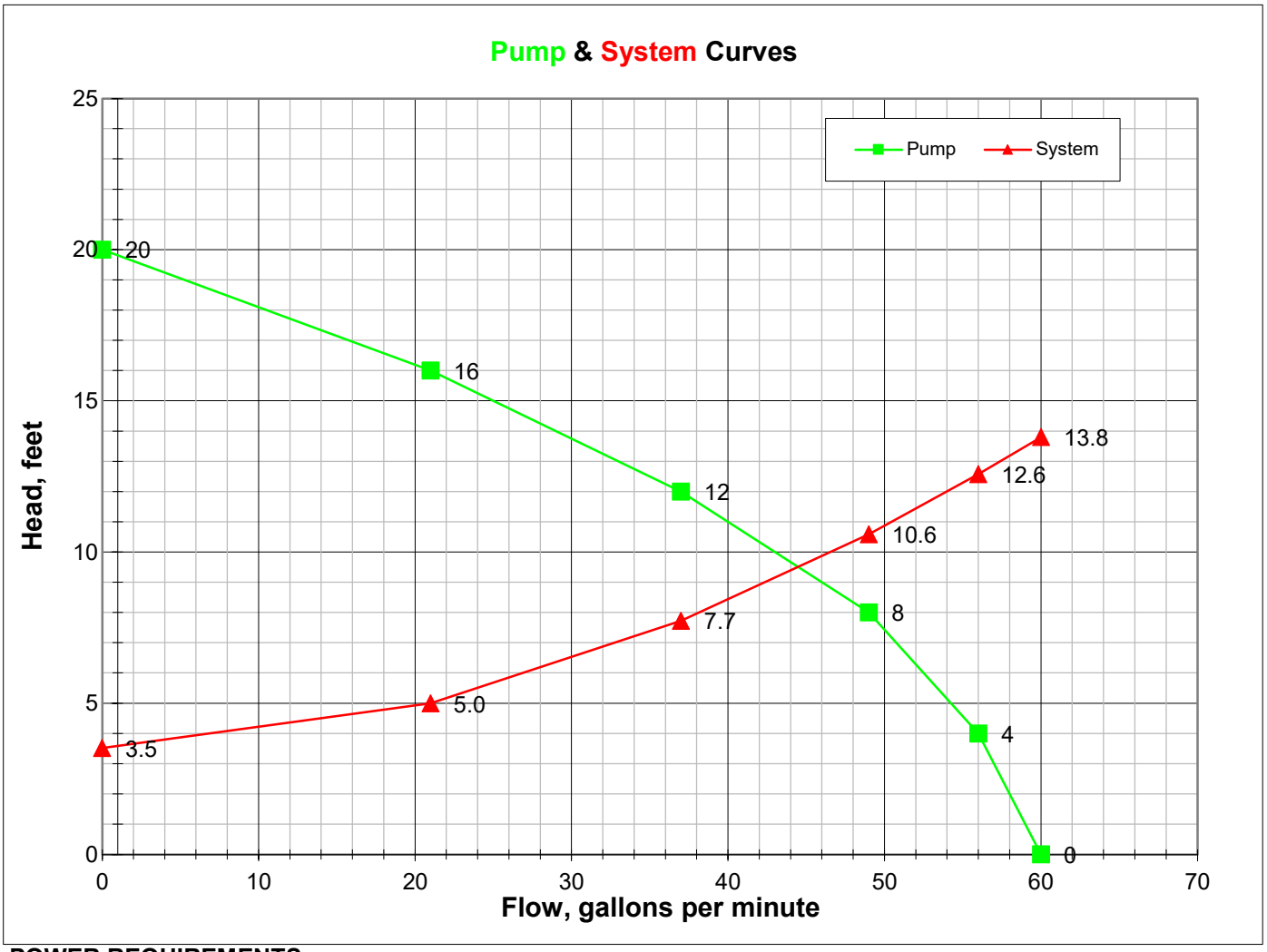
Hazen-Williams	
Material	***C***
Brass	130
Cast Iron	100
Concrete	100
Copper	130
Fiberglass	150
PE, no joints	150
PVC	130
Steel, Smooth	100
Steel, Spiral	90
Steel, CMP	60

Pump Manufacturer	Liberty Pumps
Pump Model #	FL30-Series

Pump Curve		**System Curve**	
Flow GPM	Pump Head, ft	Flow GPM	System Head, ft
60	0	60	13.8
56	4	56	12.6
49	8	49	10.6
37	12	37	7.7
21	16	21	5.0
0	20	0	3.5

Head at Operating Point	9.5	ft (Intersection of curves from graph below)
Flow at Operating Point	44	gpm (Intersection of curves from graph below)
	0.10	cfs
Operating Velocity	4.5	feet/sec
Operating Pressure	4.1	psi

Note: Velocity will increase as static head pressure (acting against the pump) decreases



POWER REQUIREMENTS

Hydraulic Power	0.1	WHP	(net energy transferred to the fluid)
	0.1	WkW	(net energy transferred to the fluid)
Installed Pump Efficiency	74.0	%	(see manufacturer's efficiency curves)
Brake Power	0.1	bHP	(power delivered by the motor to the pump)
	0.1	bkW	(power delivered by the motor to the pump)
Motor Efficiency	70.0	%	
Motor Input Power	0.2	HP	
	0.2	kW	

COST OF ELECTRICITY

Cost per kW-hr	$0.100	Dollars
Hours used	1.0	Hours
Total Cost	$0.02	Dollars

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

General Landscape Type	Conservation Design: K_L = 0.35			Active Turf Areas: K_L = 0.7		
Closest ET Station	*Irvine*	*Santa Ana*	*Laguna*	*Irvine*	*Santa Ana*	*Laguna*
Design Capture Storm Depth, inches	**Minimum Required Irrigated Area per Tributary Impervious Acre for Potential Partial Capture, ac/ac**					
0.60	0.66	0.68	0.72	0.33	0.34	0.36
0.65	0.72	0.73	0.78	0.36	0.37	0.39
0.70	0.77	0.79	0.84	0.39	0.39	0.42
0.75	0.83	0.84	0.90	0.41	0.42	0.45
0.80	0.88	0.90	0.96	0.44	0.45	0.48
0.85	0.93	0.95	1.02	0.47	0.48	0.51
0.90	0.99	1.01	1.08	0.49	0.51	0.54
0.95	1.04	1.07	1.14	0.52	0.53	0.57
1.00	1.10	1.12	1.20	0.55	0.56	0.60

Worksheet J: Summary of Harvested Water Demand and Feasibility

1	What demands for harvested water exist in the tributary area (check all that apply):			
2	Toilet and urinal flushing		☑	
3	Landscape irrigation		☑	
4	Other:_____		☐	
5	What is the design capture storm depth? (**Figure III.1**)	d	0.80	inches
6	What is the project size?	A	3.06	ac
7	What is the acreage of impervious area?	IA	2.82	ac
	For projects with multiple types of demand (toilet flushing, indoor demand, and/or other demand)			
8	What is the minimum use required for partial capture? (**Table X.6**)		1,833 *	gpd
9	What is the project estimated wet season total daily use?		180 **	gpd
10	Is partial capture potentially feasible? (Line 9 > Line 8?)		No	
	For projects with only toilet flushing demand			
11	What is the minimum TUTIA for partial capture? (**Table X.7**)		130 ***	
12	What is the project estimated TUTIA?		46 ****	

* Storm Depth = 0.8, gpd / impervious acre = 650 /ac

** KL = 0.35, Santa Ana Region, gpd per irrigated acre = 720, irrigated acre = 0.25 ac

*** Storm Depth = 0.8, Toilet Users per impervious area = 130 /ac

**** Toilet users = 4

Worksheet J: Summary of Harvested Water Demand and Feasibility

13	Is partial capture potentially feasible? (Line 12 > Line 11?)	No	
	For projects with only irrigation demand		
14	What is the minimum irrigation area required based on conservation landscape design? (**Table X.8**)	0.90	ac
15	What is the proposed project irrigated area? (multiply conservation landscaping by 1; multiply active turf by 2)	0.25	ac
16	Is partial capture potentially feasible? (Line 15 > Line 14?)	No	
Provide supporting assumptions and citations for controlling demand calculation:			

V. Implementation, Maintenance and Inspection Responsibility for BMPs (O&M Plan)

Responsible Party Information (Local Contact Information)

Name: _____ Title: _____

Company: __SCIND Batavia Point, LLC__ Phone Number: _(310) 929-8097____

Complete frequency matrix. Expand or increase each cell box to provide the information required.

Table 8 - Frequency Inspection Matrix

BMP	Responsible Party	*Maintenance Activity	*Inspection/Maintenance Frequency
Source Control BMPs (Structural and Non-structural)			
N/A		Storm drain stenciling	As needed
N/A		Sweep plazas, sidewalks and parking lots	As needed
Low Impact Development and Treatment BMPs			
BMP-1, 48” HDPE Storage Pipe & 18” Pipe		Remove trash	As needed
BMP-2, Propietary Biofiltration Facility Modular Wetland (MWS-D-6-6-3.5)		Removed trash & debris, remove sediment from separation chamber, replace cartridge filter media, replace drain down filter media, trim vegetation	Per manufacturer recommendations

*Attach in appendix additional inspection, maintenance and operations information if required.

Regulatory Permits

Identify any regulatory permits required.

N/A

Funding

Identify how the installation and on-going maintenance for all BMPs will be funded.

WILL BE PROVIDED IN MINISTERIAL REVIEW

OWNER SELF CERTIFICATION STATEMENT

As the owner representative of the Batavia Self-Storage for which a Water Quality Management Plan (WQMP) was approved by the City, I hereby certify under penalty of law that all Best Management Practices contained within the approved Project WQMP have been maintained and inspected in accordance with the schedule and frequency outlined in the approved WQMP Maintenance Table.

The maintenance activities and inspections conducted are shown in the attached table and have been performed by qualified and knowledgeable individuals. Structural Treatment BMPs have been inspected and certified by a licensed professional engineer.

To the best of my knowledge, the information submitted is true and accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and citations for violating water quality regulations.

Signed: _____

Name: _____

Title: _____

Company: __SCIND Batavia Point, LLC_____

Address: _11150 Santa Monica Blvd., Suite 700, Los Angeles, CA 90025__

Telephone Number: ___(310)-929-8097_____

Date: _____

BMP Implementation Tracking Table

BMP	Activity	Completion Dates or Frequency	Initial
Source Control BMPs (Structural and Nonstructural)			
N/A	Storm drain stenciling		
N/A	Sweep plazas, sidewalks and parking lots		
Low Impact Development and Treatment BMPs			
BMP-1, 48” HDPE Storage Pipe & 18” Pipe	Remove trash		
BMP-2, Proprietary Biofiltration Facility Modular Wetland (MWS-D-6-6-3.5)	Removed trash & debris, remove sediment from separation chamber, replace cartridge filter media, replace drain down filter media, trim vegetation		

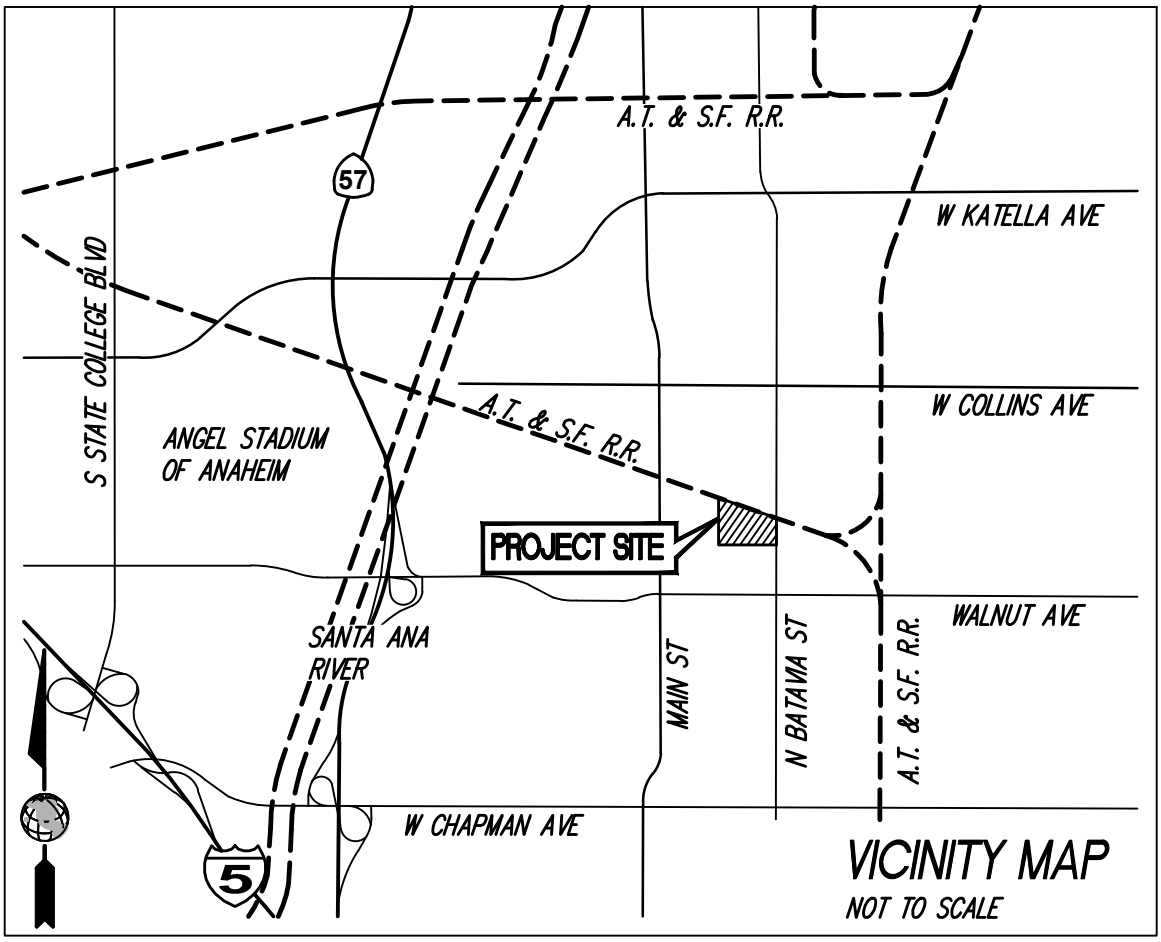
* This sheet is to be submitted annually with the Owner Self Certification Statement.

** Structural Treatment BMPs should be certified by a Licensed Professional Engineer.

VI. Location Map, Site Plan, and BMP Details

Include a location map that identifies project location and proximity to nearby water bodies. In an 11X17 sheet Identify land use, cover, feasibility constraints, structures, buildings, number of units, landscape areas, storm drain inlets, storm drain facilities, drainage flow direction, structural and treatment BMP locations, dumpsters, trash enclosures, wash areas, etc.

Delineate drainage management areas showing limits (acreage) of each drainage area for all structural, treatment and Low Impact Development BMPs used and provide BMP details on plan or in Appendix C.


A.T. & S.F. R.R.
57
W KATELLA AVE
S STATE COLLEGE BLVD
W COLLINS AVE
A.T. & S.F. R.R.
ANGEL STADIUM
OF ANAHEIM
PROJECT SITE
WALNUT AVE
SANTA ANA
RIVER
MAIN ST
N BATAVIA ST
A.T. & S.F. R.R.
W CHAPMAN AVE
5
VICINITY MAP
NOT TO SCALE

Susceptibility

Potential Areas of Erosion, Habitat, & Physical Structure Susceptibility

Channel Type

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

Tidel Influence

- <= Mean High Water Line (4.28')

Water Body

- Basin
- Dam
- Lake
- Reservoir

Forest Areas

- Cleveland National Forest

Federal Lands

- Amarus Salt Marsh

San Gabriel-Coyote Creek Watershed

San Bernardino County

Riverside County

Orange County

South Orange County

AnaheimBay-HuntingtonHarbor Watershed

Newport Bay Watershed

Carbon Canyon

Yorba Linda Reservoir

Miller Retarding Basin

Anaheim Lake

Warner Basin

Kraemer Basin

Olive Hills

Fletcher Retarding Basin

Project Site

Walnut Canyon Reservoir

Villa Park Dam

Peters Canyon Reservoir

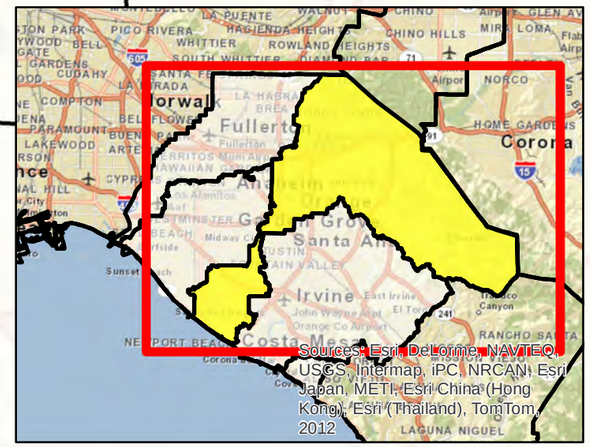
Irvine Lake

Cleveland National Forest

Stabilized by Grade Control Structure

SOUTHPARK PUMP STATION

Bartlett Retarding Basin



0 12,000 24,000 Feet

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2012

P:\9526E\16-GIS\Mxds\SuceptabilityMaps_20100505\9526E_SantaAnaRiverSusceptibility_20100430.mxd

TITLE: SUSCEPTIBILITY ANALYIS SANTA ANA RIVER

JOB: ORANGE COUNTY WATERSHED MASTER PLANNING ORANGE CO. CA

SCALE	1" = 12000'
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/30/10
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE 3

SUBJECT TO FURTHER REVISION

Site Location
Storm Depth=0.80"

LEGEND

- Orange County Precipitation Stations
- 24 Hour, 85th Percentile Rainfall (Inches)
- 24 Hour, 85th Percentile Rainfall (Inches) - Extrapolated
- City Boundaries

Rainfall Zones

Design Capture Storm Depth (inches)

- 0.65"
- 0.7
- 0.75
- 0.80
- 0.85
- 0.90
- 0.95
- 1.00
- 1.10"

Note: Events defined as 24-hour periods (calendar days) with greater than 0.1 inches of rainfall.
For areas outside of available data coverage, professional judgment shall be applied.

0 3 6 12 Kilometers
0 1.8 3.6 7.2 Miles

P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-1_RainfallZones_20110215.mxd

TITLE: RAINFALL ZONES

JOB: ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT — ORANGE CO., CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	9526-E

PACE Advanced Water Engineering

FIGURE XVI-1

SUBJECT TO FURTHER REVISION

Site Location
Soil Group B

LOS ANGELES COUNTY
ORANGE COUNTY
SAN BERNARDINO COUNTY
ORANGE COUNTY
RIVERSIDE COUNTY
ORANGE COUNTY
LOS ANGELES COUNTY
ORANGE COUNTY

LEGEND

City Boundaries

Hydrologic Soil Groups

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

Source:
Soils: Natural Resources Conservation Service (NRCS)
Soil Survey - soil_ca678, Orange County & Western Riverside
Date of publication: 2006-02-08
http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

0 2.5 5 10 Kilometers
0 1.8 3.6 7.2 Miles

TITLE
NRCS HYDROLOGIC SOILS GROUPS

JOB
ORANGE COUNTY INFILTRATION STUDY
ORANGE CO. CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE
XVI-2a

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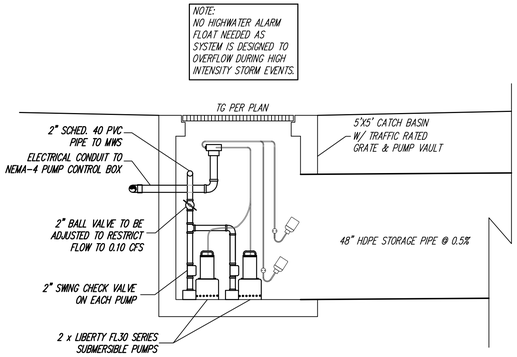


PUMP VAULT DETAIL

NOT TO SCALE

SOURCE CONTROL BMP NOTES

ALL APPLICABLE SOURCE CONTROL BMPS SHALL BE UTILIZED.

A. ALL ONSITE INLETS TO BE MARKED "NO DUMPING" OR SIMILAR AND ALL OPERATIONAL PRECAUTIONS TO AVOID NON STORM WATER DISCHARGE SHALL BE FOLLOWED PER THE CITY'S BMP DESIGN MANUAL.

B. PROPOSED REFUSE AREA WILL REMAIN COVERED AND PROTECTED FROM WIND DISPERSAL. SIGNS SHALL BE PLACED WITH WORDS "DO NOT DUMP HAZARDOUS MATERIALS OR LIQUIDS HERE" OR SIMILAR. OWNER SHALL BE RESPONSIBLE TO KEEP THE AREA CLEAN OF LITTER AND SPILLS.

C. OWNER TO BE RESPONSIBLE FOR SWEEPING PLAZAS, SIDEWALKS, AND PARKING LOTS. THIS IS TO BE DONE REGULARLY AND AS NEEDED TO PREVENT ACCUMULATION OF LITTER AND DEBRIS.

D. FIRE SPRINKLER TEST WATER SHALL BE DRAINED TO THE BIOFILTRATION BASIN.

E. CONDENSATE DRAIN LINES INCLUDING AIR CONDITIONING SHALL BE ROUTED TO LANDSCAPE.

F. ROOFING, GUTTERS, AND TRIM SHALL NOT BE MADE OF COPPER OR OTHER UNPROTECTED METALS THAT MAY LEACH INTO RUNOFF MUST BE AVOIDED.

SOURCE CONTROL BMPs

STORM DRAIN STENCILING (1)

BMP PUMPED DRAWDOWN

AT 6' OF TOTAL HEAD THE FL-30 SERIES PUMPS WILL DISCHARGE STORMWATER AT A RATE OF 0.10 CFS.

DCV = 7,491 CF
DISCHARGE FLOWRATE = 0.10 CFS

TOTAL DRAWDOWN TIME = 7,491 CF/0.10 CFS
= 74,910 SEC X (1 HR/3600 SEC)
= 20.8 HOURS

LEGEND

DMA BOUNDARY
DRAINAGE ARROWS
POINT OF COMPLIANCE: POC-#
DRAINAGE MANAGEMENT AREA: DMA-#
IMPERVIOUS AREA
ROOF AREA
LANDSCAPED AREAS
ROOF DRAIN LOCATIONS: RD

DMA DATA TABLE

DMA-NO.	TOT. AREA (SF)	IMPERVIOUS (%)	DESIGN DCV (CF)	TYPE/TREATED BY
DMA-1	129,402	96	7,491	BMP-1 / BMP-2
DMA-2	4,051	0	-	AREA IS FULLY PERVIOUS

TREATMENT BMP DATA TABLE

BMP-#	TREATING	PROPOSED VOLUME (CF)	DESCRIPTION
BMP-1	DMA-1	7,521	2-48" HDPE STORAGE PIPES & 18" PIPE
BMP-2	DMA-1	-	PROPRIETARY BIOFILTRATION FACILITY MODULAR WETLAND MWS-D-6-6-3.5

SITE SPECIFIC DATA	
PROJECT NUMBER	
PROJECT NAME	
PROJECT LOCATION	
STRUCTURE ID	
TREATMENT REQUIRED	
TREATMENT FLOW (CFS)	
NOTES:	

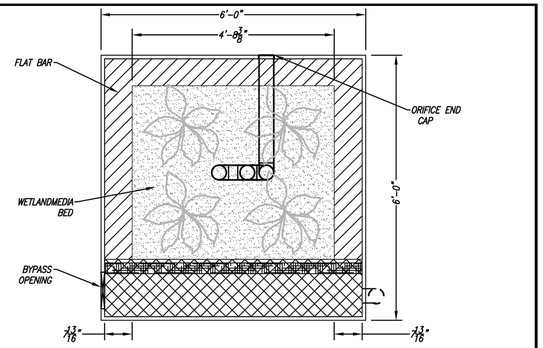
	FG-MWS-L-6-6-3.5
TREATMENT FLOW (CFS)	0.12
VAULT HEIGHT (FT)	3.5
MAX OPERATING HEAD (FT)	3.0
WETLAND MEDIA VOLUME (CY)	2.37
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0
ORIFICE SIZE (DIA. INCHES)	1.61

INSTALLATION NOTES

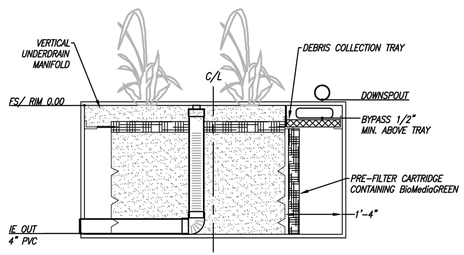
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS INSTALLING ON A PAVED SURFACE, OR 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.
4. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

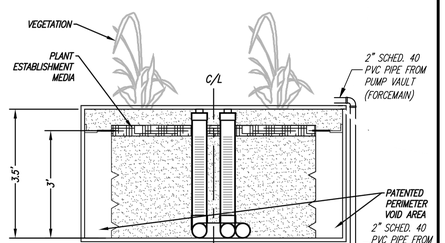
1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.



PLAN VIEW



LEFT END VIEW
BIOFILTRATION



ELEVATION VIEW

THE PRODUCT DESCRIBED MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

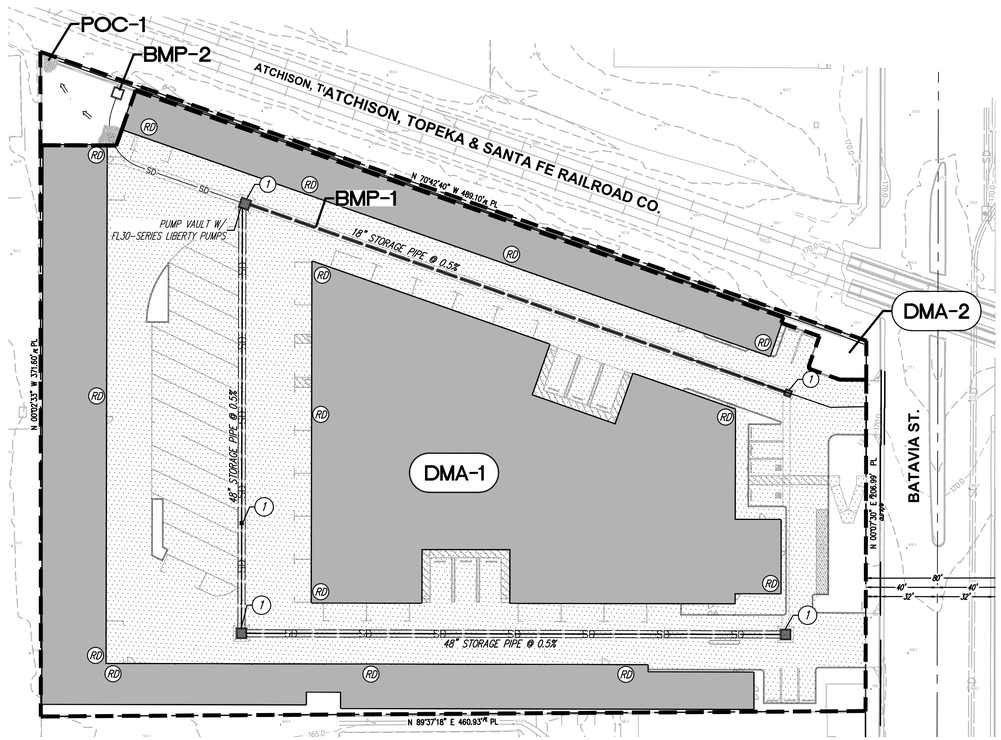
PROPRIETARY AND CONFIDENTIAL:
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MODULAR WETLANDS SYSTEMS. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MODULAR WETLANDS SYSTEMS IS PROHIBITED.

Bio Clean — A Forterra Company

FIBERGLASS MWS LINEAR
STORMWATER BIOFILTRATION SYSTEM
FG-MWS-L-6-6-3.5

BMP-2, BIOCLEAN MODULAR WETLAND SYSTEMS MODEL MWS-L-6-6-3.5

NOT TO SCALE



GRAPHICAL SCALE: 1" = 40'
0 20 40 80 160

OMEGA
ENGINEERING CONSULTANTS
4320 VIEWRIDGE AVE, SUITE C
SAN DIEGO, CA 92123
PH:(858) 634-8620 FAX:(858)-634-8627

DATE

SEAN M. SAVAGE R.C.E. 75677

SEAN M. SAVAGE — No. 75677 — REGISTERED PROFESSIONAL ENGINEER — CIVIL — STATE OF CALIFORNIA

BATAVIA SELF-STORAGE

630 N BATAVIA ST, ORANGE, CA 92864

C-3

DMA PLAN

JOB NUMBER: 21-710

DATE: 08/31/2023

JORDAN ARCHITECTS
131 CALLE IGLESIA, SUITE 100
SAN CLEMENTE, CA 92672
949.388.8090

VII. Educational Materials

Refer to the City's website www.cityoforange.org or the Orange County Stormwater Program (ocwatersheds.com) for a library of materials available. Attach *only* the educational materials specifically applicable to the project.

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 Response	☐		☐
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	☐		☐

Appendix A:

Conditions of Approval

Resolution Number_____TBD_____ dated_____

Appendix B:

Educational Material

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. Materials and excess concrete or mortar can be blown or 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 throw building materials into the ocean, so don't let them enter the storm drains. Follow these easy tips to help prevent water pollution.

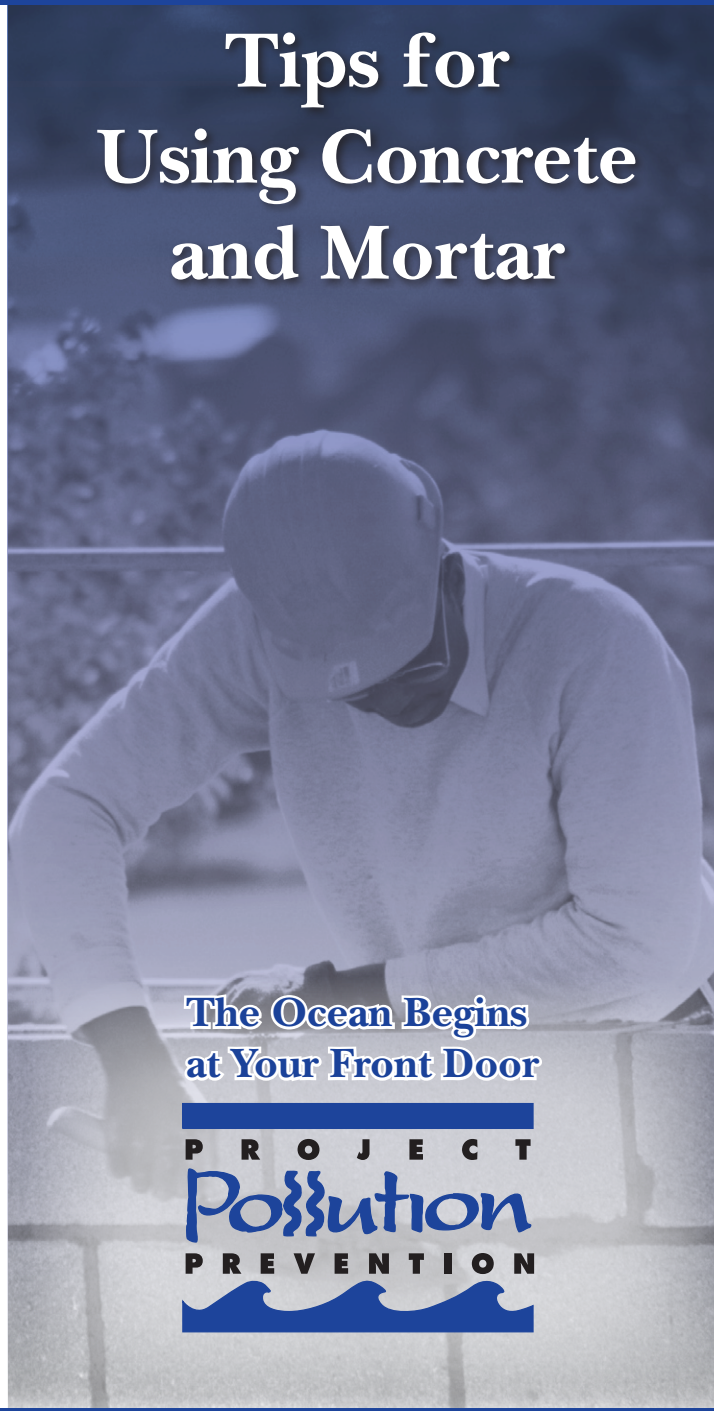
For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com.**

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

For emergencies, dial 911.

The Tips contained in this brochure provide useful information about how you can keep materials and washwater from entering the storm drain system. If you have other suggestions for how water and materials may be contained, please contact your city's stormwater representative or call the Orange County Stormwater Program.

Tips for Using Concrete and Mortar



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Tips for Using Concrete and Mortar

Never allow materials or washwater to enter the street or storm drain.

Before the Project

- Schedule projects for dry weather.
- Store materials under cover, with temporary roofs or plastic sheets, to eliminate or reduce the possibility that the materials can be carried from the project site to streets, storm drains or adjacent properties via rainfall, runoff or wind.
- Minimize waste by ordering only the amount of materials needed to complete the job.
- Take measures to block nearby storm drain inlets.

During the Project

- Set up and operate small mixers on tarps or heavy drop cloths.
- Do not mix more fresh concrete or cement than is needed for the job.

- When breaking up pavement, pick up all chunks and pieces and recycle them at a local construction and demolition recycling company. (See information to the right)
- When making saw cuts in pavement, protect nearby storm drain inlets during the saw-cutting operation and contain the slurry. Collect the slurry residue from the pavement or gutter and remove from the site.

Clean-Up

- Dispose of small amounts of dry concrete, grout or mortar in the trash.
- Never hose materials from exposed aggregate concrete, asphalt or similar treatments into a street, gutter, parking lot, or storm drain.
- Wash concrete mixers and equipment in designated washout areas where the water can flow into a containment area or onto dirt. Small amounts of dried material can be disposed of in the trash. Large amounts should be recycled at a local construction and demolition recycling company. (See information below)

- Recycle cement wash water by pumping it back into cement mixers for reuse.

Spills

- Never hose down pavement or impermeable surfaces where fluids have spilled. Use an absorbent material such as cat litter to soak up a spill, then sweep and dispose in the trash.
- Clean spills on dirt areas by digging up and properly disposing of contaminated dry soil in trash.
- Immediately report significant spills to the County's 24-Hour Water Pollution Problem Reporting Hotline at 714-567-6363 or log onto the County's website at www.ocwatersheds.com and fill out an incident reporting form.

For a list of construction and demolition recycling locations in your area visit www.ciwmb.ca.gov/Recycle/.

For additional information on how to control, prevent, remove, and reduce pollution refer to the Stormwater Best Management Practice Handbook, available on-line at www.cabmphandbooks.com.

Preventing water pollution at your commercial/industrial site

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

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

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

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

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

For emergencies, dial 911.

RECYCLE USED OIL

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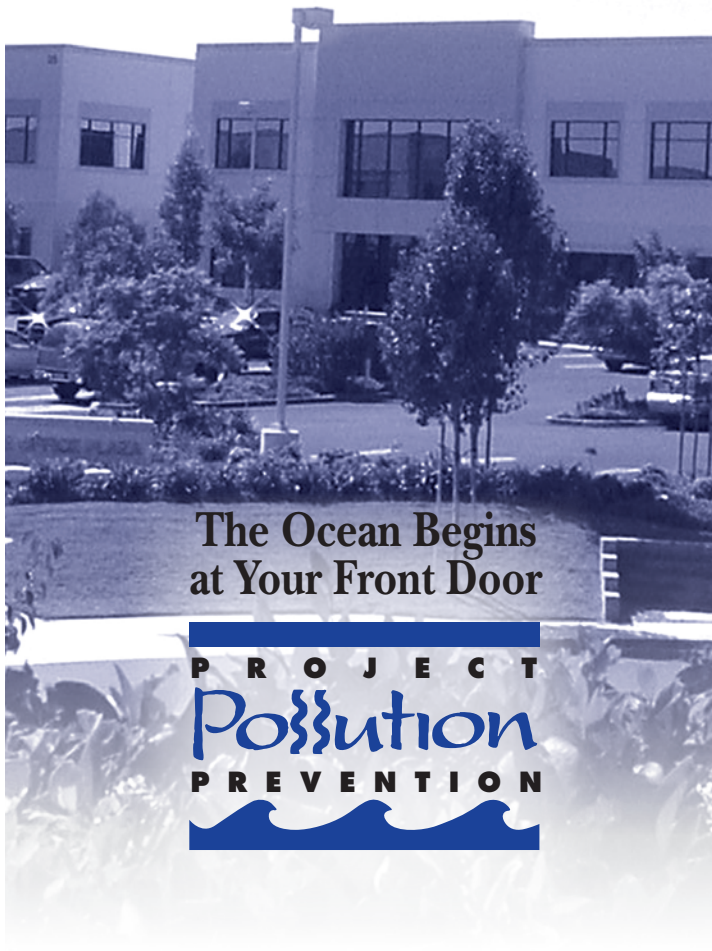
Help Prevent Ocean Pollution:

Proper Maintenance Practices for Your Business



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Proper Maintenance Practices for your Business

Landscape Maintenance

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

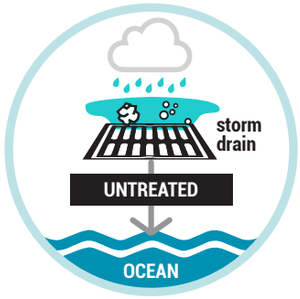
Building Maintenance

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

Never Dispose of Anything in the Storm Drain.

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

PROJECT Pollution PREVENTION



Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is **not treated or cleaned** before entering our waterways and should never contain any pollutants.

This brochure will help you protect our water quality by using BMPs appropriate to your facility.

← Learn more inside

Who is H_2OC?

H_2OC is YOU! H_2OC is also a cooperative stormwater program which includes all 34 cities in Orange County, the County of Orange, and Orange County Flood Control District (OCFCD). Clean and healthy beaches, creeks, rivers, bays, wetlands, and ocean are important to Orange County. H_2OC provides resources to residents and businesses to encourage personal action and prevent polluted runoff from entering our waterways.

Join Us

Visit **h2oc.org** to learn more about runoff, water pollution, and how you can be the solution to runoff pollution and protect our water resources!

Contact

24-hour Pollution Reporting Hotline:
1-877-89-SPILL (1-877-897-7455)

24-hour Reporting Website:
myOCeServices.ocgov.com

For emergencies, dial 911

* Some industrial facilities are also required to obtain coverage under the State's Industrial General Permit (IGP). To determine if your facility requires a permit, contact the State Water Resources Control Board at waterboards.ca.gov

** For more information about recycling and collection centers, visit oclandfills.com.

BEST MANAGEMENT PRACTICES FOR BUSINESSES

WATER POLLUTION AND COMMERCIAL & INDUSTRIAL FACILITIES

YOU ARE THE SOLUTION TO RUNOFF POLLUTION

H_2OC STORMWATER PROGRAM

How is Water Quality Affected By Your Business?

Commercial and industrial facilities can generate a variety of waste products which can become pollutants. These can include metals, plastics, toxic chemicals, oil, grease, and bacteria. If not properly managed, these pollutants can be transported to Orange County's creeks, rivers, and ocean through our storm drain system.

As a business owner or manager, you are responsible for overseeing the work of employees and outside contractors to prevent runoff pollution.

By law, commercial and industrial facilities are required to implement best management practices (BMPs) to prevent runoff pollution.*

Best Management Practices for Commercial & Industrial Sites

Implement these required best management practices (BMPs) to be in compliance and avoid enforcement actions:

Inspect

- Periodically inspect irrigation systems for leaks, overspray, and runoff. Repair and maintain as needed.
- Periodically check parking lots for discharges from leaking vehicles.
- Ensure lids on dumpsters are properly closed when not in use and sweep and pick up all debris daily.

Locate

- Locate and protect all area drains, yard drains, and catch basins where washwater could potentially enter the storm drain system.
- When working outdoors, conduct operations away from storm drains and waterbodies.
- Mix paint and clean tools in a contained area.

Contain

- Never allow washwater, sweepings, or sediment to enter storm drains.
- Store materials indoors or under cover and away from storm drains.
- Control, contain, and clean up all spills immediately with absorbents, rags, or mops. Never hose a spill.
- Follow the manufacturer's directions when applying fertilizers and pesticides. Never apply 48 hours before a forecasted rain event.

Collect

- Properly collect all washwater generated during business maintenance activities for disposal.
- Collect grass clippings, leaves, and other debris and dispose in covered containers.
- Use drop cloths underneath outdoor painting, scraping, and sandblasting work.
- Regulary sweep areas like corners and along curbs, where debris tends to accumulate, and dispose in covered containers.

Dispose

- Contact your waste hauler for proper waste, hazardous waste, and green waste disposal options.
- Contact your waste and recycling service to repair or replace leaking or damaged dumpsters.
- Recycle and dispose of materials as outlined by your local jurisdiction.**

What Pollutants Are Generated By Commercial & Industrial Sites?

Landscape Maintenance

When performing landscape maintenance, pollutants generated can include organic debris, trash, dirt, fertilizers, and pesticides.

Building Maintenance

When performing building maintenance, various types of pollutants can be generated including washwater, paint or paint chips, bacteria, and other toxic materials.

Parking Lots & Outdoor Areas

Pollutants in parking lots, patios, and outdoor areas can include trash, oil, grease, landscape debris, and bacteria.

Waste & Storage Area Management

Pollutants in waste and storage areas can include trash, oil, grease, bacteria, dirt, and other toxic materials.

Scan for more information about Commercial & Industrial site-specific BMPs or visit https://ocerws.ocpublicworks.com/service-areas/oc-environmental-resources/oc-watersheds/documents/best-management-practices-bmp-2

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

Where Do I Go For Additional Assistance?

The Orange County Stormwater Program is a collaborative effort of all 34 Orange County cities, the Orange County Flood Control District and the County of Orange. Please visit the website below for guidance to help you comply with the new requirements, including:

The Model Water Quality Management Plan (the "what, why, when" direction)

The Technical Guidance Document (the "how to" details)

Training modules and frequently asked questions

Contact information for your City/County stormwater representative

www.h2oc.org/wqmp

Water Quality Requirements for Land Development

What Are The Requirements?

New water quality requirements for land development and significant redevelopment projects took effect August 17, 2011 for Northern Orange County (generally north of El Toro Road) and will likewise take effect for Southern Orange County in late 2012. While previous requirements focused on a treat-and-release approach to stormwater, the new requirements are centered around the goal of onsite capture by emphasizing:

Low Impact Development (LID):
LID works to manage stormwater as close to its source as possible by preserving and/or creating natural landscapes and minimizing impervious areas to create functional and appealing site drainage.

Hydromodification Controls:
Hydromodification Controls are implemented in order to prevent changes to the natural flow velocity and volume and sediment supply in streams and channels that are susceptible to erosion from increased runoff.

Why Are These Requirements in Place?

In 2009, the Santa Ana and San Diego Regional Water Quality Control Boards issued revised water quality permits to the Orange County Stormwater Program that resulted in these changes to the requirements for the planning and design of certain development projects. These requirements will positively impact Orange County in the following ways:

Cleaner Water:
LID practices focus on preventing toxic and polluted runoff from reaching our local beaches and waterways by managing rainfall and stormwater runoff.

Healthier Economy:
As a coastal region much of our local economy thrives on tourism. Clean beaches and waterways are vital to tourism and the overall health of our local economy.

Water Quality Requirements for Land Development

Orange County needs your help to build environmentally sound projects that protect our streams, bays and ocean water quality.

For Developers, Architects and Contractors

H2OC.org

What Does My Project Need to Do?

If your project needs to comply with these new requirements, there are many options available to make this possible.

Low Impact Development Practices

The following are some of the actual solutions you should apply to your project to ensure it is in compliance with the requirements.

Infiltration
(e.g. permeable pavement/ pavers, bioretention, infiltration basins)

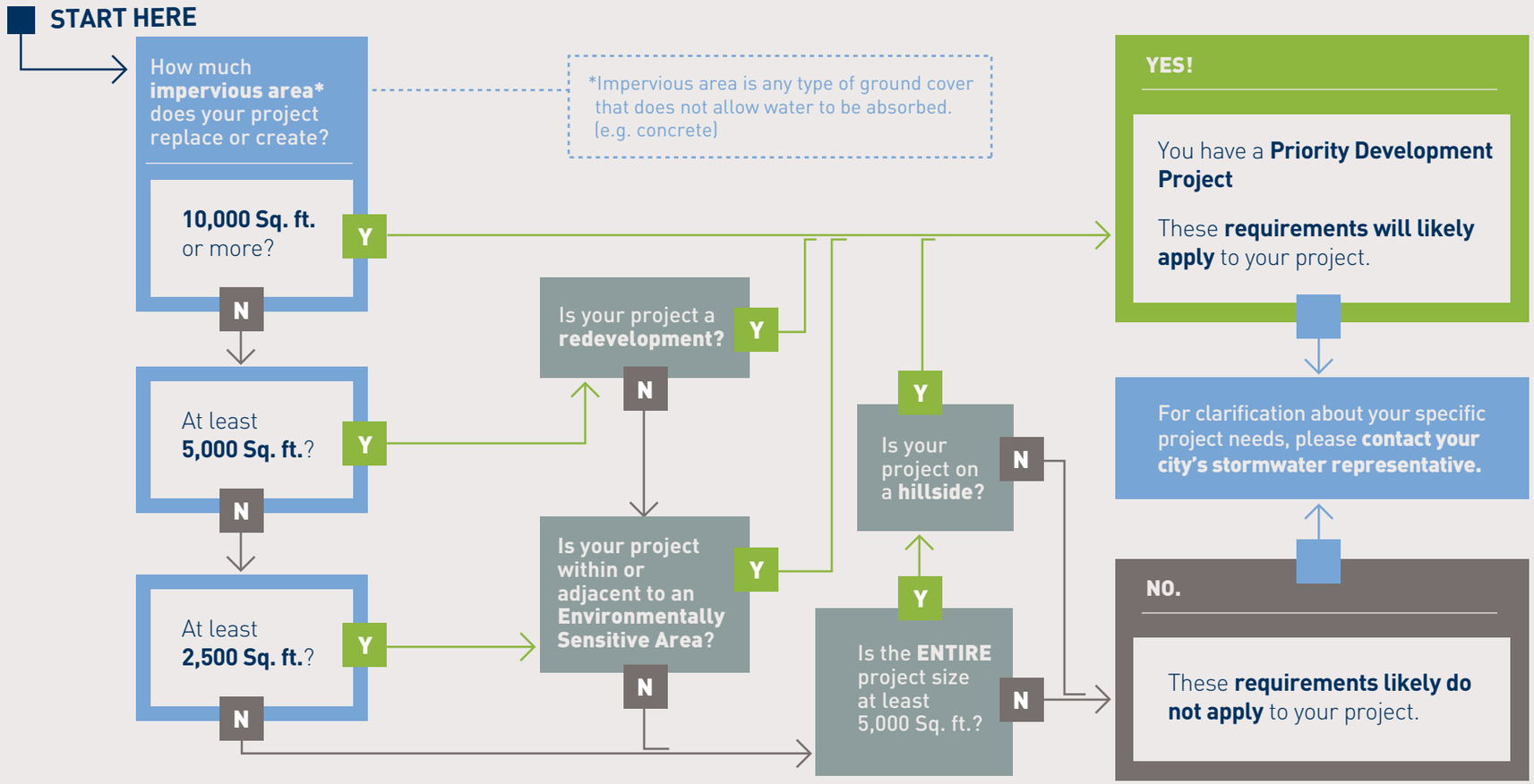
Evapotranspiration
(e.g. vegetated swales)

Harvest and Use
(e.g. cisterns and other storage for irrigation)

Biotreatment
(e.g. vegetated swales with an underdrain)

A Guide For Developers, Architects and Contractors

This chart is intended as a starting point to help you understand if the requirements apply to your project.



1. Maintain
natural waterbodies and drainage systems.

2. Minimize
the runoff that you do have to release.

3. Mitigate
the runoff that cannot be minimized.

Appendix C:

BMP Details

SITE SPECIFIC DATA	
PROJECT NUMBER	
PROJECT NAME	
PROJECT LOCATION	
STRUCTURE ID	
TREATMENT REQUIRED	
TREATMENT FLOW (CFS)	
NOTES:	

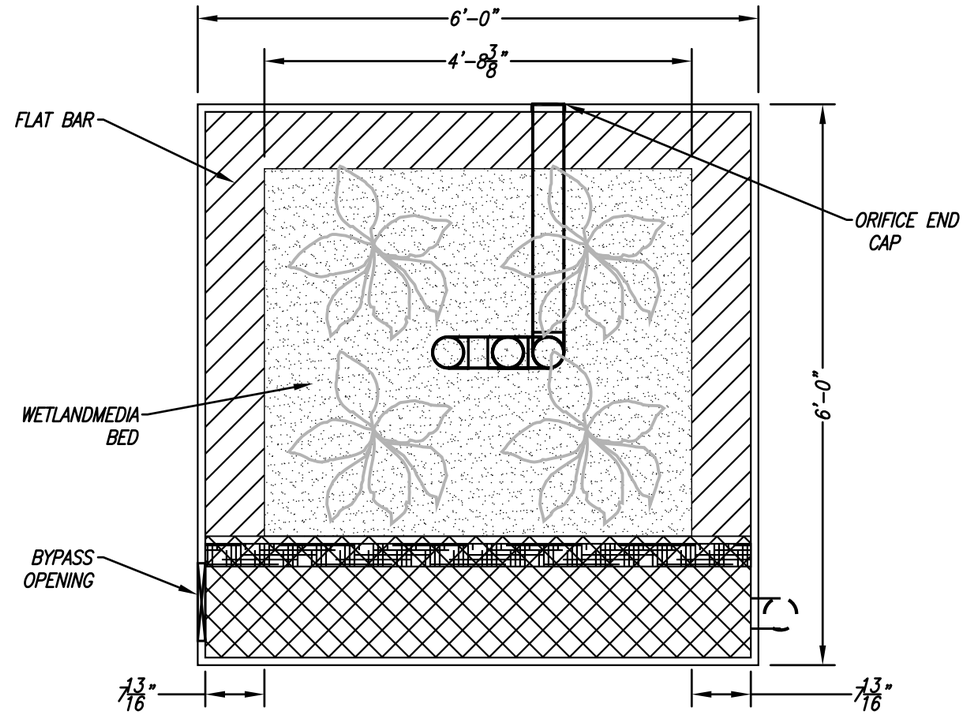
	FG-MWS-L-6-6-3.5
TREATMENT FLOW (CFS)	0.12
VAULT HEIGHT (FT)	3.5
MAX OPERATING HEAD (FT)	3.0
WETLAND MEDIA VOLUME (CY)	2.37
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0
ORIFICE SIZE (DIA. INCHES)	1.61

INSTALLATION NOTES

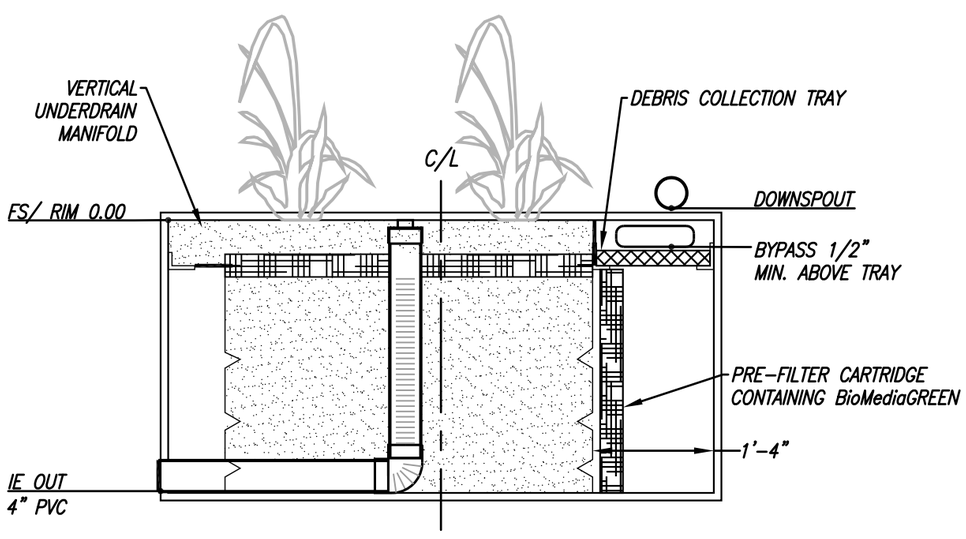
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS INSTALLING ON A PAVED SURFACE, OR 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.
4. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.

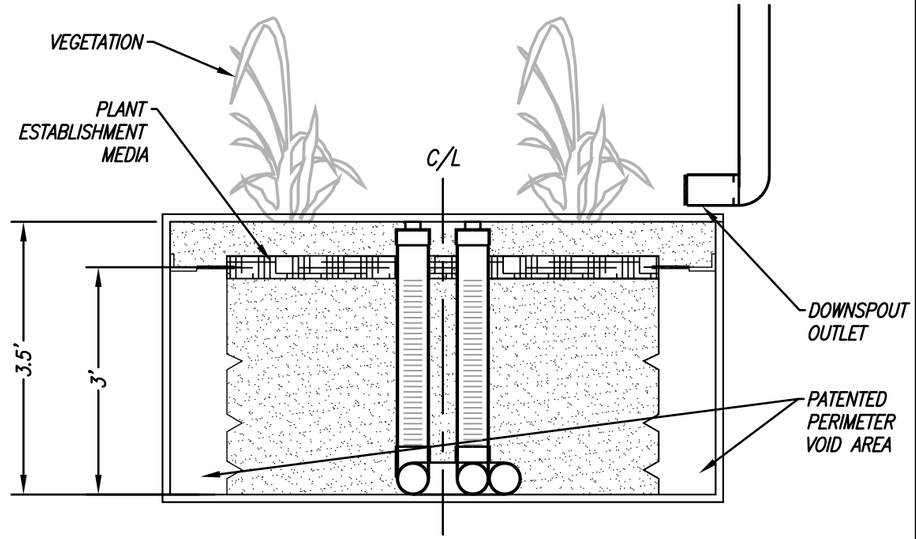


PLAN VIEW



LEFT END VIEW

BIOFILTRATION



ELEVATION VIEW

BioClean
A Forterra Company

FIBERGLASS MWS LINEAR
STORMWATER BIOFILTRATION SYSTEM
FG-MWS-L-6-6-3.5

9/15/21 KARC

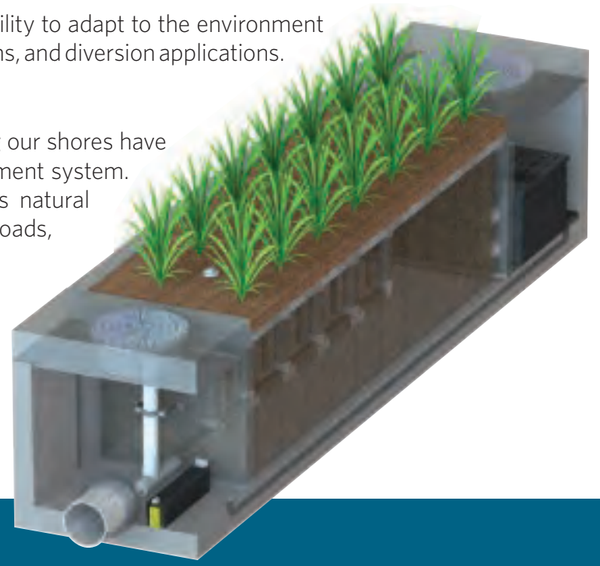
Appendix D:

BMP Maintenance Information

OVERVIEW

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

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.



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 cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the Modular Wetlands® System Linear.

PERFORMANCE

The Modular Wetlands® continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. Since 2007 the Modular Wetlands® has been field tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. In fact, the Modular Wetlands® harnesses some of the same biological processes found in natural wetlands in order to collect, transform, and remove even the most harmful pollutants.

66% REMOVAL OF DISSOLVED ZINC	**69%** REMOVAL OF TOTAL ZINC	**38%** REMOVAL OF DISSOLVED COPPER	**64%** REMOVAL OF TOTAL PHOSPHORUS	
45% REMOVAL OF NITROGEN	**50%** REMOVAL OF TOTAL COPPER	**95%** REMOVAL OF MOTOR OIL	**67%** REMOVAL OF ORTHO PHOSPHORUS	**85%** REMOVAL OF TSS

APPROVALS

The Modular Wetlands® System 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. Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.

Washington State Department of Ecology TAPE Approved
The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft² loading rate. The highest performing BMP on the market for all main pollutant categories.

California Water Resources Control Board, Full Capture Certification
The Modular Wetlands® System is the first biofiltration system to receive certification as a full capture trash treatment control device.

Virginia Department of Environmental Quality, 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) regulation technical criteria.

Maryland Department of the Environment, Approved ESD
Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.

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 Department of Environmental Management, Approved BMP
Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% pathogens, 30% total phosphorus, and 30% total nitrogen.

ADVANTAGES

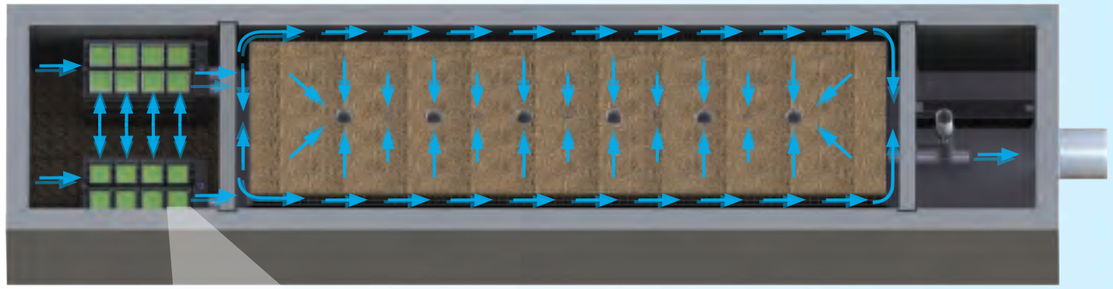
- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

The Modular Wetlands® System Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

Figure 1 & Figure 2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.



2x to 3x more surface area than traditional downward flow bioretention systems.

Figure 2, Top View

1 PRETREATMENT

SEPARATION

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

PRE-FILTER CARTRIDGES

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

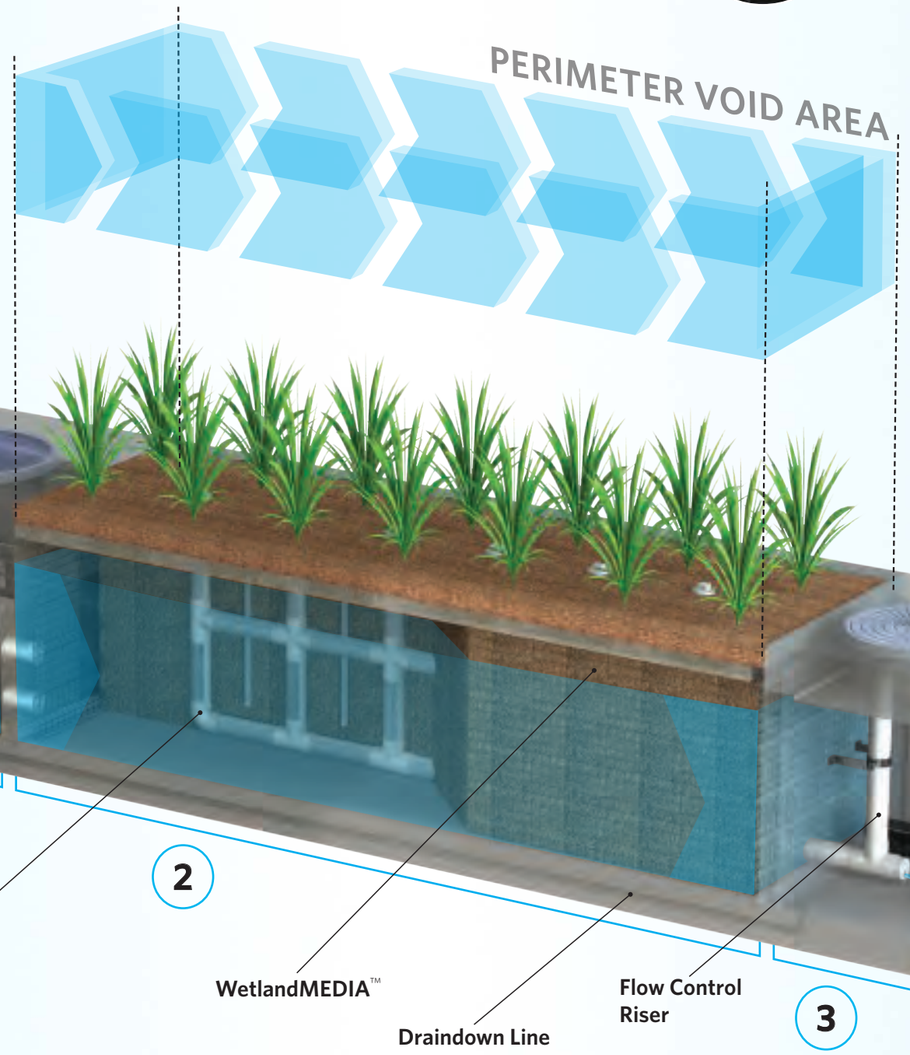


Figure 1

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 lightweight

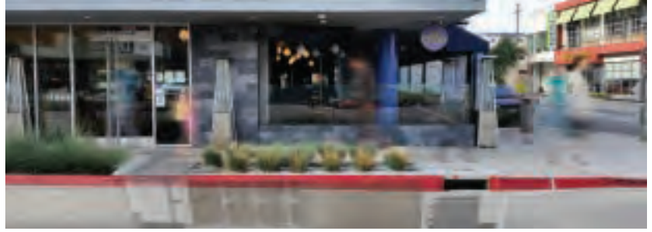
3 DISCHARGE

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

DRAINDOWN FILTER

- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated

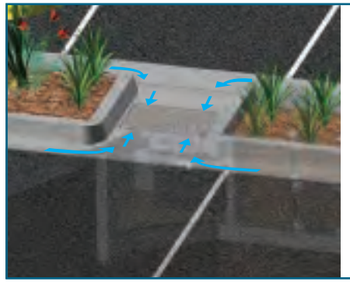


CONFIGURATIONS

The Modular Wetlands® System 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 storm drain design.

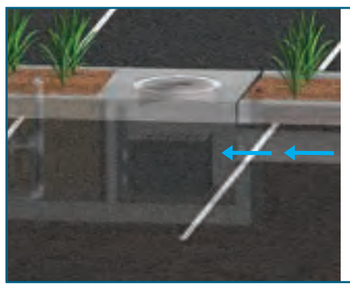
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways 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 pretreatment chamber. It has the added benefit of allowing 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 pretreatment chamber, meaning the Modular Wetlands® 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

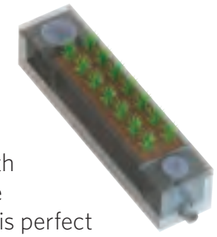
The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be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

ORIENTATIONS

SIDE-BY-SIDE

The Side-By-Side orientation places the pretreatment 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 pretreatment 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 that bypass must be external.

BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

The Side-By-Side orientation places the pretreatment 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 pretreatment chamber directly to the discharge chamber.

EXTERNAL DIVERSION WEIR STRUCTURE

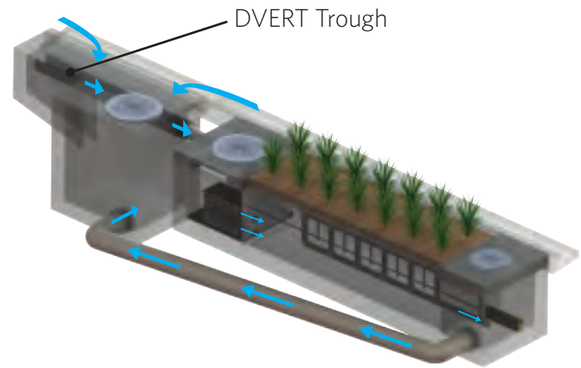
This traditional offline diversion method can be used with the Modular Wetlands® in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the Modular Wetlands® 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 Modular Wetlands® 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 Modular Wetlands® 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 allow the Modular Wetlands® to be installed anywhere space is available.

SPECIFICATIONS

FLOW-BASED DESIGNS

The Modular Wetlands® System Linear can be used in stand-alone applications to meet treatment flow requirements. Since the Modular Wetlands® 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.

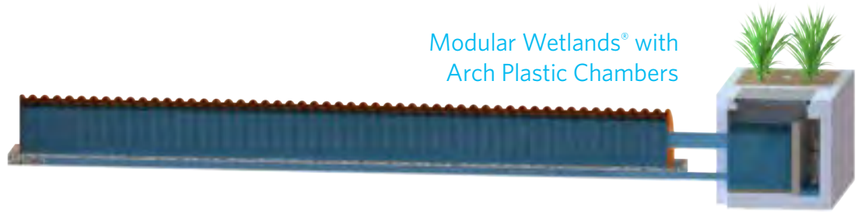
MODEL #	DIMENSIONS	WETLANDMEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4′ x 4′	23	0.052
MWS-L-4-6	4′ x 6′	32	0.073
MWS-L-4-8	4′ x 8′	50	0.115
MWS-L-4-13	4′ x 13′	63	0.144
MWS-L-4-15	4′ x 15′	76	0.175
MWS-L-4-17	4′ x 17′	90	0.206
MWS-L-4-19	4′ x 19′	103	0.237
MWS-L-4-21	4′ x 21′	117	0.268
MWS-L-6-8	7′ x 9′	64	0.147
MWS-L-8-8	8′ x 8′	100	0.230
MWS-L-8-12	8′ x 12′	151	0.346
MWS-L-8-16	8′ x 16′	201	0.462
MWS-L-8-20	9′ x 21′	252	0.577
MWS-L-8-24	9′ x 25′	302	0.693
MWS-L-10-20	10′ x 20′	302	0.693

VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE

Modular Wetlands® with
Box Culvert Prestorage

The Modular Wetlands® System Linear offers a unique advantage in the world of biofiltration due to its exclusive horizontal flow design: Volume-Based Design. No other biofilter has the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The systems horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points. In the example above, the Modular Wetlands® is installed downstream of underground box culvert storage. Designed for the water quality volume, the Modular Wetlands® will treat and discharge the required volume within local draindown time requirements.



Modular Wetlands® with
Arch Plastic Chambers

DESIGN SUPPORT

Bio Clean engineers are trained to provide you with superior support for all volume sizing configurations throughout the country. Our vast knowledge of state and local regulations allow us to quickly and efficiently size a system to maximize feasibility. Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the Modular Wetlands®, the only biofilter than can be used downstream of storage BMPs.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

APPLICATIONS

The Modular Wetlands® System 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 Modular Wetlands® 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 Modular Wetlands®. 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 Modular Wetlands® is very adaptable, and it 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 Modular Wetlands'® 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.

COMMERCIAL

Compared to bioretention systems, the Modular Wetlands® can treat far more area in less space, meeting treatment and volume control requirements.

MIXED USE

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

More applications include:

• Agriculture • Reuse • Low Impact Development • Waste Water

PLANT SELECTION

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System 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 Modular Wetlands®, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands'® micro/macro flora and fauna.

A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION

The Modular Wetlands® 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 precast 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 is available to supervise installations and provide technical support.

MAINTENANCE

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

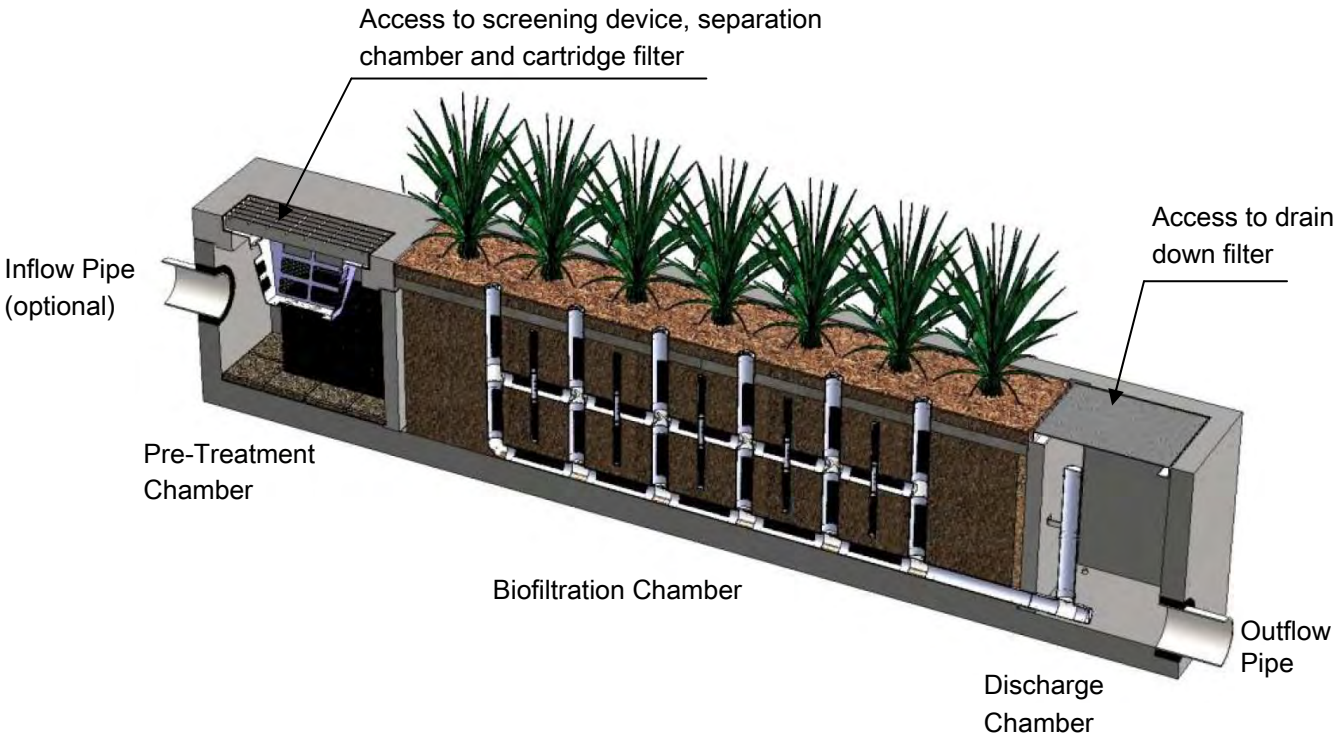
Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac 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.

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - (*5 minute average service time*).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - (*5 minute average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration Chamber.

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

Maintenance Procedure Illustration

Screening Device

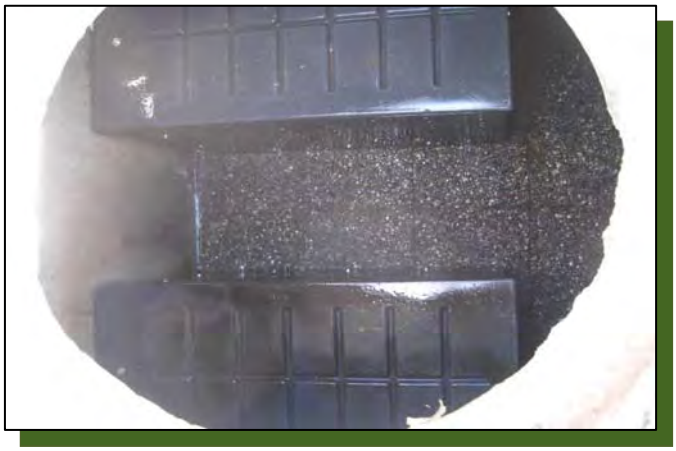
The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.

Cartridge Filters

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



Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.

Inspection Form

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Inspection Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	**Yes**	**No**	**Comments**
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes, specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	**Yes**	**No**
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: _____

2972 San Luis Rey Road, Oceanside, CA 92058 P (760) 433-7640 F (760) 433-3176

Maintenance Report

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

2972 San Luis Rey Road, Oceanside, CA 92058 P. 760.433.7640 F. 760.433.3176

Appendix E:

Geotechnical Information

(Storm water infiltration BMP evaluation)

March 14, 2022 Project No. 21184-01

Mr. Ricardo Rivas
Staley Point Capital
11150 Santa Monica Boulevard, Suite 700
Los Angeles, California 90025

Subject: ***Preliminary Geotechnical Evaluation for Proposed Self-Storage Redevelopment, 630 North Batavia Street, Orange, California***

In accordance with your request, LGC Geotechnical, Inc. has performed a preliminary geotechnical evaluation for the proposed redevelopment of the property located at 630 North Batavia Street in Orange, California. The purpose of our study was to evaluate the existing onsite geotechnical conditions and to provide preliminary geotechnical recommendations relative to the proposed development.

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

Respectfully,

LGC Geotechnical, Inc.

Kevin B. Colson, CEG 2210
Vice President

CERTIFIED ENGINEERING GEOLOGIST
KEVIN BONIFACE COLSON
No. 2210
STATE OF CALIFORNIA

Kelby Styler, RCE 87413
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
KELBY MORGAN STYLER
No. 87413
CIVIL
STATE OF CALIFORNIA

KBC/KMS/amm

Distribution: (1) Addressee (electronic copy)
(5) Jordan Architects (4 wet-signed copies and 1 electronic copy)
Attention: Mr. Elix Lopez
(1) Omega Engineering Consultants, Inc. (electronic copy)
Attention: Mr. Sean Savage

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LIST OF TABLES, ILLUSTRATIONS, & APPENDICES

Tables

Figures

Appendices

1.0 INTRODUCTION

LGC Geotechnical has performed a geotechnical evaluation for the proposed self-storage buildings to be located at 630 North Batavia Street in Orange, California (Figure 1). This report summarizes our findings, conclusions, and preliminary geotechnical design recommendations relative to the project.

1.1 Project Description

The location of the proposed self-storage facility is currently developed with two (2) existing one- and two-story industrial buildings and associated asphalt and concrete pavement of the Roseburrough Tool Company that are proposed to be demolished and replaced by two (2) one- and two-story self-storage buildings (see Figure 2 – Geotechnical Map). The existing topography at the site and surrounding area is nearly level, with site drainage via sheet flow toward the northwest corner of the site. The land adjacent to the north side and east side of the site is developed with railroad tracks and North Batavia Street, respectively. The land beyond the railroad tracks and street is developed with warehouse/industrial buildings. The land adjacent to the west of the site is located at 619 North Main Street and is developed with warehouse buildings with asphalt and concrete pavements, and two small structures that appear to be storage sheds that are located on the site's western property line. The land adjacent to the south of the site is developed with what appears to be four single-story retail/light industrial buildings with masonry construction along with asphalt and concrete pavement. The two buildings closest to the site's southern property line are located at 600 and 610 North Batavia Street. The building at 610 North Batavia Steet is located approximately 10 feet from the property line with asphalt pavement between the building and the property line, while the exterior wall of the building at 600 North Batavia Street appears to be located on the site's southern property line.

We understand that the proposed redevelopment of the site will include demolition of the existing buildings and improvements on the site for construction of at-grade, one-story, self-storage buildings around the perimeter of the site and an at-grade, two-story, self-storage building in the middle of the site. Parking and drive isles will be located between the interior and perimeter structures.

Preliminary building (dead plus live) loads were not provided at the time of this report. However, we have estimated the maximum wall and column (dead plus live) structural loads at 4 kips per lineal foot and 150 kips, respectively. Based on the preliminary grading plan proposed grades will not change significantly from existing grades.

The recommendations given in this report are based on the layout and estimated structural loads and grading information as indicated above. LGC Geotechnical should be provided with any updated project information, plans and/or any structural loads when they become available, in order to either confirm or modify the recommendations provided herein.

1.2 Subsurface Exploration

Our subsurface evaluation consisted of the excavation of four hollow-stem auger borings. The borings (HS-1 through HS-4) were excavated using a truck-mounted drill rig equipped with 6-inch-diameter hollow-stem augers with depths ranging from approximately 25 to 50 feet below existing grade. Infiltration borings (I-1 & I-2) were excavated to 5 feet below existing grade, east of the proposed building location. An LGC Geotechnical representative observed the drilling operations, logged the borings, and collected soil samples for laboratory testing. Driven soil samples were collected by means of the Standard Penetration Test (SPT) and Modified California Drive (MCD) sampler. The SPT sampler (1.4-inch ID) and MCD sampler (2.4-inch ID, 3.0-inch OD) were driven using a 140-pound hammer falling 30 inches to advance the sampler a total depth of 18 inches or until refusal. Bulk samples were also collected and logged for laboratory testing at select depths. The raw blow counts for each 6-inch increment of penetration were recorded on the boring logs. The borings were backfilled with cuttings.

The approximate locations of our subsurface explorations are provided on Figure 2. The boring logs are provided in Appendix B.

1.3 Field Infiltration Testing

Two field infiltration tests were performed in Borings I-1 and I-2 to an approximate depth of 5 feet below existing grade. The approximate location is shown on the Geotechnical Map (Figure 2). The borings for the infiltration tests were excavated using a drill rig equipped with 8-inch diameter hollow-stem augers. Estimation of the infiltration rate was accomplished in general accordance with the guidelines set forth by the County of Orange (2017). A 3-inch diameter perforated PVC pipe was placed in the borehole and the annulus was backfilled with gravel. The infiltration wells were pre-soaked prior to testing. At the completion of infiltration testing, the pipe was removed and backfilled with cuttings and tamped. Some settlement of the backfill should be expected.

In general, three-dimensional flow out of the test well (percolation), as observed in the field, is mathematically corrected to one-dimensional flow out of the bottom of the test well (infiltration). Infiltration testing was performed using relatively clean water, free of particulates, silt, etc. The results are presented in Appendix B and summarized below.

TABLE 1

Summary of Field Infiltration Testing

Infiltration Test No.	Approx. Depth Below Existing Grade (ft)	Observed Infiltration Rate* (in./hr.)	Measured Infiltration Rate** (in./hr.)
I-1	5	0.2	0.1
I-2	5	0.1	0.1

*Observed Infiltration Rates Do Not Include Factor of Safety.

**Measured Infiltration Rates Include a Factor of Safety of 2 in Order to Evaluate Feasibility.

The tested infiltration rates provided in this report are considered a general representation of the infiltration rates at the location of the proposed infiltration trench. Please note, the testing of infiltration rates is highly dependent upon the materials encountered at the point of testing (i.e., location and depth of testing). Varying subsurface conditions may exist outside of the test location which could alter the calculated infiltration rate. Please refer to Section 4.9.

1.4 Laboratory Testing

Representative bulk and driven samples were obtained for laboratory testing during our field evaluation. Laboratory testing included in-situ density and moisture content, Atterberg limits, expansion index, consolidation, collapse, R-value, grain size analysis for fines content, and corrosion (sulfate, chloride, pH and minimum resistivity). A summary of the laboratory test results is presented in Appendix C.

- Dry density of the samples collected ranged from approximately 96 pounds per cubic foot (pcf) to 128 pcf. Moisture contents ranged from approximately 1 percent to 24 percent.
- Atterberg Limit testing indicates that the Plasticity Index (PI) of the tested soils ranges from 6 to 10 and the soils are classified as low plasticity silts and clays.
- Two Expansion Index (EI) tests were performed, and the results indicated EI values ranging from 20 to 37, which are classified as having "Very Low" to "Low" expansion potential.
- Consolidation testing was performed on three samples. The plots are provided in Appendix C.
- One collapse-swell test was performed. The soil was found to have a swell of 0.03 percent. The result is provided in Appendix C.
- R-value testing was performed on one sample, the results indicate an R-value of 10.
- Grain size analysis for fines content (percent of particles by dry weight passing the #200 sieve) was performed on two samples. The fines content was found to range from 71 percent to 85 percent.
- Corrosion testing indicated a soluble sulfate content of approximately 0.067 percent (67 ppm), a chloride content of 20 parts per million (ppm), pH of 8.13, and a minimum resistivity of 2,590 ohm-centimeters. Based on Caltrans specifications, the soils are considered not corrosive.

Laboratory test results obtained from our field evaluation are provided in Appendix C.

2.0 GEOTECHNICAL CONDITIONS

2.1 Geologic Conditions

The site is located within the Peninsular Ranges Geomorphic Province, within the eastern boundary of the Los Angeles Sedimentary Basin. The Los Angeles Sedimentary Basin is a northwest-plunging synclinal sedimentary deposit that is bounded to the south of the subject site by the broadly uplifted costal mesa of Newport Beach. A channelized portion of the Santa Ana River passes approximately 0.75-miles to the west of the site. The river deposited widely dispersed sheet deposits prior to channelization.

2.2 Site-Specific Geology

The site is underlain by deposits of Quaternary-aged Old Fan Deposits (Morton & Miller, 2006). Where encountered, the upper approximately 10 feet of the alluvial fan soil was found to consist mostly of sandy silt to sandy clay, with lesser amounts of silty clay, and scattered silty sand. The soils in the approximately 10 feet were found to be moist and medium dense or medium stiff to very stiff in-place. Scattered roots were observed at a depth of approximately 7.5 feet in boring HS-2. Cobble-gravel-sand mixtures with lesser amounts of silt were encountered at depths between approximately 15 and 25 feet below the ground surface. These soils were found to be slightly moist to moist and medium dense to very dense in-place. Below depths of approximately 30 feet below the ground surface the encountered soils consisted of interbeds of silty sand, sandy silt, and silty clay, with scattered gravelly sands that were found to be slightly moist to wet, and medium dense to very dense or medium stiff to hard in-place. The approximate lateral extent of the earth units is presented on the Geotechnical Map (Figure 2), and the soils are described in the boring logs in Appendix B.

2.3 Geologic Structure

Geologic structure was not identified in the subject site geotechnical evaluation. The alluvial materials encountered are generally massive, but may include low angle bedding, typically dipping in a westerly direction.

2.4 Landslides and Rockfalls

The site and surrounding areas are nearly level, without any significant slopes. Therefore, due to the low topographic relief, the likelihood of landslides or rockfalls impacting the site is nil.

2.5 Groundwater

Groundwater was not encountered to the maximum depth explored (50 feet below the ground surface) during advancement of the deep borings at the subject site. The site is located approximately 0.75 miles east of the Santa Ana River, and the site is situated at an elevation approximately 50 feet higher than the riverbed. Based on information obtained from the

California Department of Water Resources, Water Data Library (DWR, 2021), there is a groundwater monitoring well located on the west side of the Santa Ana River, approximately 0.9 miles west of the site. The State Well number for the nearby well is 04S10W25G001S, and it is monitored by the Orange County Water District, where it is known locally as SAR-3/MP1. The well has been monitored from August of 1988, through October of 2021. The ground surface at the monitoring well is approximately 10 feet lower in elevation than the ground surface at the site. During the monitoring period the shallowest groundwater was detected approximately 58 feet below the ground surface at the monitoring location, while the deepest groundwater was detected at approximately 105 feet below the ground surface. The most recent monitoring information, from October of 2021, indicates that groundwater was at approximately 75 feet below the ground surface.

Groundwater and/or groundwater seepage conditions may occur in the future due to changes in land use and/or following periods of heavy rain. Seasonal fluctuations of groundwater elevations should be expected over time. In general, groundwater levels fluctuate with the seasons and local zones of perched groundwater may be present within the near-surface deposits due to local landscape irrigation or precipitation especially during rainy seasons.

2.6 Faulting

California is located on the boundary between the Pacific and North American Lithospheric Plates. The average motion along this boundary is on the order of 50-mm/yr. in a right-lateral sense. The majority of the motion is expressed at the surface along the northwest trending San Andreas Fault Zone with lesser amounts of motion accommodated by sub-parallel faults located predominantly west of the San Andreas including the Elsinore, Newport-Inglewood, Rose Canyon, and Coronado Bank Faults. Within Southern California, a large bend in the San Andreas Fault north of the San Gabriel Mountains has resulted in a transfer of a portion of the right-lateral motion between the plates into left-lateral displacement and vertical uplift. Compression south and west of the bend has resulted in folding, left-lateral, reverse thrust faulting, and regional uplift creating the east-west trending Transverse Ranges and several east-west trending faults. Further south within the Los Angeles Basin, "blind thrust" faults are believed to have developed below the surface also as a result of this compression, which have resulted in earthquakes such as the 1994 Northridge event along faults with little to no surface expression.

Prompted by damaging earthquakes in Northern and Southern California, State legislation and policies concerning the classification and land-use criteria associated with faults have been developed. The Alquist-Priolo Earthquake Fault Zoning Act was implemented in 1972 to prevent the construction of urban developments across the trace of active faults. California Geologic Survey Special Publication 42 was created to provide guidance for following and implementing the law requirements. Special Publication 42 was most recently revised in 2018 (CGS, 2018). According to the State Geologist, an "active" fault is defined as one which has had surface displacement within Holocene time (roughly the last 11,700 years). Regulatory Earthquake Fault Zones have been delineated to encompass traces of known, Holocene-active faults to address hazards associated with surface fault rupture within California. Where developments for human occupation are proposed within these zones, the state requires detailed fault evaluations be performed so that engineering-geologists can identify the locations of active faults and recommend setbacks from locations of possible surface fault rupture.

The subject site is not located within an Alquist-Priolo Earthquake Fault Zone and no faults were identified on the site during our site evaluation. The possibility of damage due to ground rupture is considered low since no active faults are known to cross the site.

Secondary effects of seismic shaking resulting from large earthquakes on the major faults in the Southern California region, which may affect the site, include ground lurching and shallow ground rupture, soil liquefaction, and dynamic settlement. These secondary effects of seismic shaking are a possibility throughout the Southern California region and are dependent on the distance between the site and causative fault and the onsite geology. A discussion of these secondary effects is provided in the following sections.

2.6.1 Lurching and Shallow Ground Rupture

Soil lurching refers to the rolling motion on the ground surface by the passage of seismic surface waves. Effects of this nature are not likely to be significant where the thickness of soft sediments do not vary appreciably under structures. Ground rupture due to active faulting is not likely to occur onsite due to the absence of known active fault traces. Ground cracking due to shaking from distant seismic events is not considered a significant hazard, although it is a possibility at any site.

2.6.2 Liquefaction and Dynamic Settlement

Liquefaction is a seismic phenomenon in which loose, saturated, granular soils behave similarly to a fluid when subject to high-intensity ground shaking. Liquefaction occurs when three general conditions coexist: 1) shallow groundwater; 2) low density non-cohesive (granular) soils; and 3) high-intensity ground motion. Studies indicate that saturated, loose near-surface cohesionless soils exhibit the highest liquefaction potential, while dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential. In general, cohesive soils are not considered susceptible to liquefaction, depending on their plasticity and moisture content (Bray & Sancio, 2006). Effects of liquefaction on level ground include settlement, sand boils, and bearing capacity failures below structures. Dynamic settlement of dry loose sands can occur as the sand particles tend to settle and densify as a result of a seismic event.

The site is not located within a State of California Seismic Hazard Zone (CGS 2021) for liquefaction potential. Due to a lack of shallow groundwater (greater than 50 ft below ground surface); the site is not considered susceptible to liquefaction.

2.6.3 Lateral Spreading

Lateral spreading is a type of liquefaction-induced ground failure associated with the lateral displacement of surficial blocks of sediment resulting from liquefaction in a subsurface layer. Once liquefaction transforms the subsurface layer into a fluid mass, gravity plus the earthquake inertial forces may cause the mass to move down-slope towards a free face (such as a river channel or an embankment). Lateral spreading may

cause large horizontal displacements and such movement typically damages pipelines, utilities, bridges, and structures.

Due to the very low potential for liquefaction the potential for lateral spreading is also considered very low.

2.6.4 Tsunamis and Seiches

The site is located approximately 160 feet above sea level and is approximately 12.5 miles from the coast. Based on the elevation of the site, and the distance to the shore, there is a very low possibility of damage to the site during a large tsunami event.

2.7 Seismic Design Parameters

The site seismic characteristics were evaluated per the guidelines set forth in Chapter 16, Section 1613 of the 2019 California Building Code (CBC) and applicable portions of ASCE 7-16 which has been adopted by the CBC. **Please note that the following seismic parameters are only applicable for code-based acceleration response spectra and are not applicable for where site-specific ground motion procedures are required by ASCE 7-16.** Representative site coordinates of latitude 33.7976 degrees north and longitude -117.8628 degrees west were utilized in our analyses. The maximum considered earthquake (MCE) spectral response accelerations (S_{MS} and S_{M1}) and adjusted design spectral response acceleration parameters (S_{DS} and S_{D1}) for Site Class D are provided in Table 2. Since site soils are Site Class D, additional adjustments are required to code acceleration response spectrums as outlined below and provided in ASCE 7-16. The structural designer should contact the geotechnical consultant if structural conditions (e.g., number of stories, seismically isolated structures, etc.) require site-specific ground motions.

A deaggregation of the PGA based on a 2,475-year average return period (MCE) indicates that an earthquake magnitude of 6.65 at a distance of approximately 13.67 km from the site would contribute the most to this ground motion. A deaggregation of the PGA based on a 475-year average return period (Design Earthquake) indicates that an earthquake magnitude of 6.6 at a distance of approximately 19.4 km from the site would contribute the most to this ground motion (USGS, 2008).

Section 1803.5.12 of the 2019 CBC (per Section 11.8.3 of ASCE 7) states that the maximum considered earthquake geometric mean (MCE_G) Peak Ground Acceleration (PGA) should be used for liquefaction potential. The PGA_M for the site is equal to 0.638g (SEAOC, 2021).

TABLE 2

Seismic Design Parameters

Selected Parameters from 2019 CBC, Section 1613 - Earthquake Loads	Seismic Design Values	Notes/Exceptions
Distance to applicable faults classifies the site as a "Near-Fault" site.		Section 11.4.1 of ASCE 7
Site Class	D*	Chapter 20 of ASCE 7
Ss (Risk-Targeted Spectral Acceleration for Short Periods)	1.382g	From SEAOC, 2021
S_1 (Risk-Targeted Spectral Accelerations for 1-Second Periods)	0.491g	From SEAOC, 2021
F_a (per Table 1613.2.3(1))	1.0	For Simplified Design Procedure of Section 12.14 of ASCE 7, F_a shall be taken as 1.4 (Section 12.14.8.1)
F_v (per Table 1613.2.3(2))	1.809	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
S_{MS} for Site Class D [Note: $S_{MS} = F_aS_S$]	1.382	-
S_{M1} for Site Class D [Note: $S_{M1} = F_vS_1$]	0.888g	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
S_{DS} for Site Class D [Note: $S_{DS} = (^2/_3)S_{MS}$]	0.922g	-
S_{D1} for Site Class D [Note: $S_{D1} = (^2/_3)S_{M1}$]	0.592g	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
C_{RS} (Mapped Risk Coefficient at 0.2 sec)	0.927	ASCE 7 Chapter 22
C_{R1} (Mapped Risk Coefficient at 1 sec)	0.924	ASCE 7 Chapter 22
*Since site soils are Site Class D and S_1 is greater than or equal to 0.2, the seismic response coefficient Cs is determined by Eq. 12.8-2 for values of $T \leq 1.5T_s$ and taken equal to 1.5 times the value calculated in accordance with either Eq. 12.8-3 for $T_L \geq T > T_s$, or Eq. 12.8-4 for $T > T_L$. Refer to ASCE 7-16.		

2.8 Rippability

In general, excavation for foundations and underground improvements should be achievable with the appropriate equipment.

2.9 Oversized Material

Generation of a surplus of oversized material (material greater than 8 inches in maximum dimension) is generally not anticipated during site grading. However, some oversized material may be encountered, which may result in excavation difficulty for narrow excavations. Recommendations are provided for appropriate handling of oversized materials in Appendix D. If feasible, crushing oversized materials or exporting to an offsite location may be considered.

2.10 Expansive Soil Characteristics

Expansion Index (EI) test results indicate EI values range from 20 to 37 which are classified as exhibiting "Very Low" to "Low" expansion potential.

3.0 FINDINGS AND CONCLUSIONS

Based on the results of our geotechnical evaluation, it is our opinion that the proposed site development is feasible from a geotechnical standpoint, provided the following conclusions and recommendations are incorporated into the site design, grading, and construction.

The following is a summary of the primary geotechnical factors, which may affect future development of the site.

- In general, our subsurface evaluation indicates that the site contains medium dense to dense, clayey and silty sands and very stiff to hard sandy silts and sandy clays to the maximum explored depth of approximately 50 feet below existing grade. The near-surface loose and compressible soils are not suitable for the planned improvements in their present condition (refer to Section 4.1).
- From a geotechnical perspective, the existing onsite soils are suitable material for use as general fill, provided that they are relatively free from rocks (larger than 8 inches in maximum dimension), construction debris, and significant organic material.
- A static groundwater table was not encountered to the maximum explored depth of approximately 50 feet below existing ground surface. Historic high groundwater is estimated at approximately 58 feet or greater below existing grade.
- Based on the proposed layout, remedial grading will be required adjacent to property lines and existing buildings in portions of the site. Earthwork techniques such as slot cuts and/or temporary shoring will be required.
- The proposed development will likely be subjected to strong seismic ground shaking during its design life from one of the regional faults. The subject site is not located within an Alquist-Priolo Earthquake Fault Zone and no faults were identified on the site during our site evaluation.
- The site is not located in a seismic hazard zone for liquefaction potential. Site soils are not considered susceptible to liquefaction due to lack of a groundwater table in the upper 50 feet.
- Soils exposed at the proposed foundation level are anticipated to have a “Low” expansion potential (Expansion Index not exceeding 50). This shall be confirmed at the completion of site earthwork.
- Excavation for foundations and underground improvements should be achievable with the appropriate equipment.
- The field percolation tests resulted in measured infiltration rates of approximately 0.1 inch per hour. These infiltration rates are based on feasibility factor of safety 2.0. Refer to Section 4.9.
- The site contains soils with high fines content (i.e., silts and clay) that are not suitable for backfill of any site retaining walls. Therefore, select grading and stockpiling of native suitable sandy soils and/or import of sandy soils meeting project recommendations will be required.

4.0 RECOMMENDATIONS

The following recommendations are to be considered preliminary and should be confirmed upon completion of earthwork operations. In addition, they should be considered minimal from a geotechnical viewpoint, as there may be more restrictive requirements from the architect, structural engineer, building codes, governing agencies, or the City. It is the responsibility of the builder to ensure these recommendations are provided to the appropriate parties.

It should be noted that the following geotechnical recommendations are intended to provide sufficient information to develop the site in general accordance with the 2019 California Building Code (CBC) requirements. With regard to the potential occurrence of potentially catastrophic geotechnical hazards such as fault rupture, earthquake-induced landslides, liquefaction, etc. the following geotechnical recommendations should provide adequate protection for the proposed development to the extent required to reduce seismic risk to an "acceptable level." The "acceptable level" of risk is defined by the California Code of Regulations as "the level that provides reasonable protection of the public safety, though it does not necessarily ensure continued structural integrity and functionality of the project" [Section 3721(a)]. Therefore, repair and remedial work of the proposed improvement may be required after a significant seismic event. With regards to the potential for less significant geologic hazards to the proposed development, the recommendations contained herein are intended as a reasonable protection against the potential damaging effects of geotechnical phenomena such as expansive soils, fill settlement, groundwater seepage, etc. It should be understood, however, that although our recommendations are intended to maintain the structural integrity of the proposed development and structures given the site geotechnical conditions, they cannot preclude the potential for some cosmetic distress or nuisance issues to develop as a result of the site geotechnical conditions.

The geotechnical recommendations contained herein must be confirmed to be suitable or modified based on the actual exposed conditions.

4.1 Site Earthwork

We anticipate that earthwork at the site will consist of required earthwork removals, foundation construction, utility line construction and backfill, and construction of parking/driveway areas. We recommend that earthwork onsite be performed in accordance with the following recommendations, 2019 CBC/ City of Orange guidelines and the General Earthwork and Grading Specifications included in Appendix D. In case of conflict, the following recommendations shall supersede previous recommendations and those included as part of Appendix D.

4.1.1 Site Preparation

Prior to grading of areas to receive structural fill, engineered structures or improvements should be demolished and the area should be cleared of existing vegetation (shrubs, trees, grass, etc.), surface obstructions, existing debris and potentially compressible or otherwise unsuitable material. Debris should be removed and properly disposed of off-site. Holes resulting from the removal of buried obstructions, which extend below proposed removal bottoms, should be replaced with suitable compacted fill material. Any

abandoned utility lines should be completely removed and replaced with properly compacted fill.

If cesspools or septic systems are encountered they should be removed in their entirety. The resulting excavation should be backfilled with properly compacted fill soils. As an alternative, cesspools can be backfilled with lean sand-cement slurry. Any encountered wells should be properly abandoned in accordance with regulatory requirements. At the conclusion of the clearing operations, a representative of LGC Geotechnical should observe and accept the site prior to further grading.

4.1.2 Removal Depths and Limits

Building Structures: In order to provide a relatively uniform bearing condition for the planned structural improvements, we recommend that removals extend a minimum depth of 5 feet below existing grade or 2 feet below the proposed footings, whichever is greater. In general, the envelope for removals should extend laterally a minimum horizontal distance of 5 feet beyond the edges of the proposed building footprint.

Footings Adjacent to Property Lines and/or Existing Structures: Where extending the removals 5 feet beyond the proposed building is not possible due to constrains such as property lines and/or existing buildings, subsequent to the 5-foot vertical removal, the excavation along the property line edge of the proposed building may be backfilled to proposed bottom of footing with sand cement slurry or with the onsite fill materials, recompacted to at least 95 percent (instead of a minimum of 90 percent) relative compaction at near-optimum moisture content (per ASTM D1557) to the bottom of proposed footing. This zone is defined as the edge of the proposed building and extending a minimum of 5 horizontal feet (or width of the proposed footing if greater than 5 feet) from the property line into the building pad. Refer to Figure 4.

Pavement and Hardscape Areas: Removals should extend to a depth of at least 2 feet below the existing grade. Removals in any design cut areas of the pavement may be reduced by the depth of the design cut but should not be less than 1-foot below the finished subgrade (i.e., below planned aggregate base/asphalt concrete). In general, the envelope for removals should extend laterally a minimum lateral distance of 2 feet beyond the edges of the proposed improvements.

Local conditions may be encountered during excavation that could require additional over-excavation beyond the above-noted minimum in order to obtain an acceptable subgrade including localized areas of undocumented fill. The actual depths and lateral extents of grading will be determined by the geotechnical consultant, based on subsurface conditions encountered during grading. Removal areas should be accurately staked in the field by the Project Surveyor.

4.1.3 Temporary Excavations

We expect temporary excavation slopes to be grossly stable at 1:1 (horizontal to vertical) inclinations or flatter, however, excavations must be performed in accordance with all

Occupational Safety and Health Administration (OSHA) requirements. Vehicular traffic, stockpiles, and equipment storage should be set back from the perimeter of excavations a distance equivalent to a 1:1 projection from the bottom of the excavation, or 5 feet whichever is greater. The contractor will be responsible for providing the "competent person" required by Cal/OSHA standards to evaluate soil conditions. Close coordination with the geotechnical engineer should be maintained to facilitate construction while providing safe excavations. Once an excavation has been initiated, it should be backfilled as soon as practical. Prolonged exposure of temporary excavations may result in some localized instability. Excavations should be planned so that they are not initiated without sufficient time to shore/fill them prior to weekends, holidays, or forecasted rain. Excavation safety and protection of off-site existing improvements during earthwork operations is the responsibility of the contractor.

Existing, off-site improvements and building structures are present adjacent to portions of the site property lines. In general, any excavation that extends below a 1:1 (horizontal to vertical) projection of an existing foundation will remove existing support of the structure foundation. Where needed, temporary shoring parameters can be provided, upon request.

The potential for impacting the existing improvements and adjacent properties may be reduced by performing excavations within 5 lateral feet of the existing off-site improvements using narrow "A-B-C" slot cuts. "A-B-C" slot cuts are defined as excavations perpendicular to sensitive property boundaries that are divided into multiple "slots" of equal width. If slots are labeled A, B, C, A, B, C, etc., then "A" slots should be excavated at the same time but must be backfilled before "B" slots can be excavated, etc. Slot cuts should be no wider than 12 feet and no deeper than 5 feet. Where proposed excavations are adjacent to adjacent building structures (and within 5 horizontal feet), slot cuts should be no wider than 5 feet and no deeper than 5 feet. Slot cuts should be backfilled immediately with properly placed compacted fill (per Section 4.1.6) or cement slurry to finish grade prior to excavation of adjacent slots. Due to the presence of sands at the site which are susceptible to caving, narrower slot cuts may be required. This should be further evaluated during grading. Protection of the existing improvements during grading is the responsibility of the contractor.

4.1.4 Removal Bottoms and Subgrade Preparation

In general, removal bottom areas and any areas to receive compacted fill should be scarified to a minimum depth of 6 inches, brought to a near-optimum moisture condition, and re-compacted per project recommendations.

Removal bottoms and areas to receive fill should be observed and accepted by the geotechnical consultant prior to subsequent fill placement.

4.1.5 Material for Fill

From a geotechnical perspective, the onsite soils are generally considered suitable for use as general compacted fill (i.e., non-retaining wall backfill), provided they are screened of

organic materials, construction debris and any oversized material (8 inches in greatest dimension). Moisture conditioning of site soils should be anticipated as outlined in the section below.

Retaining wall backfill should consist of sandy soils with a maximum of 35 percent fines (passing the No. 200 sieve) per American Society for Testing and Materials (ASTM) Test Method D1140 (or ASTM D6913/D422) and a Very Low expansion potential (EI of 20 or less per ASTM D4829). Soils should also be screened of organic materials, construction debris and any material greater than 3 inches in maximum dimension. The site contains soils that are not suitable for retaining wall backfill due to their fines content, therefore select grading and stockpiling and/or import will be required by the contractor for obtaining suitable retaining wall backfill soil.

From a geotechnical viewpoint, any required import soils should consist of clean, relatively granular soils of Very Low expansion potential (expansion index 20 or less based on ASTM D4829) and no particles larger than 3 inches in greatest dimension. Source samples of planned importation should be provided to the geotechnical consultant for laboratory testing a minimum of 3 working days prior to any planned importation for required laboratory testing.

Aggregate base (crushed aggregate base or crushed miscellaneous base) should conform to the requirements of Section 200-2 of the Standard Specifications for Public Works Construction ("Greenbook") for untreated base materials (except processed miscellaneous base) or Caltrans Class 2 aggregate base.

The placement of concrete or masonry demolition materials in compacted fill is acceptable from a geotechnical viewpoint provided the demolition material is broken up into pieces not larger than typically used for aggregate base (approximately 1-inch in maximum dimension) and well blended into fill soils with essentially no resulting voids. Demolition material placed in fills must be free of construction debris and reinforcing steel. If asphalt concrete fragments will be incorporated into the demolition materials, approval from an environmental viewpoint may be required and is not the purview of the geotechnical consultant. From our previous experience, we recommend that asphalt concrete fragments be limited to fill areas within planned street areas (i.e., not within building pad areas).

4.1.6 Fill Placement and Compaction

Material to be placed as fill should be brought to near-optimum moisture content (generally at about 2 percent above optimum moisture content) and recompacted to at least 90 percent relative compaction (per ASTM D1557). Moisture conditioning of site soils should be anticipated in order to achieve the required degree of compaction. The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts not exceeding 8 inches in thickness. Each lift should be thoroughly compacted and accepted prior to subsequent lifts. Generally, placement and compaction of fill should be performed in accordance with local grading ordinances and with observation and testing by the geotechnical consultant. Oversized material as previously defined should be removed

from site fills.

Fill placed on any slopes greater than 5:1 (horizontal to vertical) should be properly keyed and benched into firm and competent soils as it is placed in lifts.

Aggregate base material should be compacted to a minimum of 95 percent relative compaction at or slightly above-optimum moisture content per ASTM D1557. Subgrade below aggregate base should be compacted to a minimum of 90 percent relative compaction per ASTM D1557 at or slightly above-optimum moisture content.

If gap-graded ¾-inch rock is used for backfill (around storm drain storage chambers, retaining wall backfill, etc.) it will require compaction. Rock shall be placed in thin lifts (typically not exceeding 6 inches) and mechanically compacted with observation by geotechnical consultant. Backfill rock shall meet the requirements of ASTM D2321. Gap-graded rock is required to be wrapped in filter fabric to prevent the migration of fines into the rock backfill.

4.1.7 Trench and Retaining Wall Backfill and Compaction

Bedding material used within the pipe zone should conform to the requirements of the current Greenbook and the pipe manufacturer. Where applicable, sand having a sand equivalent (SE) of 20 or greater (per Caltrans Test Method [CTM] 217) may be used to bed and shade the pipes within the bedding zone. Sand backfill should be densified by jetting or flooding and then tamped to ensure adequate compaction. Bedding sand should be from a natural source, manufactured sand from recycled material is not suitable for jetting. The onsite soils may generally be considered suitable as trench backfill (zone defined as 12 inches above the pipe to subgrade), provided the soils are screened of rocks greater than 6 inches in maximum dimension, construction debris and organic material. Trench backfill should be compacted in uniform lifts (as outlined above in Section "Material for Fill") by mechanical means to at least 90 percent relative compaction (per ASTM D1557). If gap-graded rock is used for trench backfill, refer to above Section 4.1.6.

In backfill areas where mechanical compaction of soil backfill is impractical due to space constraints, flowable fill such as sand-cement slurry may be substituted for compacted backfill. The slurry should contain about one sack of cement per cubic yard. When set, such a mix typically has the consistency of compacted soil. Sand cement slurry placed near the surface within landscape areas should be evaluated for potential impacts on planned improvements.

Any required retaining wall backfill should consist of predominately granular, sandy soils outlined in Section 4.1.5. The limits of select sandy backfill should extend at minimum ½ the height of the retaining wall or the width of the heel (if applicable), whichever is greater (Refer to Figure 4). Retaining wall backfill soils should be compacted in relatively uniform thin lifts to a minimum of 90 percent relative compaction (per ASTM D1557). Jetting or flooding of retaining wall backfill materials should not be permitted. If gap-graded rock is used for retaining wall backfill, refer to above Section 4.1.6.

A representative from LGC Geotechnical should observe, probe, and test the backfill to

verify compliance with the project recommendations.

4.1.8 Shrinkage and Subsidence

Allowance in the earthwork volumes budget should be made for an estimated 5 to 10 percent reduction in volume of near-surface (upper approximate 5 feet) soils. It should be stressed that these values are only estimates and that an actual shrinkage factor would be extremely difficult to predetermine. Subsidence, due to earthwork operations, is expected to be on the order of 0.1-foot. These values are estimates only and exclude losses due to removal of any vegetation or debris. The effective shrinkage of onsite soils will depend primarily on the type of compaction equipment and method of compaction used onsite by the contractor and accuracy of the topographic survey.

4.2 Preliminary Foundation Recommendations

Site soils are anticipated to be of Low expansion potential (EI of 50 or less per ASTM D4829). However, this must be verified based on as-graded conditions. Please note that the following foundation recommendations are preliminary and must be confirmed by LGC Geotechnical at the completion of project plans (i.e., foundation, grading and site layout plans) as well as completion of earthwork. Recommended soil bearing and estimated static settlement are provided in Section 4.3.

Please note that building structures are proposed adjacent to existing building structures in portions of the site. Deepened and/or widening of footings may be prudent in these areas in order to reduce the surcharge on the adjacent existing structure.

4.2.1 Preliminary Conventional Foundation Design Parameters

Conventional foundations may be designed in accordance with Wire Reinforcement Institute (WRI) procedure for slab-on-ground foundations per Section 1808 of the 2019 CBC to resist expansive soils. The following preliminary soil parameters may be used:

- Effective Plasticity Index: 25
- Climatic Rating: Cw = 15
- Reinforcement: Per structural designer.
- Moisture condition subgrade soils to 100 % of optimum moisture content to a depth of 12 inches prior to trenching for footings.

4.2.2 Provisional Post-Tensioned Foundation Design Parameters

The geotechnical parameters provided herein may be used for post-tensioned slab foundations with a deepened perimeter footing or a post-tensioned mat slab. These parameters have been determined in general accordance with the Post-Tensioning Institute (PTI) Standard Requirements for Design of Shallow Post-Tensioned Concrete Foundations on Expansive Soils, referenced in Chapter 18 of the 2019 CBC. In utilizing these parameters, the foundation engineer should design the foundation system in

accordance with the allowable deflection criteria of applicable codes and the requirements of the structural designer/architect. Other types of stiff slabs may be used in place of the CBC post-tensioned slab design provided that, in the opinion of the foundation structural designer, the alternative type of slab is at least as stiff and strong as that designed by the CBC/PTI method.

Our design parameters are based on our experience with similar projects, test results onsite, and the anticipated nature of the soil (with respect to expansion potential). Please note that implementation of our recommendations will not eliminate foundation movement (and related distress) should the moisture content of the subgrade soils fluctuate. It is the intent of these recommendations to help maintain the integrity of the proposed structures and reduce (not eliminate) movement, based upon the anticipated site soil conditions. Should future owners and/or property maintenance personnel not properly maintain the areas surrounding the foundation, for example by overwatering, then we anticipate for highly expansive soils the maximum differential movement of the perimeter of the foundation to the center of the foundation to be on the order of a couple of inches. Soils of lower expansion potential are anticipated to show less movement.

TABLE 3

Preliminary Post-Tensioned Foundation Design Parameters

Parameter	PT Slab with Perimeter Footing	PT Mat with Thickened Edge
Expansion Index	Low[1]	Low[1]
Thornthwaite Moisture Index	-20	-20
Constant Soil Suction	PF 3.9	PF 3.9
Center Lift Edge moisture variation distance, e_m Center lift, y_m	 9.0 feet 0.25 inch	 9.0 feet 0.30 inch
Edge Lift Edge moisture variation distance, e_m Edge lift, y_m	 5.5 feet 0.55 inch	 5.5 feet 0.66 inch

1. Assumed for preliminary design purposes. Further evaluation is needed at the completion of grading.
2. Recommendations for foundation reinforcement and slab thickness are ultimately the purview of the foundation engineer/structural engineer based upon geotechnical criteria and structural engineering considerations.
3. Moisture condition to 100 % of optimum moisture content to a depth of 12 inches prior to trenching.

4.2.3 Shallow Foundation Maintenance

The geotechnical parameters provided herein assume that if the areas adjacent to the foundation are planted and irrigated, these areas will be designed with proper drainage and adequately maintained so that ponding, which causes significant moisture changes below the foundation, does not occur. Our recommendations do not account for excessive irrigation and/or incorrect landscape design. Plants should only be provided with sufficient irrigation for life and not overwatered to saturate subgrade soils. Sunken planters placed adjacent to the foundation, should either be designed with an efficient drainage system or liners to prevent moisture infiltration below the foundation. Some lifting of the perimeter foundation beam should be expected even with properly constructed planters.

In addition to the factors mentioned above, future owners/property management personnel should be made aware of the potential negative influences of trees and/or other large vegetation. Roots that extend near the vicinity of foundations can cause distress to foundations. Future owners (and the owner's landscape architect) should not plant trees/large shrubs closer to the foundations than a distance equal to half the mature height of the tree or 20 feet, whichever is more conservative unless specifically provided with root barriers to prevent root growth below the building foundation.

It is the owner's responsibility to perform periodic maintenance during hot and dry periods to ensure that adequate watering has been provided to keep soil from separating or pulling back from the foundation. Future owners and property management personnel should be informed and educated regarding the importance of maintaining a constant level of soil-moisture. The owners should be made aware of the potential negative consequences of both excessive watering, as well as allowing potentially expansive soils to become too dry. Expansive soils can undergo shrinkage during drying, and swelling during the rainy winter season, or when irrigation is resumed. This can result in distress to building structures and hardscape improvements. The builder should provide these recommendations to future owners and property management personnel.

4.2.4 Slab Underlayment Guidelines

The following is for informational purposes only since slab underlayment (e.g., moisture retarder, sand or gravel layers for concrete curing and/or capillary break) is unrelated to the geotechnical performance of the foundation and thereby not the purview of the geotechnical consultant. Post-construction moisture migration should be expected below the foundation. The foundation engineer/architect should determine whether the use of a capillary break (sand or gravel layer), in conjunction with the vapor retarder, is necessary or required by code. Sand layer thickness and location (above and/or below vapor retarder) should also be determined by the foundation engineer/architect.

4.3 Soil Bearing and Lateral Resistance

Provided our earthwork recommendations are implemented, the following minimum footing widths and embedments for isolated spread and continuous wall footings are recommended for the corresponding allowable bearing pressures.

TABLE 4

Allowable Soil Bearing Pressures

Allowable Static Bearing Pressure (psf)	Minimum Footing Width (feet)	Minimum Footing Embedment* (feet)
3,000	3	2
2,500	2	2
2,000	2	1.5

*Refers to minimum depth to the bottom of the footing below lowest adjacent finish grade.

These allowable bearing pressures are applicable for level (ground slope equal to or flatter than 5 horizontal feet to 1-foot vertical) conditions only. Bearing values indicated above are for total dead loads and live loads. The above vertical bearing may be increased by one-third for short durations of loading which will include the effect of wind or seismic loading.

Soil settlement is a function of footing dimensions and applied soil bearing pressure. In utilizing the above-mentioned allowable bearing capacity, assumed structural loads, and provided our earthwork recommendations are implemented, foundation settlement due to structural loads is anticipated to be on the order of 1-inch or less. Differential settlement should be anticipated between nearby columns or walls where a large differential loading condition exists. Settlement estimates should be evaluated by LGC Geotechnical when foundation plans are available.

Resistance to lateral loads can be provided by friction acting at the base of foundations and by passive earth pressure. For concrete/soil frictional resistance, an allowable coefficient of friction of 0.35 may be assumed with dead-load forces. An allowable passive lateral earth pressure of 250 psf per foot of depth (or pcf) to a maximum of 2,500 psf may be used for lateral resistance. This passive pressure is applicable for level (ground slope equal to or flatter than 5 horizontal feet to 1-foot vertical) conditions only. Frictional resistance and passive pressure may be used in combination without reduction. We recommend that the upper foot of passive resistance be neglected if finished grade will not be covered with concrete or asphalt concrete. The provided allowable passive pressure is based on a factor of safety of 1.5 and may be increased by one-third for short duration wind or seismic loading.

4.4 Lateral Earth Pressures for Retaining Walls

The following preliminary lateral earth pressures may be used for retaining wall structures 10 feet or less in height. Lateral earth pressures are provided as equivalent fluid unit weights, in pound per square foot (psf) per foot of depth or pcf. These values do not contain an appreciable

factor of safety, so the retaining wall designer should apply the applicable factors of safety and/or load factors during design.

The following lateral earth pressures are presented on Table 5 for approved select granular soils with a maximum of 35 percent fines (passing the No. 200 sieve per ASTM D-421/422) and Very Low expansion potential (EI of 20 or less per ASTM D4829). The wall designer should clearly indicate on the retaining wall plans the required sandy soil backfill criteria.

TABLE 5

Lateral Earth Pressures – Sandy Backfill

Conditions	**Equivalent Fluid Unit Weight (pcf)**
	Level Backfill
	Approved Granular Soils
Active	35
At-Rest	55

If the wall can yield enough to mobilize the full shear strength of the soil, it can be designed for "active" pressure. If the wall cannot yield under the applied load, the earth pressure will be higher. This would include 90-degree corners of retaining walls. Such walls should be designed for "at-rest." The equivalent fluid pressure values assume free-draining conditions. Retaining wall structures should be provided with appropriate drainage and appropriately waterproofed, refer to Figure 3. Please note that waterproofing and outlet systems are not the purview of the geotechnical consultant. If conditions other than those assumed above are anticipated, the equivalent fluid pressure values should be provided on an individual-case basis by the geotechnical consultant.

Surcharge loading effects from any adjacent structures should be evaluated by the retaining wall designer. In general, structural loads within a 1:1 (horizontal to vertical) upward projection from the bottom of the proposed retaining wall footing will surcharge the proposed retaining structure. In addition to the recommended earth pressure, basement/retaining walls adjacent to streets should be designed to resist vehicular traffic if applicable. Uniform surcharges may be estimated using the applicable coefficient of lateral earth pressure using a rectangular distribution. A factor of 0.5 and 0.30 may be used for at-rest and active conditions, respectively. The vertical traffic surcharge may be determined by the structural designer. The structural designer should contact the geotechnical engineer for any required geotechnical input in estimating any applicable surcharge loads.

If required, the retaining wall designer may use a seismic lateral earth pressure increment of 10 pcf. This increment should be applied in addition to the provided static lateral earth pressure using a "normal" triangular distribution with the resultant acting at H/3 in relation to the base of the retaining structure (where H is the retained height). For the restrained, at-rest condition, the seismic increment may be added to the applicable active lateral earth pressure (in lieu of the at-

rest lateral earth pressure) when analyzing short duration seismic loading. Per Section 1803.5.12 of the 2019 CBC, the seismic lateral earth pressure is applicable to structures assigned to Seismic Design Category D through F for retaining wall structures supporting more than 6 feet of backfill height. This seismic lateral earth pressure is estimated using the procedure outlined by the Structural Engineers Association of California (Lew, et al, 2010).

Soil bearing and lateral resistance (friction coefficient and passive resistance) are provided in Section 4.3. Earthwork considerations (temporary backcuts, backfill, compaction, etc.) for retaining walls are provided in Section 4.1 (Site Earthwork) and the subsequent earthwork related sub-sections.

4.5 Preliminary Pavement Sections

The following preliminary minimum asphalt concrete (AC) pavement sections are provided in Table 6 below. An R-Value of 10 was utilized for preliminary calculations. These recommendations must be confirmed with R-value testing of representative near-surface soils at the completion of grading and after underground utilities have been installed and backfilled. Determination of the Traffic Index (TI) is not the purview of the geotechnical consultant. Final pavement sections should be confirmed by the project civil/transportation engineer based upon the final design Traffic Index. If requested, LGC Geotechnical will provide sections for alternate TI values.

TABLE 6

Paving Section Options

Pavement Area	Assumed Traffic Index*	Section Thickness (inches)	
		Asphalt Concrete	Aggregate Base
Auto Parking	4.5	4.0	5.5
Circulation Drives (little to no truck traffic)	5.0	4.0	7.5
Truck Driveways	6.0	4.0	11.0

*Determination of the Traffic Index is not the purview of the geotechnical consultant

The provided preliminary Portland Cement concrete pavement section is based on the guidelines of the American Concrete Institute (ACI 330R-08). For the final design section, we recommend a traffic study be performed as LGC Geotechnical does not perform traffic engineering. Traffic study should include the design vehicle (number of axles and load per axle) and estimated number of daily repetitions/trips. Based on an assumed Traffic Category C with an assumed Average Daily Truck Traffic (ADTT) of 20, we recommend a preliminary section of a minimum of 6 inches of concrete over 4 inches of compacted aggregate base over compacted subgrade. The concrete should have a minimum compressive strength of 4,000 psi and a minimum flexural strength of 550 psi at the time the pavement is subjected to traffic. Steel reinforcement is not required (ACI, 2013). This pavement section assumes that edge restraints like a curb and gutter will be provided. To reduce the potential (but not eliminate) for cracking, paving should provide

control joints at regular intervals not exceeding 10 feet in each direction. Decreasing the spacing of these joints will further reduce, but not eliminate the potential for unsightly cracking. Preliminary pavement section is based on a 20-year design. Truck loading is defined one 16-kip axle and two 32-kip tandem axles (80 kips). Alternate section(s) may be provided based on anticipated specific traffic loadings and repetitions provided by others. LGC Geotechnical does not perform traffic engineering and determination of traffic loading is not the purview of the geotechnical consultant.

The thicknesses shown are for minimum thicknesses. Increasing the thickness of any or all of the above layers will reduce the likelihood of the pavement experiencing distress during its service life. The above recommendations are based on the assumption that proper maintenance and irrigation of the areas adjacent to the roadway will occur through the design life of the pavement. Failure to maintain a proper maintenance and/or irrigation program may jeopardize the integrity of the pavement.

Earthwork recommendations regarding aggregate base and subgrade are provided in the previous section "Site Earthwork" and the related sub-sections of this report.

4.6 Soil Corrosivity

Although not corrosion engineers (LGC Geotechnical is not a corrosion consultant), several governing agencies in Southern California require the geotechnical consultant to determine the corrosion potential of soils to buried concrete and metal facilities. We therefore present the results of our testing with regard to corrosion for the use of the client and other consultants, as they determine necessary.

Corrosion testing indicated a soluble sulfate content of approximately 0.067 percent, a chloride content of 20 parts per million (ppm), pH of 8.13, and a minimum resistivity of 2,590 ohm-centimeters. Based on Caltrans Corrosion Guidelines (2021), soils are considered corrosive if the sulfate concentration is 2,000 ppm (0.2 percent) or greater, the chloride concentration is 500 ppm or greater, the pH is 5.5 or less, or the minimum resistivity is equal to or less than 1,500 om-cm.

Based on laboratory sulfate test results, the near-surface soils have an exposure class of "S0" per ACI 318-14, Table 19.3.1.1 with respect to sulfates (ACI, 2014). This must be verified based on as-graded conditions.

4.7 Nonstructural Concrete Flatwork

Nonstructural concrete flatwork (such as walkways, etc.) has a high potential for cracking due to changes in soil volume related to soil-moisture fluctuations. To reduce the potential for excessive cracking and lifting, concrete should be designed in accordance with the minimum guidelines outlined in Table 7 on the following page. These guidelines will reduce the potential for irregular cracking and promote cracking along construction joints but will not eliminate all cracking or lifting. Thickening the concrete and/or adding additional reinforcement and construction joints will further reduce cosmetic distress. Please note that where tile is planned to be placed over concrete the architect must take special care to ensure that construction

joints are carried up through the tile from the concrete. The concrete flatwork will move over time, the architect and builder must make provisions for this movement in both design and construction.

TABLE 7

Nonstructural Concrete Flatwork

	Flatwork	**City Sidewalk Curb and Gutters**
Minimum Thickness (in.)	4 inches	City/Agency Standard
Presoak	Wet down prior to placing	City/Agency Standard
Minimum Reinforcement	No. 3 rebar at 24 inches on centers	City/Agency Standard
Crack Control Joints	Saw cut or deep open tool joint to a minimum of $^1/_3$ the concrete thickness	City/Agency Standard
Maximum Joint Spacing	6 feet	City/Agency Standard

4.8 Surface Drainage and Landscaping

4.8.1 Precise Grading

From a geotechnical perspective, we recommend that compacted finished grade soils adjacent to proposed structures be sloped away from the structures and towards an approved drainage device or unobstructed swale. Drainage swales, wherever feasible, should not be constructed within 5 feet of buildings. Where lot and building geometry necessitates that drainage swales be routed closer than 5 feet to structural foundations, we recommend the use of area drains together with drainage swales. Drainage swales used in conjunction with area drains should be designed by the project civil engineer so that a properly constructed and maintained system will prevent ponding within 5 feet of the foundation. Code compliance of grades is not the purview of the geotechnical consultant.

Planters with open bottoms adjacent to buildings should be avoided. Planters should not be designed adjacent to buildings unless provisions for drainage, such as catch basins, liners, and/or area drains, are made. Overwatering must be avoided.

4.8.2 Landscaping

Planters adjacent to a building or structure should be avoided wherever possible or be properly designed (e.g., lined with a membrane), to reduce the penetration of water into

the adjacent footing subgrades and thereby reduce moisture-related damage to the foundation. Planting areas at grade should be provided with appropriate positive drainage. Wherever possible, exposed soil areas should be above adjacent paved grades to facilitate drainage. Planters should not be depressed below adjacent paved grades unless provisions for drainage, such as multiple depressed area drains, are constructed. Adequate drainage gradients, devices, and curbing should be provided to prevent runoff from adjacent pavement or walks into the planting areas. Irrigation methods should promote uniformity of moisture in planters and beneath adjacent concrete flatwork. Overwatering and underwatering of landscape areas must be avoided. Irrigation levels should be kept to the absolute minimum level necessary to maintain healthy plant life.

Area drain inlets should be maintained and kept clear of debris in order to properly function. Owners and property management personnel should also be made aware that excessive irrigation of neighboring properties can cause seepage and moisture conditions. Owners and property management personnel should be furnished with these recommendations communicating the importance of maintaining positive drainage away from structures, towards streets, when they design their improvements.

The impact of heavy irrigation or inadequate runoff gradients can create perched water conditions. This may result in seepage or shallow groundwater conditions where previously none existed. Maintaining adequate surface drainage and controlled irrigation will significantly reduce the potential for nuisance-type moisture problems. To reduce differential earth movements such as heaving and shrinkage due to the change in moisture content of foundation soils, which may cause distress to a structure and associated improvements, moisture content of the soils surrounding the structure should be kept as relatively constant as possible.

4.9 Subsurface Water Infiltration

Recent regulatory changes have occurred that mandate that storm water be infiltrated below grade rather than collected in a conventional storm drain system. Typically, a combination of methods are implemented to reduce surface water runoff and increase infiltration including; permeable pavements/pavers for roadways and walkways, directing surface water runoff to grass-lined swales, retention areas, and/or drywells, etc.

It should be noted that collecting and concentrating surface water for the purpose of intentional infiltration below grade, conflicts with the geotechnical engineering objective of directing surface water away from slopes, structures and other improvements. The geotechnical stability and integrity of a site is reliant upon appropriately handling surface water. In general, the vast majority of geotechnical distress issues are directly related to improper drainage. In general, distress in the form of movement of improvements could occur as a result of soil saturation and loss of soil support, expansion, internal soil erosion, collapse and/or settlement.

If it is determined that water must be infiltrated due to regulatory requirements, we recommend the absolute minimum amount of water be infiltrated and that the infiltration areas not be located near settlement-sensitive existing /proposed improvements, retaining wall structures, property lines, or any slopes. We recommend the design of any infiltration system include at least one redundancy or overflow system. It may be prudent to provide an overflow system connected

directly to a storm drain system in order to prevent failure of the infiltration system, either as a result of lower than anticipated infiltration with time and/or very high flow volumes.

As with all systems that are designed to concentrate surface flow and direct the water into the subsurface soils, some minor settlement, nuisance type localized saturation and/or other water related issues should be expected. Due to variability in geologic and hydraulic conductivity characteristics, these effects may be experienced at the onsite location and/or potentially at other locations beyond the physical limits of the subject site. Infiltrated water may enter underground utility pipe zones or flow along heterogeneous soil layers or geologic structure and migrate laterally impacting other improvements which may be located far away or at an elevation much lower than the infiltration source.

Adequate distances should be maintained between infiltration locations and structures. The invert of any storm water infiltration system should be set back a minimum of 15 feet from building structures and outside a 1:1 plane drawn up from the bottom of adjacent foundations.

Observed infiltration rates (no factor of safety) of 0.1 and 0.2 inches per hour were obtained from field infiltration testing. The design infiltration rate is determined by dividing the observed infiltration rate by a series of safety factors for site suitability and design considerations that are the purview of both the geotechnical consultant and designer of the infiltration system. The following geotechnical factors of safety provided in Table 8 can be used to determine any required design infiltration rate.

TABLE 8

Geotechnical Factors of Safety for Design Infiltration Rate

Geotechnical Reduction Factors	
Consideration	**F.S.**
Soil Assessment Methods (RF_t)	2
Site Variability (RF_v)	1
Long-term Siltation & Maintenance (RF_s)	Per Infiltration Designer
Calculated Design F.S.	Per Infiltration Designer
Combined F.S.= RF_t x RF_t x RF_s	**TBD**

These values are for native materials only and are not to be utilized for compacted fill. Infiltration shall not be permitted directly on or into compacted fill soils. The infiltration values provided are based on clean water and this requires the removal of trash, debris, soil particles, etc., and on-going maintenance. Over time, siltation, plugging, and clogging of the system may reduce the infiltration rate and subsequently reduce the effectiveness of the infiltration system. It should be noted that methods to prevent this shall be the sole responsibility of the infiltration designer and are not the purview of the geotechnical consultant. If adequate measures cannot be incorporated into the design and maintenance of the system, then the infiltration rates may need to be further reduced. These and other factors should be considered in selecting a design infiltration rate.

4.10 Pre-Construction Documentation and Construction Monitoring

It is recommended that a program of documentation and monitoring be devised and put into practice before the onset of any groundwork. LGC Geotechnical can perform these services at your request. This should include, but not necessarily be limited to, detailed documentation of the existing improvements, buildings, and utilities around the area of proposed excavation, with particular attention to any distress that is already present prior to the start of work. Subsequent readings should be scheduled consistent with the program of work.

4.11 Geotechnical Plan Review

Grading and foundation plans and final project drawings should be reviewed by this office prior to construction to verify that our geotechnical recommendations, provided herein, have been appropriately incorporated. Additional or modified geotechnical recommendations may be required based on the proposed layout.

4.12 Footing/Foundation Excavations

Footing/foundation excavation bottoms should be firm, relatively unyielding, and free of loose material. Footing/foundation excavations should be observed and accepted by the geotechnical consultant prior to placement of steel reinforcement.

Because of the sandy nature of some of the on-site soils, the materials at the base of foundations may become loosened and disturbed after excavating and subsequently drying out. It may be required immediately prior to placing reinforcing steel, the base of foundations be moistened and compacted.

4.13 Geotechnical Observation and Testing During Construction

The recommendations provided in this report are based on limited subsurface observations and geotechnical analysis. The interpolated subsurface conditions should be checked in the field during construction by a representative of LGC Geotechnical. Geotechnical observation and testing is required per Section 1705 of the 2019 California Building Code (CBC).

Geotechnical observation and/or testing should be performed by LGC Geotechnical at the following stages:

- During grading (removal bottoms, fill placement, etc.);
- During utility trench and retaining wall backfill and compaction;
- Preparation of pavement subgrade and placement of aggregate base;
- After building and wall footing excavation and prior to placing reinforcement and/or concrete; and
- When any unusual soil conditions are encountered during any construction operation subsequent to issuance of this report.

5.0 LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report. The samples taken and submitted for laboratory testing, the observations made, and the in-situ field testing performed are believed representative of the entire project; however, soil and geologic conditions revealed by excavation may be different than our preliminary findings. If this occurs, the changed conditions must be evaluated by the project soils engineer and geologist and design(s) adjusted as required or alternate design(s) recommended.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and/or project engineer and incorporated into the plans, and the necessary steps are taken to see that the contractor and/or subcontractor properly implements the recommendations in the field. The contractor and/or subcontractor should notify the owner if they consider any of the recommendations presented herein to be unsafe.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can and do occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. Therefore, the findings, conclusions, and recommendations presented in this report can be relied upon only if LGC Geotechnical has the opportunity to observe the subsurface conditions during grading and construction of the project, in order to confirm that our preliminary findings are representative for the site.

In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and modification, and should not be relied upon after a period of 3 years.

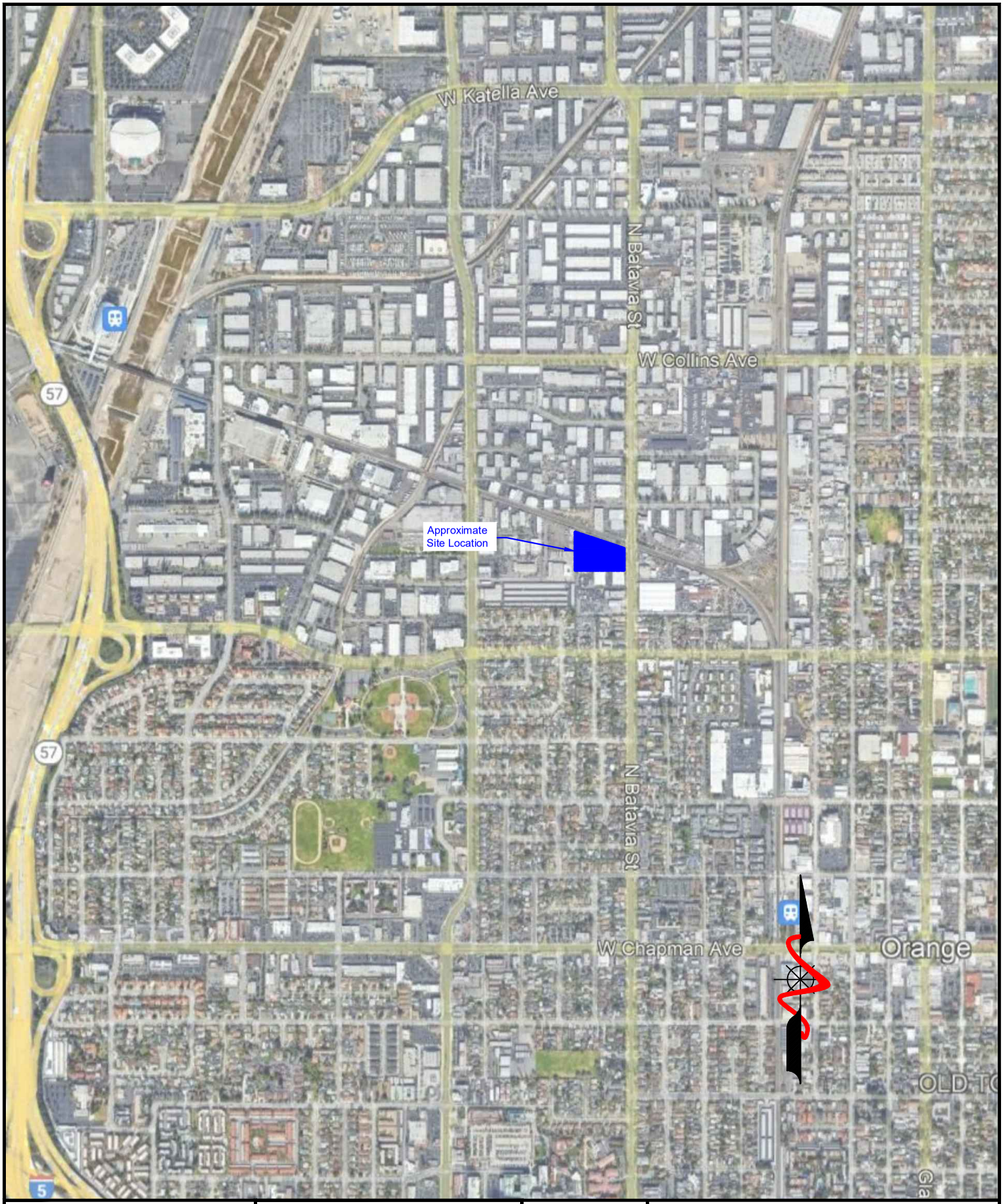

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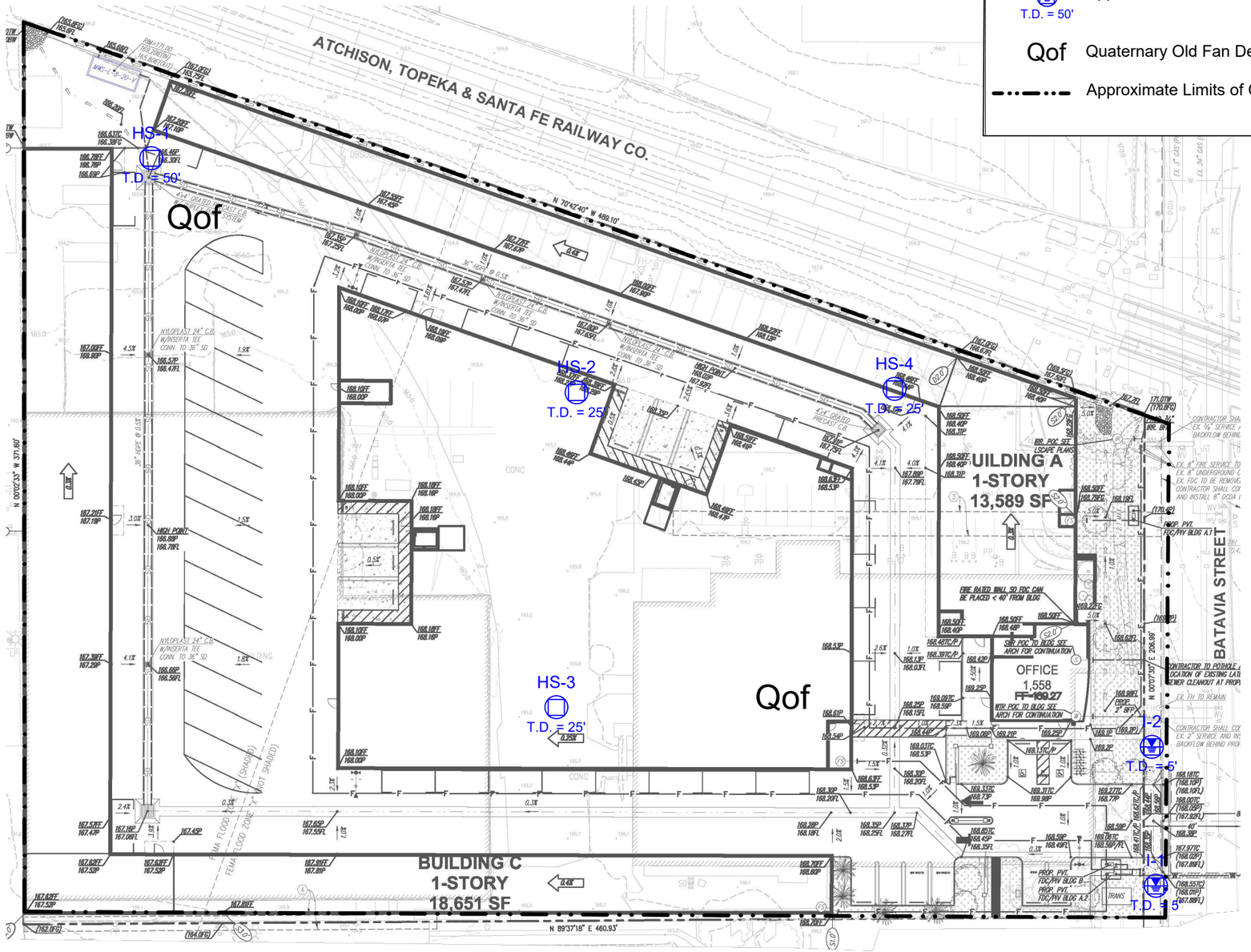
FIGURE 1
Site Location Map

PROJECT NAME	SCIND Batavia Point, LLC
PROJECT NO.	21184-01
ENG. / GEOL.	KMS/KBC
SCALE	Not to Scale
DATE	March 2022



LEGEND

HS-1 / T.D. = 50'	Approximate Location of Hollow Stem Auger Boring by LGC Geotechnical, With Total Depth in Feet
I-1 / T.D. = 50'	Approximate Location of Hollow Stem Auger Infiltration Boring by LGC Geotechnical, With Total Depth in Feet
Qof	Quaternary Old Fan Deposits, Circled Where Buried
	Approximate Limits of Grading

SCALE: 1"=50'

50' 0 50' 100'

LGC Geotechnical, Inc.

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FIGURE 2
Geotechnical Map

PROJECT NAME	SCIND Batavia Point, LLC
PROJECT NO.	21184-01
ENG. / GEOL.	KMS/KBC
SCALE	1" = 50'
DATE	March 2022

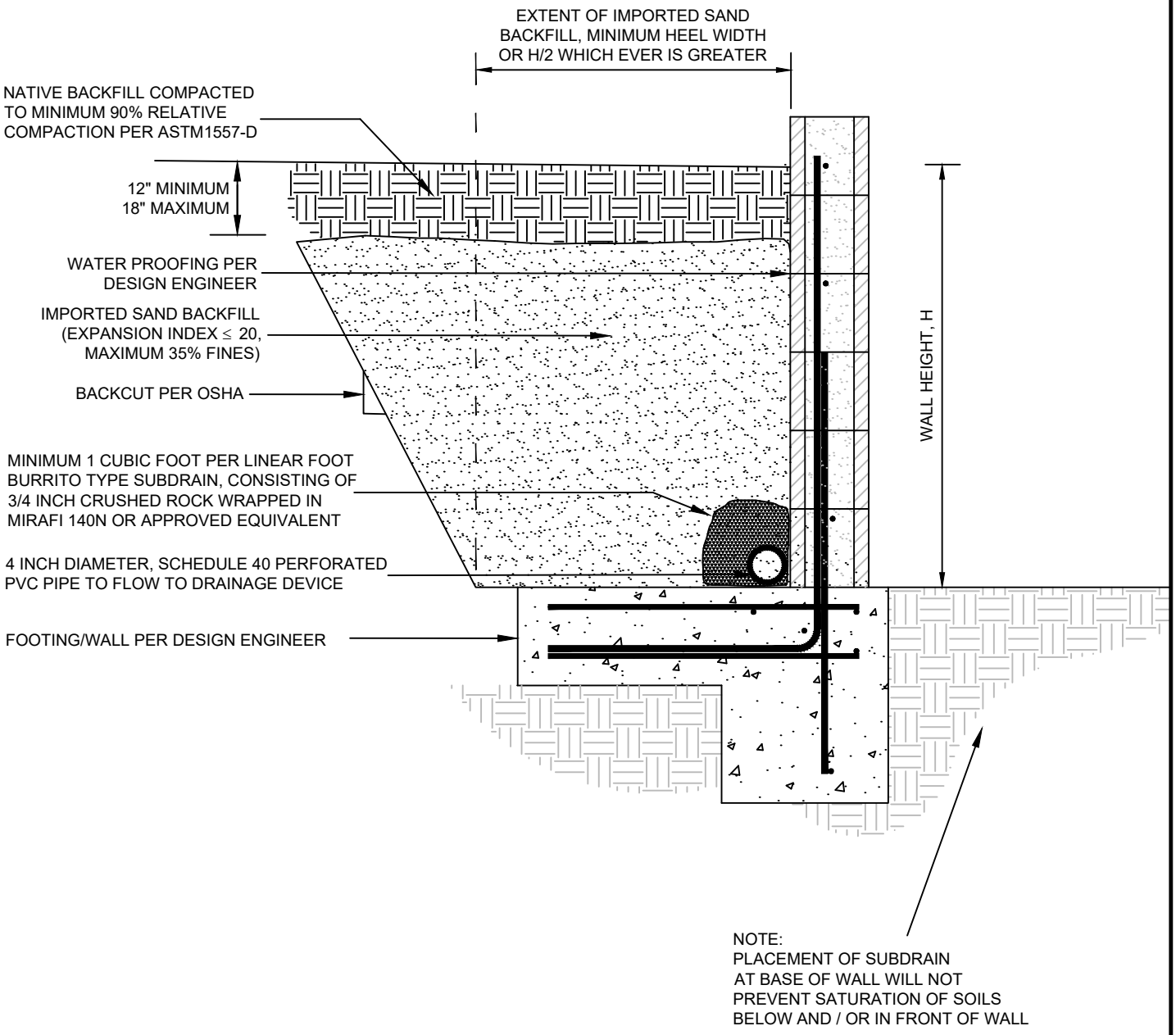

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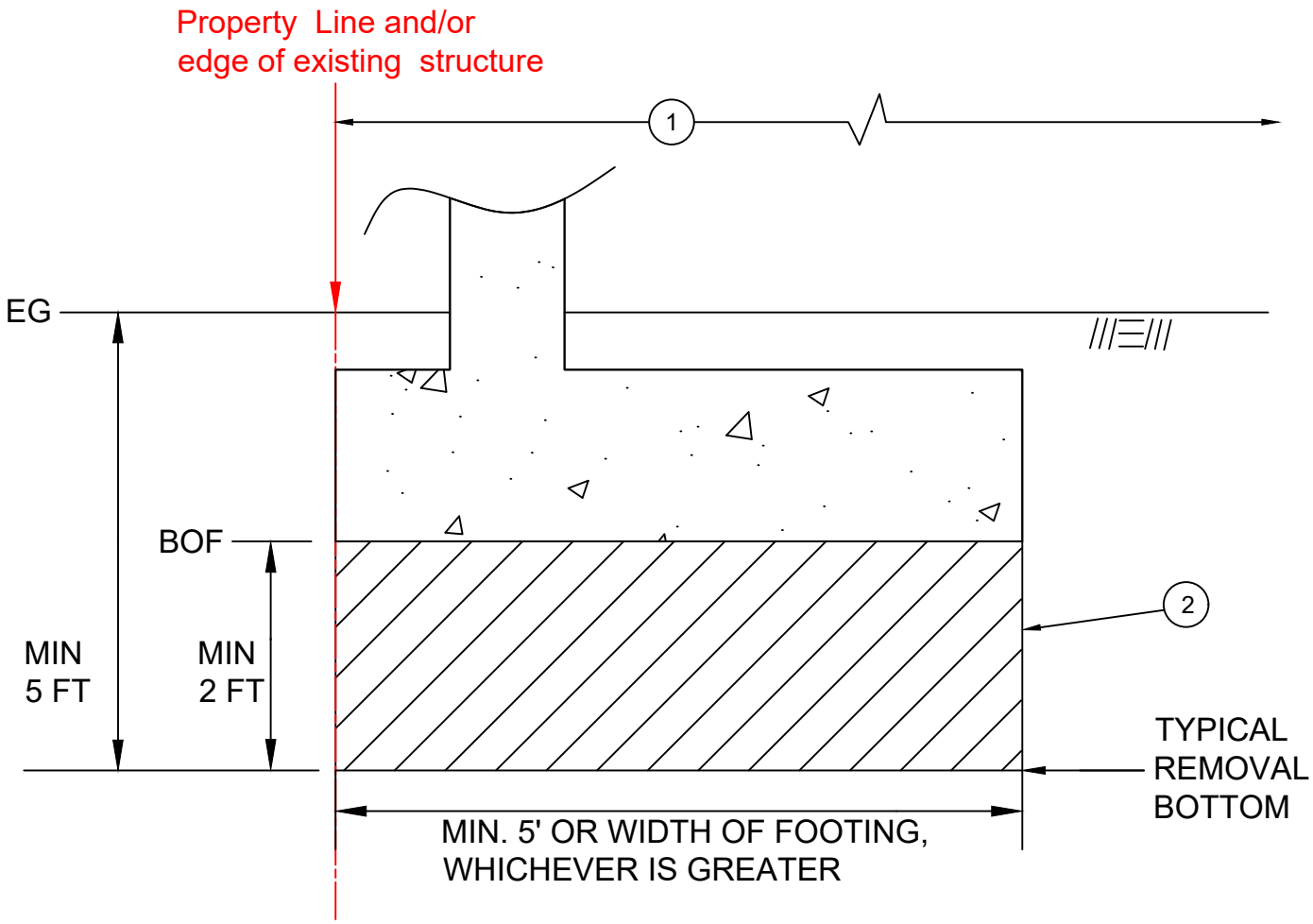
FIGURE 3

Retaining Wall Backfill and Subdrain Detail
Level Backfill
Approved Import Sand

PROJECT NAME	SCIND Batavia Point, LLC
PROJECT NO.	21184-01
ENG. / GEOL.	KMS/KBC
SCALE	Not to Scale
DATE	March 2022

EARTHWORK REMOVALS FOR FOOTINGS ADJACENT TO PROPERTY LINES AND/OR EXISTING STRUCTURES



(1) EXCAVATIONS 4' OR DEEPER WITHIN 5' HORIZONTAL FEET OF PROPERTY LINE AND/OR EXISTING BUILDING STRUCTURES SHOULD BE MADE IN "A-B-C" SLOT CUTS OR TEMPORARY SHORING SHOULD BE USED

(2) REPLACE REMOVED UNSUITABLE SOIL BELOW PROPOSED FOOTINGS WITH SAND CEMENT SLURRY OF SOIL COMPACTED TO A MINIMUM OF 95% RELATIVE COMPACTION

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FIGURE 4

PROJECT NAME	SCIND Batavia Point, LLC
PROJECT NO.	21184-01
ENG / GEO	KMS/KBC
SCALE	Not to Scale
DATE	March 2022

Appendix A
References

APPENDIX A

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Appendix B
Boring Logs and Field Infiltration Data

Geotechnical Boring Log Borehole LGC-HS-1

Date: 10/26/2021 | **Drilling Company:** Cal Pack Drilling

Project Name: SCIND Batavia Point | **Type of Rig:** Truck Mounted

Project Number: 21184-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~159' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By RNP
Sampled By RNP
Checked By KBC

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B						@ 0' - 6" of concrete pavement	
155			R-1	7 10 12	118.5	14.1	CL-ML	@ 2.5' - Sandy SILT to Silty CLAY: brown, moist, very stiff	
	5		SPT-1	2 4 4		14.8		@ 5' - Sandy SILT to Silty CLAY: brown, moist, medium stiff	
			R-2	5 8 8	116.7	13.9		@ 7.5' - Silty CLAY: yellowish brown, moist, very stiff	CN
150	10		SPT-2	2 3 4		16.0		@ 10' - Sandy SILT to Silty CLAY: moist to very moist, medium stiff, low plasticity	
145	15		R-3	8 20 22		3.5	GM	@ 15' - Silty Gravel: grayish brown, slightly moist, medium dense, sample disturbed	
140	20		SPT-3	20 26 24		3.3	SP	@ 20' - SAND w/ Fine to Coarse Gravel: brown & gray, slightly moist, dense to very dense	
135	25		R-4	14 50/6"	120.4	1.3	GP	@ 25' - SAND w/ Fine to Coarse Gravel: brown & gray, slightly moist, very dense	
130	30								

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 12/1/2021

Geotechnical Boring Log Borehole LGC-HS-1

Date: 10/26/2021 | **Drilling Company:** Cal Pack Drilling

Project Name: SCIND Batavia Point | **Type of Rig:** Truck Mounted

Project Number: 21184-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~159' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By RNP
Sampled By RNP
Checked By KBC

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		SPT-4	5 11 5		24.3	CL	@ 30' - Silty CLAY w/ trace Gravel: brown, moist to very moist, very stiff, low plasticity	
125									
	35		R-5	12 14 13	103.8	22.1		@ 35' - Lean CLAY w/ trace Gravel: yellowish brown to brown, moist to very moist, stiff	AL
120									
	40		SPT-5	3 4 4		23.2		@ 40' - Silty CLAY w/ trace of Gravel: brown, moist to very moist, medium stiff, low plasticity	
115									
	45		R-6	21 50/3"	109.9	4.6	SM	@ 45' - Silty SAND w/ Gravel: gray to brown, slightly moist to moist, very dense	
110									
	50		SPT-6	11 50/6"		4.5		@ 50' - SAND: gray to brown, slightly moist to moist, medium dense to dense	
								Total Depth = 51' Groundwater Not Encountered Backfilled with Cuttings on 10/26/2021	
105									
	55								
100									
	60								

LGC Geotechnical, Inc.

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
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EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Geotechnical Boring Log Borehole LGC-HS-2

Date: 10/26/2021 | **Drilling Company:** Cal Pack Drilling

Project Name: SCIND Batavia Point | **Type of Rig:** Truck Mounted

Project Number: 21184-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~161' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By RNP
Sampled By RNP
Checked By KBC

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
160	0							@ 0' - 10" Asphalt, two layers of asphalt	
			R-1	7 8 9	107.4	10.6	CL	@ 2.5' - Silty CLAY: brown, slightly moist, stiff, low plasticity	
155	5		SPT-1	6 5 5		11.6	CL-ML	@ 5' - Sandy SILT to Sandy CLAY: dusky brown, slightly moist to moist, stiff, low plasticity	-#200
			R-2	5 9 9	109.1	7.8		@ 7.5' - Silty CLAY: light brown to brown, slightly moist to moist, loose, scattered roots	CO
150	10		SPT-2	2 3 4		12.8		@ 10' - Sandy SILT to Sandy CLAY: dusky brown, slightly moist to moist, medium stiff	-#200
145	15		R-3	14 37 50/4"		1.0	GP	@ 15' - Poorly Graded Gravel: gray slightly moist, very dense, sample disturbed	
140	20		SPT-3	20 50/3"		1.7		@ 20' - Poorly Graded Gravel w/ Silty SAND: dusky gray, slightly moist, very dense	
135	25		R-4	17 50/6"		1.6	SP	@ 25' - Poorly Graded SAND w/ Gravel: gray to light brown, slightly moist, very dense	
	30								

LGC Geotechnical, Inc.

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 12/1/2021

Geotechnical Boring Log Borehole LGC-HS-2

Date: 10/26/2021 | **Drilling Company:** Cal Pack Drilling

Project Name: SCIND Batavia Point | **Type of Rig:** Truck Mounted

Project Number: 21184-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~161' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By RNP
Sampled By RNP
Checked By KBC

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
130	30		SPT-4	5 3 5		9.6	CL-ML	@ 30' - Silty CLAY w/ Fine Gravel: yellowish brown, slightly moist to moist, medium stiff	AL
125	35		R-5	7 9 12	96.4	19.3	CL	@ 35' - Silty CLAY: brown, moist, stiff, low plasticity	
120	40		SPT-5	2 5 27		10.1	CL-ML	@ 40' - Sandy SILT to Sandy CLAY: brown to dark brown, moist, hard, low plasticity	
115	45		R-6	20 50/3"	128.5	3.5	GP	@ 45' - Poorly Graded Sandy Gravel: reddish brown, slightly moist, very dense	
110	50		SPT-6	12 45 35		3.6	SP	@ 50' - Poor Graded Gravelly SAND: gray to brown, slightly moist, very dense	
105	55							Total Depth = 51.5' Groundwater Not Encountered Backfilled with Cuttings on 10/26/2021	
	60								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Geotechnical Boring Log Borehole LGC-HS-3

Date: 10/26/2021 | **Drilling Company:** Cal Pack Drilling

Project Name: SCIND Batavia Point | **Type of Rig:** Truck Mounted

Project Number: 21184-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~161' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By RNP
Sampled By RNP
Checked By KBC

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
160	0							@ 0' - 6.5" Asphalt	
			R-1	5 9 11	116.2	15.6	CL-ML	@ 2.5' -Sandy SILT to Sandy CLAY: brown to reddish brown, moist, stiff, low plasticity	
155	5		SPT-1	3 3 3		14.2		@ 5' - Sandy SILT to Sandy CLAY: dark brown, moist, medium stiff, low plasticity	
			R-2	5 7 7				@ 7.5' - Silt CLAY: reddish brown to yellowish brown, moist to very moist, medium stiff, low plasticity	CN
150	10		SPT-2	3 3 3		22.7	CL	@ 10' - Silty CLAY: dusky brown, moist to very moist, medium stiff, low plasticity	
145	15		R-3	9 19 40	110.9	3.0	SP	@ 15' - Poorly Graded SAND: brown to dark gray, slightly moist, dense	
140	20		SPT-3	14 47 24		1.9	GP	@ 20' -Sandy Poorly Graded Gravel: dusky gray, dry to slightly moist, very dense	
135	25		R-4	42 50/3"	116.6	2.5		@ 25' - Sandy Poorly Graded Gravel: gray to brown, moist, very dense	
	30							Total Depth = 26' Groundwater Not Encountered Backfilled with Cuttings on 10/26/2021	

LGC Geotechnical, Inc.

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 12/1/2021

Geotechnical Boring Log Borehole LGC-HS-4

Date: 10/26/2021 | **Drilling Company:** Cal Pack Drilling

Project Name: SCIND Batavia Point | **Type of Rig:** Truck Mounted

Project Number: 21184-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~161' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By RNP
Sampled By RNP
Checked By KBC

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
160	0	B-2						@ 0' - 4" Asphalt	
			R-1	5 7 15	114.1	16.3	ML	@ 2.5' - Sandy SILT w/ trace Gravel: olive to gray, moist, stiff	
155	5		SPT-1	5 5 9		14.5	SM	@ 5' - Silty SAND: olive gray, very moist, medium dense	
			R-2	5 6 10	115.7	12.8	CL-ML	@ 7.5' - Silty CLAY: olive gray, moist, stiff	CN
150	10		SPT-2	3 4 5		13.7		@ 10' - Sandy SILT to Sandy CLAY: grayish brown, moist, stiff	
145	15		R-3	9 21 32	115.9	3.9	GP	@ 15' - Sandy Poorly Graded Gravel w/ SILT: grayish brown, slightly moist, dense	
140	20		SPT-3	12 24 23	R-1	1.2		@ 20' - Sandy Poorly Graded Gravel w/ SILT, grayish brown, slightly moist, dense	
135	25		R-4	18 22 24	115.5	4.4	SP-SM	@ 25' - SAND to Silty SAND w/ Gravel: grayish brown to reddish brown, slightly moist, dense	
	30							Total Depth = 25' Groundwater Not Encountered Backfilled with Cuttings on 10/26/2021	

LGC Geotechnical, Inc.

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 12/1/2021

Geotechnical Boring Log Borehole LGC-I-1

Date: 10/26/2021 | **Drilling Company:** Cal Pack Drilling

Project Name: SCIND Batavia Point | **Type of Rig:** Truck Mounted

Project Number: 21184-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~165' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By RNP
Sampled By RNP
Checked By KBC

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
165	0								
			R-1				CL-ML	@ 3.5' - Sandy SILT to Sandy CLAY: brown, slightly moist to moist, stiff	
160	5							Total Depth = 5' Groundwater Not Encountered Backfilled with Cuttings on 10/26/2021	
155	10								
150	15								
145	20								
140	25								
	30								

LGC Geotechnical, Inc.

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 12/3/2021

Geotechnical Boring Log Borehole LGC-I-2

Date: 10/26/2021 | **Drilling Company:** Cal Pack Drilling

Project Name: SCIND Batavia Point | **Type of Rig:** Truck Mounted

Project Number: 21184-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~166' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By RNP
Sampled By RNP
Checked By KBC

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
165	0		R-1				CL-ML	@ 3.5' - Sandy SILT to Sandy CLAY: brown, slightly moist to moist, stiff	
	5							Total Depth = 5' Groundwater Not Encountered Backfilled with Cuttings on 10/26/2021	
160									
	10								
155									
	15								
150									
	20								
145									
	25								
140									
	30								

LGC Geotechnical, Inc.

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
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CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 12/3/2021

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: SCIND Batavia Point
Project Number: 21189-01
Date: 10/27/2021
Boring Number: I-1

Test hole dimensions (if circular)	
Boring Depth (feet)*:	5
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:37	9:02	25.0	2.61	2.73	0.12	No
2	9:04	9:29	25.0	2.73	2.86	0.13	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Dt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, DD (feet)	Measured Infiltration Rate(in/hr)
1	9:31	10:01	30.0	2.65	2.78	0.13	0.2
2	10:02	10:32	30.0	2.60	2.70	0.10	0.2
3	10:33	11:03	30.0	2.70	2.83	0.13	0.2
4	11:04	11:34	30.0	2.70	2.83	0.13	0.2
5	11:36	12:06	30.0	2.73	2.85	0.12	0.2
6	12:09	12:39	30.0	2.45	2.52	0.07	0.1
7	12:39	13:09	30.0	2.52	2.63	0.11	0.2
8	13:09	13:39	30.0	2.63	2.74	0.11	0.2
9	13:40	14:10	30.0	2.61	2.70	0.09	0.1
10	14:10	14:40	30.0	2.70	2.81	0.11	0.2
11	14:41	15:11	30.0	2.61	2.72	0.11	0.2
12	15:13	15:43	30.0	2.58	2.68	0.10	0.2

Tested Infiltration Rate (No Factor of Safety)	**0.2**
Minimum Factor of Safety	**2.0**
Infiltration Rate (With Factor of Safety)	**0.1**

Sketch:

Notes:

Based on Guidelines from: South Orange County 9/28/2017
Spreadsheet Revised on: 10/30/2019

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: SCIND Batavia Point
Project Number: 21189-01
Date: 10/27/2021
Boring Number: I-2

Test hole dimensions (if circular)	
Boring Depth (feet)*:	5
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:38	9:03	25.0	2.70	2.75	0.05	No
2	9:04	9:29	25.0	2.69	2.72	0.03	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Dt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, DD (feet)	Measured Infiltration Rate(in/hr)
1	9:31	10:01	30.0	2.55	2.58	0.03	0.0
2	10:02	10:32	30.0	2.49	2.52	0.03	0.0
3	10:32	11:02	30.0	2.52	2.56	0.04	0.1
4	11:04	11:34	30.0	2.48	2.52	0.04	0.1
5	11:36	12:06	30.0	2.52	2.60	0.08	0.1
6	12:09	12:39	30.0	2.43	2.49	0.06	0.1
7	12:39	13:09	30.0	2.44	2.52	0.08	0.1
8	13:09	13:39	30.0	2.52	2.59	0.07	0.1
9	13:40	14:10	30.0	2.51	2.59	0.08	0.1
10	14:10	14:40	30.0	2.59	2.65	0.06	0.1
11	14:41	15:11	30.0	2.47	2.55	0.08	0.1
12	15:13	15:43	30.0	2.49	2.56	0.07	0.1
						Tested Infiltration Rate (No Factor of Safety)	**0.1**
						Minimum Factor of Safety	**2.0**
						Infiltration Rate (With Factor of Safety)	**0.1**

Sketch:

Notes:

Based on Guidelines from: South Orange County 9/28/2017
Spreadsheet Revised on: 10/30/2019

LGC Geotechnical, Inc.

Appendix C
Laboratory Test Results

APPENDIX C

Laboratory Testing Procedures and Test Results

The laboratory testing program was formulated towards providing data relating to the relevant engineering properties of the soils with respect to residential construction. Samples considered representative of site conditions were tested in general accordance with American Society for Testing and Materials (ASTM) procedure and/or California Test Methods (CTM), where applicable. The following summary is a brief outline of the test type and a table summarizing the test results.

Moisture and Density Determination Tests: Moisture content (ASTM D2216) and dry density determinations (ASTM D2937) were performed on relatively undisturbed samples obtained from the test borings and/or trenches. The results of these tests are presented in the boring and/or trench logs. Where applicable, only moisture content was determined from undisturbed or disturbed samples.

Expansion Index: The expansion potential of selected samples was evaluated by the Expansion Index Test, Standard ASTM D4829. Specimens are molded under a given compactive energy to approximately the optimum moisture content and approximately 50 percent saturation or approximately 90 percent relative compaction. The prepared 1-inch-thick by 4-inch-diameter specimens are loaded to an equivalent 144 psf surcharge and are inundated with tap water until volumetric equilibrium is reached. The results of these tests are presented in the following table.

Sample Location	Expansion Index	Expansion Potential*
HS-1 @ 0-5 ft	37	Low
HS-4 @ 0-5 ft	20	Very Low

* ASTM D4829

Atterberg Limits: The liquid and plastic limits ("Atterberg Limits") were determined in accordance with ASTM Test Method D4318 for engineering classification of fine-grained material and presented in the following table.

Sample Location	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS Soil Classification
HS-1 @ 35 ft	27	18	9	CL
HS-2 @ 30 ft	23	17	6	CL-ML
HS-4 @ 0-5 ft	28	18	10	CL

Laboratory Testing Procedures and Test Results

Grain Size Distribution/Fines Content: Representative samples were dried, weighed, and soaked in water until individual soil particles were separated (per ASTM D421) and then washed on a No. 200 sieve (ASTM D1140). Where applicable, the portion retained on the No. 200 sieve was dried and then sieved on a U.S. Standard brass sieve set in accordance with ASTM D6913 (sieve).

Sample Location	Description	% Passing # 200 Sieve
HS-2 @ 5'	Brown Sandy Silt	71
HS-2 @ 10'	Brown Sandy Silt	85

Chloride Content: Chloride content was tested in accordance with Caltrans Test Method (CTM) 422. The results are presented in the following table.

Sample Location	Chloride Content, ppm
HS-4 @ 0-5 ft	20

Minimum Resistivity and pH Tests: Minimum resistivity and pH tests were performed in general accordance with CTM 643 and standard geochemical methods. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. As a result of a decrease in resistivity, the potential for corrosion increases. The results are presented in the following table.

Sample Location	pH	Minimum Resistivity (ohms-cm)
HS-4 @ 0-5 ft	8.13	2590

Soluble Sulfates: The soluble sulfate contents of selected samples were determined by standard geochemical methods (CTM 417). The soluble sulfate content is used to determine the appropriate cement type and maximum water-cement ratios. The test results are presented in the following table.

Sample Location	Sulfate Content (%)
HS-4 @ 0-5 ft	.0067

*Based on ACI 318R-19, Table 19.3.1.1

Laboratory Testing Procedures and Test Results

Hydro-consolidation: Hydro-consolidation tests (collapse) were performed on selected, relatively undisturbed ring samples (ASTM D4546). Samples were placed in a consolidometer and a load approximately equal to the in-situ overburden pressure was applied. Water was then added to the sample and the percent hydro-consolidation under the applied load was measured. The percent for the load was calculated as the ratio of the amount of vertical deformation to the original sample height. The percent hydro-consolidation results are presented in the following table.

Sample Location	Percent Hydro-consolidation
HS-2 @ 7.5 ft	-0.03

Note: Positive values of hydro-consolidation represent collapse of the soil structure, while negative values represent heave (or swelling) or the soil structure.

Consolidation: Consolidation tests were performed per ASTM D2435. Samples (2.4 inches in diameter and 1 inch in height) were placed in a consolidometer and increasing loads were applied. The samples were allowed to consolidate under "double drainage" and total deformation for each loading step was recorded. The percent consolidation for each load step was recorded as the ratio of the amount of vertical compression to the original sample height. The consolidation plots are provided in this Appendix.

R-Value: The resistance R-value was determined by the ASTM D2844 for base, subbase, and basement soils. The samples were prepared and exudation pressure and R-value were determined. The graphically determined R-values at exudation pressure of 300 psi are reported in this appendix. These results were used for pavement design purposes. The results of these tests are presented in the following table.

Sample Location	R-Value
HS-1 @ 0-5 ft	10

ATTERBERG LIMITS

ASTM D 4318

Project Name:	Orange	Tested By:	Y. Nguyen	Date:	11/22/21
Project No. :	21184-01	Input By:	J. Ward	Date:	12/03/21
Boring No.:	HS-1	Checked By:	J. Ward		
Sample No.:	R-5	Depth (ft.)	35.0		
Soil Identification:	Yellowish brown lean clay (CL)				

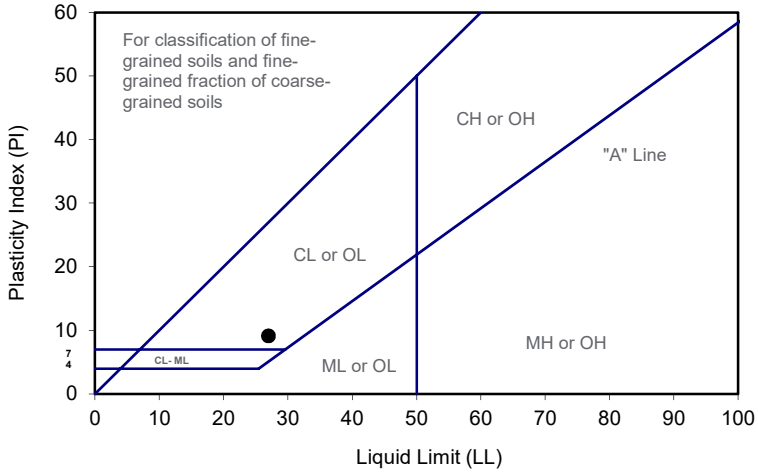
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			31	26	19	
Wet Wt. of Soil + Cont. (g)	9.85	9.89	19.21	19.91	20.77	
Dry Wt. of Soil + Cont. (g)	8.52	8.55	15.51	15.95	16.49	
Wt. of Container (g)	1.07	1.07	1.06	1.07	1.02	
Moisture Content (%) [Wn]	17.85	17.91	25.61	26.61	27.67	

Liquid Limit	**27**
Plastic Limit	**18**
Plasticity Index	**9**
Classification	**CL**

PI at "A" - Line = 0.73(LL-20) 5.11

One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



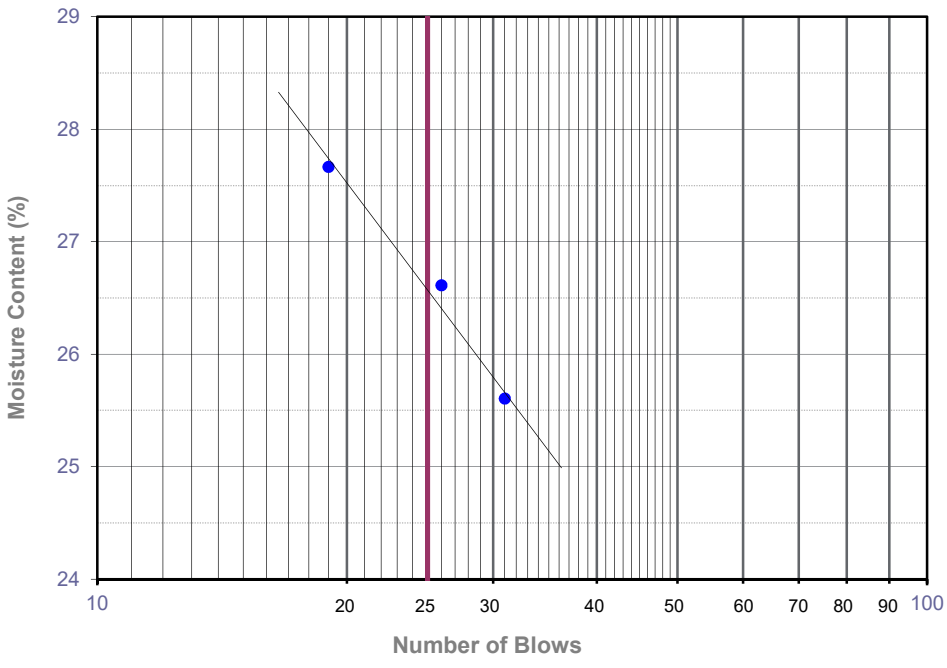
PROCEDURES USED

☐ Wet Preparation
Multipoint - Wet

☒ Dry Preparation
Multipoint - Dry

☒ Procedure A
Multipoint Test

☐ Procedure B
One-point Test



ATTERBERG LIMITS

ASTM D 4318

Project Name:	Orange	Tested By:	Y. Nguyen	Date:	11/22/21
Project No. :	21184-01	Input By:	J. Ward	Date:	12/03/21
Boring No.:	HS-2	Checked By:	J. Ward		
Sample No.:	SPT-4	Depth (ft.)	30.0		
Soil Identification:	Yellowish brown silty clay (CL-ML)				

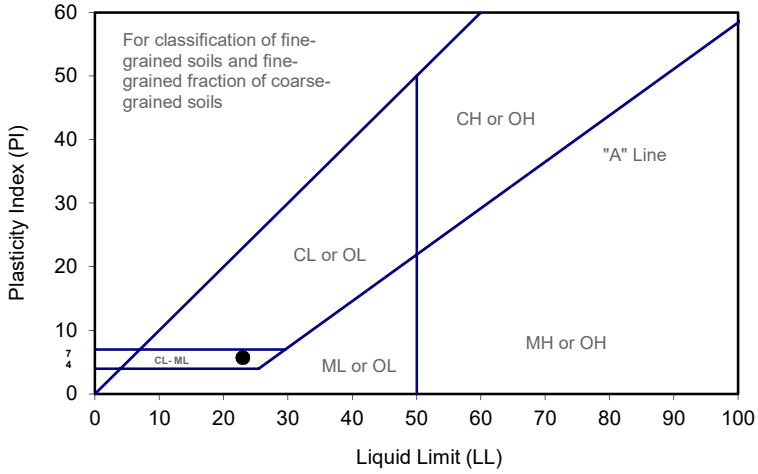
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			31	23	17	
Wet Wt. of Soil + Cont. (g)	10.02	10.21	22.06	21.22	19.10	
Dry Wt. of Soil + Cont. (g)	8.69	8.86	18.18	17.42	15.62	
Wt. of Container (g)	1.02	1.05	1.02	1.06	1.04	
Moisture Content (%) [Wn]	17.34	17.29	22.61	23.23	23.87	

Liquid Limit	**23**
Plastic Limit	**17**
Plasticity Index	**6**
Classification	**CL-ML**

PI at "A" - Line = 0.73(LL-20) 2.19

One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



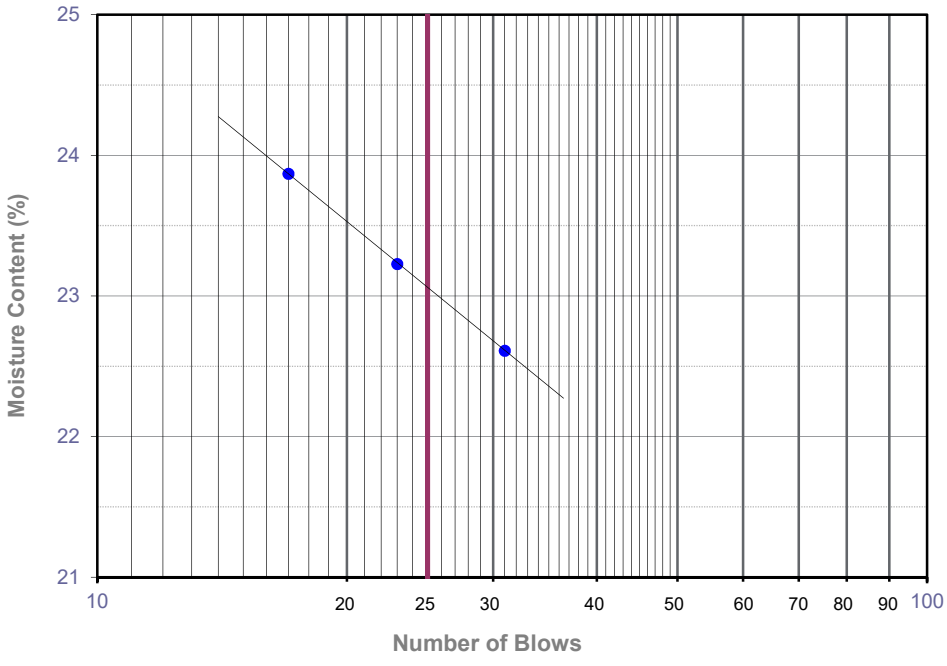
PROCEDURES USED

☐ Wet Preparation
Multipoint - Wet

☒ Dry Preparation
Multipoint - Dry

☒ Procedure A
Multipoint Test

☐ Procedure B
One-point Test



ATTERBERG LIMITS

ASTM D 4318

Project Name:	Orange	Tested By:	Y. Nguyen	Date:	11/22/21
Project No. :	21184-01	Input By:	J. Ward	Date:	12/03/21
Boring No.:	HS-4	Checked By:	J. Ward		
Sample No.:	B-1	Depth (ft.)	0-5		
Soil Identification:	Olive gray clayey sand (SC)				

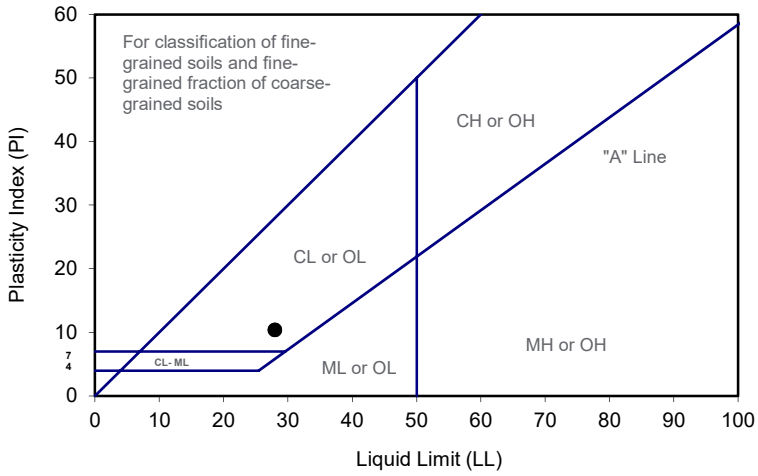
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			34	27	20	
Wet Wt. of Soil + Cont. (g)	9.90	10.03	18.33	18.36	21.54	
Dry Wt. of Soil + Cont. (g)	8.58	8.68	14.74	14.66	16.94	
Wt. of Container (g)	1.03	1.07	1.05	1.02	1.00	
Moisture Content (%) [Wn]	17.48	17.74	26.22	27.13	28.86	

Liquid Limit	**28**
Plastic Limit	**18**
Plasticity Index	**10**
Classification	**CL**

PI at "A" - Line = 0.73(LL-20) 5.84

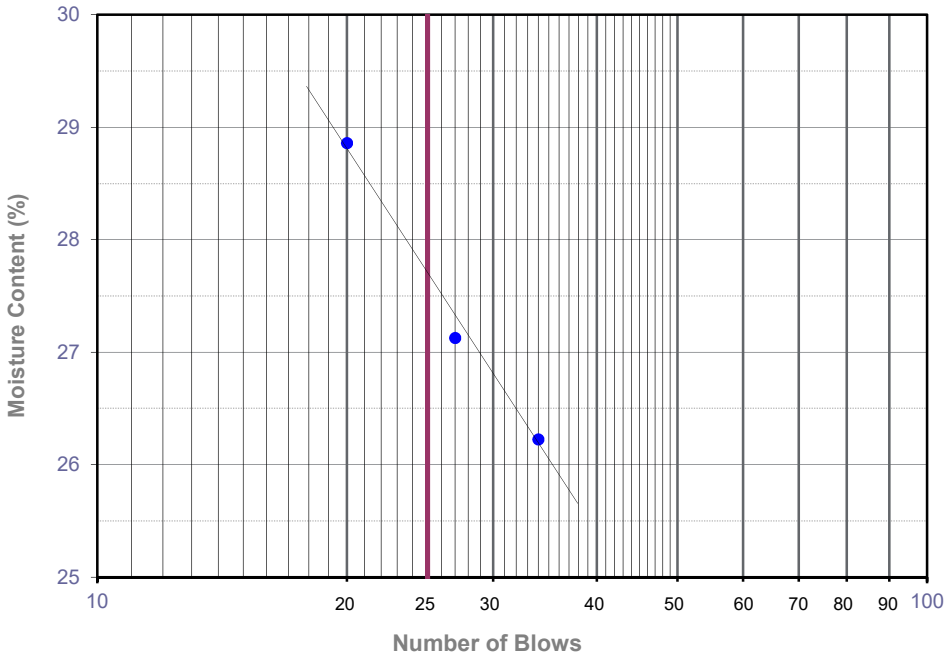
One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



PROCEDURES USED

- [ ] Wet Preparation
  Multipoint - Wet
- [X] Dry Preparation
  Multipoint - Dry
- [X] Procedure A
  Multipoint Test
- [ ] Procedure B
  One-point Test



TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: Orange | Tested By : G. Bathala | Date: 11/13/21

Project No. : 21184-01 | Checked By: J. Ward | Date: 12/03/21

Boring No.	HS-4			
Sample No.	B-1			
Sample Depth (ft)	0-5			
Soil Identification:	Olive gray SC			
Wet Weight of Soil + Container (g)	85.52			
Dry Weight of Soil + Container (g)	84.43			
Weight of Container (g)	38.48			
Moisture Content (%)	2.37			
Weight of Soaked Soil (g)	100.48			

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	0			
Crucible No.	12			
Furnace Temperature (°C)	860			
Time In / Time Out	15:45/16:30			
Duration of Combustion (min)	45			
Wt. of Crucible + Residue (g)	20.7505			
Wt. of Crucible (g)	20.7489			
Wt. of Residue (g) (A)	0.0016			
PPM of Sulfate (A) x 41150	65.84			
PPM of Sulfate, Dry Weight Basis	**67**			

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	30			
ml of AgNO3 Soln. Used in Titration (C)	0.4			
PPM of Chloride (C -0.2) * 100 * 30 / B	20			
PPM of Chloride, Dry Wt. Basis	**20**			

pH TEST, DOT California Test 643

pH Value	**8.13**			
Temperature °C	20.3			

SOIL RESISTIVITY TEST

DOT CA TEST 643

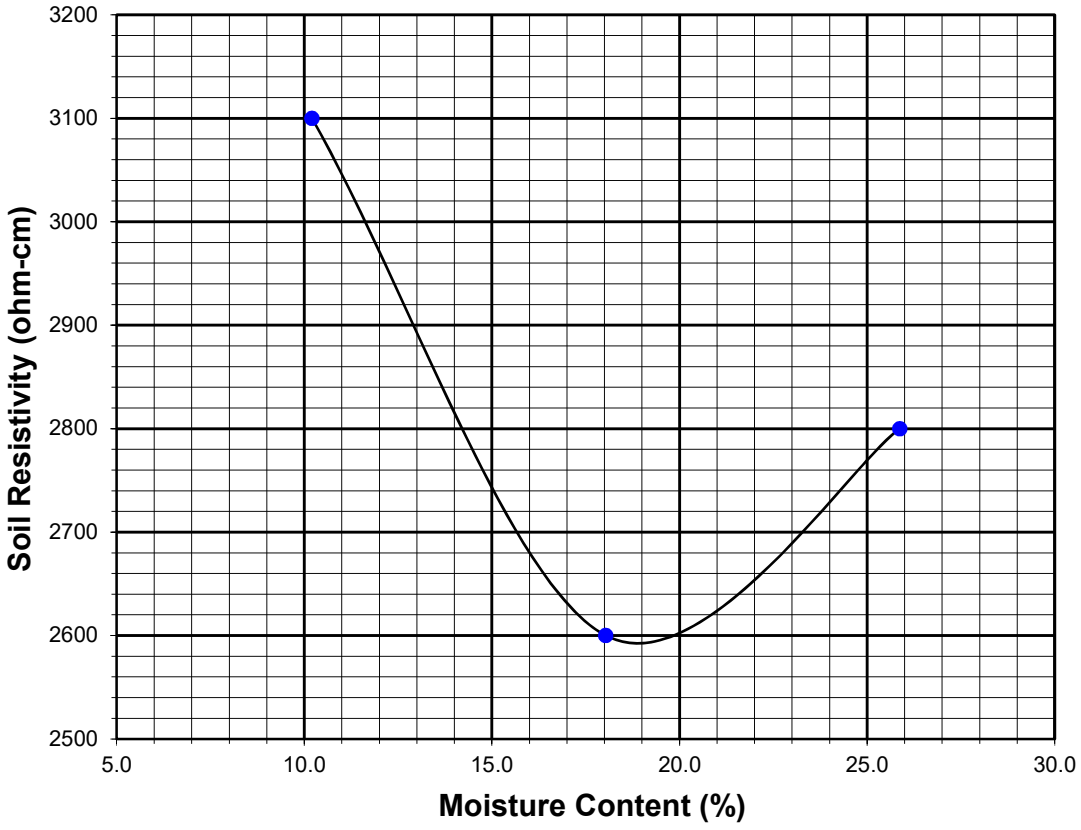
Project Name:	Orange		Tested By :	A. Santos	Date: 11/23/21
Project No. :	21184-01		Checked By:	J. Ward	Date: 12/03/21
Boring No.:	HS-4		Depth (ft.) :	0-5	
Sample No. :	B-1				
Soil Identification:*	Olive gray SC				

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	10	10.20	3100	3100
2	20	18.04	2600	2600
3	30	25.87	2800	2800
4				
5				

Moisture Content (%) (MCi)	2.37
Wet Wt. of Soil + Cont. (g)	85.52
Dry Wt. of Soil + Cont. (g)	84.43
Wt. of Container (g)	38.48
Container No.	
Initial Soil Wt. (g) (Wt)	130.70
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
2590	**19.0**	**67**	**20**	**8.13**	**20.3**



ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

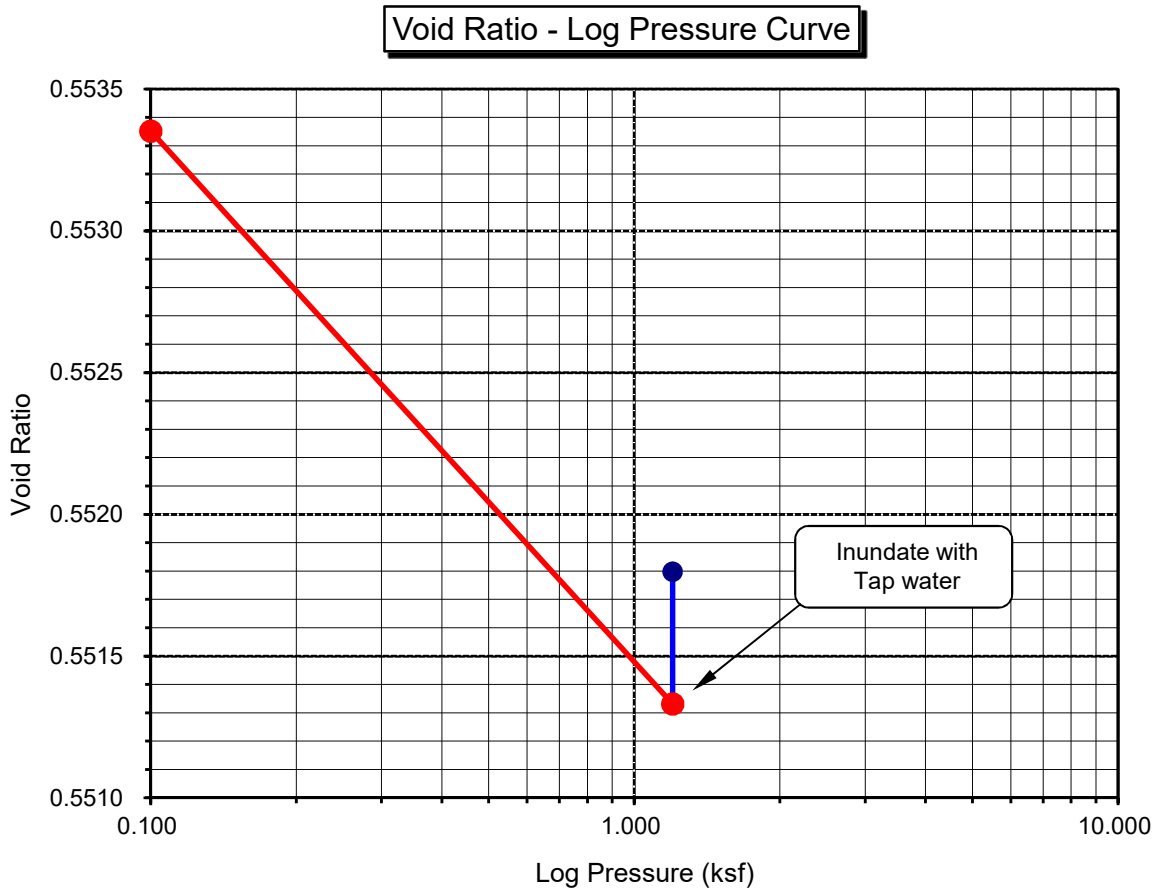
Project Name:	Orange	Tested By:	G. Bathala	Date:	11/17/21
Project No.:	21184-01	Checked By:	J. Ward	Date:	12/03/21
Boring No.:	HS-2	Sample Type:	Ring		
Sample No.:	R-2	Depth (ft.)	7.5		
Sample Description:	Brown silty clay (CL-ML)				

Initial Dry Density (pcf):	108.5
Initial Moisture (%):	7.80
Initial Length (in.):	1.0000
Initial Dial Reading:	0.2532
Diameter(in):	2.415

Final Dry Density (pcf):	108.6
Final Moisture (%) :	17.7
Initial Void Ratio:	0.5538
Specific Gravity(assumed):	2.70
Initial Saturation (%)	38.0

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.2529	0.9997	0.00	-0.03	0.5534	-0.03
1.200	0.2484	0.9952	0.32	-0.48	0.5513	-0.16
H2O	0.2487	0.9955	0.32	-0.45	0.5518	-0.13

Percent Swell (+) / Settlement (-) After Inundation = 0.03



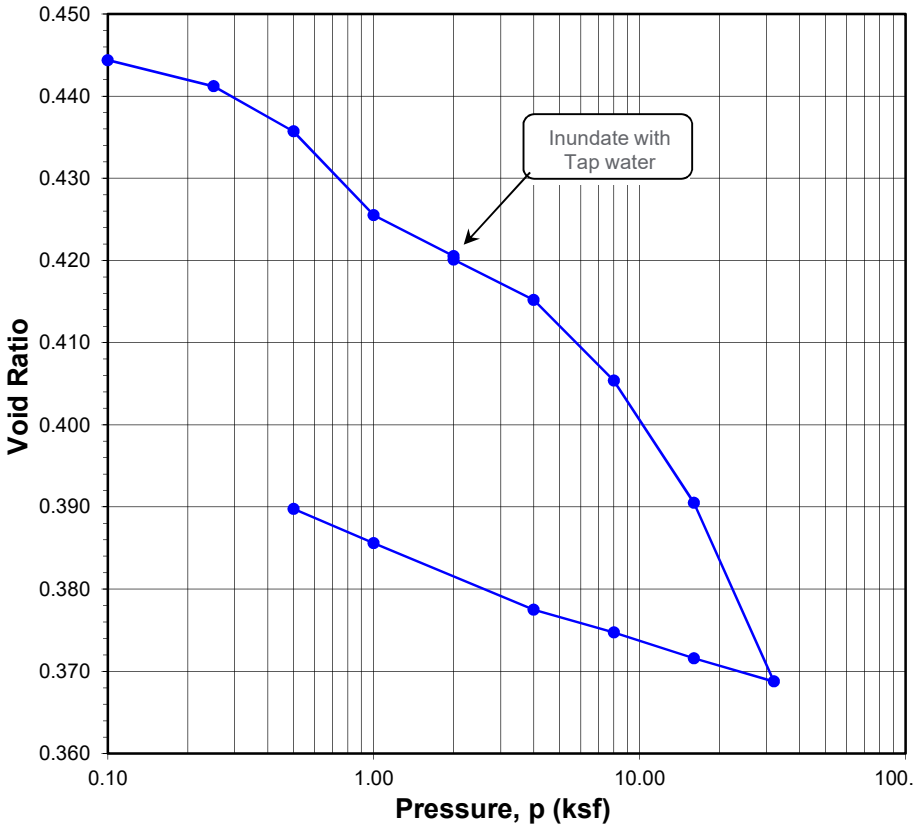
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name: Orange
Project No.: 21184-01
Boring No.: HS-1
Sample No.: R-2
Soil Identification: Yellowish brown silty clay (CL-ML)

Tested By: G. Bathala Date: 11/12/21
Checked By: J. Ward Date: 12/02/21
Depth (ft.): 7.5
Sample Type: Ring

Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	205.29
Weight of Ring (g)	45.51
Height after consol. (in.)	0.9622
Before Test	
Wt.Wet Sample+Cont. (g)	189.98
Wt.of Dry Sample+Cont. (g)	171.51
Weight of Container (g)	38.30
Initial Moisture Content (%)	13.9
Initial Dry Density (pcf)	116.7
Initial Saturation (%)	84
Initial Vertical Reading (in.)	0.2837
After Test	
Wt.of Wet Sample+Cont. (g)	262.89
Wt. of Dry Sample+Cont. (g)	243.88
Weight of Container (g)	59.03
Final Moisture Content (%)	13.64
Final Dry Density (pcf)	120.4
Final Saturation (%)	92
Final Vertical Reading (in.)	0.2405
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

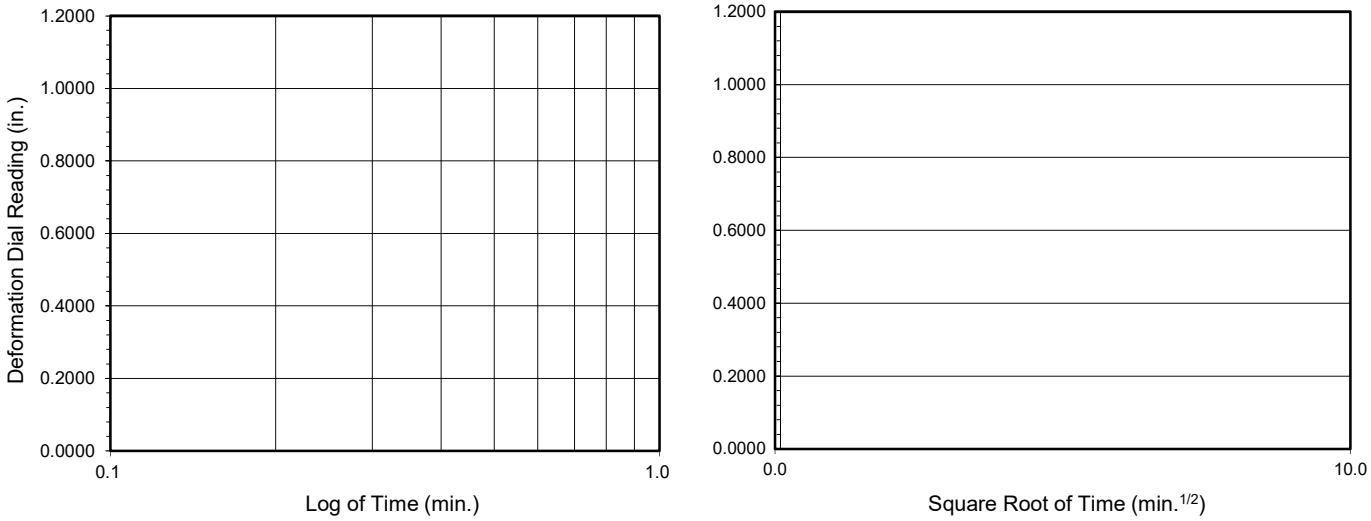


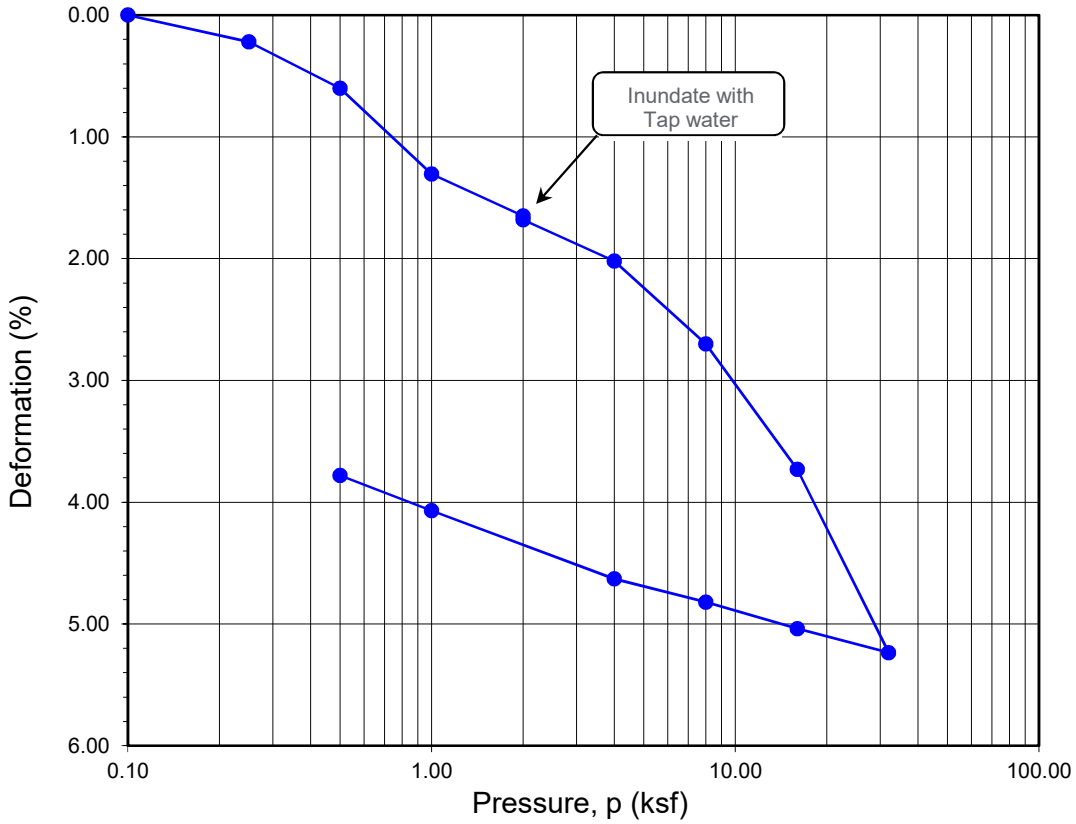
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.2837	1.0000	0.00	0.00	0.444	0.00
0.25	0.2810	0.9973	0.05	0.27	0.441	0.22
0.50	0.2766	0.9929	0.11	0.71	0.436	0.60
1.00	0.2688	0.9851	0.19	1.50	0.426	1.31
2.00	0.2642	0.9805	0.30	1.95	0.421	1.65
2.00	0.2639	0.9802	0.30	1.98	0.420	1.68
4.00	0.2591	0.9754	0.44	2.46	0.415	2.02
8.00	0.2502	0.9665	0.65	3.35	0.405	2.70
16.00	0.2373	0.9536	0.91	4.64	0.391	3.73
32.00	0.2197	0.9360	1.17	6.40	0.369	5.23
16.00	0.2227	0.9390	1.06	6.10	0.372	5.04
8.00	0.2265	0.9428	0.90	5.72	0.375	4.82
4.00	0.2298	0.9461	0.76	5.39	0.378	4.63
1.00	0.2371	0.9534	0.59	4.66	0.386	4.07
0.50	0.2405	0.9568	0.54	4.32	0.390	3.78

Time Readings

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-1	**R-2**	**7.5**	**13.9**	**13.6**	**116.7**	**120.4**	**0.444**	**0.390**	**84**	**92**

Soil Identification: Yellowish brown silty clay (CL-ML)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 21184-01

Orange

12-21

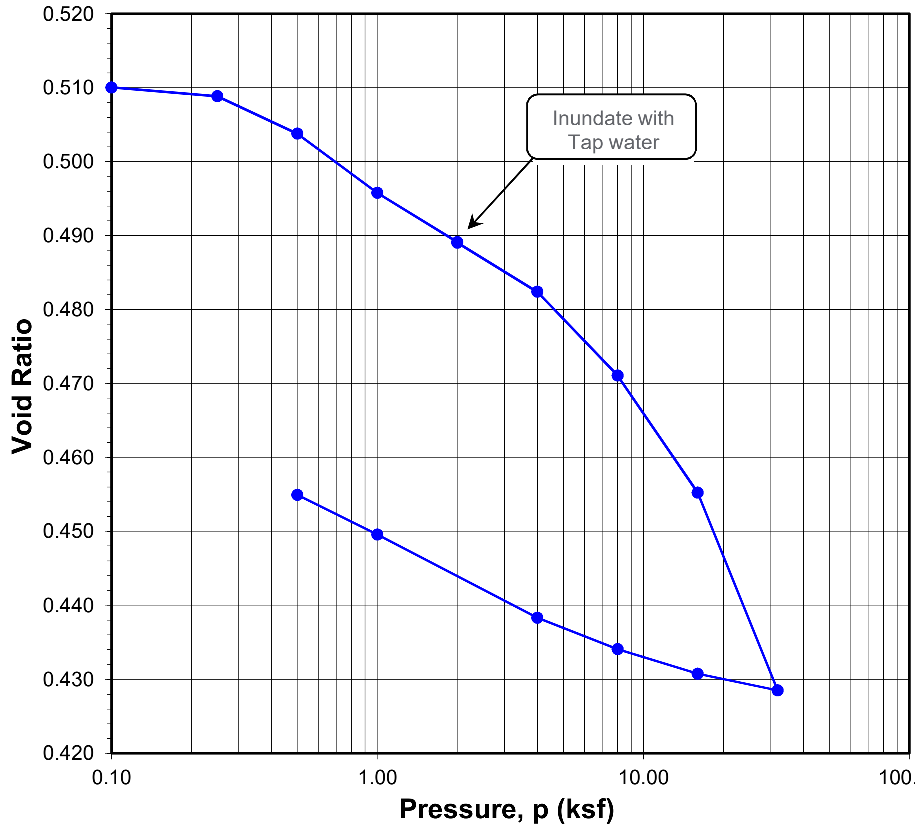
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name: Orange
Project No.: 21184-01
Boring No.: HS-3
Sample No.: R-2
Soil Identification: Yellowish brown silty clay (CL-ML)

Tested By: G. Bathala Date: 11/12/21
Checked By: J. Ward Date: 12/02/21
Depth (ft.): 7.5
Sample Type: Ring

Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	199.79
Weight of Ring (g)	45.68
Height after consol. (in.)	0.9635
Before Test	
Wt.Wet Sample+Cont. (g)	189.28
Wt.of Dry Sample+Cont. (g)	170.02
Weight of Container (g)	40.04
Initial Moisture Content (%)	14.8
Initial Dry Density (pcf)	111.6
Initial Saturation (%)	78
Initial Vertical Reading (in.)	0.3242
After Test	
Wt.of Wet Sample+Cont. (g)	237.40
Wt. of Dry Sample+Cont. (g)	217.18
Weight of Container (g)	36.72
Final Moisture Content (%)	15.00
Final Dry Density (pcf)	116.3
Final Saturation (%)	90
Final Vertical Reading (in.)	0.2827
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

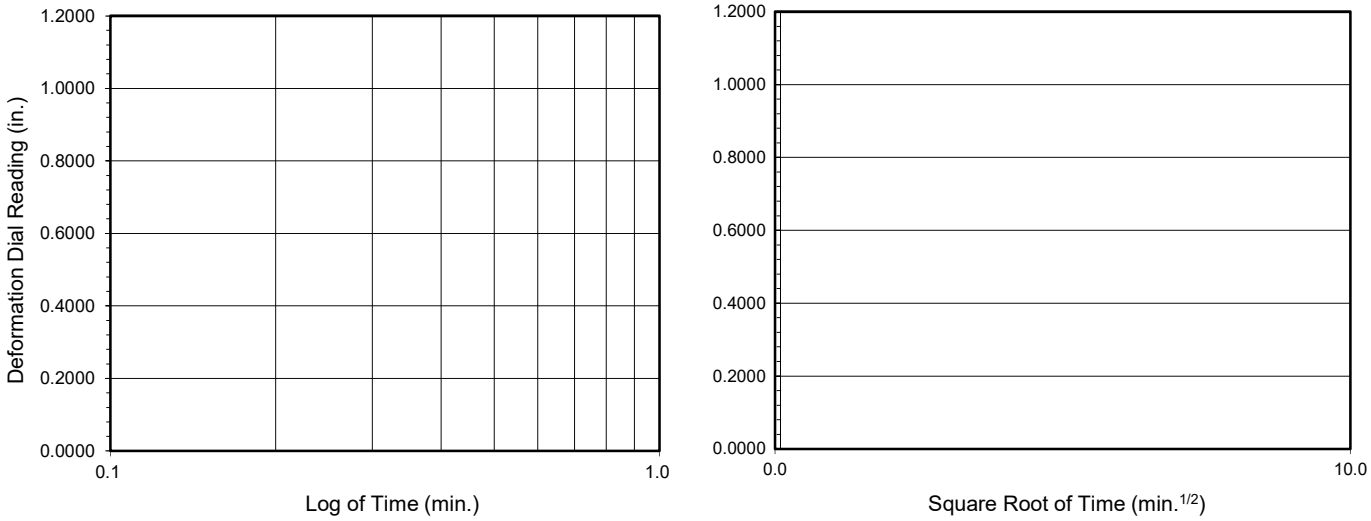


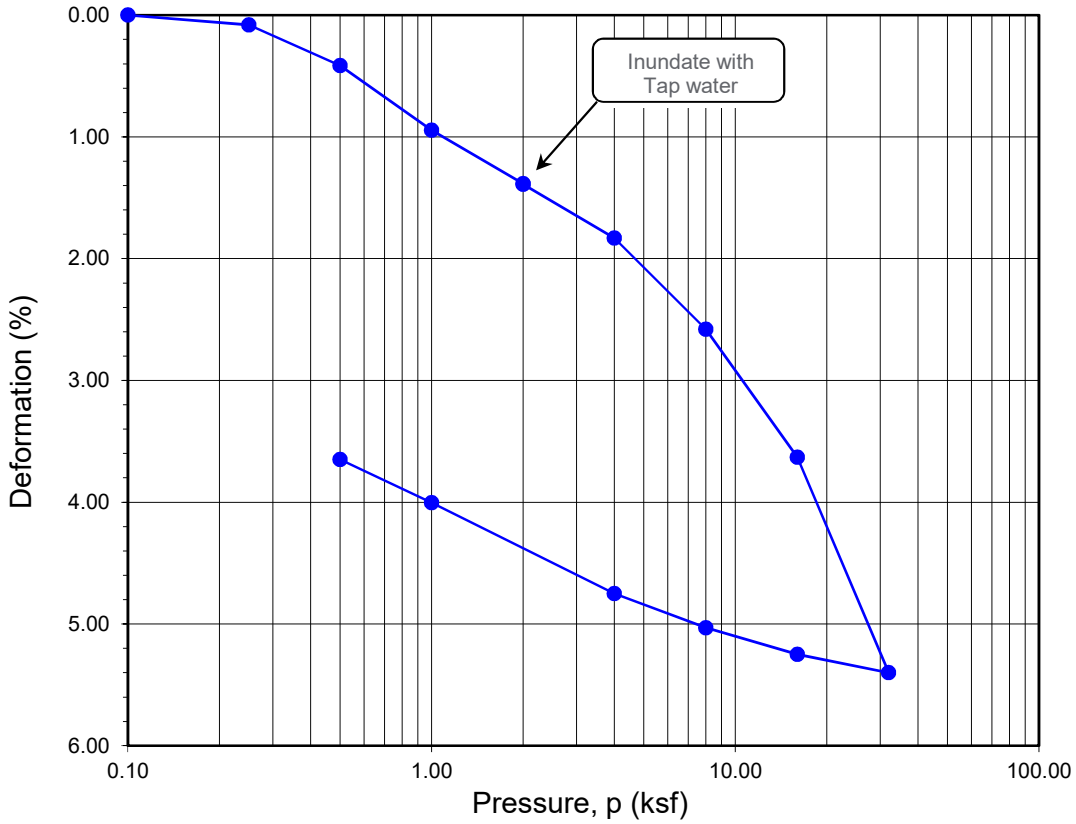
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.3242	1.0000	0.00	0.00	0.510	0.00
0.25	0.3231	0.9989	0.03	0.11	0.509	0.08
0.50	0.3195	0.9953	0.06	0.48	0.504	0.42
1.00	0.3136	0.9894	0.12	1.07	0.496	0.95
2.00	0.3082	0.9840	0.22	1.61	0.489	1.39
2.00	0.3081	0.9839	0.22	1.61	0.489	1.39
4.00	0.3024	0.9782	0.35	2.18	0.482	1.83
8.00	0.2931	0.9689	0.53	3.11	0.471	2.58
16.00	0.2805	0.9563	0.74	4.37	0.455	3.63
32.00	0.2604	0.9362	0.98	6.38	0.429	5.40
16.00	0.2631	0.9389	0.86	6.11	0.431	5.25
8.00	0.2665	0.9423	0.74	5.77	0.434	5.03
4.00	0.2702	0.9460	0.65	5.40	0.438	4.75
1.00	0.2789	0.9547	0.53	4.54	0.450	4.01
0.50	0.2827	0.9585	0.50	4.15	0.455	3.65

Time Readings

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-3	**R-2**	**7.5**	**14.8**	**15.0**	**111.6**	**116.3**	**0.510**	**0.455**	**78**	**90**

Soil Identification: Yellowish brown silty clay (CL-ML)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 21184-01

Orange

12-21

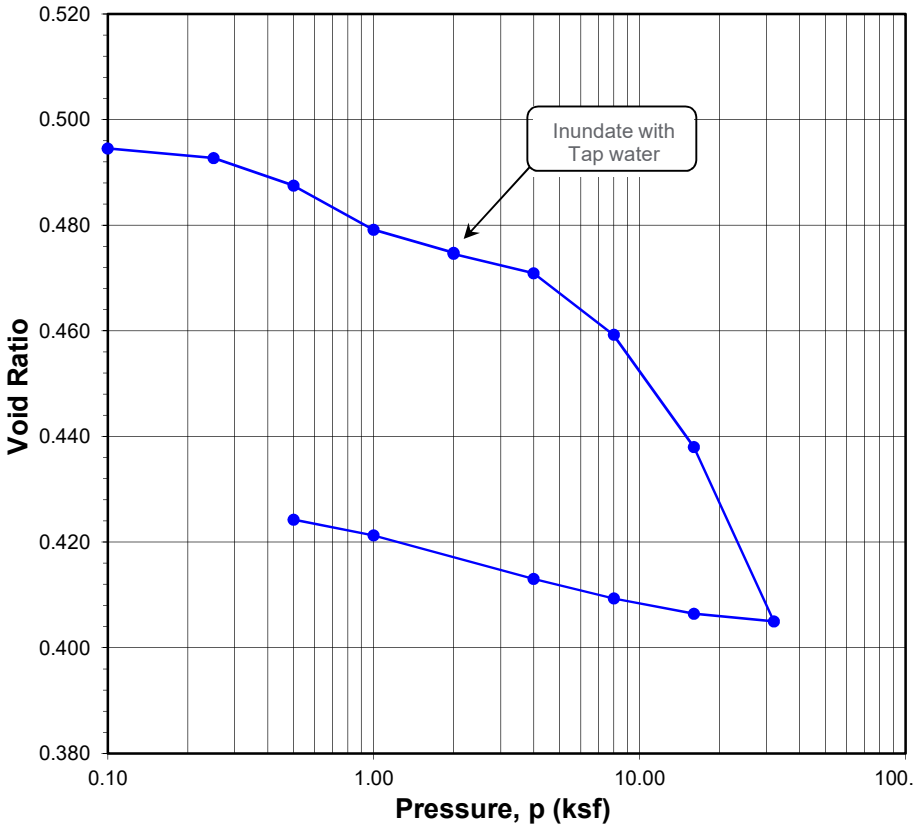
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name: Orange
Project No.: 21184-01
Boring No.: HS-4
Sample No.: R-2
Soil Identification: Olive gray silty clay (CL-ML)

Tested By: G. Bathala Date: 11/12/21
Checked By: J. Ward Date: 12/02/21
Depth (ft.): 7.5
Sample Type: Ring

Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	198.13
Weight of Ring (g)	45.14
Height after consol. (in.)	0.9529
Before Test	
Wt.Wet Sample+Cont. (g)	224.90
Wt.of Dry Sample+Cont. (g)	206.06
Weight of Container (g)	59.14
Initial Moisture Content (%)	12.8
Initial Dry Density (pcf)	112.8
Initial Saturation (%)	70
Initial Vertical Reading (in.)	0.3105
After Test	
Wt.of Wet Sample+Cont. (g)	259.47
Wt. of Dry Sample+Cont. (g)	242.14
Weight of Container (g)	63.85
Final Moisture Content (%)	13.02
Final Dry Density (pcf)	116.2
Final Saturation (%)	78
Final Vertical Reading (in.)	0.2586
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

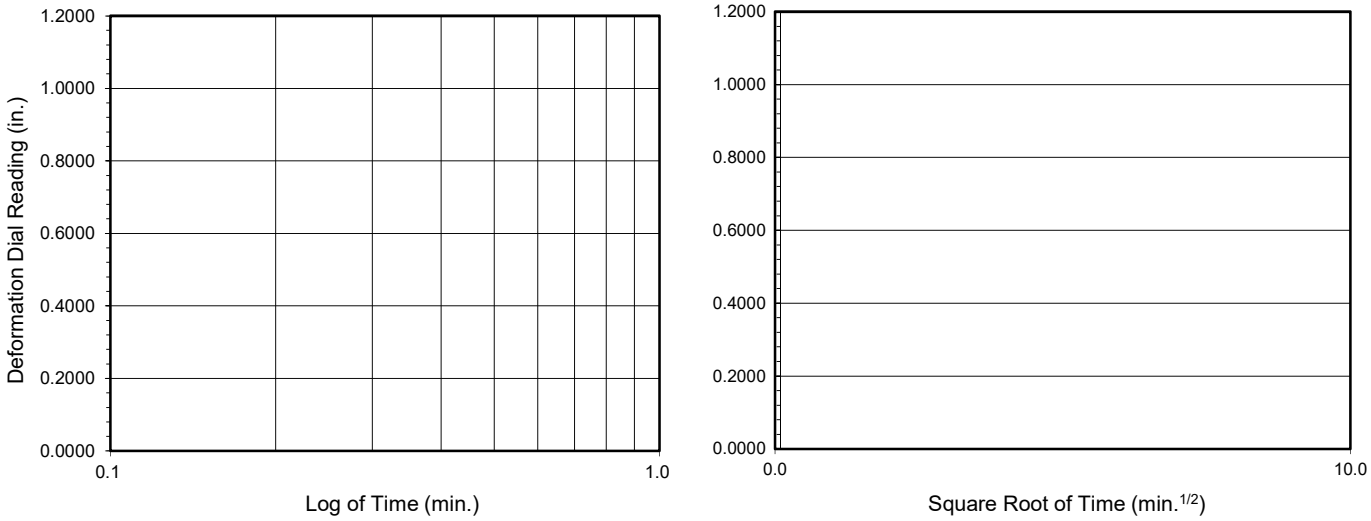


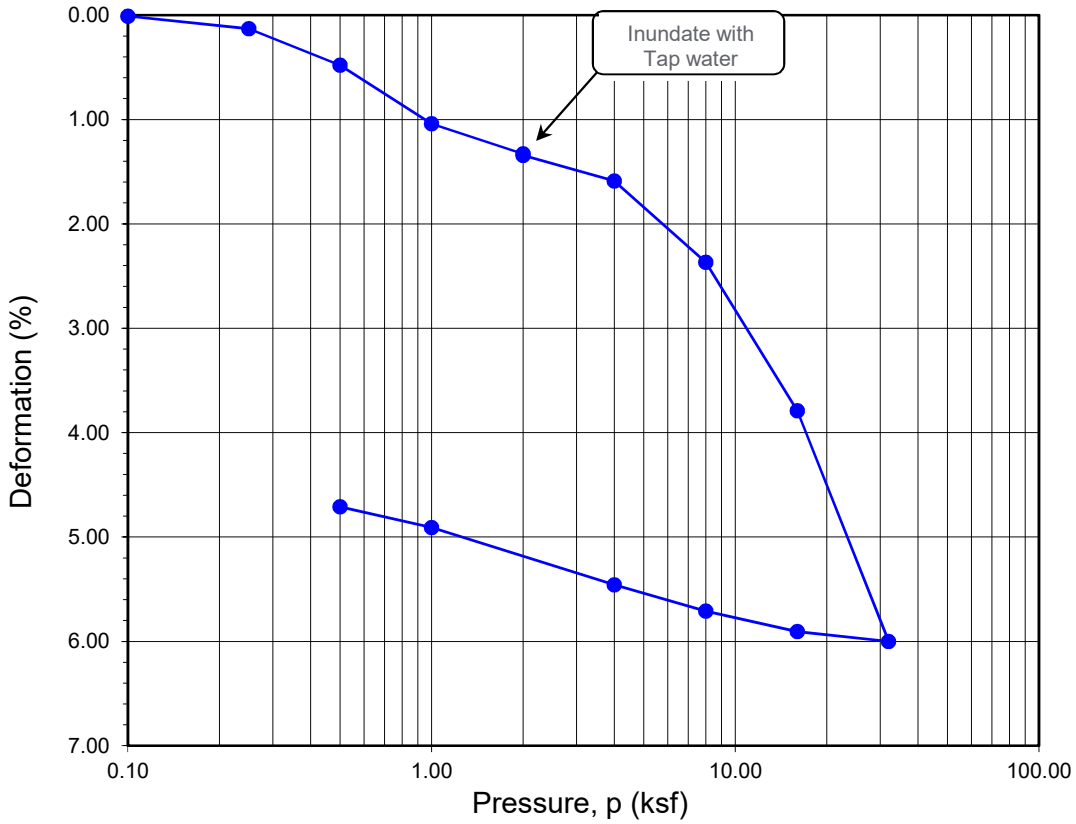
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.3104	0.9999	0.00	0.01	0.495	0.01
0.25	0.3089	0.9984	0.03	0.16	0.493	0.13
0.50	0.3045	0.9940	0.12	0.60	0.488	0.48
1.00	0.2971	0.9866	0.30	1.34	0.479	1.04
2.00	0.2927	0.9822	0.45	1.78	0.475	1.33
2.00	0.2926	0.9821	0.45	1.80	0.475	1.35
4.00	0.2882	0.9777	0.64	2.23	0.471	1.59
8.00	0.2787	0.9682	0.81	3.18	0.459	2.37
16.00	0.2627	0.9522	0.99	4.78	0.438	3.79
32.00	0.2384	0.9279	1.21	7.21	0.405	6.00
16.00	0.2408	0.9303	1.07	6.98	0.406	5.91
8.00	0.2439	0.9334	0.95	6.66	0.409	5.71
4.00	0.2475	0.9370	0.84	6.30	0.413	5.46
1.00	0.2555	0.9450	0.59	5.50	0.421	4.91
0.50	0.2586	0.9481	0.48	5.19	0.424	4.71

Time Readings

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-4	**R-2**	**7.5**	**12.8**	**13.0**	**112.8**	**116.2**	**0.495**	**0.424**	**70**	**78**

Soil Identification: Olive gray silty clay (CL-ML)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 21184-01

Orange

12-21

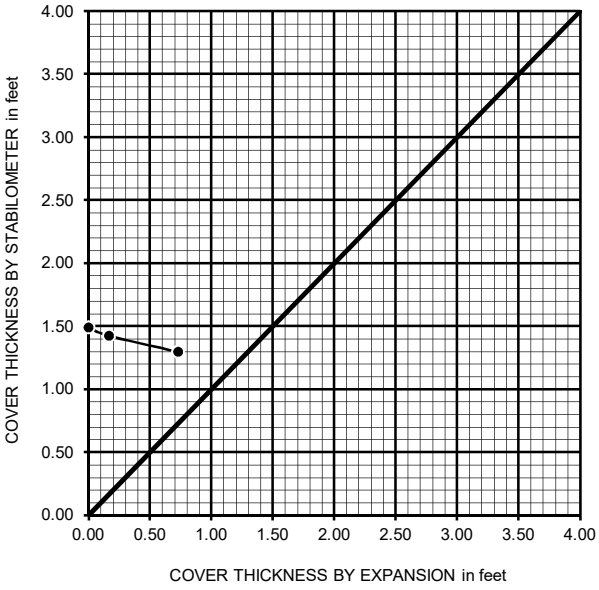
R-VALUE TEST RESULTS
DOT CA Test 301

PROJECT NAME:	Orange	PROJECT NUMBER:	21184-01
BORING NUMBER:	HS-1	DEPTH (FT.):	0-5
SAMPLE NUMBER:	B-1	TECHNICIAN:	O. Figueroa
SAMPLE DESCRIPTION:	Strong brown sandy lean clay s(CL)	DATE COMPLETED:	11/16/2021

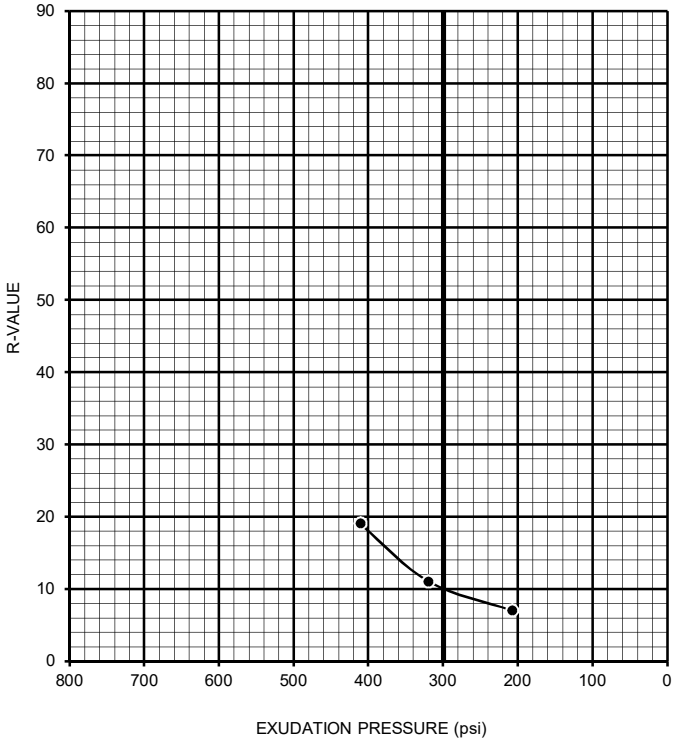
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	14.5	15.4	16.7
HEIGHT OF SAMPLE, Inches	2.48	2.52	2.57
DRY DENSITY, pcf	120.6	118.8	115.4
COMPACTOR PRESSURE, psi	110	80	60
EXUDATION PRESSURE, psi	411	319	207
EXPANSION, Inches x 10exp-4	22	5	0
STABILITY Ph 2,000 lbs (160 psi)	116	132	140
TURNS DISPLACEMENT	4.15	4.35	4.55
R-VALUE UNCORRECTED	19	11	7
R-VALUE CORRECTED	19	11	7

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	1.30	1.42	1.49
EXPANSION PRESSURE THICKNESS, ft.	0.73	0.17	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	25
R-VALUE BY EXUDATION:	10
EQUILIBRIUM R-VALUE:	10

Appendix D
General Earthwork and Grading Specifications

General Earthwork and Grading Specifications for Rough Grading

1.0 General

1.1 Intent

These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 The Geotechnical Consultant of Record

Prior to commencement of work, the owner shall employ a qualified Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to confirm that the attained level of compaction is being accomplished as specified. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 The Earthwork Contractor

The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the project plans and specifications. The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of “equipment” of work and the estimated quantities of daily earthwork

contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the
Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate personnel will be available for observation and testing. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified. It is the contractor's sole responsibility to provide proper fill compaction.

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed. The contractor is responsible for all hazardous waste relating to his work. The Geotechnical Consultant does not have expertise in this area. If hazardous waste is a concern, then the Client should acquire the services of a qualified environmental assessor.

2.2 Processing

Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be over-excavated as specified in the following section. Scarification shall continue until soils are broken down and free of oversize material and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 Over-excavation

In addition to removals and over-excavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be over-excavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise over-excavated to provide a flat subgrade for the fill.

2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 General

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of the geotechnical consultant. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557).

4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557.

4.5 Compaction Testing

Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing

Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations

The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than
5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 The Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

7.2 All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over

the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.

7.3 The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

7.4 The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

Appendix F:

Hydrology Information

(Q2 – Two-year frequency storm evaluation)

EXISTING RATIONAL METHOD CALCULATION FORM

ORANGE COUNTY HYDROLOGY MANUAL

STUDY NAME: BATAVIA SELF-STORAGE
2 - YEAR STORM

Calculated By: Rogelio Ruiz Date: February 16, 2022

Checked By: Patric de Boer Date: February 16, 2022

Concentration Point	Area (acres)		Soil Type	Dev. Type	T(t) min	T(c) min	I in/hr	F(m) in/hr	F(m) avg.	Q Total cfs	Flow Path Length ft.	Slope ft./ft.	V ft./sec	Hydraulics and Notes
	Sub Area	Total												
E-1	3.06	3.06	B	Comm		10.0	1.52	0.017	0.017	4.14	425	0.005		Initial Sub Area
											DP-1: Peak discharge is 4.14 cfs			

For the confluence of two streams, let T_1, I_1, Fm_1, A_1, and Q_1, be the time of concentration, rainfall intensity, area-averaged loss rate, catchment area, and peak flow rate for stream #1 while T_2, I_2, Fm_2, A_2 and Q_2 correspond to stream #2. Also, let Q_1 be less than Q_2. Finally, let T_p, A_p, and Q_p be the resulting confluence estimates for Tc, area, and peak flow rate, respectively.

T_1 is less than T_2.

$A_p = A_1 + A_2$.

$$Q_p = Q_2 + \frac{(I_2 - Fm_1)}{(I_1 - Fm_1)} Q_1$$

PROPOSED RATIONAL METHOD CALCULATION FORM

ORANGE COUNTY HYDROLOGY MANUAL

STUDY NAME: BATAVIA SELF-STORAGE
2 - YEAR STORM

Calculated By: Rogelio Ruiz Date: February 16, 2022

Checked By: Patric de Boer Date: February 16, 2022

Concentration Point	Area (acres)		Soil Type	Dev. Type	T(t) min	T(c) min	I in/hr	F(m) in/hr	F(m) avg.	Q Total cfs	Flow Path Length ft.	Slope ft./ft.	V ft./sec	Hydraulics and Notes
	Sub Area	Total												
P-1	3.06	3.06	B	Comm		10.5	1.48	0.021	0.021	4.02	475	0.004		Initial Sub Area
											DP-1: Peak discharge is 4.02 cfs			

For the confluence of two streams, let T_1, I_1, Fm_1, A_1, and Q_1, be the time of concentration, rainfall intensity, area-averaged loss rate, catchment area, and peak flow rate for stream #1 while T_2, I_2, Fm_2, A_2 and Q_2 correspond to stream #2. Also, let Q_1 be less than Q_2. Finally, let T_p, A_p, and Q_p be the resulting confluence estimates for Tc, area, and peak flow rate, respectively.

T_1 is less than T_2. $\quad Q_p = Q_2 + \frac{(I_2 - Fm_1)}{(I_1 - Fm_1)} Q_1$

$A_p = A_1 + A_2$.

HCOC Exemption				
Conditions	Q_2 (cfs)	Post/Pre	≤1.05?	HCOC Exempt?
Pre 2-yr	4.14	0.98	Yes	Yes
Post 2-yr	4.04			