WQMP2023-01482

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

Project Name:

Extra Space Storage - 1761 W Katella Avenue, Anaheim, CA 92804

PLANNING APPLICATION NO. APLN-DEV2023-00016, TRACT 3258/LOT NUMBER 12, AND APN 128-542-11

Prepared for:

Extra Space Storage

2795 E Cottonwood Pkwy, Suite 400,

Cottonwood Heights, UT 84121

(877) 387-1674

Prepared by:

Coory Engineering

1718 N Neville Street,

Orange, CA 92865

(714) 202-8700 | skhoury@cooryengineering.com

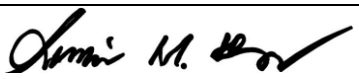
08/26/2024

Project Owner's Certification			
Planning Application No. (If applicable)	APLN-DEV2023-00016	Grading Permit No.	TBD
Tract/Parcel Map and Lot(s) No.	LOT 12 TRACT 3258	Building Permit No.	TBD
Address of Project Site and APN (If no address, specify Tract/Parcel Map and Lot Numbers)			1761 W Katella Ave., Anaheim, CA 92865 APN: 128-542-11

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

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

Owner: TBD			
Title	Clint Kleppe		
Company	Extra Space Storage		
Address	2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121		
Email	Ckeleppe@extraspace.com		
Telephone #	(877) 387.1674		
I understand my responsibility to implement the provisions of this WQMP including the ongoing operation and maintenance of the best management practices (BMPs) described herein.			
Owner Signature		Date	

Preparer (Engineer):			
Title	Civil Engineer	PE Registration #	30567
Company	Coory Engineering		
Address	1718 N Neville St, Orange, CA 92865		
Email	skhoury@cooryengineering.com		
Telephone #	(714) 202-8700		
I hereby certify that this Water Quality Management Plan is in compliance with, and meets the requirements set forth in, Order No. R8-2009-0030/NPDES No. CAS618030, of the Santa Ana Regional Water Quality Control Board.			
Preparer Signature		Date	08/26/2024
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Attachments

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

Project Infomation			
Permit/Application No. (If applicable)	TBD	Grading or Building Permit No. (If applicable)	TBD
Address of Project Site (or Tract Map and Lot Number if no address) and APN	1761 W Katella Ave., Anaheim, CA 92865 APN: 128-542-11		
Water Quality Conditions of Approval or Issuance			
Water Quality Conditions of Approval or Issuance applied to this project. (Please list verbatim.)	💡 *The City will provide any pertinent Water Quality Conditions of Approval. If none are provided, please reference Section 10.09.030 of the City of Anaheim Municipal Code (see below):* *"Prior to the issuance by the City of Anaheim of a grading permit, building permit and/or conditional use permit for any new development or significant redevelopment, the property owner shall submit to and obtain the approval of the Public Works Department of a water quality management plan. If the new development or significant redevelopment will be approved without application for a grading permit, building permit or conditional use permit, the property owner shall submit to and obtain the approval of the Public Works Department of a water quality management plan prior to the issuance of a discretionary land use approval or, at the City's discretion, prior to recordation of a subdivision map."*		
Conceptual WQMP			
Was a Conceptual Water Quality Management Plan previously approved for this project?	This document is the preliminary WQMP for this project. Project site is not covered under an existing Master WQMP.		

Watershed-Based Plan Conditions	
Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	WIHMPS is not applicable to City of Anaheim.

Section II Project Description

The proposed improvement consists of constructing a new storage building by converting portion of the existing parking lot within the property.

II.1 Project Description

<table>
<tr><th colspan="5">Description of Proposed Project</th></tr>
<tr><td>Development Category (From Model WQMP, Table 7.11-2; or -3):</td><td colspan="4">Per Table 7.II-2 Priority Projects for North Orange County.

8. All significant redevelopment projects, where significant redevelopment is defined as the addition or replacement of 5,000 or more square feet of impervious surface on an already developed site. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility, or emergency redevelopment activity required to protect public health and safety.

If the redevelopment results in the addition or replacement of less than 50 percent of the impervious area on-site and the existing development was not subject to WQMP requirement, the numeric sizing criteria discussed in Section 7.II-2.0 only applies to the addition or replacement area. If the addition or replacement accounts for 50 percent or more of the impervious area, the Project WQMP requirements apply to the entire development.</td></tr>
<tr><td>Project Area (ft²): 84,071</td><td colspan="2">Number of Dwelling Units: N/A</td><td colspan="2">SIC Code: 4212 Public Warehousing and Storage</td></tr>
<tr><td rowspan="2">Project Area</td><td colspan="2">Pervious</td><td colspan="2">Impervious</td></tr>
<tr><td>Area (acres or sq ft)</td><td>Percentage</td><td>Area (acres or sq ft)</td><td>Percentage</td></tr>
<tr><td>Pre-Project Conditions</td><td>0.00</td><td>0</td><td>1.93</td><td>100</td></tr>
<tr><td>Post-Project Conditions</td><td>0.00</td><td>0</td><td>1.93</td><td>100</td></tr>
<tr><td>Drainage Patterns/Connections</td><td colspan="4">Runoff from the site is sheet flowing towards Humor Drive across drive aisle towards the driveway, to the curb and gutter along Humor Drive and to public catch basin about 100 feet north of Katella Avenue and Humor Drive intersection. The site does not appear to have a direct storm drain connection at this catch basin. Based on storm drain</td></tr>
</table>

	facilities map from County Flood Control District, stormwater is collected by City storm drain at Humor Drive, conveyed by underground storm drain system to City drainage facility to Anaheim-Barber City Channel C03. Post-development drainage condition mimics the pre-development drainage condition by conveying surface runoff to an area drain. To comply with water quality requirements, post-development condition surface runoff shall be captured by underground infiltration gallery with catch basin filter insert. Stormwater runoff will undergo pretreatment using City approved media filter before runoff goes to underground infiltration galleries BMP. During heavy storm events, surface runoff will by-pass the underground infiltration galleries through a parkway drain. Ultimately, stormwater runoff will be co-mingle with offsite surface runoff along Humor Drive to the public storm drain system.

Narrative Project Description: (Use as much space as necessary.)	The proposed site improvement is located at the northeast corner of La Humor Drive and Katella Avenue. The site is geographically situated 33°48'14" N and 117°56'39" W, about 112 feet above mean sea level. The site is currently a developed piece of land and occupied by Extra Space Storage. The scope of the work involves constructing a multi-level storage building with basement of approx. 17,578 square feet. The new building is proposed to be constructed at the parking lot, which is to the north of the existing one-story storage building. This WQMP is prepared to comply with MS4 permit that utilizes BMP's designed to infiltrate surface runoff for activities and pollutants associated with public storage and warehousing. Based on the proposed design, proposed improvements will slightly alter impervious surfaces but there is no significant impact. The proposed project will have no outdoor storage areas. All storage facilities will be covered spaces. No loading docks are planned for this project. No food preparation and/or processing in this facility. All hazardous materials will be handled indoors with no direct spill or chemical exposure to rainfall and/or drainage ways throughout the site. There is a designated delivery parking space at the back of the facility right next to the trash enclosure. Trash enclosure will be re-designed to allow ease of access and use. No car washing and maintenance of vehicle is allowed at the parking area.

II.2 Potential Stormwater Pollutants

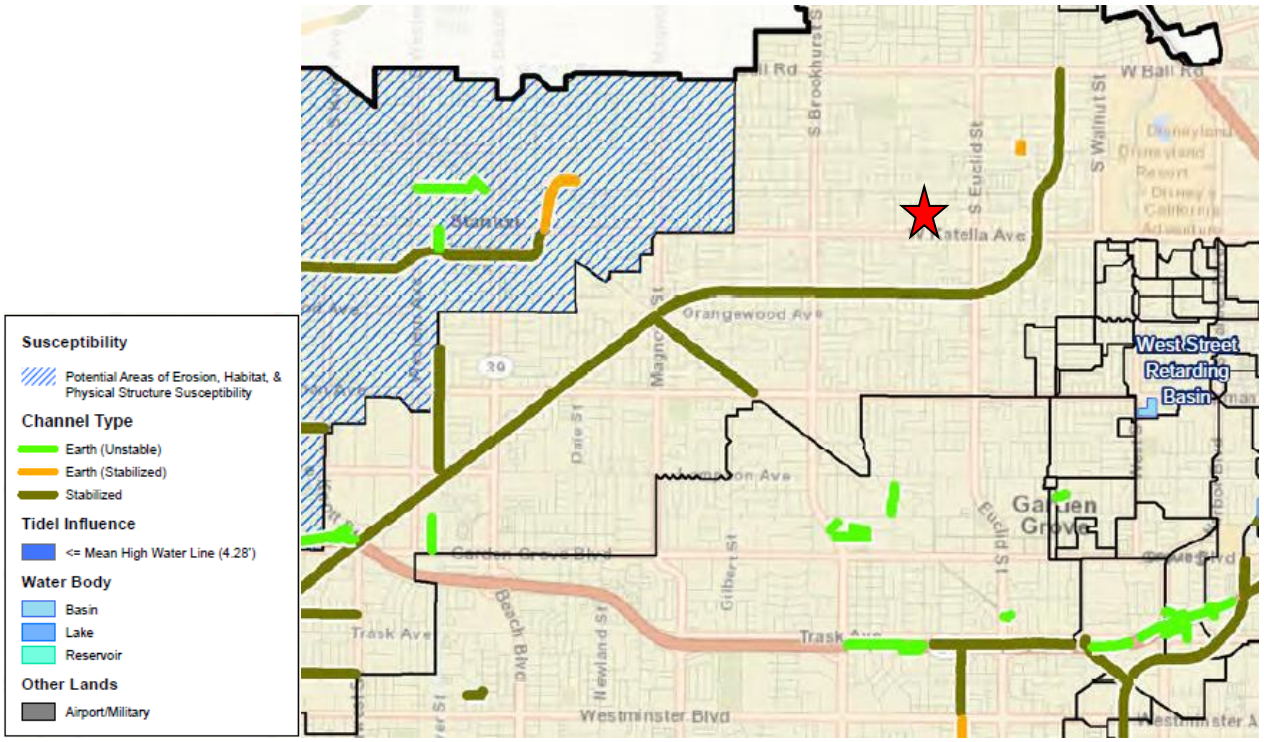
Pollutants of Concern			
Pollutant	Check One for each: E=Expected to be of concern N=Not Expected to be of concern		Additional Information and Comments
Suspended-Solid/ Sediment	E ☒	N ☐	
Nutrients	E ☒	N ☐	
Heavy Metals	E ☒	N ☐	
Pathogens (Bacteria/Virus)	E ☒	N ☐	
Pesticides	E ☒	N ☐	
Oil and Grease	E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

II.3 Hydrologic Conditions of Concern

Proposed site improvements reduces the 2yr-24hr volume

☒ No – Show map

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



Project Site

Return Frequency = **2 Years**

PRE-DEVELOPMENT									
Drainage Area	A (acres)	A_p (acres)	a_p	Soils Group	F_p	F_m	T_c (min)	I* (in/hr)	Q (cfs)
DMA-A0	1.93	0.000	0.00	B	0.40	0.0000	5	0.552	0.959
	1.93							TOTAL	0.959

POST-DEVELOPMENT									
Drainage Area	A (acres)	A_p (acres)	a_p	Soils Group	F_p	F_m	T_c (min)	I* (in/hr)	Q (cfs)
DMA-A	1.18	0.000	0.00	B	0.40	0.0000	5	0.552	0.586
DMA-B	0.75	0.000	0.00	B	0.40	0.0000	5	0.552	0.373
	1.93							TOTAL	0.959
								(Percent Increase/Decrease in Flowrate)	0.00%

Return Frequency = **2 Years**

PRE-DEVELOPMENT									
Drainage Area	A (acres)	Soils Group	CN AMC II	CN AMC I	S	I_a	P_{24}	Y	V (Ac-ft)
DMA-A0	1.93	B	98	90	1.111	0.222	2.37	0.597	0.228
	1.93							TOTAL	0.228

POST-DEVELOPMENT									
Drainage Area	A (acres)	Soils Group	CN AMC II	CN AMC I	S	I_a	P_{24}	Y	V (Ac-ft)
DMA-A	1.18	B	98	90	1.111	0.222	2.37	0.597	0.139
DMA-B	0.75	B	98	90	1.111	0.222	2.37	0.597	0.088
	1.93							TOTAL	0.228
								(Percent Increase/Decrease in Volume)	0.00%

II.4 Post Development Drainage Characteristics

Post-development drainage condition mimics the pre-development drainage condition by conveying surface runoff to an area drain. To comply with water quality requirements, post-development condition surface runoff shall be captured by underground infiltration gallery with catch basin filter insert. Stormwater runoff retained on site through underground infiltration galleries will undergo treatment using infiltration BMP. During heavy storm events, surface runoff will bypass the underground infiltration galleries through a parkway drain. Ultimately, stormwater runoff will be co-mingled with offsite surface runoff along Humor Drive to the public storm drain system.

Runoff from the site is sheet flowing towards Humor Drive across the drive aisle towards the driveway, to the curb and gutter along Humor Drive and to public catch basin about 100 feet north of Katella Avenue and Humor Drive intersection. The site does not appear to have a direct storm drain connection at this catch basin. Based on storm drain facilities map from County Flood Control District, stormwater is collected by City storm drain at Humor Drive, conveyed by underground storm drain system to City drainage facility to Anaheim-Barber City Channel C03.

II.5 Property Ownership/Management

The BMPs identified in the WQMP shall be inspected and maintained as required by the State Permit. The maintenance and inspection responsibilities will remain primarily the responsibility of Extra Space Storage. Refer to Section V for Responsibility/Frequency Matrixes.

The contact person for this project is TBD located at 2795 E Cottonwood Prkwy, #400, Cottonwood Heights, UT 84121 and is responsible for the management of the project and implementation and maintenance of the requirements of the State Permit and WQMP and can be reached at (877) 387-1674.

Section III Site Description

III.1 Physical Setting

Name of Planned Community/Planning Area (if applicable)	C-NC (Neighborhood Center Commercial)
Location/Address	1761 W Katella Ave., Anaheim, CA 92804
	APN: 128-542-11
General Plan Land Use Designation	C-G (General Commercial)
Zoning	C-G
Acreage of Project Site	1.136 acres
Predominant Soil Type	A

III.2 Site Characteristics

Site Characteristics	
Precipitation Zone	0.82 inches
Topography	Developed land and fairly flat approx. 1%-2% slope towards Humor Drive.
Drainage Patterns/Connections	See Section II.1 for a complete description of existing and proposed drainage patterns and connections.
Soil Type, Geology, and Infiltration Properties	Soil Type B per TGD Figure XVI-2a. Soil type A is characterized by fair to moderate infiltration rate.

Hydrogeologic (Groundwater) Conditions	Depth to groundwater is more than 50 feet (OC TGD XVI-2d).
Geotechnical Conditions (relevant to infiltration)	Soils report and infiltration testing reveals that the existing soil has an infiltration capacity of 1.04 in/hr. Using safety factor of 2, the design infiltration rate is 0.52 in/hr. In accordance with State Geotracker, no clean up action against this site. After consultation with OCWD, it was confirmed that infiltration is feasible. Coordination will continue until agreement is finalized.
Off-Site Drainage	None. Surrounding properties north and east sides of the site are fully developed and no offsite drainage is expected to flow through this site.
Utility and Infrastructure Information	No underground utility infrastructure may interfere any of the proposed BMPs.

III.3 Watershed Description

Receiving Waters	Watershed C – Los Alamitos/East Garden Grove/Bolsa Chica (OCFCD Drainage System) Anaheim Barber City Channel (CO3), Bolsa Chica Channel (CO2), Pacific Ocean
303(d) Listed Impairments	Nickel, Ammonia, Copper, pH, Indicator Bacteria, Toxicity
Applicable TMDLs	Nickel, Ammonia, Copper, pH, Indicator Bacteria, Toxicity
Pollutants of Concern for the Project	Suspended Solid/Sediments, Nutrients, Heavy Metals, Pathogens (bacteria/Virus), Metal, Pesticides, Oil and Grease, Toxic Organic Compounds, Trash and Debris
Environmentally Sensitive and Special Biological Significant Areas	N/A. Site is not located within ESA.

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

(NOC Permit Area only) Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?		YES ☐	NO ☒
If yes, describe WIHMP feasibility criteria or regional/sub-regional LID opportunities.	Not applicable.		

Project Performance Criteria	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	HCOC's do not exist for this project. The post development 2year-24hr volume is less than the pre-development volume.
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	The following performance criteria for LID implementation are stated in both permits: • Priority Projects must infiltrate, harvest and use, evapotranspire, or biotreat/biofilter, the 85th percentile, 24-hour storm event (Design Capture Volume). • A properly designed biotreatment system may only be considered if infiltration, harvest and use, and evapotranspiration (ET) cannot be feasibly implemented for the full design capture volume. In this case, infiltration, harvest and use, and ET practices must be implemented to the greatest extent feasible and biotreatment may be provided for the remaining design capture volume.
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	If it is not feasible to meet LID performance criteria through retention and/or biotreatment provided on-site or at a sub-regional/regional scale, then treatment control BMPs shall be provided on-site or offsite prior to discharge to waters of the US. Sizing of treatment control BMP(s) shall be based on either the unmet volume after claiming applicable water quality credits, if appropriate (See **Section 7.II-3.1** Water Quality Credits) and as calculated in **TGD Appendix VI**. If treatment control BMPs can treat all of the remaining unmet volume and have a medium to high effectiveness for reducing the primary POCs, the project is considered to be in compliance; a waiver application and participation in an alternative program is not required. If the cost of providing treatment control BMPs greatly outweighs the pollution control benefits they would provide, a waiver of treatment control and LID requirements can be requested, and alternative compliance approaches must be used to fulfill the remaining unmet volume (See **Section 7.II-3.3**).

Calculate LID design storm capture flowrate for Project.	**DMA-A (Area = 1.20 acres)** 1) From Equation III.1 of TGD: V = C × d × A x 43560 sf/ac x 1/12 in/ft 2) C = (0.75×0.90) + 0.15 = 0.825 3) A = 1.18 ac 4) d = 0.87 inches 5) V = 0.825 × 0.87 in × 1.18 ac x 43560/12 = **3,075 cu.ft.** **DMA-A (Area = 1.20 acres)** 1) From Equation III.3 of TGD: Q = C × i × A 2) C = (0.75×0.9) + 0.15 = 0.825 3) A = 1.18 ac 4) i = 0.27 inches 5) Q = 0.825 × 0.27 in × 1.18 ac = **0.26 cfs** **DMA-B (Area = 0.73 acres)** 1) From Equation III.1 of TGD: V = C × d × A x 43560 sf/ac x 1/12 in/ft 2) C = (0.75×0.90) + 0.15 = 0.825 3) A = 0.75 ac 4) d = 0.82 inches 5) V = 0.825 × 0.82 in × 0.75 ac x 43560/12 = **1,842 cu.ft.** **DMA-B (Area = 0.73 acres)** 1) From Equation III.3 of TGD: Q = C × i × A 2) C = (0.75×0.90) + 0.15 = 0.825 3) A = 0.75 ac 4) i = 0.27 inches 5) Q = 0.825 × 0.27 in × 0.75 ac = **0.17 cfs**

IV.2. Site Design and Drainage

Site Design

DESIGN CAPTURE VOLUME

The post-development drainage areas are made up of two (2) DMA's. **DMA-A**, consisting of the south portion of the site to include the existing one-story storage building, drive aisle, and half of the area of the new 2-story building, about 62% of the property acreage. **DMA-B**, consisting of the north portion of the site to include the existing parking lot, drive aisle, and half of the area of the new 2-story building, about 38% of the property acreage.

The hydrologic method shall be used to calculate the runoff flowrate associated with LID and water quality design storms. The runoff flowrate shall be calculated as:

$$DCV = c \times d \times A \times 43560\ sf/ac \times 1/12\ in/ft \qquad \text{Equation III.1}$$

Where:

DCV = runoff volume during the design storm event, cu-ft

C = runoff coefficient = (0.75 × imp + 0.15)

imp = impervious fraction of drainage area (ranges from 0 to 1)

d = depth (inches) = 0.82 or 0.87

A = tributary area (acres)

DMA	BMP DESCRIPTION	imp	Area (sq-ft)	Area (acres)	d	*C*	DCV (cf) req'd	DCV (cf) prov'd
A	UG Infiltration Chambers	1.0	52,272	1.18	0.87	0.825	3,075	3,540
B	UG Infiltration Chambers	1.0	31,799	0.75	0.82	0.825	1,842	2,077

Design capture volume (DCV) will be captured and stored in an *offline* UG infiltration gallery to minimize resuspension of pollutants. Prior to stormwater entering the UG infiltration galleries, a pre-treatment device called "StormFilter" with PhophoSorb media filter shall be installed.

Street right-of-way improvements may be required for drainage overflow during high flow events. Project overflow drains to Humor Drive via parkway under sidewalk drain therefore full trash capture is not required.

IV.3 LID BMP Selection and Project Conformance Analysis

IV.3.1 Hydrologic Source Controls (HSCs)

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

IV.3.2 Infiltration BMPs

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

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

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

IV.3.4 Biotreatment BMPs

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

IV.3.5 Hydromodification Control BMPs

Hydromodification Control BMPs	
BMP Name	**BMP Description**

IV.3.6 Regional/Sub-Regional LID BMPs

Regional/Sub-Regional LID BMPs

IV.3.7 Treatment Control BMPs

Treatment Control BMPs	
BMP Name	**BMP Description**
PRE-2 Catch Basin Insert	Flogard Filter or approved equal
INF-7 Underground Infiltration	Underground Infiltration Chambers (Cultec or approved equal)

IV.3.8 Non-structural Source Control BMPs

Non-Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**If not applicable, state brief reason**
		Included	**Not Applicable**	
N1	Education for Property Owners, Tenants and Occupants	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	Not a medical or drug facility.
N6	Local Industrial Permit Compliance	☒	☐	
N7	Spill Contingency Plan	☒	☐	
N8	Underground Storage Tank Compliance	☒	☐	
N9	Hazardous Materials Disclosure Compliance	☒	☐	
N10	Uniform Fire Code Implementation	☒	☐	
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	No loading dock.
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☒	☐	

IV.3.9 Structural Source Control BMPs

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

IV.4 Alternative Compliance Plan (If Applicable)

IV.4.1 Water Quality Credits

<table>
<tr><th colspan="5">Description of Proposed Project</th></tr>
<tr><td colspan="5">Project Types that Qualify for Water Quality Credits (Select all that apply):</td></tr>
<tr><td>☐Redevelopment projects that reduce the overall impervious footprint of the project site.</td><td colspan="2">☐Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface WQ if not redeveloped.</td><td colspan="2">☐ Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance).</td></tr>
<tr><td colspan="2">☐ Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).</td><td colspan="2">☐ Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned</td><td>☐ Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).</td></tr>
<tr><td>☐Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.</td><td>☐ Developments in a city center area.</td><td>☐ Developments in historic districts or historic preservation areas.</td><td>☐ Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.</td><td>☐In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.</td></tr>
<tr><td>Calculation of Water Quality Credits
(if applicable)</td><td colspan="4">Not applicable.</td></tr>
</table>

IV.4.2 Alternative Compliance Plan Information

Not applicable.

Section V Inspection/Maintenance Responsibility for BMPs

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
N1 Education for Property Owners, Tenants and Occupants	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	Prohibit maintenance & washing of vehicles, outdoor storage of materials, unlabeled containers, loading/unloading of materials that may come in contact with stormwater.	Ongoing
N2 Activity Restrictions	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	Prohibit maintenance & washing of vehicles, outdoor storage of materials, unlabeled containers, loading/unloading of materials that may come in contact with stormwater.	Daily
N4 BMP Maintenance	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	All BMP's shall be visually inspected and schedule cleaning and/or maintenance of all structural BMP facilities on regular basis.	Monthly or as needed.

N7 Spill Contingency Plan	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	Keep your Spill Prevention Control and Countermeasure (SPCC) plan up-to-date, and implement accordingly.	Ongoing
N9 Hazardous materials Disclosure Compliance	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	File with the City of Anaheim and maintain onsite a current "Hazardous Materials Disclosure & Business Emergency Plan".	Ongoing
N10 Uniform Fire Code Compliance	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	Facility shall be in compliance with Article 80 of the Uniform Fire Code enforced by fire protection agency. The classification of hazards for chemicals stored, used, and handled at this facility is required to ensure that proper types of fire and life safety protection systems and procedures are in place at all times.	Ongoing
N11 Common Area Litter Control	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	Provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations	Twice Monthly

N12 Employee Training	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	Train all employees, management, office, yard, manufacturing, field and clerical in BMPs and pollution prevention and make them accountable.	Within 6 months and annually thereafter
N14 Common Area Catch Basin Inspection	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	All drainage facilities inspected, cleaned and maintained.	Inspect bi-annually, clean at minimum, prior to October 1st and as often as needed when debris is present.
N15 Street Sweeping Private Streets and Parking Lots	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	N15 Street Sweeping Private Streets and Parking Lots	Every two weeks and once before October 1st.
S1 Storm Drain Signage	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	Maintain legibility of stencils, signs and markers	At a minimum, 1 annually.
Efficient Irrigation	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	Maintain equipment-water sensors, irrigation heads and timers in good working order	Minimum monthly inspection. Maintain as necessary to ensure proper function.
Underground Infiltration Galleries (Cultec or approved equal)	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	Follow manufacturer's recommended maintenance requirements	Bi-annually or after every storm event

Catch Basin Filter Insert (Flogard or approved equal)	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	Follow manufacturer's recommended maintenance requirements	Monthly or after every storm events.
Media Filter Contech StormFilter	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674	Follow manufacturer's recommended maintenance requirements	Once every year.

Section VI BMP Exhibit (Site Plan)

VI.1 BMP Exhibit (Site Plan) – See Attachment A

VI.2 Submittal and Recordation of Water Quality Management Plan

Section VII Educational Materials

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

Attachment A

Calculations, Worksheets, and Cross-Sections – Calculations shall follow City of Anaheim BMP Sizing Worksheets

Attachment B

2-Year Storm Event Hydrology Calculations

Attachment C

O+M Plan

Attachment D

Educational Materials (Include Reference/Link Only)

Attachment E

Geotechnical Report

Attachment F

Notice of Transfer of Responsibility Form

Attachment G

City of Anaheim Correspondence, if Applicable

Attachment H

Any Additional Pertinent Appendices

Attachment A

Calculations, Worksheets, and Cross-Sections – Calculations shall follow City of Anaheim BMP Sizing Worksheets

Worksheet A: Hydrologic Source Control Calculation Form

Drainage area ID	DMA-A			
Total drainage area	1.18	acres		
Total drainage area Impervious Area (IA_{total})	1.06	acres		
HSC ID	HSC Type/ Description/ Reference BMP Fact Sheet	Effect of individual HSC_i per criteria in **BMP Fact Sheets (XIV.1)** (d_{HSCi})[1]	Impervious Area Tributary to HSC_i (IA_i)	$d_i \times IA_i$
1		0.82	1.06	0.87
Box 1:		$\sum d_i \times IA_i =$		0.87
Box 2:		$IA_{total} =$		1.06
[Box 1]/[Box 2]:		$d_{HSC\ total} =$		0.82
		*Percent Capture Provided by HSCs (**Table III.1**)*		80%

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

Worksheet A: Hydrologic Source Control Calculation Form

Drainage area ID	DMA-B			
Total drainage area	0.75	acres		
Total drainage area Impervious Area (IA_{total})	0.66	acres		
HSC ID	HSC Type/ Description/ Reference BMP Fact Sheet	Effect of individual HSC_i per criteria in **BMP Fact Sheets (XIV.1)** (d_{HSCi})[1]	Impervious Area Tributary to HSC_i (IA_i)	$d_i \times IA_i$
1		0.82	0.68	0.56
Box 1:		$\sum d_i \times IA_i =$		0.56
Box 2:		$IA_{total} =$		0.68
[Box 1]/[Box 2]:		$d_{HSC\ total} =$		0.82
		*Percent Capture Provided by HSCs (**Table III.1**)*		80%

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

Worksheet B: Simple Design Capture Volume Sizing Method DMA-A; A = 1.18 ac

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=	0.87	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)	$d_{remainder}$=	0.87	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	1.18	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	0.90	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.825	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	3,075	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**)	$K_{observed}$=	1.04	In/hr
2	Enter combined safety factor from Worksheet H, S_{total} (unitless)	S_{total}=	2	
3	Calculate design infiltration rate, $K_{design} = K_{observed} / S_{total}$	K_{design}=	0.72	In/hr
Step 3b: Determine minimum BMP footprint	Kdesign per Geotech = 0.52 in/hr			
4	Enter drawdown time, *T* (max 48 hours)	T=	48	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}=	2.08	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	1,546	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.

Worksheet B: Simple Design Capture Volume Sizing Method DMA-B; A = 0.75 ac

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=	0.82	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)	$d_{remainder}$=	0.82	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	0.75	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	0.90	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	0.825	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	1,842	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**)	$K_{observed}$=	1.04	In/hr
2	Enter combined safety factor from Worksheet H, S_{total} (unitless)	S_{total}=	2	
3	Calculate design infiltration rate, $K_{design} = K_{observed} / S_{total}$	K_{design}=	0.72	In/hr
Step 3b: Determine minimum BMP footprint	Kdesign per Geotech = 0.52 in/hr			
4	Enter drawdown time, *T* (max 48 hours)	T=	48	Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} x\ T\ x\ (1/12)$	D_{max}=	2.08	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	940	sq-ft

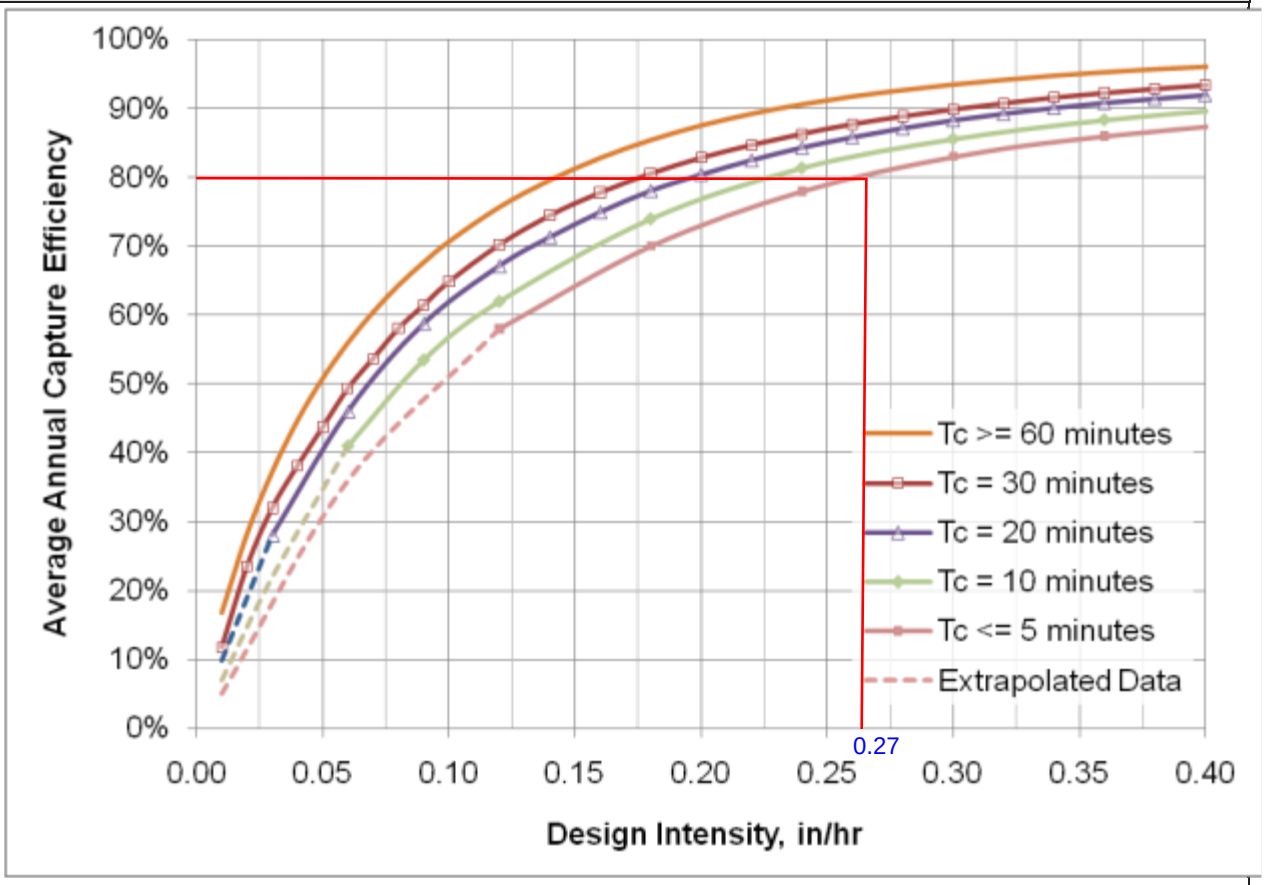
[1] $K_{observed}$ is the vertical infiltration measured in the field, before applying a factor of safety. If field testing measures a rate that is different than the vertical infiltration rate (for example, three-dimensional borehole percolation rate), then this rate must be adjusted by an acceptable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

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter the time of concentration, T_c (min) (See **Appendix IV.2**)	T_c=	5	
2	Using **Figure III.4**, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	I_1=	0.27	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (**Worksheet A**)	d_{HSC}=	0.82	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (**Worksheet A**)	Y_2=	80	%
5	Using **Figure III.4**, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency(Y_2), I_2	I_2=	0.00	
6	Determine the design intensity that must be provided by BMP, $I_{design}= I_1-I_2$	I_{design}=	0.27	
Step 2: Calculate the design flowrate				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	1.18	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	90	
3	Calculate runoff coefficient, $C= (0.75 \times imp) + 0.15$	C=	0.825	
4	Calculate design flowrate, $Q_{design}= (C \times i_{design} \times A)$	Q_{design}=	0.26	cfs
Supporting Calculations				
Describe system:				
Provide time of concentration assumptions:				

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Graphical Operations



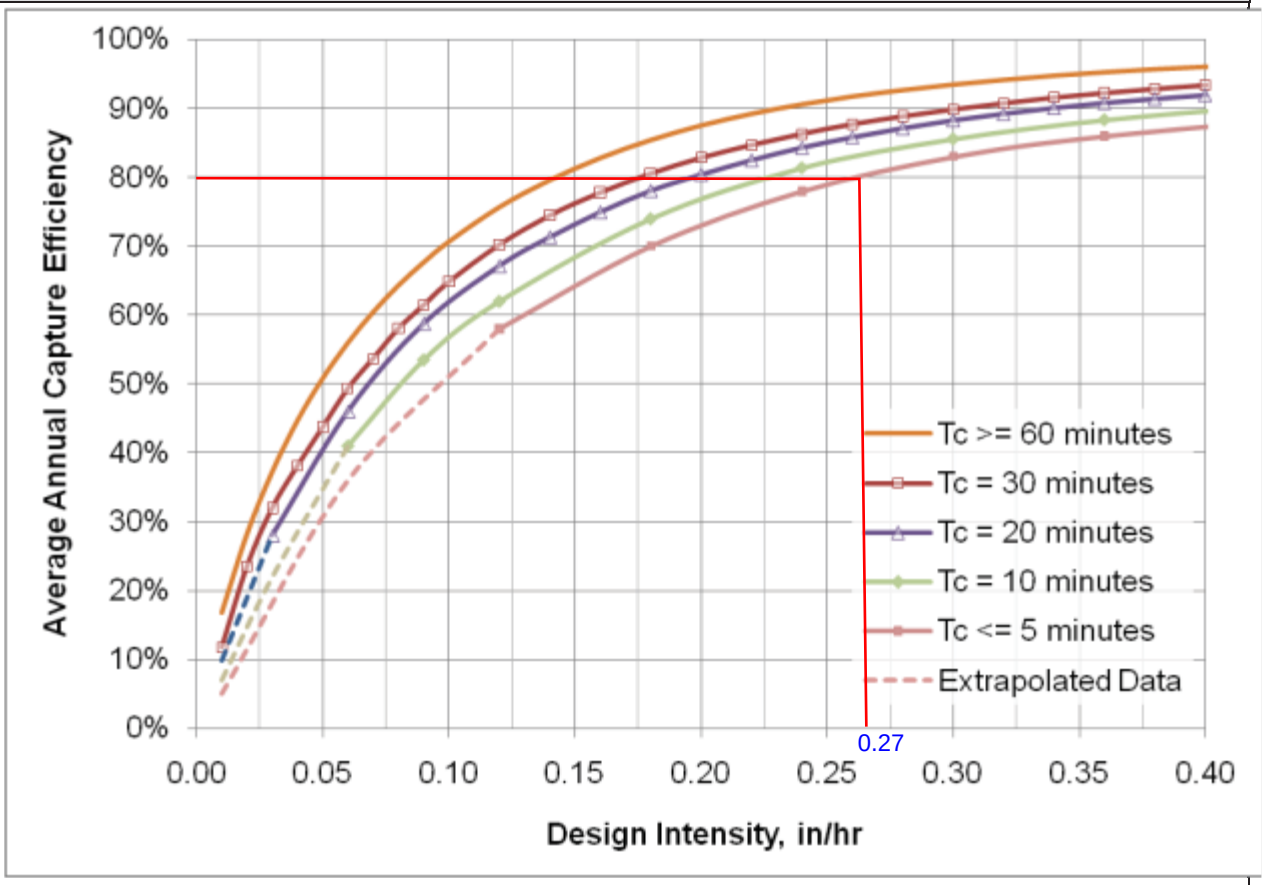
Provide supporting graphical operations. See Example III.7.

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter the time of concentration, T_c (min) (See **Appendix IV.2**)	T_c=	5	
2	Using **Figure III.4**, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	I_1=	0.27	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (**Worksheet A**)	d_{HSC}=	0.82	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (**Worksheet A**)	Y_2=	80	%
5	Using **Figure III.4**, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency(Y_2), I_2	I_2=	0.00	
6	Determine the design intensity that must be provided by BMP, $I_{design}= I_1-I_2$	I_{design}=	0.27	
Step 2: Calculate the design flowrate				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	0.75	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	90	
3	Calculate runoff coefficient, $C= (0.75 \times imp) + 0.15$	C=	0.825	
4	Calculate design flowrate, $Q_{design}= (C \times i_{design} \times A)$	Q_{design}=	0.17	cfs
Supporting Calculations				
Describe system:				
Provide time of concentration assumptions:				

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Graphical Operations



Provide supporting graphical operations. See Example III.7.

Worksheet H: Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	1.0	0.25
		Predominant soil texture	0.25	2.0	0.50
		Site soil variability	0.25	2.0	0.50
		Depth to groundwater / impervious layer	0.25	1.0	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.50
B	Design	Tributary area size	0.25	1.0	0.25
		Level of pretreatment/ expected sediment loads	0.25	1.0	0.25
		Redundancy	0.25	3.0	0.75
		Compaction during construction	0.25	1.0	0.25
		Design Safety Factor, $S_B = \Sigma p$			1.50
Combined Safety Factor, $S_{Total} = S_A \times S_B$ Soils Engineer Recommendation is					2.25 2.00
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					1.04 in/hr 1.84 in/hr
Design Infiltration Rate, in/hr, $K_{DESIGN} = K_{Observed} / S_{Total}$ FS = 2.0					0.52 in/hr 0.92 in/hr

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

Percolation tests were performed by Gorian and Associates, Inc.

Proposed infiltration BMPs meet the required minimum infiltration rate of 0.33 in/hr.

For design purposes, design infiltration rate to be used per Geotech recommendation will be 0.52 in/hr.

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

Worksheet I: Summary of Groundwater-related Feasibility Criteria

1	Is project large or small? (as defined by **Table VIII.2**) circle one	Large		Small
2	What is the tributary area to the BMP?	A	1.93	acres
3	What type of BMP is proposed?	UG Infiltration galleries		
4	What is the infiltrating surface area of the proposed BMP?	A_{BMP}	850	sq-ft
5	What land use activities are present in the tributary area (list all) Commercial			
6	What land use-based risk category is applicable?	L	M	H
7	If M or H, what pretreatment and source isolation BMPs have been considered and are proposed (describe all): Filter media pre-treatment.			
8	What minimum separation to mounded seasonally high groundwater applies to the proposed BMP? See Section **VIII.2** (circle one)	5 ft	10 ft	
9	Provide rationale for selection of applicable minimum separation to seasonally high mounded groundwater:			
10	What is separation from the infiltrating surface to seasonally high groundwater?	SHGWT	N/A	ft
11	What is separation from the infiltrating surface to mounded seasonally high groundwater?	Mounded SHGWT	N/A	ft
12	Describe assumptions and methods used for mounding analysis:			
13	Is the site within a plume protection boundary (See **Figure**	Y	N	N/A

Worksheet I: Summary of Groundwater-related Feasibility Criteria

	VIII.2)?	
14	Is the site within a selenium source area or other natural plume area (See Figure VIII.2)?	Y (N) N/A
15	Is the site within 250 feet of a contaminated site?	Y (N) N/A
16	If site-specific study has been prepared, provide citation and briefly summarize relevant findings: None	
17	Is the site within 100 feet of a water supply well, spring, septic system?	Y (N) N/A
18	Is infiltration feasible on the site relative to groundwater-related criteria?	(Y) N
Provide rationale for feasibility determination: Infiltration tests report shows that site infiltration capacity is greater than the minimum.		

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

Table 2.7: Infiltration BMP Feasibility Worksheet

	Infeasibility Criteria	*Yes*	*No*
1	**Would Infiltration BMPs pose significant risk for groundwater related concerns?** Refer to **Appendix VIII** (Worksheet I) for guidance on groundwater-related infiltration feasibility criteria.		x
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	Would Infiltration BMPs **pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level**? (Yes if the answer to any of the following questions is yes, as established by a geotechnical expert): • The BMP can only be located less than 50 feet away from slopes steeper than 15 percent • The BMP can only be located less than eight feet from building foundations or an alternative setback. • A study prepared by a geotechnical professional or an available watershed study substantiates that stormwater infiltration would potentially result in significantly increased risks of geotechnical hazards that cannot be mitigated to an acceptable level.		x
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
3	Would infiltration of the DCV from drainage area **violate downstream water rights**?		x
Provide basis: Summarize findings of studies provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

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

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)

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

Harvest and Use Infeasibility

Harvest and use infeasibility criteria include:

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

CULTEC Stormwater Design Calculator

Please Fill in the Shaded Cells

Project Information:

Project Name	ESS Anaheim
Address	1761 W Katella Avenue
City	Anaheim
State/Province	CA
ZIP/Postal Code	92804
Country	USA

Calculations Performed By:

Name	LM
Company Name	Coory Engineering
Address	1718 N Neville Street
City	Orange
State/Province	CA
ZIP/Postal Code	92865
Country	USA
Phone	(714) 202-8700
Email	skhoury@cooryengineering.com

Date: August 26, 2024

Project Number: 812-105

Input Project Requirements

Unit of Measure	**Imperial**	
Select Model	Contactor 100HD	
Stone Porosity	40%	
Number of HVLV Internal Manifolds	External Pipe Manifold	
Stone Depth **Above** Chamber	6	inches
Stone Depth **Below** Chamber	6	inches
Stone **Between** Chamber rows	6	inches
Include Separator Row		
Workable Bed Depth	15.75	feet
Max. Bed Width	60.00	feet
Storage Volume Required	1842.00	cu. feet
Stone Base Elevation	0.00	feet

Additional Information:

Other models are available if products above do not meet your requirements. Contact CULTEC for further design assistance.
Call CULTEC at 203-775-4416 for pricing information.

Hyperlinks to product specific webpages:

Please visit our website for more information such as CAD details, spec information, brochures, installation instructions, and other design tools on certain models.

Contactor Field Drain C-4HD
Contactor 100HD
Recharger 150XLHD
Recharger 180HD
Recharger 280HD
Recharger 330XLHD
Recharger 360HD
Recharger 902HD
HVLV SFCx2 Feed Connector
HVLV FC-24 Feed Connector
HVLV FC-48 Feed Connector
CULTEC No. 4800 Woven Geotextile
CULTEC No. 410 Non-Woven Geotextile

For design assistance, drawings and pricing send these calculations to:
mailto:tech@cultec.com

Website:
www.cultec.com

CULTEC Stormwater Design Calculator

Date:	August 26, 2024

Project Number:	812-105

Project Information:

ESS Anaheim
1761 W Katella Avenue
Anaheim
CA
USA

Calculations Performed By:

LM
Coory Engineering
1718 N Neville Street
Orange CA
92865
USA
(714) 202-8700
skhoury@cooryengineering.com

CONTACTOR 100HD

Contactor 100HD Chamber Specifications

Height	12.5	inches
Width	36.0	inches
Length	8.00	feet
Installed Length	7.50	feet
Bare Chamber Volume	14.11	cu. feet
Installed Chamber Volume	29.90	cu. feet

Breakdown of Storage Provided by Contactor 100HD Stormwater System

Within Chambers	917.93	cu. feet
Within Feed Connectors	-	cu. feet
Within Stone	1,158.97	cu. feet
Total Storage Provided	**2,076.9**	**cu. feet**
Total Storage Required	1842.00	cu. feet

Materials List

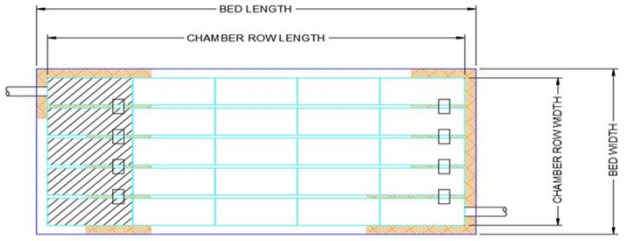
Contactor 100HD

Total Number of Chambers Required	**64**	**pieces**
Separator Row Chambers	4	pieces
Starter Chambers	16	pieces
End Chambers	48	pieces
HVLV SFCx2 Feed Connectors	0	pieces
CULTEC No. 410 Non-Woven Geotextile	570	sq. yards
CULTEC No. 4800 Woven Geotextile	33	feet
Stone	107	cu. yards

Separator Row Qty Included in Total

Based on External Pipe Manifold

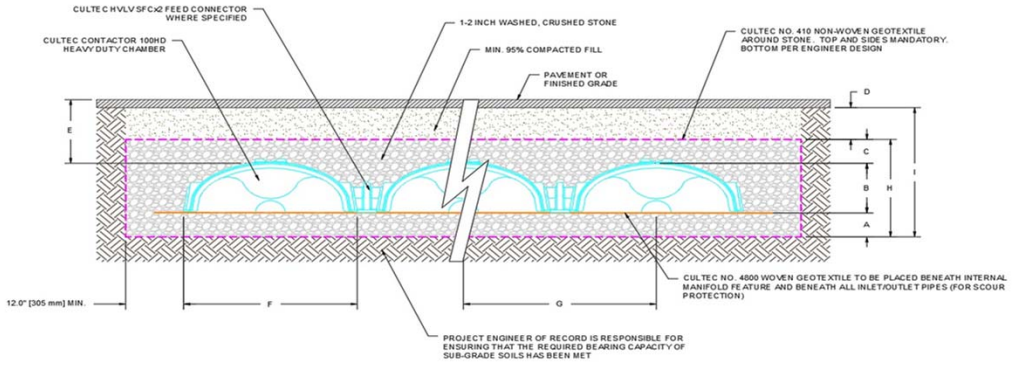
Bed Detail



Bed detail for reference only. Not project specific. Not to scale.

Bed Layout Information

Number of Rows Wide	16	pieces
Number of Chambers Long	4	pieces
Chamber Row Width	55.50	feet
Chamber Row Length	30.50	feet
Bed Width	57.50	feet
Bed Length	32.50	feet
Bed Area Required	1868.75	sq. feet
Length of Separator Row	30.50	feet



Conceptual graphic only. Not job specific.

Cross Section Table Reference

A	Depth of Stone Base	**6.0**	inches
B	Chamber Height	**12.5**	inches
C	Depth of Stone Above Units	**6.0**	inches
D	Depth of 95% Compacted Fill	**8.0**	inches
E	Max. Depth Allowed Above the Chamber	**12.00**	feet
F	Chamber Width	**36.0**	inches
G	Center to Center Spacing	**3.50**	feet
H	Effective Depth	**2.04**	feet
I	Bed Depth	**2.71**	feet

CULTEC Stage-Storage Calculations

Date:	August 26, 2024

Project Information:

ESS Anaheim
1761 W Katella Avenue
Anaheim
CA 92804
USA

Project Number: 812-105

	Contactor 100HD	
Chamber Model -		
Number of Rows-	16	units
Total Number of Chambers -	64	units
HVLV SFCx2 Feed Connectors-	0	units
Stone Void -	40	%
Stone Base -	6	inches
Stone Above Units -	6	inches
Area -	1868.75	ft2
Base of Stone Elevation -	0.00	

Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation		
in	mm	ft³	m³	ft3	m3	ft³	m³	ft³	m³	ft³	m³	ft	m	
24.5	622	0.0	0.0	0.0	0.0	62.3	1.8	62.292	1.8	2076.93	58.81	2.04	0.62	Top of Stone Elevation
23.5	597	0.0	0.0	0.0	0.0	62.3	1.8	62.292	1.8	2014.64	57.05	1.96	0.60	
22.5	572	0.0	0.0	0.0	0.0	62.3	1.8	62.292	1.8	1952.35	55.28	1.88	0.57	
21.5	546	0.0	0.0	0.0	0.0	62.3	1.8	62.292	1.8	1890.06	53.52	1.79	0.55	
20.5	521	0.0	0.0	0.0	0.0	62.3	1.8	62.292	1.8	1827.77	51.76	1.71	0.52	
19.5	495	0.0	0.0	0.0	0.0	62.3	1.8	62.292	1.8	1765.47	49.99	1.63	0.50	
18.5	470	0.0	0.0	0.0	0.0	31.1	0.9	31.175	0.9	1703.18	48.23	1.54	0.47	Top of Chamber Elevation
18.0	457	11.7	0.3	0.0	0.0	57.6	1.6	69.319	2.0	1672.01	47.35	1.50	0.46	
17.0	432	32.7	0.9	0.0	0.0	49.2	1.4	81.909	2.3	1602.69	45.38	1.42	0.43	
16.0	406	53.7	1.5	0.0	0.0	40.8	1.2	94.500	2.7	1520.78	43.06	1.33	0.41	
15.0	381	67.8	1.9	0.0	0.0	35.2	1.0	102.991	2.9	1426.28	40.39	1.25	0.38	
14.0	356	77.6	2.2	0.0	0.0	31.3	0.9	108.847	3.1	1323.29	37.47	1.17	0.36	
13.0	330	84.9	2.4	0.0	0.0	28.3	0.8	113.239	3.2	1214.44	34.39	1.08	0.33	
12.0	305	89.8	2.5	0.0	0.0	26.4	0.7	116.167	3.3	1101.20	31.18	1.00	0.30	
11.0	279	93.7	2.7	0.0	0.0	24.8	0.7	118.509	3.4	985.04	27.89	0.92	0.28	
10.0	254	99.1	2.8	0.0	0.0	22.7	0.6	121.730	3.4	866.53	24.54	0.83	0.25	
9.0	229	99.1	2.8	0.0	0.0	22.7	0.6	121.730	3.4	744.80	21.09	0.75	0.23	
8.0	203	99.1	2.8	0.0	0.0	22.7	0.6	121.730	3.4	623.07	17.64	0.67	0.20	
7.0	178	108.8	3.1	0.0	0.0	18.8	0.5	127.586	3.6	501.34	14.20	0.58	0.18	
6.0	152	0.0	0.0	0.0	0.0	62.3	1.8	62.292	1.8	373.75	10.58	0.50	0.15	Bottom of Chamber Elevation
5.0	127	0.0	0.0	0.0	0.0	62.3	1.8	62.292	1.8	311.46	8.82	0.42	0.13	
4.0	102	0.0	0.0	0.0	0.0	62.3	1.8	62.292	1.8	249.17	7.06	0.33	0.10	
3.0	76	0.0	0.0	0.0	0.0	62.3	1.8	62.292	1.8	186.88	5.29	0.25	0.08	
2.0	51	0.0	0.0	0.0	0.0	62.3	1.8	62.292	1.8	124.58	3.53	0.17	0.05	
1.0	25	0.0	0.0	0.0	0.0	62.3	1.8	62.292	1.8	62.29	1.76	0.08	0.03	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	Bottom of Stone Elevation
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Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation	
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft	m
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CULTEC Stormwater Design Calculator

Please Fill in the Shaded Cells

Project Information:

Project Name	ESS Anaheim
Address	1761 W Katella Avenue
City	Anaheim
State/Province	CA
ZIP/Postal Code	92804
Country	USA

Calculations Performed By:

Name	LM
Company Name	Coory Engineering
Address	1718 N Neville Street
City	Orange
State/Province	CA
ZIP/Postal Code	92865
Country	USA
Phone	(714) 202-8700
Email	skhoury@cooryengineering.com

Date: August 26, 2024

Project Number: 812-105

Input Project Requirements

Unit of Measure	**Imperial**	
Select Model	Contactor 100HD	
Stone Porosity	40%	
Number of HVLV Internal Manifolds	External Pipe Manifold	
Stone Depth **Above** Chamber	6	inches
Stone Depth **Below** Chamber	6	inches
Stone **Between** Chamber rows	6	inches
Include Separator Row		
Workable Bed Depth	15.75	feet
Max. Bed Width	60.00	feet
Storage Volume Required	3075.00	cu. feet
Stone Base Elevation	0.00	feet

Additional Information:

Other models are available if products above do not meet your requirements. Contact CULTEC for further design assistance.
Call CULTEC at 203-775-4416 for pricing information.

Hyperlinks to product specific webpages:

Please visit our website for more information such as CAD details, spec information, brochures, installation instructions, and other design tools on certain models.

Contactor Field Drain C-4HD
Contactor 100HD
Recharger 150XLHD
Recharger 180HD
Recharger 280HD
Recharger 330XLHD
Recharger 360HD
Recharger 902HD
HVLV SFCx2 Feed Connector
HVLV FC-24 Feed Connector
HVLV FC-48 Feed Connector
CULTEC No. 4800 Woven Geotextile
CULTEC No. 410 Non-Woven Geotextile

For design assistance, drawings and pricing send these calculations to:
mailto:tech@cultec.com

Website:
www.cultec.com

CULTEC Stormwater Design Calculator

Date:	August 26, 2024

Project Number:	812-105

Project Information:

ESS Anaheim
1761 W Katella Avenue
Anaheim
CA
USA

Calculations Performed By:

LM
Coory Engineering
1718 N Neville Street
Orange CA
92865
USA
(714) 202-8700
skhoury@cooryengineering.com

CONTACTOR 100HD

Contactor 100HD Chamber Specifications

Height	12.5	inches
Width	36.0	inches
Length	8.00	feet
Installed Length	7.50	feet
Bare Chamber Volume	14.11	cu. feet
Installed Chamber Volume	29.90	cu. feet

Breakdown of Storage Provided by Contactor 100HD Stormwater System

Within Chambers	1,595.09	cu. feet
Within Feed Connectors	-	cu. feet
Within Stone	1,944.67	cu. feet
Total Storage Provided	**3,539.8**	**cu. feet**
Total Storage Required	3075.00	cu. feet

Materials List

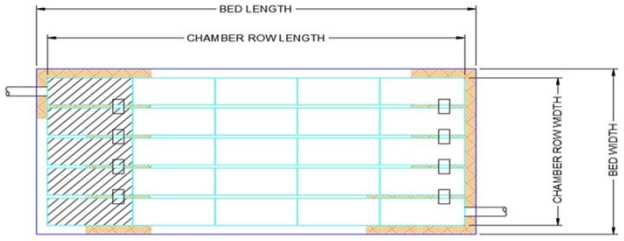
Contactor 100HD

Total Number of Chambers Required	**112**	**pieces**
Separator Row Chambers	7	pieces
Starter Chambers	16	pieces
End Chambers	96	pieces
HVLV SFCx2 Feed Connectors	0	pieces
CULTEC No. 410 Non-Woven Geotextile	942	sq. yards
CULTEC No. 4800 Woven Geotextile	56	feet
Stone	180	cu. yards

Separator Row Qty Included in Total

Based on External Pipe Manifold

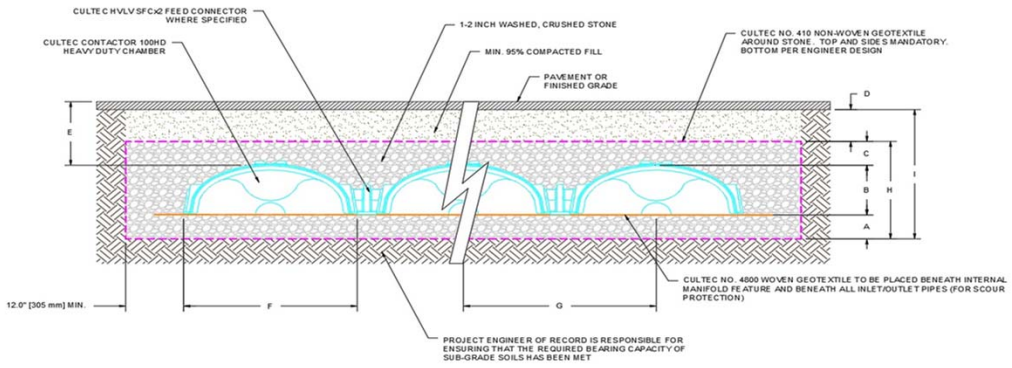
Bed Detail



Bed detail for reference only. Not project specific. Not to scale.

Bed Layout Information

Number of Rows Wide	16	pieces
Number of Chambers Long	7	pieces
Chamber Row Width	55.50	feet
Chamber Row Length	53.00	feet
Bed Width	57.50	feet
Bed Length	55.00	feet
Bed Area Required	3162.50	sq. feet
Length of Separator Row	53.00	feet



Conceptual graphic only. Not job specific.

Cross Section Table Reference

A	Depth of Stone Base	**6.0**	inches
B	Chamber Height	**12.5**	inches
C	Depth of Stone Above Units	**6.0**	inches
D	Depth of 95% Compacted Fill	**8.0**	inches
E	Max. Depth Allowed Above the Chamber	**12.00**	feet
F	Chamber Width	**36.0**	inches
G	Center to Center Spacing	**3.50**	feet
H	Effective Depth	**2.04**	feet
I	Bed Depth	**2.71**	feet

CULTEC Stage-Storage Calculations

Date:	August 26, 2024

Project Information:
ESS Anaheim
1761 W Katella Avenue
Anaheim
CA 92804
USA

Project Number:
812-105

	Contactor 100HD	
Chamber Model -		
Number of Rows-	16	units
Total Number of Chambers -	112	units
HVLV SFCx2 Feed Connectors-	0	units
Stone Void -	40	%
Stone Base -	6	inches
Stone Above Units -	6	inches
Area -	3162.50	ft2
Base of Stone Elevation -	0.00	

Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation		
in	mm	ft³	m³	ft3	m3	ft³	m³	ft³	m³	ft³	m³	ft	m	
24.5	622	0.0	0.0	0.0	0.0	105.4	3.0	105.417	3.0	3539.81	100.24	2.04	0.62	Top of Stone Elevation
23.5	597	0.0	0.0	0.0	0.0	105.4	3.0	105.417	3.0	3434.40	97.25	1.96	0.60	
22.5	572	0.0	0.0	0.0	0.0	105.4	3.0	105.417	3.0	3328.98	94.27	1.88	0.57	
21.5	546	0.0	0.0	0.0	0.0	105.4	3.0	105.417	3.0	3223.56	91.28	1.79	0.55	
20.5	521	0.0	0.0	0.0	0.0	105.4	3.0	105.417	3.0	3118.15	88.30	1.71	0.52	
19.5	495	0.0	0.0	0.0	0.0	105.4	3.0	105.417	3.0	3012.73	85.31	1.63	0.50	
18.5	470	0.1	0.0	0.0	0.0	52.7	1.5	52.759	1.5	2907.31	82.33	1.54	0.47	Top of Chamber Elevation
18.0	457	20.4	0.6	0.0	0.0	97.3	2.8	117.628	3.3	2854.55	80.83	1.50	0.46	
17.0	432	56.8	1.6	0.0	0.0	82.7	2.3	139.506	4.0	2736.92	77.50	1.42	0.43	
16.0	406	93.3	2.6	0.0	0.0	68.1	1.9	161.385	4.6	2597.42	73.55	1.33	0.41	
15.0	381	117.9	3.3	0.0	0.0	58.3	1.6	176.140	5.0	2436.03	68.98	1.25	0.38	
14.0	356	134.8	3.8	0.0	0.0	51.5	1.5	186.316	5.3	2259.89	63.99	1.17	0.36	
13.0	330	147.6	4.2	0.0	0.0	46.4	1.3	193.948	5.5	2073.58	58.72	1.08	0.33	
12.0	305	156.0	4.4	0.0	0.0	43.0	1.2	199.036	5.6	1879.63	53.23	1.00	0.30	
11.0	279	162.8	4.6	0.0	0.0	40.3	1.1	203.106	5.8	1680.59	47.59	0.92	0.28	
10.0	254	172.1	4.9	0.0	0.0	36.6	1.0	208.703	5.9	1477.49	41.84	0.83	0.25	
9.0	229	172.1	4.9	0.0	0.0	36.6	1.0	208.703	5.9	1268.79	35.93	0.75	0.23	
8.0	203	172.1	4.9	0.0	0.0	36.6	1.0	208.703	5.9	1060.08	30.02	0.67	0.20	
7.0	178	189.1	5.4	0.0	0.0	29.8	0.8	218.879	6.2	851.38	24.11	0.58	0.18	
6.0	152	0.0	0.0	0.0	0.0	105.4	3.0	105.417	3.0	632.50	17.91	0.50	0.15	Bottom of Chamber Elevation
5.0	127	0.0	0.0	0.0	0.0	105.4	3.0	105.417	3.0	527.08	14.93	0.42	0.13	
4.0	102	0.0	0.0	0.0	0.0	105.4	3.0	105.417	3.0	421.67	11.94	0.33	0.10	
3.0	76	0.0	0.0	0.0	0.0	105.4	3.0	105.417	3.0	316.25	8.96	0.25	0.08	
2.0	51	0.0	0.0	0.0	0.0	105.4	3.0	105.417	3.0	210.83	5.97	0.17	0.05	
1.0	25	0.0	0.0	0.0	0.0	105.4	3.0	105.417	3.0	105.42	2.99	0.08	0.03	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	Bottom of Stone Elevation
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Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation	
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft	m
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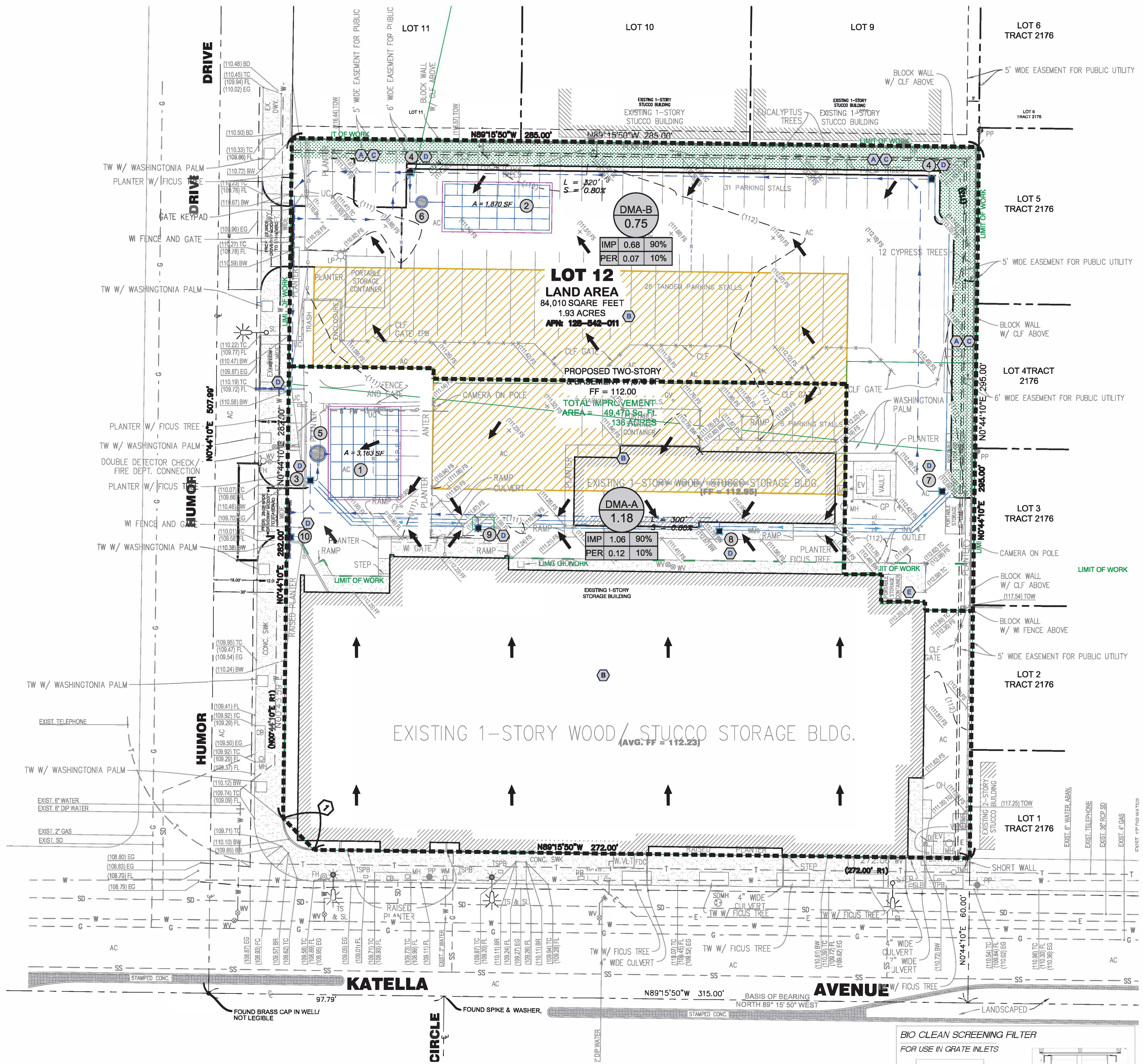
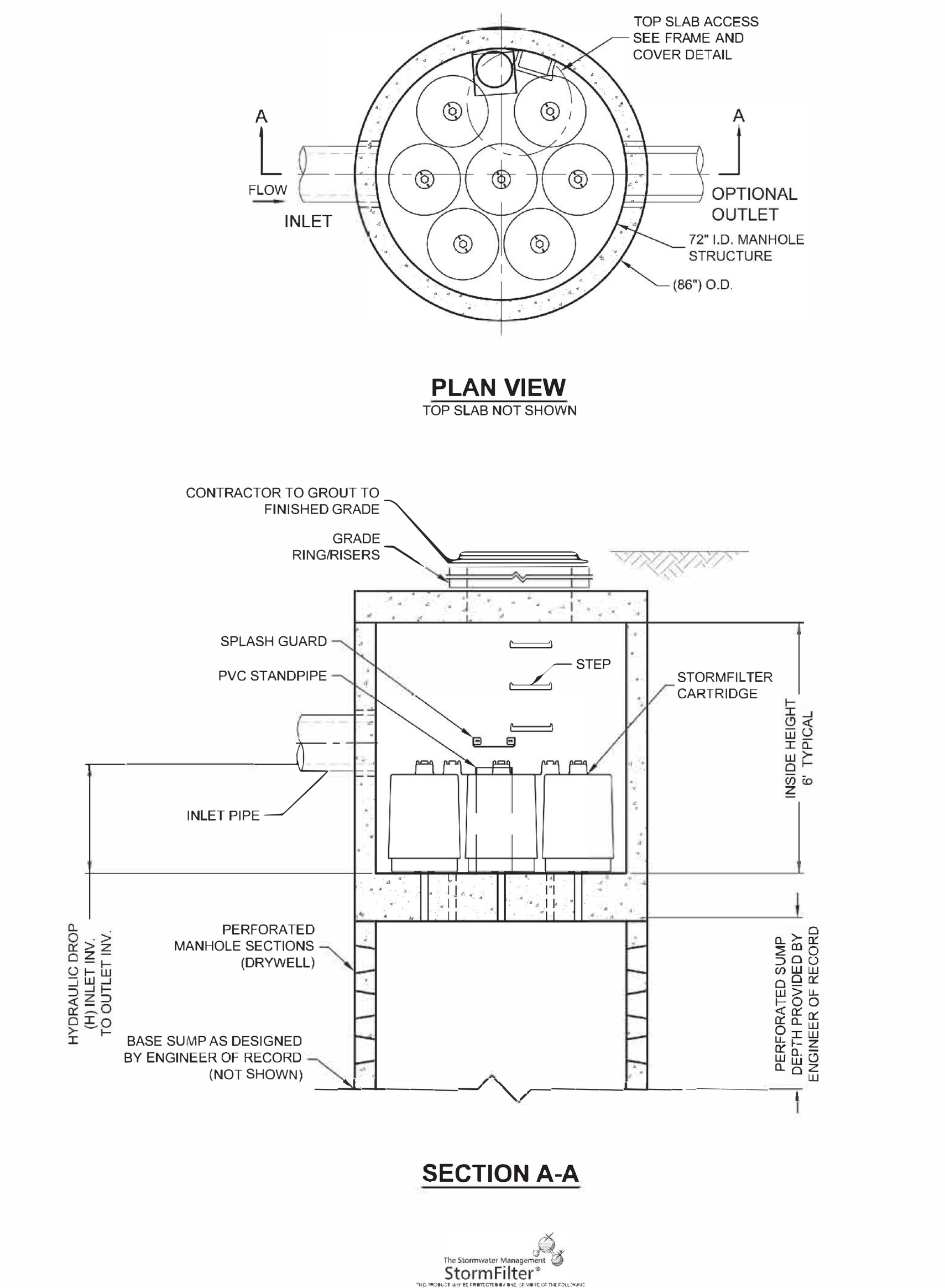


LEGEND:

- FLOW DIRECTION
- DRAINAGE BOUNDARY
- FLOW PATH
- DMA-A 1.18 — DRAINAGE AREA DESIGNATION — AREA IN ACRES
- UG INFILTRATION GALLERIES CULTEC CONTACTOR 100HD
- CONTECH STORMFILTER
- CATCH BASIN FILTER INSERT
- LANDSCAPE/PLANTING



INFILTRATOR STORMFILTER DESIGN NOTES

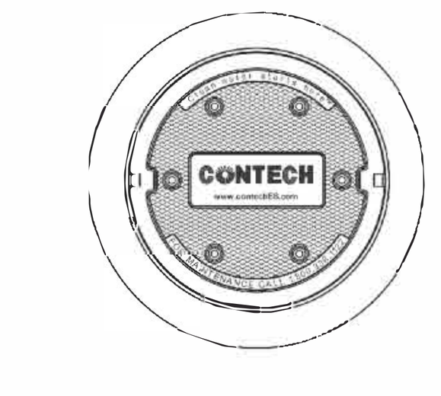
INFILTRATOR STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. THE STANDARD MANHOLE STYLE IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (7).

Ø72" MANHOLE STORMFILTER PEAK HYDRAULIC CAPACITY IS 1.5 CFS. IF THE SITE CONDITIONS EXCEED 1.5 CFS AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

DMA-A, Q = 0.26 cfs < 1.5 cfs, therefore OK

CARTRIDGE SELECTION

CARTRIDGE HEIGHT	27"		18"		LOW DROP	
RECOMMENDED HYDRAULIC DROP (H)	3.05'		2.3'		1.8'	
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	10	5



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

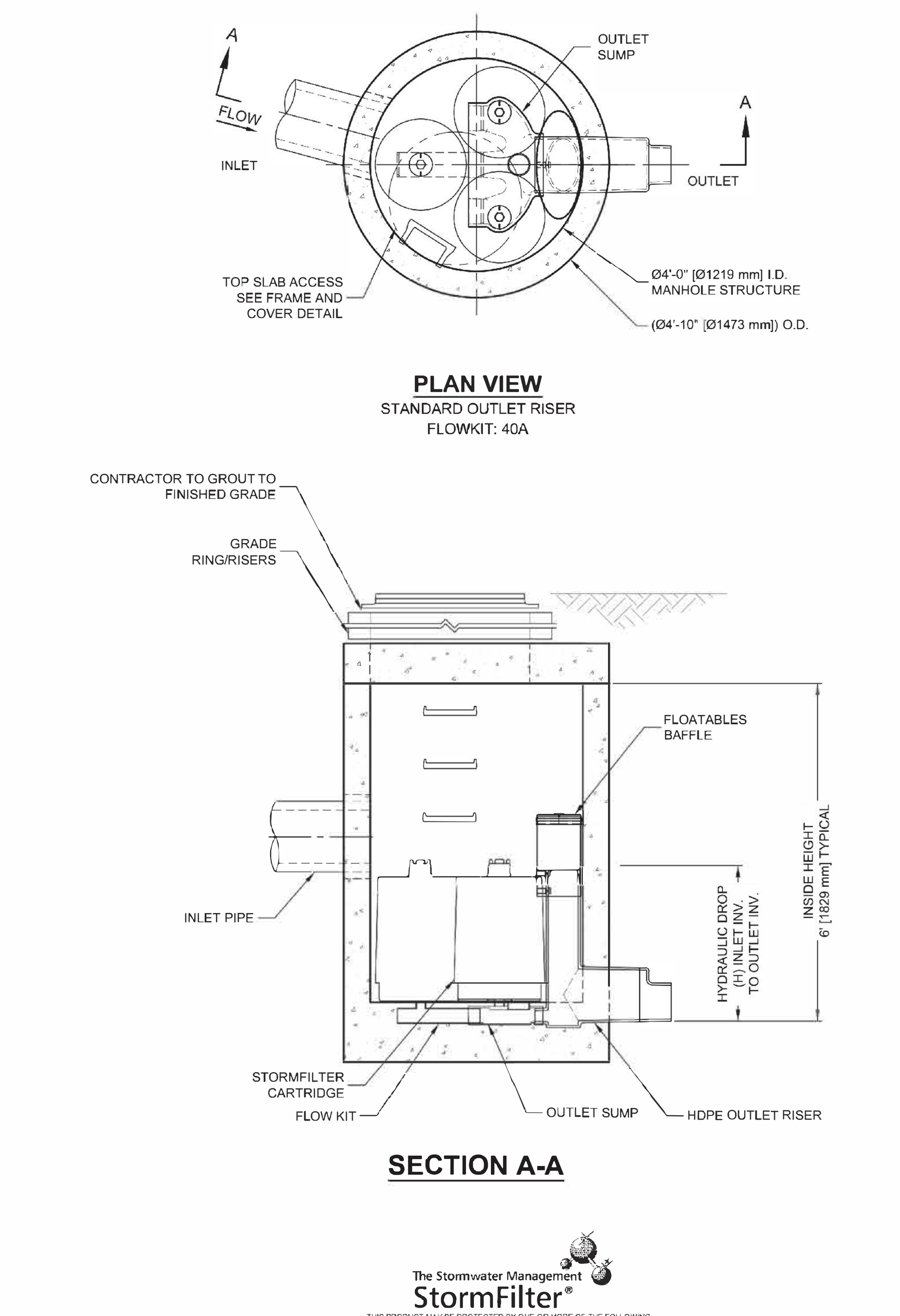
STRUCTURE ID			*
WATER QUALITY FLOW RATE (cfs)			0.26*
PEAK FLOW RATE (cfs)			1.71*
RETURN PERIOD OF PEAK FLOW (yrs)			2 *
# OF CARTRIDGES REQUIRED			7 *
CARTRIDGE FLOW RATE			18.79 gpm
MEDIA TYPE (CSF, PERLITE, ZPG, GAC, PHS)			PSORB
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	109.00	PVC*	12 *
INLET PIPE #2	*	*	*
OUTLET PIPE	105.50	PVC	12 *
RIM ELEVATION			111.30
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*
NOTES/SPECIAL REQUIREMENTS:			
* PER ENGINEER OF RECORD			

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR SITE SPECIFIC DRAWINGS WITH DETAILED VAULT DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. INFILTRATOR STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
6. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 39 SECONDS.
7. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft).

INSTALLATION NOTES
1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
3. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET PIPE(S).
5. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

SFIN-MH72
INFILTRATOR STORMFILTER
STANDARD DETAIL



STORMFILTER DESIGN NOTES

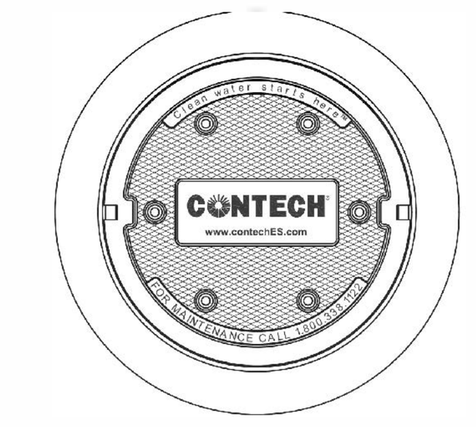
STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. THE STANDARD MANHOLE STYLE IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (3). VOLUME SYSTEM IS ALSO AVAILABLE WITH MAXIMUM 3 CARTRIDGES. Ø4 [1219 mm] MANHOLE STORMFILTER PEAK HYDRAULIC CAPACITY IS 1.0 CFS [28.3 L/s]. IF THE SITE CONDITIONS EXCEED 1.0 CFS [28.3 L/s] AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

DMA-B, Q = 0.17 cfs < 1.5 cfs, therefore OK

CARTRIDGE SELECTION

CARTRIDGE HEIGHT	27" [686 mm]			18" [458 mm]			LOW DROP		
RECOMMENDED HYDRAULIC DROP (H)	3.05' [930 mm]			2.3' [700 mm]			1.8' [550 mm]		
SPECIFIC FLOW RATE (gpm/sf) [L/s/m²]	2 [1.30]	1.67* [1.08]	1 [0.65]	2 [1.30]	1.67* [1.08]	1 [0.65]	2 [1.30]	1.67* [1.08]	1 [0.65]
CARTRIDGE FLOW RATE (gpm) [L/s]	22.5 [1.42]	18.79 [1.19]	11.25 [0.71]	15 [0.95]	12.53 [0.79]	7.5 [0.44]	10 [0.63]	8.35 [0.54]	5 [0.32]

* 1.67 gpm/sf [1.08 L/s/m²] SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB® (PSORB) MEDIA ONLY



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			*
WATER QUALITY FLOW RATE (cfs) [L/s]			0.17*
PEAK FLOW RATE (cfs) [L/s]			1.71*
RETURN PERIOD OF PEAK FLOW (yrs)			2 *
CARTRIDGE HEIGHT (SEE TABLE ABOVE)			27 *
NUMBER OF CARTRIDGES REQUIRED			4 *
CARTRIDGE FLOW RATE			18.79 gpm
MEDIA TYPE (PERLITE, ZPG, PSORB)			PSORB
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	109.00	PVC*	12 *
INLET PIPE #2	*	*	*
OUTLET PIPE	105.50	PVC	12 *
RIM ELEVATION			111.30
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*
NOTES/SPECIAL REQUIREMENTS:			
* PER ENGINEER OF RECORD			

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR SITE SPECIFIC DRAWINGS WITH DETAILED VAULT DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS-20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' [1524 mm] AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
6. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES [178 mm]. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 38 SECONDS.
7. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) [L/s] DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft)[m²].
8. STORMFILTER STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET PIPE(S).
E. CONTRACTOR TO PROVIDE AND INSTALL CONNECTOR TO THE OUTLET RISER STUB. STORMFILTER EQUIPPED WITH A DUAL DIAMETER HDPE OUTLET STUB AND SAND COLLAR. IF OUTLET PIPE IS LARGER THAN 8 INCHES [200 mm], CONTRACTOR TO REMOVE THE 8 INCH [200 mm] OUTLET STUB AT MOLDED-IN CUT LINE. COUPLING BY FERNCO OR EQUAL AND PROVIDED BY CONTRACTOR.
F. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

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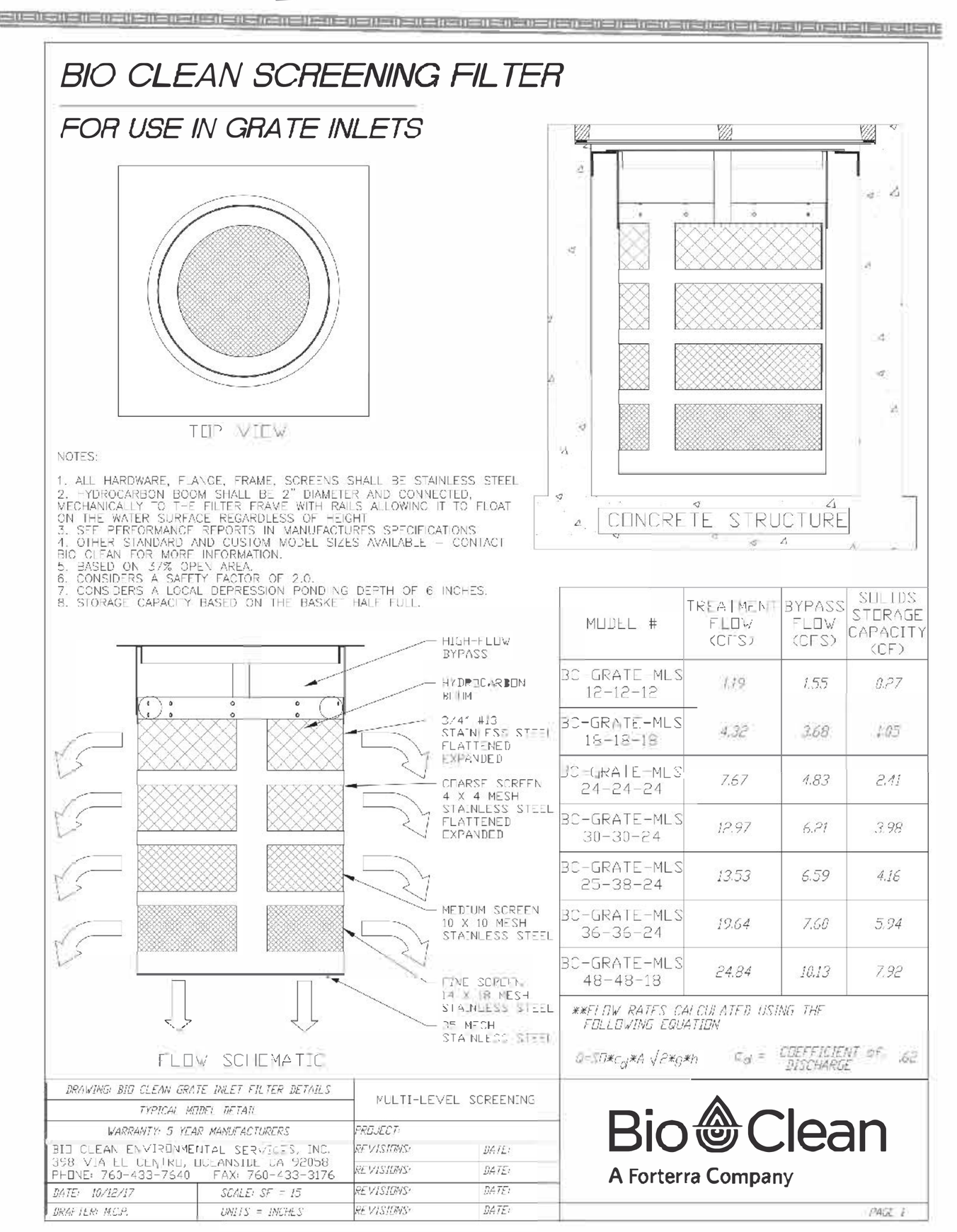
SFMH48
STORMFILTER
STANDARD DETAIL

BEST MANAGEMENT PRACTICES:

SOURCE CONTROL
- (A) SITE DESIGN AND LANDSCAPING PLANNING (SD-10)
- (B) ROOF RUNOFF CONTROLS (SD-11)
- (C) EFFICIENT IRRIGATION (SD-12)
- (D) STORM DRAIN SYSTEM STENCIL (SD-13)
- (E) TRASH ENCLOSURES (SD-32)

BMP LAT / LONG

BMP #	DESCRIPTION	LATITUDE	LONGITUDE
1	CULTEC CHAMBERS	33.8040 N	117.9444 W
2	CULTEC CHAMBERS	33.8038 N	117.9445 W
3	CATCH BASIN FILTER	33.8041 N	117.9444 W
4	CATCH BASIN FILTER	33.8041 N	117.9437 W
5	CONTECH 72" STORMFILTER	33.8038 N	117.9437 W
6	CONTECH 48" STORMFILTER	33.8037 N	117.9439 W
7	CATCH BASIN FILTER	33.8037 N	117.9443 W
8	CATCH BASIN FILTER	33.8037 N	117.9446 W
9	CATCH BASIN FILTER	33.8038 N	117.9445 W
10	CATCH BASIN FILTER	33.8039 N	117.9445 W



SCALE: 1" = 20'

BASIS OF BEARINGS

THE BASIS OF BEARINGS USED FOR THIS SURVEY IS BASED ON THE BEARING OF NORTH 89° 15' 50" WEST ALONG THE CENTERLINE OF KATELLA AVENUE PER **TRACT NO. 3258**, FILED IN **BOOK 99, PAGES 19-20** OF MISCELLANEOUS MAPS IN THE OFFICE OF THE COUNTY RECORDER OF ORANGE COUNTY, CALIFORNIA.

PROJECT BENCH MARK: **BM NUMBER GG-157**

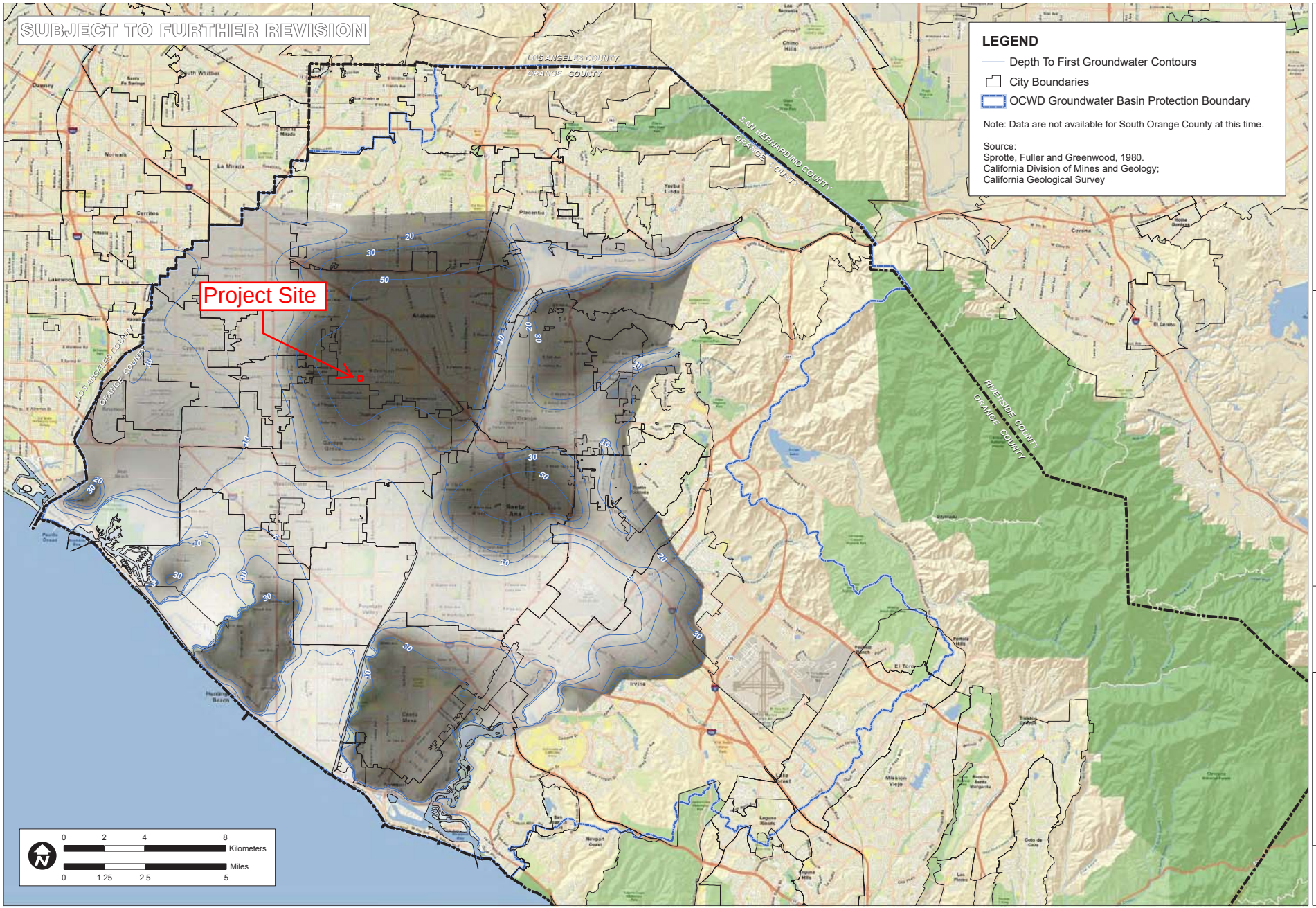
FOUND 2 ½"BRONZE CITY OF GARDEN GROVE BENCHMARK DISK WITH PUNCH IN TRIANGLE, SET IN THE NORTHWEST CORNER OF A 15 FT. BY 4 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE NORTHEAST CORNER OF THE INTERSECTION OF EUCLID ST. AND KATELLA AVE. 2 FT. EAST OF THE B.C.R. AND 3 FT. NORTH OF THE CURB FACE

ADJUSTMENT YEAR 2012 **ELEVATION: 112.921'**

CIVIL ENGINEERING & LAND SURVEYING
COORY ENGINEERING
TEL: (714) 202-8700 FAX: (714) 202-8701
1718 N. Neville Street. Orange, CA 92865

WQMP EXHIBIT
1761 WEST KATELLA AVENUE
ANAHEIM, CA 92804
A.P.N. 128-542-011

PREPARED FOR: EXTRA SPACE STORAGE
DRAWN BY: DCT
CHECKED BY: SMK | JOB NO: 812-105 | SHEET: 1 OF 1
DISREGARD PRINTS BEARING EARLIER REVISION DATES → ~~5/16/23~~ ~~5/19/23~~ ~~06/28/24~~ ~~08/19/24~~ 08/26/24



TITLE
NORTH ORANGE COUNTY
MAPPED DEPTH TO FIRST
GROUNDWATER

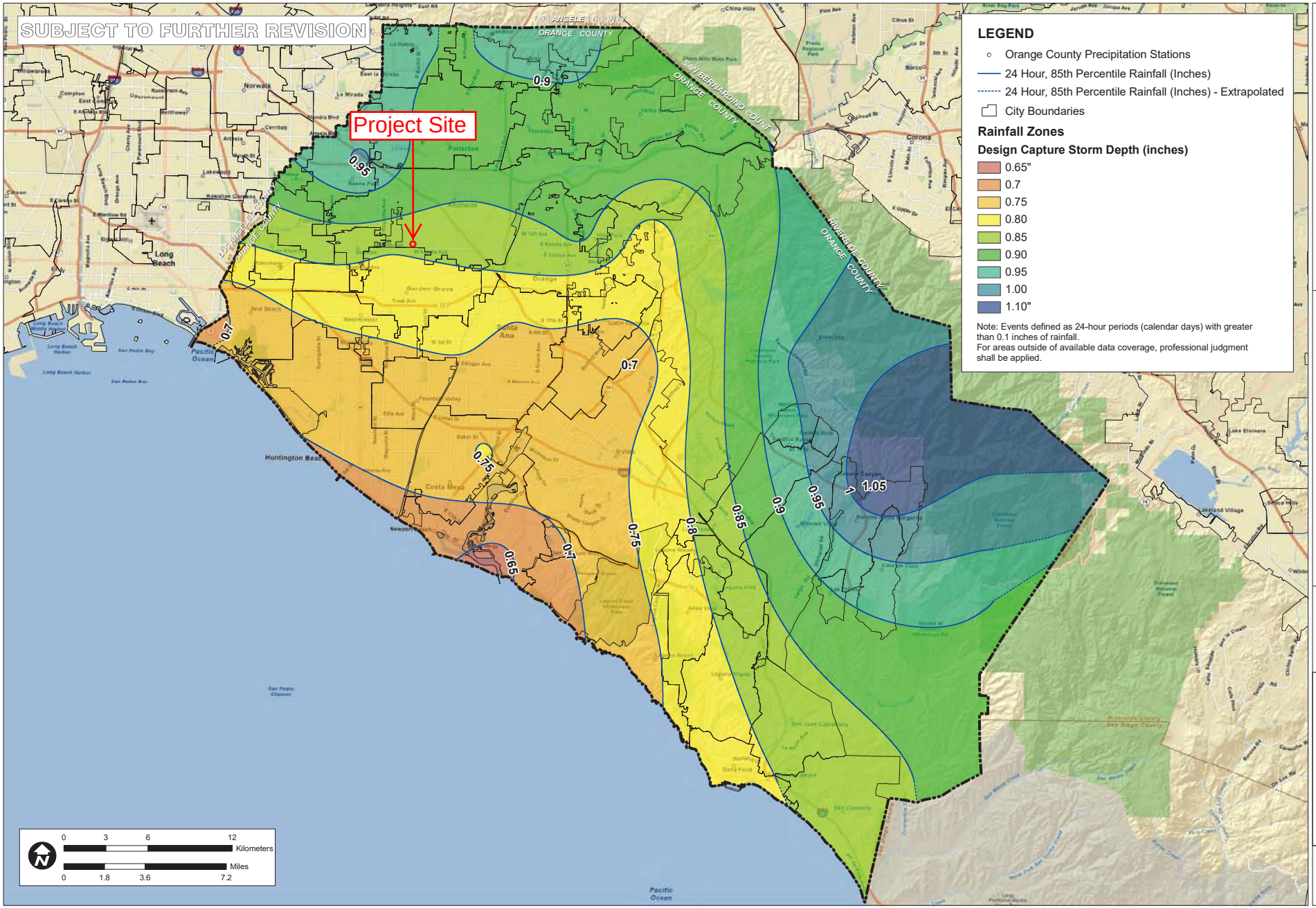
JOB
ORANGE COUNTY
INFILTRATION STUDY
ORANGE CO. CA

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

PACE
Advanced Water Engineering

FIGURE
XVI-2d

P:\9526E16-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2d_DepthToGroundwaterOverview_20110215.mxd



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.

TITLE: RAINFALL ZONES

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

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

PACE Advanced Water Engineering

FIGURE XVI-1

P:\9526E16-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-1_RainfallZones_20110215.mxd

CONTECH®
ENGINEERED SOLUTIONS

The Stormwater Management StormFilter®

The experts you need to solve your stormwater challenges

Contech is the leader in stormwater solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.

With our responsive team of stormwater experts, local regulatory expertise and flexible solutions, Contech is the trusted partner you can count on for stormwater management solutions.

Your Contech Team

STORMWATER CONSULTANT

It's my job to recommend the best solution to meet permitting requirements.

STORMWATER DESIGN ENGINEER

I work with consultants to design the best approved solution to meet your project's needs.

REGULATORY MANAGER

I understand the local stormwater regulations and what solutions will be approved.

SALES ENGINEER

I make sure our solutions meet the needs of the contractor during construction.

Contech is your partner in stormwater management solutions

An 8' x 24' Stormwater Management StormFilter with 60 cartridges is used to remove pollutants from runoff at Surfers Point Beach in Ventura, California.

Flexible Stormwater Filtration Technology

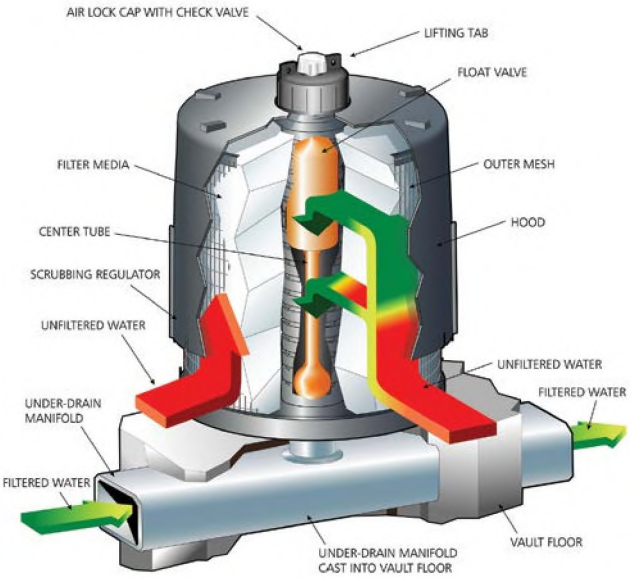
As stormwater quality regulations become more stringent, engineers need a filtration device that can tackle the most challenging pollutants and provide the flexibility to meet the needs of a variety of sites.

The Stormwater Management StormFilter® is an underground stormwater treatment device comprised of one or more structures that house rechargeable, media-filled cartridges that trap particulates and adsorb pollutants from stormwater runoff such as total suspended solids, hydrocarbons, nutrients, metals, and other common pollutants. With media options to target multiple or specific pollutants, multiple system configurations, and field and laboratory performance verified by the most stringent stormwater technology evaluation organizations; the StormFilter provides engineers the most flexible and most reliable manufactured treatment technology available.

The Stormwater Management StormFilter®

How the StormFilter Treats Stormwater

During a storm, runoff passes through the filtration media and starts filling the cartridge center tube. The air inside the hood is purged through a one-way check valve as the water rises. When water reaches the top of the float, buoyant forces pull the float free and allow filtered water to exit the cartridge. A siphon is established within each cartridge that draws water uniformly across the full height of the media bed ensuring even distribution of pollutants and prolonged media longevity. After the storm, the water level in the structure starts falling. A hanging water column remains under the cartridge hood until the water level reaches the scrubbing regulators at the bottom of the hood. Air then rushes through the regulators, breaking the siphon and creating air bubbles that agitate the surface of the filter media, causing accumulated sediment to settle on the treatment bay floor. This unique surface-cleaning mechanism prevents surface blinding and further extends cartridge life.



Learn More:
www.ContechES.com/stormfilter

The StormFilter has a 20+ year history of successful installations and over 200,000 cartridges installed worldwide.

FEATURE	BENEFIT
Siphon actuated, high surface area media cartridges	Stormwater is drawn evenly through the filter media providing efficient, effective stormwater treatment
Multiple cartridge heights	Flexibility to meet site-specific hydraulic needs and reduce system size and costs
Multiple media options	Ability to target specific pollutants of concern including TSS, phosphorus, heavy metals, and hydrocarbons
Internal peak bypass and multiple configurations	Design flexibility to meet your unique site requirements
Maintenance intervals of one to five years	Fewer maintenance events and reduced long-term ownership costs
Performance verified by both the WA DOE and NJ DEP	Superior pollutant capture with confidence
Arrives to the jobsite fully assembled	Factory build ensures quality and a simple, fast installation onsite

Design flexibility to meet your unique site requirements

StormFilter Media Options

Flexibility to target site-specific pollutants ...

- PhosphoSorb® is a lightweight media built from a Perlite-base that removes total phosphorus (TP) by adsorbing dissolved-P and filtering particulate-P simultaneously.
- CSF® Leaf Media is created from deciduous leaves processed into granular, organic media. CSF is most effective for removing soluble metals, TSS, oil and grease, and buffering acid rain.
- Perlite is naturally occurring puffed volcanic ash. Effective for removing TSS, oil, and grease.
- Zeolite is a naturally occurring mineral used to remove soluble metals, ammonium, and some organics.
- GAC (Granular Activated Carbon) has a micro-porous structure with an extensive surface area to provide high levels of adsorption. It is primarily used to remove oil and grease and organics such as PAHs and phthalates.

	PHOSPHOSORB	CSF	ZPG	PERLITE
Sediments	✓	✓	✓	✓
Oil and Grease	✓	✓	✓	✓
Soluble Metals	✓	✓	✓	
Organics		✓	✓	
Nutrients	✓	✓	✓	
Total Phosphorus	✓			

Note: Indicated media are most effective for associated pollutant type. Other media may treat pollutants, but to a lesser degree.

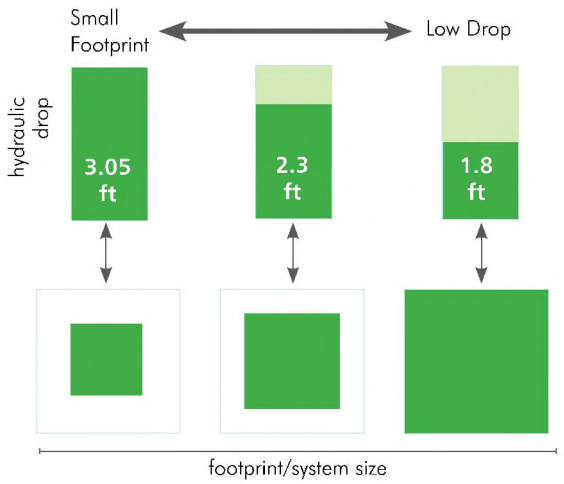
ZPG™ media is a proprietary blend of zeolite, perlite, and GAC, and is also available.

Cartridge Options

Flexibility to reduce size and costs ...

Every site is different, and one size does not fit all. Multiple cartridge heights give you design flexibility to design the StormFilter specifically for your site and reduce the cost of the system for the owner.

- 27″ cartridge – Capitalizing on sites with at least 3.05 feet of available driving head, media surface area is maximized to allow the greatest treatment rate per cartridge; best for sites with footprint constraints
- 18″ cartridge - The original StormFilter cartridge size provides a middle ground and operates with 2.3 feet of driving head
- Low Drop – Provides filtration treatment with only 1.8 feet of headloss; best for sites with limited by hydraulic constraints



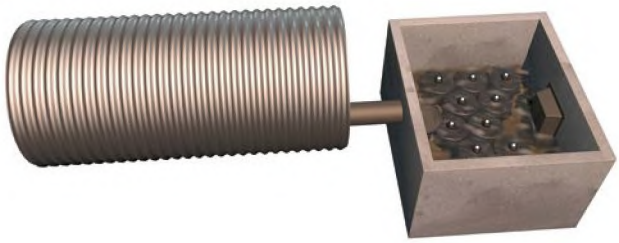
CARTRIDGE FLOW RATES			
Cartridge Height	2 gpm/ft²	1.67* gpm/ft²	1 gpm/ft²
12″ LD	10 gpm	8.35 gpm	5 gpm
18″	15 gpm	12.53 gpm	7.5 gpm
27″	22.5 gpm	18.79 gpm	11.25 gpm

** For use with Phosphosorb media as per WA DOE GULD approval.*

MASS LOAD CAPACITY			
Cartridge Height	2 gpm/ft²	1.67* gpm/ft²	1 gpm/ft²
12″ LD	15 lbs	18 lbs	24 lbs
18″	22.5 lbs	27 lbs	36 lbs
27″	33.8 lbs	40.45 lbs	54 lbs

** For use with Phosphosorb media as per WA DOE GULD approval.*

Configurations



Flexibility to accommodate flows, project footprints, and hydraulics ...

The structures that house the filter cartridges can be constructed in a variety of ways to accommodate a wide range of flows, project footprints, and variable hydraulic conditions. Standard configurations include catch basin, manhole, vault, curb inlet, and linear grate.

- **The Peak Diversion StomFilter** provides treatment and high flow bypass in one precast vault, eliminating the need for an external bypass or junction structures.
- **The Volume StormFilter** is designed to meet volume-based treatment regulations and can be combined with upstream storage to treat and drawdown the water quality volume within the required drain down time.
- **The Cast-in-Place StormFilter** structures allow the highest degree of flexibility and are available for installations within buildings or other areas where precast structures cannot be accommodated. On-site Contractor assistance is provided to ensure the finished product meets Contech's standards for fit and function.

Select StormFilter Approvals

The StormFilter has been verified by some of the most stringent stormwater technology evaluation organizations in North America, including:

- Washington State Department of Ecology (TAPE) GULD – Basic, Phosphorus
- New Jersey Department of Environmental Protection (NJ DEP)
- Canada ISO 14034 Environmental Management – Environmental Technology Verified (ETV)
- North Carolina Department of Environmental Quality (NC DEQ)
- Maryland Department of the Environment (MD DOE)
- Texas Commission on Environmental Quality (TCEQ)
- Virginia Department of Environmental Quality (VA DEQ)
- Maine Department of Environmental Protection (ME DEP)
- St. Louis Metropolitan Sewer District

Verified by some of the most stringent organizations

StormFilter Maintenance

APPLICATION TIPS

- Clogging is a major factor in the failure of filter systems. Look for systems that offer mechanisms that prevent clogging, extend service life, and reduce life-cycle cost.
- A compact design reduces construction, installation, and life-cycle cost, so look for systems that offer the most flexibility in design and construction.
- All media filters will eventually need to be replaced. Look for filters that have lightweight cartridges and provide easy access for maintenance.

An easy-to-access treatment system can make all the difference in maintenance expenses.

Every manufactured filtration device will eventually need routine maintenance. The question is how often and how much it will cost. Proper evaluation of long-term maintenance costs should be a consideration when selecting a manufactured treatment device. The StormFilter has been optimized to reduce long-term maintenance costs with proven, repeatable performance in the laboratory and in the field.

- **Reduce Life Cycle Costs** - StormFilter has been designed for predictable maintenance intervals ranging from 1 to 5 years, resulting in fewer maintenance events and reduced life-cycle costs compared to other filtration devices.
- **Easy to maintain** - All StormFilter structures provide access for inspection, media replacement, and washing of the structure. Visual indicators for maintenance are observable from the surface.
- **Cartridge replacement program** provides refurbished cartridges that are shipped to your site ready to install. Contech arranges for empty cartridges to be picked up and shipped back, reducing cartridge costs and environmental impact.
- **Maintenance support** - Contech has created a network of Certified Maintenance Providers to provide StormFilter maintenance at the lowest possible cost.

A partner you can rely on

STORMWATER SOLUTIONS

PIPE SOLUTIONS

STRUCTURES SOLUTIONS

Few companies offer the wide range of high-quality stormwater resources you can find with us — state-of-the-art products, decades of expertise, and all the maintenance support you need to operate your system cost-effectively.

THE CONTECH WAY

Contech® Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors, and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.

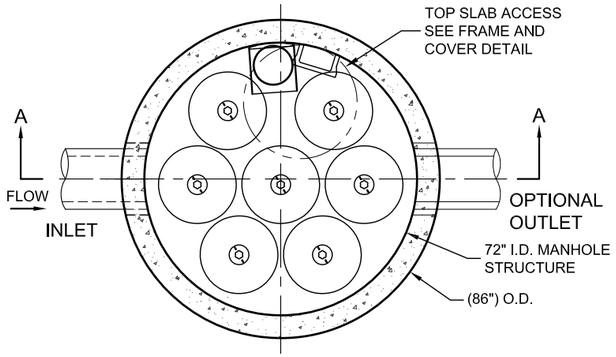
TAKE THE NEXT STEP

For more information: www.ContechES.com

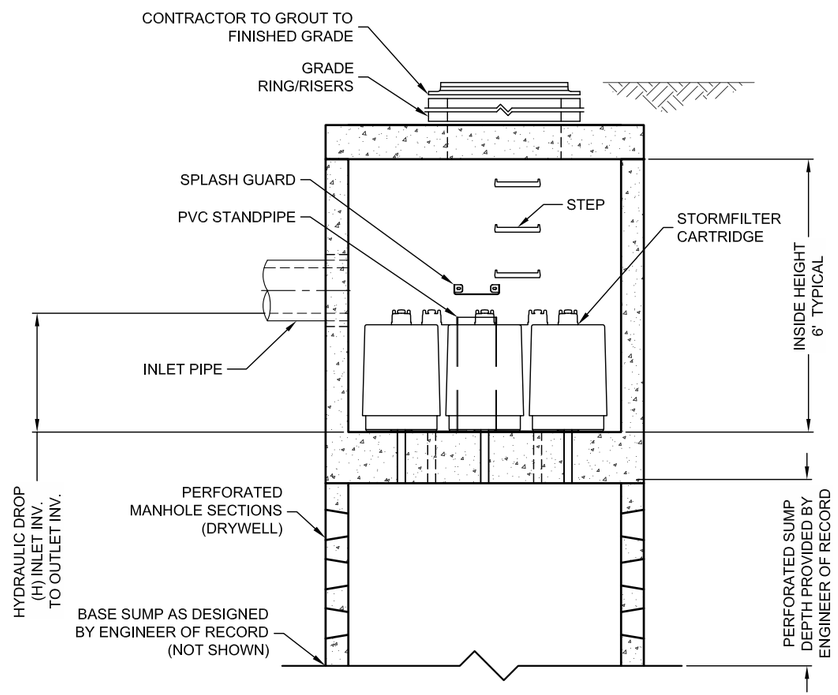
CONTECH® ENGINEERED SOLUTIONS

Get social with us:

800-338-1122 | www.ContechES.com



PLAN VIEW
TOP SLAB NOT SHOWN



SECTION A-A

The Stormwater Management StormFilter®
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,322,629; 5,324,370; 5,707,527; 5,985,157; 6,027,639; 6,649,048; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

INFILTRATOR STORMFILTER DESIGN NOTES

INFILTRATOR STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. THE STANDARD MANHOLE STYLE IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (7).

Ø72" MANHOLE STORMFILTER PEAK HYDRAULIC CAPACITY IS 1.5 CFS. IF THE SITE CONDITIONS EXCEED 1.5 CFS AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

DMA-A, Q = 0.27 cfs < 1.5 cfs, therefore OK

CARTRIDGE SELECTION

CARTRIDGE HEIGHT	27"		18"		LOW DROP	
RECOMMENDED HYDRAULIC DROP (H)	3.05'		2.3'		1.8'	
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	10	5

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	0.27 *
PEAK FLOW RATE (cfs)	1.71 *
RETURN PERIOD OF PEAK FLOW (yrs)	2 *
# OF CARTRIDGES REQUIRED	7 *
CARTRIDGE FLOW RATE	18.79 gpm
MEDIA TYPE (CSF, PERLITE, ZPG, GAC, PHS)	PSORB

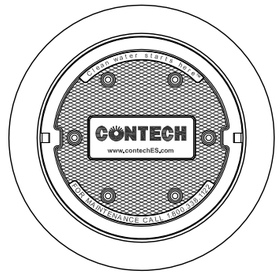
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	109.00	PVC *	12 *
INLET PIPE #2	*	*	*
OUTLET PIPE	105.50	PVC	12 *

RIM ELEVATION	111.30

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD



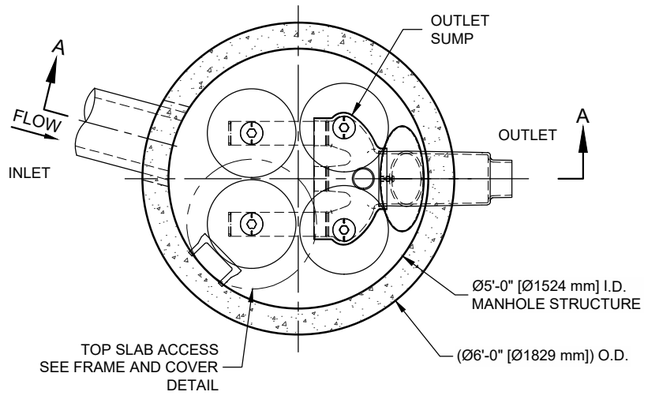
FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR SITE SPECIFIC DRAWINGS WITH DETAILED VAULT DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. INFILTRATOR STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
6. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 39 SECONDS.
7. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft).

INSTALLATION NOTES
1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
3. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET PIPE(S).
5. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

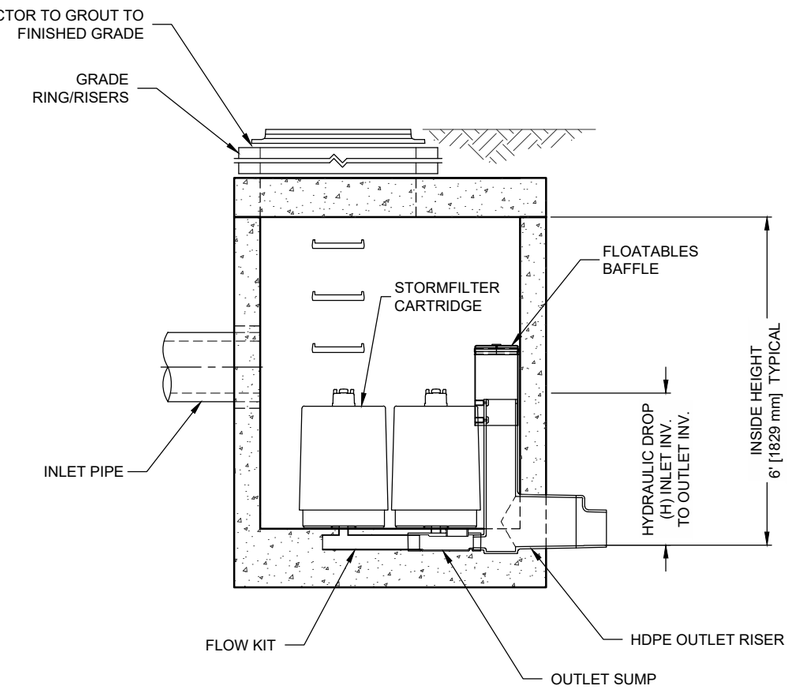
CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

SFIN-MH72
INFILTRATOR STORMFILTER
STANDARD DETAIL



PLAN VIEW

STANDARD OUTLET RISER
FLOWKIT: 41A



SECTION A-A

STORMFILTER DESIGN NOTES

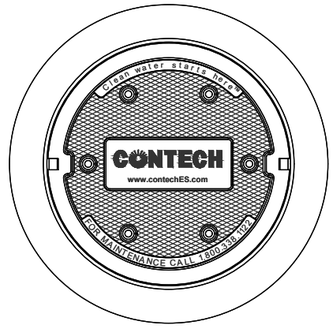
STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. THE STANDARD MANHOLE STYLE IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (4). VOLUME SYSTEM IS ALSO AVAILABLE WITH MAXIMUM 4 CARTRIDGES.
Ø5'-0" [1524 mm] MANHOLE STORMFILTER PEAK HYDRAULIC CAPACITY IS 1.0 CFS [28.3 L/s] . IF THE SITE CONDITIONS EXCEED 1.0 CFS [28.3 L/s] AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

DMA-B, Q = 0.16 cfs < 1.0 cfs, therefore OK

CARTRIDGE SELECTION

CARTRIDGE HEIGHT	27" [686 mm]			18" [458 mm]			LOW DROP		
RECOMMENDED HYDRAULIC DROP (H)	3.05' [930 mm]			2.3' [700 mm]			1.8' [550 mm]		
SPECIFIC FLOW RATE (gpm/sf) [L/s/m^2]	2 [1.30]	1.67* [1.08]	1 [0.65]	2 [1.30]	1.67* [1.08]	1 [0.65]	2 [1.30]	1.67* [1.08]	1 [0.65]
CARTRIDGE FLOW RATE (gpm) [L/s]	22.5 [1.42]	18.79 [1.19]	11.25 [0.71]	15 [0.95]	12.53 [0.79]	7.5 [0.44]	10 [0.63]	8.35 [0.54]	5 [0.32]

* 1.67 gpm/sf [1.08 L/s/m^2] SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB® (PSORB) MEDIA ONLY



FRAME AND COVER

(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs) [L/s]	0.16 *
PEAK FLOW RATE (cfs) [L/s]	1.71 *
RETURN PERIOD OF PEAK FLOW (yrs)	2 *
CARTRIDGE HEIGHT (SEE TABLE ABOVE)	27 in *
NUMBER OF CARTRIDGES REQUIRED	4 *
CARTRIDGE FLOW RATE	18.79 gpm
MEDIA TYPE (PERLITE, ZPG, PSORB)	PSORB

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	109.00	PVC *	12 *
INLET PIPE #2	*	*	*
OUTLET PIPE	105.50	PVC *	12 *

RIM ELEVATION	111.30

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR SITE SPECIFIC DRAWINGS WITH DETAILED VAULT DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS-20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' [1524 mm] AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
6. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES [178 mm]. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 38 SECONDS.
7. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) [L/s] DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft)[m^2].
8. STORMFILTER STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET PIPE(S).
E. CONTRACTOR TO PROVIDE AND INSTALL CONNECTOR TO THE OUTLET RISER STUB. STORMFILTER EQUIPPED WITH A DUAL DIAMETER HDPE OUTLET STUB AND SAND COLLAR. IF OUTLET PIPE IS LARGER THAN 8 INCHES [200 mm], CONTRACTOR TO REMOVE THE 8 INCH [200 mm] OUTLET STUB AT MOLDED-IN CUT LINE. COUPLING BY FERNCO OR EQUAL AND PROVIDED BY CONTRACTOR.
F. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

The Stormwater Management StormFilter®

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

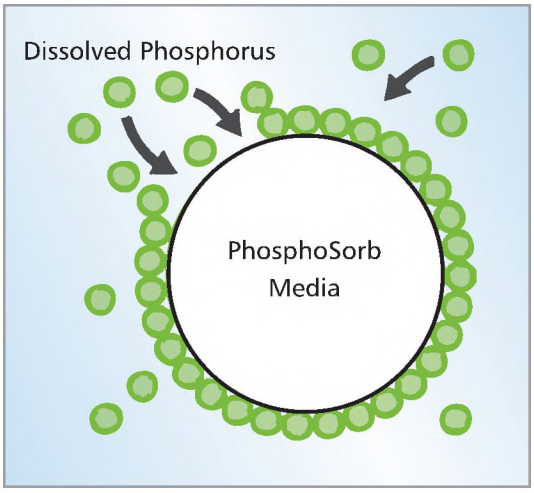
SFMH60
STORMFILTER
STANDARD DETAIL

Phosphosorb® Media

PhosphoSorb®

Effectively targets TSS and Total Phosphorus

Manufactured in an environmentally-friendly manner, PhosphoSorb is a lightweight media built from a Perlite base. This innovative, engineered filtration media removes total phosphorus (TP) from stormwater runoff by absorbing dissolved-P and filtering particulate-P simultaneously. Field tests of the PhosphoSorb media showed a load reduction of 89% TSS and 82% total phosphorus with an average influent concentration of 380 mg/L and 0.33 mg/L respectively.



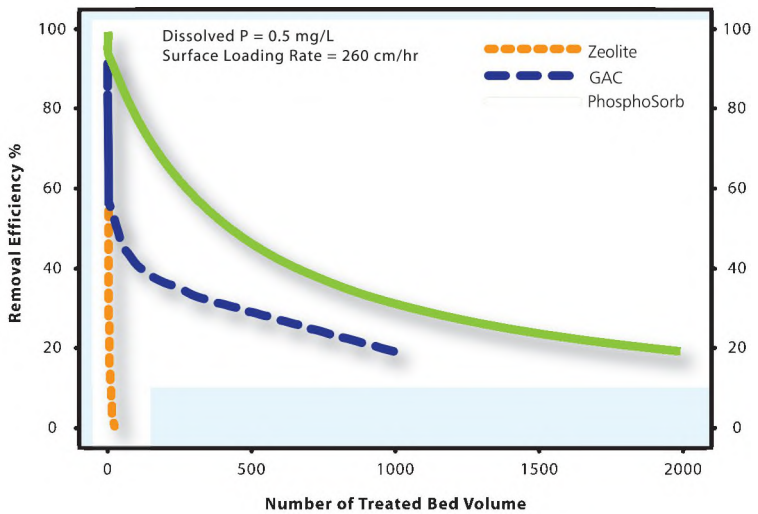
PHYSICAL CHARACTERISTICS OF PHOSPHOSORB	
Nominal Size (mm)	1.4 - 6.3
Bulk Density (lbs/ft^3)	20 - 25
Effective Bed Porosity	65% - 80%
Specific Surface Area (m^2/g)	20 - 30

State of Washington TAPE GULD Basic Phosphorus

Learn More:
www.ContechES.com/phosphosorb

Key Benefits:

- Removes both TSS and TP from stormwater runoff
- Removal of both soluble and total Phosphorus can exceed 50%
- Low impact product life cycle – no production by-products
- Lightweight media – easy to handle, ship and deploy
- Reliable performance and longevity using the laboratory and field-proven Stormwater Managment StormFilter® cartridge



In laboratory testing, PhosphoSorb removed 50% of the first 1,000 treated empty bed volumes (EBVs) of 0.5 mg/L influent dissolved P solution, and lasted for at least 2,000 treated EBVs.

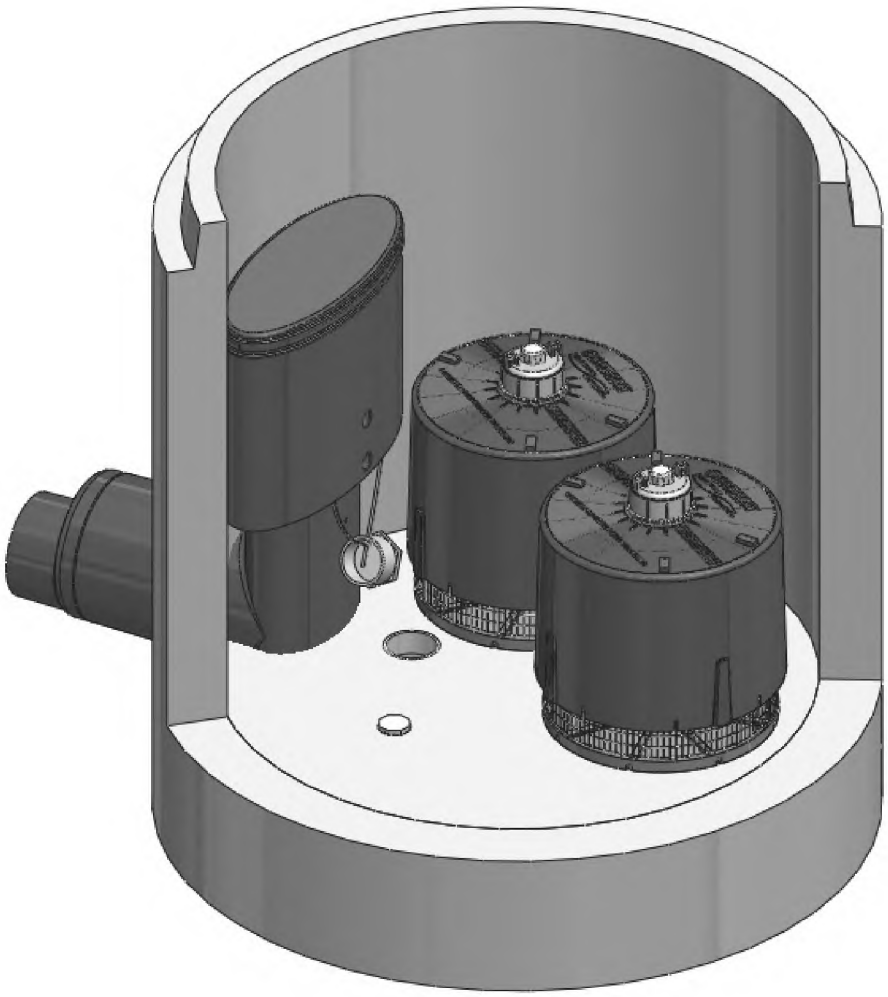
Effectively target TSS and Total Phosphorus

CONTECH ENGINEERED SOLUTIONS

CONTECH®
ENGINEERED SOLUTIONS

Manhole StormFilter

Installation Guide For Contractors



The Stormwater Management
StormFilter®

Safety Notice

Confined Space Entry

Secure all equipment and training to meet applicable local and OSHA regulations regarding confined space entry.

Unloading and Handling

Any unloading/handling suggestions or guidance is beyond our scope of work but can be obtained from the precaster. Contact Contech if contact information for the precaster is needed.

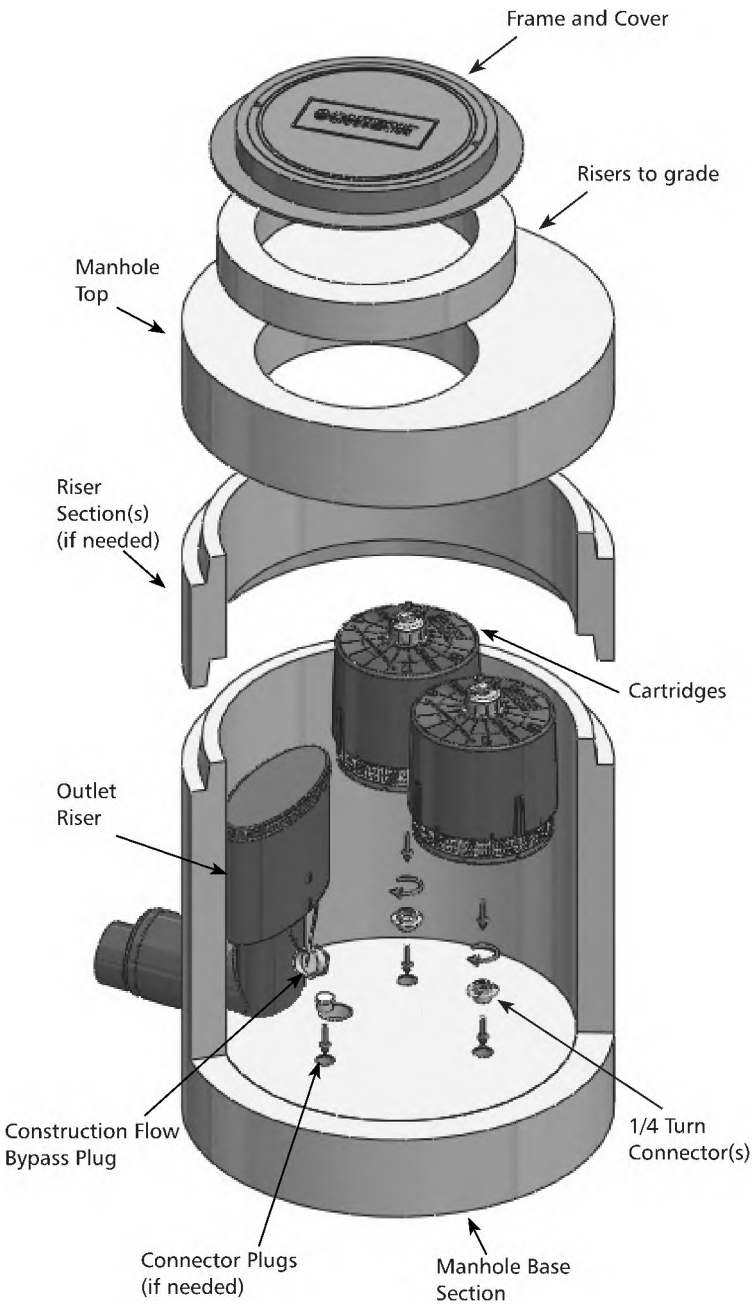
Personal Safety Equipment

- Fall protection equipment
- Gloves
- Hard hat
- Eye protection
- Ear protection
- Respiratory protection

Manhole StormFilter Parts List
(what to expect)

Typically, the MHSF will arrive on site with components pre-installed

- Manhole Base Section (diameter per plans)
    - Flow Kit: embedded in MH base
    - Manhole Outlet Riser: embedded in MH base, outlet stub grouted through MH hole.
    - ¼ Turn Connectors: glued to flow kit
    - Connector Plugs: all unused cartridge connections are plugged
    - StormFilter Cartridges: count, size and media type per plans (pre-installed)
- Construction Flow Bypass Plug (attached to outlet riser)
- Manhole Riser sections (if needed, per plans)
- Manhole Top/Cone (per plans)
- Risers to grade (per plans)
- Frame(s) and Cover(s) (per plans)
- Butyl mastic sealant



Contractor Supplied Material

Outlet pipe fitting — Select the appropriate fitting to join the 8"/12" MHSF outlet stub to the downstream pipe per plans

Grout — Non-shrink grout to connect the Inlet pipe(s) to the MHSF

Base Preparation

Compact undisturbed sub-grade materials to 95% of maximum density at +/-2% of optimum moisture content prior to placement of crushed rock. Crushed rock base material shall be six-inch minimum layer of ¾-inch minus rock. Unsuitable material below sub-grade shall be replaced per site engineer's recommendation.

Crane Selection

The contractor is responsible for selecting the appropriate equipment to unload and set the Manhole StormFilter. Contech will provide the contractor with the weights of the precast units. A representative from the crane company should visit the jobsite and review pertinent information (shop drawings, weights, etc) prior to the selection of the crane. The crane representative and/or contractor should determine the distance from center of the crane's position to the center of the final position of the precast units. The weight and the distance from the center of the crane's position to the center of the final position of the precast units determine the crane size. Locate the crane as close to the installation as possible and follow all recommendations of the crane supplier. The staging area for the crane must be stabilized and crane supplier should be prepared to supply outrigger mats.

Setting the Manhole StormFilter

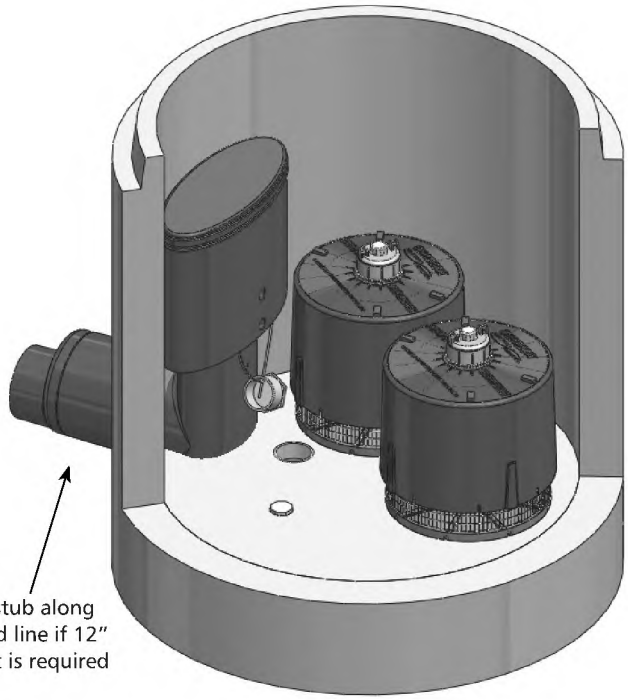
Ensure the inlet(s) and outlet are oriented per the plans. Manhole floor shall slope ¼ inch maximum across the "width" and slope downstream 1 inch per 12 foot of "length" ("Length" is defined by a line running from the invert of the outlet through the center of the manhole and "width" is the perpendicular to the "length"). Manhole top finish grade shall be even with surrounding finish grade surface per the plans unless otherwise directed by the site engineer.

Assembling Internal Components

In most cases, internal components have been assembled inside the manhole before shipment and will arrive on site pre-installed. The contractor should:

- Verify flow kit and outlet riser assembly are installed securely and outlet stub is grouted
- Ensure all cartridges are attached to the ¼-turn connectors (some may have been disconnected to provide access to lifting points)
- Ensure all unused cartridge connections are plugged
- The top to the outlet baffle is securely in place

NOTE: in some cases, the Manhole StormFilter is designed without internal overflow. In these instances, there is no baffle on the riser, and the riser is sealed.



Pipe Connections

Inlet pipe(s) shall be stubbed in and connected to precast manhole according to Engineer's requirements and specifications. Contractor to grout all inlet pipes flush with or protruding up to 2 inches into interior of vault per plan and specifications.

Outlet Pipe stub shall be connected to the outlet pipe with a Fernco connection. If necessary, trim the stub along the scored line to enlarge the outlet pipe stub to meet the plans.

Ballast

When required, ballast shall be placed to the dimensions specified by the Engineer and noted on the plans. Ballast shall not encase the inlet and/or outlet piping and 12" of clearance should be provided between the ballast and the inlet/outlet pipes.

Protecting the Filter System from Construction Run-off

The Manhole StormFilter was selected by Engineer as a **Post-Construction** Stormwater Treatment Best Management Practice. It is the responsibility of the contractor to ensure appropriate erosion control measures and Construction BMPs are in place to protect the Manhole StormFilter from sediment and other debris until construction is complete and the site is stabilized. Methods for protecting the cartridges include:

1. Remove cartridges from the manhole and store appropriately. Cartridges shall be reinstalled when the system is placed on-line after construction is complete
2. Leave cartridges in the vault and plug the outlet of an upstream flow splitter or bypass structure to prevent run-off from reaching the MHSF
3. Ensure the construction bypass hole is open and the plug is attached to the outlet riser for installation after construction is complete

The method ultimately selected shall be at the Contractor's discretion and the Contractor's risk

Risers, Covers and Closing the System

The Manhole StormFilter is delivered with the necessary risers and covers to bring the unit to grade. It is the contractors responsibility to assemble the Manhole StormFilter per the plans and as directed by the Engineer.

- Place a layer of 1/4 x 1 1/2 butyl mastic manhole sealant between the manhole base, riser sections and top
- Manhole access opening should be oriented over steps (if provided) and oriented away from the outlet riser according to the contract drawing

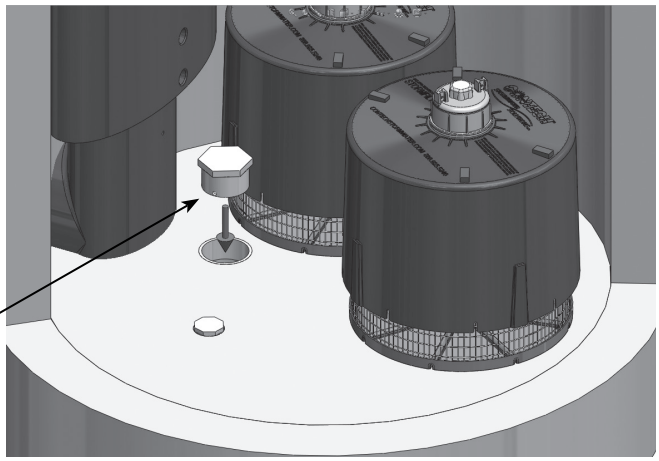
Backfill

Backfill material and placement method should be performed in accordance with the construction plans and as directed by the Engineer.

Activating the System

Once construction is complete, landscaping is in place, and the site has stabilized, the contractor is responsible for activating the Manhole StormFilter system. Depending on the method of protecting the MHSF from construction runoff, the contractor should:

1. Inspect the system to ensure maintenance is not required (see **StormFilter Inspection and Maintenance Procedures)**
2. If the cartridges were stored outside the vault during construction, install the cartridges and ensure all empty connectors are plugged
3. Remove all upstream pipe plugs that were used to prevent runoff from reaching the StormFilter. (Standing water should be pumped out prior to entering any underground structure).
4. Plug the construction bypass port in the floor of the manhole with supplied 4" pvc plug.



800.925.5240
www.ContechES.com

Support

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from Contech Stormwater Design Engineers.

Attachment B

2-Year Storm Event Hydrology Calculations

Runoff Flow & Velocities Calculations

$$Q = 0.9(I-F_m)A \qquad \textit{(Formula D.4)}$$

Where :

Q = runoff in cubic feet per second (cfs) from a given area.

$F_m = a_p F_p$ *(Formula C.7)*

a_p = is the pervious area fraction (See the Hydrology Map)

F_p = is the maximum loss rate for the pervious area based on Soils Group (See Table C-2)

I = the time-averaged rainfall intensity (inches/hour) - Hydrology Manual

A = Drainage area (acres)

A_p = pervious area for a given drainage area (See Hydrology Map)

Soils Maps: OC TGD XIV-2a

Return Frequency = **2 Years**

PRE-DEVELOPMENT									
Drainage Area	**A (acres)**	**A_p (acres)**	**a_p**	**Soils Group**	**F_p**	**F_m**	**T_c (min)**	**I* (in/hr)**	**Q (cfs)**
DMA-A0	1.93	0.000	0.00	B	0.40	0.0000	5	0.552	0.959
	1.93							**TOTAL**	**0.959**

POST-DEVELOPMENT									
Drainage Area	**A (acres)**	**A_p (acres)**	**a_p**	**Soils Group**	**F_p**	**F_m**	**T_c (min)**	**I* (in/hr)**	**Q (cfs)**
DMA-A	1.18	0.000	0.00	B	0.40	0.0000	5	0.552	0.586
DMA-B	0.75	0.000	0.00	B	0.40	0.0000	5	0.552	0.373
	1.93							**TOTAL**	**0.959**
								(Percent Increase/Decrease in Flowrate)	0.00%

Runoff Volume Calculations

$$V = \frac{Y * A * P_{24}}{12}$$

Where :

V= Volume in acre-ft.

Y = 24-hour storm runnoff yield factor for subarea A

$$Y = \frac{(P_{24} - I_a)^2}{(P_{24} - I_a + S)P_{24}}$$ *Formula C.3*

P_{24} = 24-hour storm rainfall from Figures B-1 and B-2

I_a = initial abstraction

= 0.2S *Formula C.1*

$$S = \frac{1000}{CN} - 10$$ *Formula C.2*

A= Drainage area in acres

Return Frequency = **2 Years**

PRE-DEVELOPMENT									
Drainage Area	**A (acres)**	**Soils Group**	**CN AMC II**	**CN AMC I**	**S**	**I_a**	**P_{24}**	**Y**	**V (Ac-ft)**
DMA-A0	1.93	B	98	90	1.111	0.222	2.37	0.597	0.228
	1.93							**TOTAL**	**0.228**

POST-DEVELOPMENT									
Drainage Area	**A (acres)**	**Soils Group**	**CN AMC II**	**CN AMC I**	**S**	**I_a**	**P_{24}**	**Y**	**V (Ac-ft)**
DMA-A	1.18	B	98	90	1.111	0.222	2.37	0.597	0.139
DMA-B	0.75	B	98	90	1.111	0.222	2.37	0.597	0.088
	1.93							**TOTAL**	**0.228**
								(Percent Increase/Decrease in Volume)	0.00%

Attachment C

O+M Plan

Operations and Maintenance (O&M) Plan

Water Quality Management Plan
for

Extra Space Storage

1761 W Katella Ave, Anaheim, CA 92804

APN: 128-542-011

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Non-Structural Source Control BMPs			
Yes	**N1. Education for Property Owners, Tenants and Occupants** For developments with no Property Owners Association (POA) or with POAs of less than fifty (50) dwelling units, practical information materials will be provided to the first residents/occupants/tenants on general housekeeping practices that contribute to the protection of stormwater quality. These materials will be initially developed and provided to first residents/occupants/tenants by the developer. Thereafter such materials will be available through the Permittees' education program. Different materials for residential, office commercial, retail commercial, vehicle-related commercial and industrial uses will be developed. For developments with POA and residential projects of more than fifty (50) dwelling units, project conditions of approval will require that the POA periodically provide environmental awareness education materials, made available by the municipalities, to all of its members. Among other things, these materials will describe the use of chemicals (including household type) that should be limited to the property, with no discharge of wastes via hosing or other direct discharge to gutters, catch basins and storm drains. Educational materials available from the County of Orange can be downloaded here: **http://www.ocwatersheds.com/PublicEd/resources/default.aspx**	Brief employee with the maintenance and monitoring of all BMPs. On going.	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N2. Activity Restrictions** If a POA is formed, conditions, covenants and restrictions (CCRs) must be prepared by the developer for the purpose of surface water quality protection. An example would be not allowing car washing outside of established community car wash areas in multi-unit complexes. Alternatively, use restrictions may be developed by a building operator through lease terms, etc. These restrictions must be included in the Project WQMP.	Prohibit maintenance & outside washing of vehicles, outdoor storage of materials, unlabeled containers, loading/unloading of materials that may come in contact with stormwater. On going	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674
Yes	**N4. BMP Maintenance** The Project WQMP shall identify responsibility for implementation of each non-structural BMP and scheduled cleaning and/or maintenance of all structural BMP facilities.	Identify responsibility for implementation of each non-structural BMP and scheduled cleaning and/or maintenance of all structural BMP facilities. On going	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674
Yes	**N7. Spill Contingency Plan** A Spill Contingency Plan is prepared by building operator or occupants for use by specified types of building or suite occupancies. The Spill Contingency Plan describes how the occupants will prepare for and respond to spills of hazardous materials. Plans typically describe stockpiling of cleanup materials, notification of responsible agencies, disposal of cleanup materials, documentation, etc.	Keep your Spill Prevention Control and Countermeasure (SPCC) plan up-to-date, and implement accordingly. On going.	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N9. Hazardous Materials Disclosure Compliance** Compliance with Permittee ordinances typically enforced by respective fire protection agencies for the management of hazardous materials. The Orange County, health care agencies, and/or other appropriate agencies (i.e., Department of Toxics Substances Control) are typically responsible for enforcing hazardous materials and hazardous waste handling and disposal regulations.	File with the City of Anaheim and maintain onsite a current "Hazardous Materials Disclosure & Business Emergency Plan". Ongoing	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674
Yes	**N10. Uniform Fire Code Implementation** Compliance with Article 80 of the Uniform Fire Code enforced by fire protection agency.	Facility shall be in compliance with Article 80 of the Uniform Fire Code enforced by fire protection agency. The classification of hazards for chemicals stored, used, and handled at this facility is required to ensure that proper types of fire and life safety protection systems and procedures are in place at all times. Ongoing	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N11. Common Area Litter Control** For industrial/commercial developments and for developments with POAs, the owner/POA should be required to implement trash management and litter control procedures in the common areas aimed at reducing pollution of drainage water. The owner/POA may contract with their landscape maintenance firms to provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations by tenants/homeowners or businesses and reporting the violations to the owner/POA for investigation.	Provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations. Every two weeks.	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674
Yes	**N12. Employee Training** Education program (see N1) as it would apply to future employees of individual businesses. Developer either prepares manual(s) for initial purchasers of business site or for development that is constructed for an unspecified use makes commitment on behalf of POA or future business owner to prepare. An example would be training on the proper storage and use of fertilizers and pesticides, or training on the implementation of hazardous spill contingency plans.	Train all employees, management, office, yard, manufacturing, field and clerical in BMPs and pollution prevention and make them aware of the maintenance procedures and requirements of all BMPs. Within 6 months after occupancy and annually thereafter.	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N14. Common Area Catch Basin Inspection** For industrial/commercial developments and for developments with privately maintained drainage systems, the owner is required to have at least 80 percent of drainage facilities inspected, cleaned and maintained on an annual basis with 100 percent of the facilities included in a two-year period. Cleaning should take place in the late summer/early fall prior to the start of the rainy season. Drainage facilities include catch basins (storm drain inlets) detention basins, retention basins, sediment basins, open drainage channels and lift stations. Records should be kept to document the annual maintenance.	All drainage facilities inspected, cleaned and maintained. Inspect annually, clean at minimum, prior to October 1st or more often as needed when debris is present.	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**N15. Street Sweeping Private Streets and Parking Lots** Streets and parking lots are required to be swept prior to the storm season, in late summer or early fall, prior to the start of the rainy season or equivalent as required by the governing jurisdiction.	Prevent soil from being washed onto pavement and keep landscape areas well maintained. Vacuum/Pressure- wash clogged surfaces. Every two weeks and once before October 1st.	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Structural Source Control BMPs			
Yes	**S1. Provide Storm Drain System Stenciling and Signage** Storm drain stencils are highly visible source control messages, typically placed directly adjacent to storm drain inlets. The stencils contain a brief statement that prohibits the dumping of improper materials into the municipal storm drain system. Graphical icons, either illustrating anti-dumping symbols or images of receiving water fauna, are effective supplements to the antidumping message. Stencils and signs alert the public to the destination of pollutants discharged into stormwater. The following requirements should be included in the project design and shown on the project plans: 1. Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language (such as: "NO DUMPINGDRAINS TO OCEAN") and/or graphical icons to discourage illegal dumping. 2. Post signs and prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area. 3. Maintain legibility of stencils and signs. See CASQA Stormwater Handbook BMP Fact Sheet SD-13 for additional information.	Maintain legibility of stencils, signs and markers. At a minimum of annually.	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	**S4. Use Efficient Irrigation Systems and Landscape Design** Projects shall design the timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the municipal storm drain system. (Limited exclusion: detached residential homes.) The following methods to reduce excessive irrigation runoff shall be considered, and incorporated on common areas of development and other areas where determined applicable and feasible by the Permittee: 1. Employing rain shutoff devices to prevent irrigation after precipitation. 2. Designing irrigation systems to each landscape area' s specific water requirements. 3. Using flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines. 4. Implementing landscape plan consistent with County Water Conservation Resolution or city equivalent, which may include provision of water sensors, programmable irrigation times (for short cycles), etc. 5. The timing and application methods of irrigation water shall be designed to minimize the runoff of excess irrigation water into the municipal storm drain system. 6. Employing other comparable, equally effective, methods to reduce irrigation water runoff. 7. Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider other design features, such as: Use mulches (such as wood chips or shredded wood products) in planter areas without ground cover to minimize sediment in runoff.	Maintain equipment-water sensors, irrigation heads and timers in good working order. Inspection of irrigation on monthly basis. Maintain as necessary to ensure proper function. Remove and replace broken pipes, damaged sprinkler heads.	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674

BMP Name and BMP Implementation, Maintenance and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Low Impact Development BMPs		
Cartridge Filter (TRT-2) TRT-2: Cartridge Media Filter – Contech StormFilter or approved equal Cartridge media filters (CMFs) are manufactured devices that consist of a series of modular filters packed with engineered media that can be contained in a catch basin, manhole, or vault that provide treatment through filtration and sedimentation. The manhole or vault may be divided into multiple chambers where the first chamber acts as a presettling basin for removal of coarse sediment while another chamber acts as the filter bay and houses the filter cartridges. A variety of media types are available from various manufacturers which can target pollutants of concern.	Inspect and maintain filters regularly and follow manufacturer's recommended maintenance requirements On going	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674

Catch Basin Filter Insert **Bioclean Catch Basin Filter Insert** The FloGard +Plus is a catch basin insert that provides physical screening of pollutants such as gross solids, trash and debris using a filter fabric basket for removal of petroleum hydrocarbons using sorbent pouches. It is ideally suited for removal of primary pollutants from paved surfaces in commercial and residential areas. Available in a wide variety of sizes and configurations, the FloGard can be incorporated in most industry-standard flat-grated and combination drainage inlets by suspending the device from the catch basin frame underneath the grate. The FloGard insert has a shallow profile, contains a high-flow bypass and is ideal for applications where water needs to be sampled after treatment. As with any storm water treatment system, the FloGard requires regular maintenance to prolong the life of the system. Routine maintenance is accomplished by removing accumulated pollutants from the filter basket by hand or by using a vacuum truck and replacing the sorbent pouches. Frequency of maintenance depends on the conditions of the site and performance of the system.	Inspect and maintain catch basin insert per manufacturer's recommendation. On going	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674
HU-2: Underground Detention – Cultec Contactor 100HD or approved equal Underground detention facilities are subsurface tanks, vaults, or oversized pipes that store stormwater runoff. Similar to cisterns, underground detention facilities can store water for later use as irrigation and/or other non-potable uses.	Inspect and maintain underground chambers per manufacturer's recommendation. On going	Extra Space Storage 2795 E Cottonwood Pkwy #400, Cottonwood Heights, UT 84121 (877) 387.1674

Required Permits

This section must list any permits required for the implementation, operation, and maintenance of the BMPs.

-No other permit(s) required.

Forms to Record BMP Implementation, Maintenance, and Inspection

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

Recordkeeping

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

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

Attachment D

Educational Materials (Include Reference/Link Only)

Attachment E

Geotechnical Report

Geotechnical Site Evaluation
and
Storm Water Infiltration Test Report
Proposed 4 Level, Self-Storage Building
Extra Space Storage #1974
1761 West Katella Avenue
(APN 128-542-011)
Anaheim, California

prepared for

Extra Space Storage
2795 East Cottonwood Parkway, #300
Salt Lake City, Utah 84121

GORIAN & ASSOCIATES, INC.

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Applied Earth Sciences
Geotechnical Engineers
Engineering Geologists
DSA Accepted Testing Laboratory
Special Inspection and Materials Testing

3595 Old Conejo Road
Thousand Oaks
California 91320-2122
805 375-9262

March 30, 2023

Extra Space Storage
2795 East Cottonwood Pkwy
#300
Salt Lake City, Utah 84121

Work Order: 3239-0-0-100

Attention: Mr. Clint Kleppe
Development Manager, Asset Strategy

Subject: **Geotechnical Site Evaluation and Storm Water Infiltration Test Report, Proposed 4 Level, Self-Storage Building, Extra Space Storage #1974, 1761 West Katella Avenue (APN 128-542-011), Anaheim, California**

1. INTRODUCTION

The following report contains the results of our geotechnical site evaluation addressing design and construction of a 4 level building planned at the Extra Space Storage Facility (ESS) #1974 at 1761 West Katella Avenue (APN 128-542-011) in Anaheim, California. In addition, storm water infiltration testing was performed as part of this site evaluation. The address is in the northeast corner of West Katella Avenue and South Humor Drive approximately 1-1/2 block west of Euclid Street as shown on the attached Site Vicinity Map, Figure 1. Based on information provided by ESS, the self-storage building with a 18,377 square foot gross footprint with two above grade levels over two subterranean levels will be constructed in the northern portion of the site as shown on Plate 1.

Geotechnical borings were used to obtain data on the subsurface alluvial soils consisting predominately of silty fine sand interstratified with clayey silt to silty clay to the explored depth of 41 feet as described herein. The field exploration was supplemented with laboratory testing to determine mechanical properties of the encountered soils. In addition, research was performed that indicated the site is not within Earthquake Fault, Liquefaction, or Landslide Zones (CGS, *Earthquake Zones of Required Investigation* website). Based on our site evaluation, the site is suitable for the proposed construction from a geotechnical standpoint provided recommendations presented herein are implemented in the project design and construction. Descriptions of the site and geologic units along with our conclusions and recommendations are presented within the text of this report.

2. PROPOSED DEVELOPMENT

Based on information provided by ESS, the project will consist of a four level self-storage building having a gross footprint of 18,377 square feet. The building will have two above grade levels over two subterranean levels in the northern portion of the site as shown on Plate 1. Construction of the building will

include demolition of the existing parking / open air storage area. The site is relatively flat and therefore no significant grade changes are anticipated to the site except possibly for drainage adjacent the completed building. Overall configuration of the site will remain roughly as currently laid out with the driveway off South Humor Drive remaining at the current location as shown on Plate 1a. The planned configuration of the site is shown on Plate 1b.

The building is anticipated to be supported on continuous footings, with individual storage units possibly supported on a mat slab on grade within the interior of the structure. Continuous footings at the perimeter and at the interior are anticipated to be loaded to 7 to 10 kips per linear foot. The steel stud walls spaced on 10-foot centers will be loaded to approximately 5 kips per linear foot and will be supported directly on a thickened interior slab typical of this type of structure. The storage live loads are anticipated to be 125 pounds per square foot.

3. SCOPE OF SERVICES

This office performed a geotechnical evaluation of the site outlined herein in general accordance with the *Scope of Services* presented in our proposal of August 27, 2022 (Proposal Number: 7244-10). Our scope of services included the following:

3.1. ARCHIVAL REVIEW

Pertinent references in our office including regional geologic references applicable to the site were reviewed with respect to the proposed development.

3.2. SUBSURFACE EXPLORATION

Three borings were drilled to a total depth of 41 feet below the existing ground surface within the area of the proposed building to explore the underlying soil and groundwater conditions. The borings were drilled using a subcontractor supplied and operated truck mounted CME 75 hollow stem drill rig equipped with 8-inch diameter augers. A geologist from our office logged the borings and obtained both relatively undisturbed drive and bulk samples for laboratory testing. Drive samples were obtained using an automatic hammer providing a hammer weight of 140 pounds with a fall of 30 inches. The Logs of Subsurface Data are presented in Appendix A and the approximate locations of the points of exploration are shown on the attached Boring Location Map, Plate 1.

At the conclusion of drilling, logging, and sampling the borings were backfilled with the boring cuttings and tamped. However, the backfill may settle over time and the site representative should fill any depression that may occur, as necessary.

3.3. INFILTRATION TESTING

The storm water infiltration testing was conducted by the drilling of two infiltration test borings to total depths ranging from 21 feet (IB-1) to 14 feet (IB-2) below the existing ground surface using a subcontractor supplied and operated truck mounted CME 75 hollow-stem auger drill rig equipped with 8-inch diameter augers. A geologist from our office logged and sampled the subsurface soils at various depths from the infiltration borings for additional soil classification per the design manual.

The hollow-stem auger borings (IB-1 and IB-2) were excavated within the area of the proposed BMP to total depths of 14 to 21 feet below the ground surface and were tested for stormwater infiltration. At the conclusion of logging and soil sampling, the hollow-stem borings were converted into infiltration test wells. 1 foot of medium bentonite chips was placed on the bottom of each boring, then a 2-inch diameter PVC pipe was placed in the boring; with the lower 5 feet of pipe being slotted (0.02). The annular space between the slotted pipe and the wall of the excavation was backfilled using #3 sand to just above the slotted portion of the pipe, then another 1 foot of medium bentonite chips was placed. The upper portion of the annular space was backfilled with soil cuttings from the borings and the test borings were pre-

soaked. At the completion of the infiltration testing (as discussed later herein), the borings were back-filled and topped with rapid set concrete.

3.4. GEOTECHNICAL LABORATORY TESTING

A program of laboratory testing was performed to evaluate geotechnical properties of selected soil samples obtained during the subsurface exploration. Testing was performed to determine compaction characteristics, consolidation potential, shear strength, grain size analysis, and in-situ moisture content and dry density. One sample of the underlying soil was provided to an independent corrosion engineer for corrosion testing. The results of the laboratory testing are presented in Appendix B.

3.5. GEOTECHNICAL ENGINEERING ANALYSIS AND REPORT PREPARATION

The results of our field and laboratory programs were used in engineering evaluations to develop geotechnical recommendations for design and construction of the self-storage structure. The results of our completed scope of services are presented in this geotechnical report that includes:

a) A description of the subsurface conditions encountered in the exploratory excavations, including Logs of Subsurface Data (Appendix A) and a Boring Location Map (Plate 1) showing the approximate excavation locations.

b) A description of the laboratory testing program, including tests results (Appendix B).

c) Discussion and recommendations regarding:
   i) Geologic hazards including seismic setting of the site and faulting;
   ii) Seismic design criteria;
   iii) Seismically induced settlement;
   iv) Soil collapse and expansion potential;
   v) Site preparation and remedial grading;
   vi) Concrete slabs on grade including aggregate base and vapor retarder;
   vii) Modulus of subgrade reaction;
   viii) Conventional and mat foundation design recommendations;
   ix) Estimated settlements;
   x) Pavement and hardscape design recommendations;
   xi) Soil chemistry analysis, by subcontract;
   xii) Lateral earth pressures.
   xiii) Temporary excavations;
   xiv) Shoring.

4. SITE CONDITIONS

4.1. SITE DESCRIPTION

Extra Space Storage Facility (ESS) #1974 is located at 1761 West Katella Avenue (APN 128-542-011)) in Anaheim, California approximately a mile west of Disneyland, (see the attached Site Vicinity Map, Figure 1). The nearly level square property is situated at the northeast corner of West Katella Avenue and South Humor Drive approximately 1.5 blocks west of Euclid Street. The property is developed with a single story storage building in the southern portion of the property with paved parking and open air storage in the northern portion of the site. Drainage of the site is by sheet flow to storm drain inlet structures within the parking and drive areas.

4.2. SUBSURFACE CONDITIONS

The site, as encountered in our subsurface exploration program, is underlain by asphaltic concrete and aggregate base mantling Quaternary-age alluvium to the maximum depth explored, 41 feet (borings B-1

through B-3). However, 17 feet of artificial fill was locally encountered in boring B-2 mantling the underlying alluvial soils consisting of pea gravel (this appears to be a backfill of a prior excavation). Descriptions of these units are presented below and in the attached Logs of Subsurface Data (Appendix A).

4.2.1. Alluvium

Quaternary-age alluvium underlies the entire site to the maximum depth explored, 41 feet (B-1 through B-3) (see the attached Regional Geologic Map, Figure 2). As encountered in the borings, the upper portion of the alluvium generally consists of brown grading to yellowish brown silty fine sand in a damp to moist and medium dense condition. At depth, the alluvium generally consists of yellowish brown to light yellowish brown to light gray silty fine to silty fine to coarse sand with few fine gravels in a damp to moist and medium dense to dense condition. Typically, these sandy soils are friable. The sandy units of the alluvium are commonly interstratified with yellowish brown to light yellowish brown to grayish brown silt to silty clay in a moist and stiff to hard condition.

4.2.2. Artificial Fill

Artificial fill was encountered only in boring B-2 and was observed to be approximately 17 feet in thickness. The fill consists of pea gravel and based on sampling efforts; the pea gravel is in a loose condition. It appears the pea gravel was used to backfill an excavation, however, these materials are not well consolidated resulting in a sag in the parking lot and subsequent standing water condition after a heavy rain storm.

4.2.3. Asphaltic Concrete and Aggregate Base

The surface of the site is generally covered with 2 to 3-inches of asphaltic concrete which is underlain by 4 to 6-inches of aggregate base in a damp and dense condition. However, in the area of B-2 the asphaltic concrete was observed to be 7.5 inches in thickness.

4.3. GROUNDWATER

Groundwater was not encountered in the hollow stem auger borings extended to a maximum depth of 41 feet below the existing ground surface. However, high moisture contents were noted in the borings within the silty soils at 20 feet below grade. Based on the *Seismic Hazard Zone Report* for the Anaheim 7.5-minute Quadrangle, historic groundwater is approximated at 50 feet below the site. Based on California Department of Water Resources *California Groundwater Live*, groundwater measured is at 97 feet in a well roughly 1.4 miles to the northeast of the property. As in any groundwater situation, groundwater levels can fluctuate and groundwater (or perched zones) may be encountered at higher elevations than previously observed in the general area.

4.4. FAULTING AND SEISMICITY

The storage facility, like any other development in greater Southern California, is in a seismically active region prone to occasional damaging earthquakes. The destructive power of earthquakes can be grouped into fault-rupture, ground shaking (strong motion), and secondary effects of ground shaking such as tsunami, liquefaction, settlement, landslides, etc.

The hazard of fault-rupture is generally thought to be associated with a relatively narrow zone along well-defined pre-existing active faults. No doubt there is and will be exceptions to this, because it is not possible to predict the precise location of a new fault where none existed before (CDMG, 1975). Holocene-active faults are not known to cross the site nor is the project site currently within an Alquist-Priolo (A-P) Earthquake Fault Zone as defined by the State Geologist (CGS 2018). The site is between two major, active fault zones: the Newport-Inglewood Fault Zone to the southwest and the Whittier-Elsinore Fault Zone to the northeast, approximately 8.7 and 10.5 miles from the site respectively. Additionally, the site is between the El Modeno and Los Alamitos Faults to the east and west, approximately 8 and 5.6 miles from the site respectively. Potential for surface ground rupture due to faulting onsite during the project lifetime is considered remote.

Although no active or potentially active faults are known to exist within or adjacent the site, the area will be subject to strong ground motion from occasional earthquakes in the region. Significant earthquakes have occurred within a 40-mile radius of the Site within the last 50 years. Additional earthquakes will likely occur in this area within the life of the project and it will experience strong ground shaking from these events.

Probabilistic seismic hazard analyses (PSHA) predict the Design Basis Earthquake having a 2% probability of exceedance in 50 years (2,475-year return period will have a peak ground acceleration estimated to be 0.68g based on a seismic event with a mean magnitude of 6.7 (Mw) at a mean distance of 12.64 km from the site. This is based on the U.S. Geological Survey (USGS) interactive web application, Unified Hazard Tool https://earthquake.usgs.gov/hazards/interactive/ for the D class site.

Secondary effects of strong ground motion include tsunami, seiche, liquefaction, settlement, earthquake triggered landslides, and flooding from dam failures. Tsunamis are impulsively generated water waves that can cause damage to shoreline areas. A seiche is an oscillation wave within an enclosed body of water. The site is not near the ocean or adjacent a body of water and, therefore, is not subject to tsunami and seiche hazards. Furthermore, the site is not prone to earthquake triggered landslides due to the relatively low relief in the area and preponderance of development covered land, nor is the site in the vicinity of any dam failure inundation zone. The site is not within a State designated seismic hazard zone for liquefaction potential (CGS, *Earthquake Zones of Required Investigation* website). See Figure 3, the Seismic Hazards Zone Map.

4.5. FLOOD POTENTIAL

The site is not in an area of flood hazard based on the FEMA flood hazard zone as indicated on the FEMA Flood Zone FIRM Panel: 06059C0137J (effective on12/03/2009).

4.6. HYDROCONSOLIDATION

Hydroconsolidation occurs when the soil structure collapses due to soil wetting resulting in consolidation of the soil column. The consolidation test performed for this evaluation indicate hydroconsolidation is negotiable for the onsite soils tested below the proposed basement level.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. GENERAL

The site was evaluated from a geotechnical standpoint for construction of a self-storage facility described herein. The bottom of the basement excavation will expose alluvial deposits suitable for support of the structure. Differential settlement should be negligible based on the bearing capacities provided herein. The project may be developed as described earlier in this report provided recommendations presented herein are followed and incorporated into the project design and construction. Excavation of the basement should be completed with care to avoid undermining adjacent structures or facilities.

5.2. GEOTECHNICAL SEISMIC DESIGN

As previously discussed, active faults identified by the State are not onsite nor is the site within an Alquist-Priolo Earthquake Fault Zone. Nevertheless, the site is within a seismically active region prone to occasional damaging earthquakes.

Structures within the site may be designed using procedures for seismic design presented in ASCE/SEI 7-16. Mapped acceleration parameters are initially determined for sites having a shear wave velocity of 2,500 feet per second (Section C11.4.4). The S_s and S_1 values are adjusted to obtain the maximum considered earthquake (MCE) spectral acceleration values for the site based on its site class of D. The seismic design parameters for the site's coordinates (latitude 33.8040 N and longitude 117.9453 W) were

obtained from the web based ASCE 7 Hazard Tool https://asce7hazardtool.online/ The parameters are presented on the following page (the full report is presented in Appendix C).

SEISMIC PARAMETER	VALUE PER CBC
Short Period Mapped Acceleration (S_s)	1.416g
Long Period Mapped Acceleration (S_1)	0.5g
Site Class Definition	D
Site Coefficient (F_a)	1.0
Site Coefficient (F_v)	1.7*
$S_{MS} = F_aS_s$	1.416g
$S_{M1} = F_vS_1$	0.85g*
$S_{DS} = 2/3S_{MS}$	0.944g
$S_{D1} = 2/3S_{M1}$	0.0.567g*
PGA_M	0.662

**Based on proposed development meeting requirements of the exemption for Site Class D sites in Section 11.4.8 of ASCE 7-16. Further analysis may be required once the Response Modification Factor and Period of the proposed development are known.*

The purpose of the building code earthquake provisions is primarily to safeguard against major structural failures and loss of life, not to limit damage nor maintain function. Therefore, values provided in the building code should be considered minimum design values and should be used with the understanding site acceleration could be higher than addressed by code-based parameters. Cracking of walls and possible structural damage should be anticipated in a significant seismic event.

5.3. STORMWATER INFILTRATION TESTING

The test zone was pre-soaked by filling to the top of the casing with water. At the conclusion of the pre-soak, the pipe will be refilled with water to the top of the slotted pipe. After the pre-soak, a falling head test was performed for the infiltration well. The measurements were taken at 20-minute intervals.

Based on our test results and field exploration observations, the soils were found to be suitable for construction of a stormwater infiltration system (greater than 0.3 inches/hour). A design infiltration rate of 0.52 inches/hour may be used for design purposes using a reduction factor of 2. The test results can be found in Appendix D.

Sizing of the infiltration system or field construction should be specified by the project design civil engineer. Input should be solicited from and data provided to the civil engineer, structural engineer and geotechnical engineer to optimize the design while minimizing the potential detrimental effects the addition of water could have on the site or adjacent sites. Plans and specifications should be provided to our office for review. Depending on actual design depth(s) and location(s) additional infiltration rate testing may be warranted.

5.4. BASEMENT EXCAVATION

5.4.1. General

The 4 level building proposed in the northern portion of the site will have two levels of subterranean storage, which could have a lower finished floor 24± feet below the ground level floor. Therefore, the bottom of the basement footings could be 26± feet below the ground surface. For this depth of excavation, shoring is anticipated to consist of soldier beams and lagging supported by either tiebacks or rakers. In addition, soils nails could be used when the nails would not project offsite.

The project civil engineer should prepare an excavation plan detailing the excavation and relationship to existing utilities and structures. This office should review the excavation plan prior to starting construction. In addition, this office should evaluate possible loads (such as crane loading) than may surcharge the excavation.

5.4.2. Soil Conditions

The soil conditions anticipated to be encountered in the basement excavation are summarized previously in this report. One caution is a zone of pea gravel was encountered in boring B-2 to a depth of 17 feet. However, the limits of the gravel was not explored.

5.4.3. Shored Excavation

Shoring for the basement excavation may consist of soldier beams and lagging supported by either tiebacks or rakers along with the possibly of soil nails. Lagging should be used to support the cut between the piles. Grouting is the preferred method to fill the voids between the cut and lagging. The shoring should be designed to include the lowest construction elevation (bottom of footing). Care will be required to avoid damaging buried utilities or possible foundations of adjacent structures. The excavation and shoring will encounter sandy alluvial deposits is as described previously herein and in detail in the attached Logs of Subsurface Data (Appendix A).

5.4.4. Surcharge Loading

An area surcharge of 300 psf should be included in the shoring design where the shoring is near street or interior traffic. The lateral pressure on the shoring due to a uniform area surcharge of intensity q (force/area) is equal to a uniform pressure of 0.4q over the entire height of the wall. Surcharge on the shoring from construction equipment (e.g., crane or concrete pump) or adjacent structures directly adjacent the top of a shored cut should be evaluated on an individual basis. The structural engineer should evaluate the surcharge loading from the adjacent building, etc.

5.4.5. Soil Pressure

Shoring should be designed for temporary lateral earth pressure plus lateral pressure imposed by existing adjacent foundations or surcharges. For supported shoring systems (i.e., systems supported with tiebacks or rakers) the lateral earth pressure will be initiated below the ground surface, therefore, at the ground surface the pressure may be taken as zero. The pressure will increase with depth to 24H at a depth of 0.2H below the ground surface. The shoring pressure would then extend uniformly at 24H to a depth of 0.8H and then decrease uniformly to zero at the base of the excavation. H is the supported total height of the cut and the resultant of 24H is in units of psf. The pressure diagram is shown in Figure 4 under Lateral Earth Pressures in Basement Retaining Walls. As an alternate to a trapezoidal pressure distribution, basement walls may be design using an equivalent at rest pressure of 50 pounds per cubic foot. The resultant may be applied at one third the wall height measured from the bottom of the wall. The width of active pressure acting on the pile below the bottom of the excavation may be taken as the pile diameter.

Cantilevered shoring systems should be designed for an active earth pressure distribution of 30 pounds per cubic foot (pcf) with level ground behind the shoring based on a triangular pressure distribution starting at zero at the ground surface. The value of 30 pcf is an ultimate value without a factor of safety. The width of active pressure acting on the pile below the bottom of the excavation should be two pile diameters for a cantilevered soldier pile.

The shoring pressures do not include lateral loads from surcharges (such as crane loading) near the top of the excavation.

5.4.6. Cantilever Shoring Tilt

Similar to a cantilever retaining wall, cantilever shoring designed for an active pressure can yield at the top to develop full active pressure. Generally, tilt is a function of the wall height and it this case is estimated at .001 to .002 of the wall height.

5.4.7. Passive Pressure with Soldier Piles

The lower ends of the soldier piles will be seated in alluvial deposits is as described previously herein and in the attached Logs of Subsurface Data (Appendix A). For isolated piles (spaced at least 3 diameters center to center) the passive earth pressure should start at zero at the excavated grade. This value may be increased at a rate of 300 pounds per cubic foot for each foot of depth below the proposed base of excavation to a maximum of 2500 pounds per square foot. The surface area (pile diameter) that the allowable passive pressure may induce passive resistance may be doubled for soldier beams that are a minimum of 3 diameters apart center to center.

For vertical support, a unit friction value of 350 pounds per square foot may be used for that portion of the soldier pile encased in structural concrete or drilled and cast concrete pile extending below the lowest depth of excavation. The unit of friction is independent of the pile diameter; however, the piles should be at least 24 inch diameter with a minimum embedment depth of 15 feet below the lowest excavation depth. Fixity may be assumed at 5 feet below the lowest unsupported grade (such as the basement excavation).

5.4.8. Friction Values for Anchors

Tieback anchors should extend into the embankment at an angle of about 20° to 35° below horizontal. The bond or anchor length of the tieback is the portion located behind the active wedge, a 60° plane from horizontal generated upwards from the toe of the proposed excavation. The portion of the tieback that extends from the soldier pile to the 60° plane is identified as the free anchor length. Tieback anchors are to be designed to obtain their capacities from within the bond length. Capacity should not be assumed from within the free anchor length, nor should the free anchor length be grouted prior to tensioning of the tendon.

Tiebacks will be founded predominately in sandy silts to silty sand alluvial deposits is as described previously herein and in detail in the attached Logs of Subsurface Data (Appendix A). The frictional resistance of 16 inch diameter anchors a minimum of 15 feet below the ground surface may be designed within an allowable frictional resistance of 600 psf. The resistance may be increased to 1,000 psf below a depth of 30 feet.

The capacities presented above are based on minimum spacing requirements. The minimum spacing between adjacent tiebacks should be 3 diameters center to center where the diameter is the largest diameter of the tiebacks.

Installation of the tiebacks should be observed by this office. Installation should also be in accordance with the Post Tensioning Institute *Recommendations for Prestressed Rock and Soil Anchors*.

5.4.9. Testing of Tiebacks

Failure or yielding of anchors generally occurs within the soil surrounding the anchor, not at the soil/concrete interface. The capacity of any anchor is calculated based on soil strength. Each tieback should be tested to verify the design strengths in accordance with the Post Tensioning Institute (PTI) Recommendations for Prestressed Rock and Soil Anchors (or per the shoring engineer's recommendations). Testing requirements should be clearly indicated on the shoring plans.

5.4.10. Soil Nail Walls
Soil nail retaining walls consisting of grouted anchors extending into the excavation backcut with a reinforced shotcrete face may be used for permanent and temporary support of vertical excavations. The walls should be design by a structural engineer familiar with shoring design and construction. Shear strengths of a frictional strength of 32 degrees and cohesion of 0.0 pounds per square foot (psf) along with a unit weight of 118 pounds per cubic foot (pcf) may be used for cuts into the underlying alluvial soils. A bond strength of 20 pounds per square inch (psi) may be assumed for nail design. Vertical lifts and nail spacing should not exceed five feet with a minimum number of sacrificial nails for test purposes equal to 5 percent of the total wall nails. Vertical drains should be installed between the columns of soil nails. The final wall design should be reviewed by this office.

5.4.11. Lagging
Lagging consisting of treated timber will be required the entire depth of the shored excavation. Wood lagging should be new 3 inch No. 2 or better rough timber (full dimension) Douglas Fir, straight, free of bends, and free from defects that might impair structural strength. Lagging to be left in-place shall be pressure treated for contact with soil. The upper two feet of the shoring and lagging measured from the adjacent grade should be removed when the shoring is no longer needed for support of the excavation. The resulting cavity should be backfilled with grout/slurry or clean soils compacted to a minimum of 90% relative compaction. The cavity may be filled with concrete when the area is below a slab or walkway.

Lagging should be designed to resist an equivalent fluid pressure equal to 30 pcf measured below the ground surface. A maximum lagging pressure of 400 psf may be assumed where the maximum spacing of soldier piles does not exceed 8 feet center to center. An alternate to installing lagging would be to construct the shoring as a continuous gunite/shotcrete wall descending as the excavation proceeds. Cavities behind the lagging and retained soils should be filled with minimum 1-1/2 sack sand/cement slurry (preferred).

5.4.12. General Considerations
The basement excavation can be made with ordinary excavating equipment. Soils between existing foundations and shoring system should be maintained in an undisturbed and intact condition. Caving of soldier beam excavations should be anticipated since sandy materials will be encountered in the excavations. The shoring contractor should be prepared to provide methods to prevent caving such as the use of hollow stem augers, casing, or drilling mud.

Caving of the tieback excavations should be anticipated since sandy materials may be encountered within the alluvial soils. The shoring contractor should be prepared to provide methods to prevent caving such as the use of hollow stem augers or casing. Where caving soils are encountered within the free length of the tieback excavation, that portion of the excavation may be backfilled with sand or low strength sand/cement slurry before testing the anchor. The sand backfill should be placed by pumping. In no cases should the free length portion of the friction tieback be grouted (with high strength grout that would restrict movement of the bond length) prior to testing.

5.4.13. Barricades
Appropriate barricades should be placed at the top of all temporary excavations that are approached by pedestrians or public vehicle traffic (such as in streets or parking areas).

5.4.14. Shoring System Monitoring
The shoring system should be monitored for vertical and horizontal movements at the top of each soldier beam. Reference points for horizontal movement should also be selectively placed at various tieback levels as the excavation progresses. A licensed surveyor should perform the surveying.

The reference points and pile tops should be read prior to commencing the excavation. To create a baseline, all soldier piles should be surveyed twice (approximately one day apart) before beginning excavation. Additional readings should be performed roughly biweekly throughout construction until the shoring and excavation is complete. More frequent reads may be required at critical times of construction or if significant movement is indicated. After completion of the shoring construction and excavation, readings may be taken biweekly until the shoring is no longer needed for support of the excavation.

The survey data should be submitted to the shoring engineer and Gorian and Associates, Inc. within 24 hours of the measurements. The tolerable movement for any location within the structure will be evaluated with the data and is dependent on the soil conditions at that location, the stage of construction, and adjacent structures or loading. Some movement of the shoring can be expected and is considered tolerable. In general, movement in excess of 2 inches horizontally or vertically will require supplemental shoring before excavation continues.

5.4.15. Temporary Slopes

Temporary slopes, if required, should be at a gradient of 1(horizontal):1(vertical) or flatter to a maximum depth of 3 feet. Due to the sandy nature of the soils, vertical cuts should not be made within the site. Sloped excavations can be evaluated when the proposed location and depth are known. One caution is a zone of pea gravel was encountered in boring B-2 to a depth of 17 feet. However, the limits of the gravel was not explored.

During construction, the contractor is responsible for the excavation and maintenance of safe and stable slope angles considering the subsurface conditions and the methods of operations. Temporary excavations should be made per the applicable requirements of the current Cal/OSHA excavation regulations. Surcharge loads should be setback from the top of temporary excavations a minimum horizontal distance of 10 feet.

5.4.16. Shoring Plan Review and Construction Inspection

A structural engineer with shoring experience should prepare the shoring plans. Our office should be provided with a copy of the proposed shoring plans and calculations for review. Variations in subgrade conditions or construction techniques exercised by the shoring contractor may require this office to provide specific modifications to the shoring system or installation. Therefore, this office should perform all geotechnical observations to confirm the subsurface conditions.

5.5. SITE PREPARATION AND GRADING

5.5.1. General

Geotechnical recommendations are presented in the following sections for grading of the building pad within the basement and above the basement. Site preparation and fill placement should be performed per the City of Anaheim standards. Undisturbed in-placed alluvial floodplain deposits are suitable for the support of the proposed construction project.

5.5.2. Demolition

Presently, the area is covered by paving and facilities related to the current use of the property that are planned for demolition. Utilities to remain should be protected in place.

5.5.3. Site Clearing

Prior to starting earthwork, trash, debris, and remnants of demolition within all areas of construction should be stripped and removed from the site. Utilities within the area of proposed grading should be identified and removed or protected prior to grading.

5.5.4. Soil Removals within Basement Excavations
The basement may be cut to the proposed grade and no additional soil removal should be necessary. However, soils disturbed during the basement excavation should be removed to firm in-place soils at the bottom of the excavation and replaced as compacted fill.

5.5.5. Soil Removals Outside Basement Excavations
Soil removals, as a minimum, should extend below soils disturbed during the site clearing. For areas supporting shallow continuous and isolated footings outside of the basement areas, as well as those supporting structural fill or lightly loaded footings, the soil removals should extend to firm native soil, anticipated to be directly below the disturbed zone.

Soil removal and recompaction should be performed as necessary within all areas of at-grade construction requiring compacted engineered fill. The removals should extend a minimum of five feet outside the footings or area of fill placement. Removal may be stopped at property lines and adjacent buildings. This office should evaluate removals adjacent existing structures prior to excavation. When the removals are completed and prior to in-place processing, this office should observe the bottom of the removal areas.

5.5.6. Soil Compaction
Fill soil or in-place compaction should be completed to a minimum 90 percent relative compaction. Relative compaction is the ratio of the in-place dry soil density to the maximum dry soil density as determined in general accordance with ASTM laboratory standard D-1557.

5.5.7. In-Place Soil Processing
Once the soil removals are complete and prior to placing fill, the bottom of the removal area should be processed. Processing consists of scarifying the exposed surface to a depth of roughly 6 to 8 inches, conditioning the scarified soil to above the optimum moisture content, and compacting the scarified soil. Processed soil should be compacted to 90 percent relative compaction.

5.5.8. Fill Placement
Soils generated from the removal areas should be suitable for reuse as fill. Fill soils should be free of significant vegetation, rocks greater than 6 inches in maximum linear dimension, and other deleterious materials. In addition, fill soils should be mixed and blended. Fill soils should be placed in lifts not exceeding 8 inches in maximum loose thickness, moisture conditioned to slightly over optimum moisture content, and compacted to at least 90 percent relative compaction.

5.6. SOIL EXPANSIVENESS
An expansion test conducted on the upper soils within the site are non-expansive. Expansive soils contain clay particles that change in volume (shrink or swell) due to a change in the soil moisture content. The amount of volume change depends upon the soil swell potential (amount of expansive clay in the soil), availability of water to the soil, and the soil confining pressure. Swelling occurs when soils containing clay become wet due to excessive water from poor surface drainage, over-irrigation of lawns and planters, and sprinkler or plumbing leaks. Swelling clay soils can cause distress to structures, walks, drains, and patio slabs.

5.7. FOUNDATION DESIGN

5.7.1. Design Data
The structure may be supported on continuous or isolated footings underlain by engineered compacted soil or firm native soils as addressed above and may be designed for an allowable bearing pressure of 2,500 pounds per square foot (psf). In the basement area, continuous and isolated footings with the minimum width and depth, may be designed using an allowable bearing pressure of 4000 psf. Shallow foot-

ings adjacent basement walls, should be included in the design of the wall or stepped down below a 2(horizontal):1(vertical) plane projecting upward from the bottom of basement footings. The allowable net bearing pressure may be increased by one-third when considering wind or seismic loads. The weight of concrete below grade may be excluded from the footing load.

Continuous and isolated footings should have minimum widths of 18 inches and 24 inches, respectively. The footings should be embedded a minimum of 24 inches for interior and exterior footings. The embedment should be measured from the lowest adjacent grade (lowest grade at the time of excavation or after). Interior and basement footings may be embedded a minimum of 24 inches below the interior slab. The above embedments are for footings embedded into soils having a medium expansion index. Steel reinforcement should be per the structural engineers' recommendations. However, minimum continuous footing reinforcement should consist of two number five bars in the top and bottom (total of 4 bars). In addition, interior slabs should be tied to the footings with number 4 bars at 24-inch centers bent 3-feet into the slab and extended to within 3 inches of the bottom of the footing. Perimeter isolated footings should be tied together with a grade beam extending 30 inches deep below the lowest adjacent grade.

5.7.2. Mat Slab Design Data

Mat slabs may be designed using an allowable soil bearing pressure of 1,500 pounds per square foot (at the basement grade) or a modulus of subgrade reaction "K" of 150 pounds per cubic inch (pci) at the basement excavated surface. The project structural engineer should determine the steel reinforcement and concrete compressive strength. The slabs supporting interior steel stud walls should be a minimum of 8 inches thick. A mat slab should be underlain by a minimum 6-inch-thick layer of ½ inch or larger clean aggregate or per applicable building codes, whichever is the more restrictive. In addition, interior mat slab design should include a moisture retarder as indicated under *Slabs on Grade* below.

5.7.3. Lateral Resistance

Lateral forces on foundations may be resisted by passive earth pressure and base friction. Lateral passive earth pressure may be considered equal to a fluid weighing 250 pcf. The lateral passive pressure may be increased to a maximum of 1500 psf. Base friction may be computed at 0.3 times the normal load. Base friction and passive earth pressure may be combined without reduction.

5.7.4. Estimated Settlements

Static settlement of footings should be evaluated once building footing locations and structural loads are known. However, footing settlement for static loading is anticipated on the order of 1/2 inch or less, with a maximum differential settlement of 1/4± inch over a span of approximately 30 feet or between adjacent individual footings. This is provided building construction is started directly after footing excavation, footings are cast soon after the footing excavation, and construction is completed in a timely manner. Settlements due to static loading are expected to occur rapidly as the loads are applied.

All structures settle during construction and some minor settlement of structures can occur after construction during the life of the project. Minor wall cracking could occur within the structure associated with expansion and contraction of the structural members. In addition, wall or slab cracking may be associated with settlement or expansive soil movement. Additional settlement/soil movement could occur if the soils dry or become saturated due to excessive water infiltration generally caused by excessive irrigation, poor drainage, etc.

5.7.5. Footing Excavations

Excavation of the footings should be started directly after the excavation of the basement and the footings should be poured soon after footing excavation is complete. This office should observe the footing excavations prior to placing reinforcing steel. Footings should be cut square and level and cleaned of loose soils. Soil excavated from the footing and utility trenches should not be spread over any areas of

construction unless properly compacted. Soils silted into the footing excavations should be removed to the required depth prior to casting the concrete. The footings should be cast as soon as possible to avoid deep desiccation of the footing subsoils.

5.7.6. Premoistening
Footing subsoils should be kept in a moist condition preferably at 3% over the optimum moisture content for a depth of 18 inches below the bottom of the footing. Saturated soils or soils silted into the footing excavations should be removed prior to concrete placement.

5.8. SLABS-ON-GRADE

5.8.1. Site Preparation
The slab-on-grade subgrade, if disturbed during foundation and utility construction, should be conditioned prior to placement of aggregate materials. Loose soils should be removed to firm in-place material, the exposed subgrade processed, and the material replaced as engineered compacted fill or aggregate material.

5.8.2. Slab-on-Grade Design Data
Interior concrete slabs on-grade not used for structural support should be 5 inches thick and underlain by 6-inch-thick layer of ½ inch or larger clean aggregate or per applicable building codes, whichever is the more restrictive. The slab should be reinforced with a minimum of number 4 bars at 18-inch centers in each direction. The reinforcement should be placed and kept at slab mid-depth.

Exterior concrete slabs-on-grade (non-auto traffic) and walkways should be a minimum of 4 inches thick and underlain by a minimum of 4 inches of sand. In areas of heavy loading for truck traffic (including trash pickup areas and loading docks) the slab thickness should be increased to a minimum of 7 inches thick. Exterior slabs should be reinforced with a minimum of No. 3 bars on 24-inch centers in each direction. The reinforcement should be placed at mid-depth of the slab. Sidewalks may be constructed of non-reinforced concrete provided the sidewalks are cut into square panels (i.e., 4-foot wide walks should be cut into 4 foot by 4 foot squares). A deepened edge should be considered on all exterior slabs (non-auto traffic) to prevent water from entering the sand base. The edge should extend a minimum of 2 inches into the subgrade soils.

5.8.3. Premoistening
Soils under lightly loaded slabs on-grade should be kept in a moist condition preferably at 3% over the optimum moisture content for a depth of 18 inches.

5.8.4. Concrete Placement and Cracking
Minor cracking of concrete slabs is common and is generally the result of concrete shrinkage continuing after construction. Concrete shrinks as it cures resulting in shrinkage tension within the concrete mass. Since concrete is weak in tension, development of tension results in cracks within the concrete. Therefore, the concrete should be placed using procedures to minimize the cracking within the slab. Shrinkage cracks can become excessive if water is added to the concrete above the allowable limit and proper finishing and curing practices are not followed. Concrete mixing, placement, finishing, and curing should be performed per the American Concrete Institute Guide for Concrete Floor and Slab Construction (ACI 302.1R). Concrete slump during concrete placement should not exceed the design slump specified by the structural engineer. Concrete slabs on grade should be provided with tooled crack control joints at 10-15 foot centers or as specified by the structural engineer.

5.8.5. Moisture Vapor Barrier
Moisture migration occurs when there is a differential potential in the relative moisture below and above the concrete slab on grade. Therefore, concrete slabs on grade within the building interior should be

considered sensitive to moisture and an appropriate moisture vapor retarder layer should be installed and maintained below concrete slabs-on-grade. The water vapor retarder should be one that is specifically designed as a vapor retarder and consist of a minimum 15 mil extruded polyolefin plastic and complying with Class A requirements under ASTM E1745 (*Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs*). The vapor retarder should be installed in accordance with ASTM E1643. The water vapor retarder should be installed in direct contact with the concrete slab along with a concrete mix design to control bleeding, shrinkage, and curling (ACI 302.2R). The vapor retarder shall be installed over a minimum 6-inch-thick layer of ½ inch or larger clean aggregate or per applicable building codes, whichever is the more restrictive. The vapor retarder should be placed per ASTM E1643-98(2005) *Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs*. In addition, various trades and the concrete contractor should be required to protect the moisture retarder during construction.

Panel joints should be lapped and sealed. Perforations through the moisture vapor retarder such as at pipes, conduits, columns, grade beams, and wall footing penetrations should be sealed per the manufacture's specifications or ASTM E1643. Proper construction practices should be followed during construction of slabs on-grade. Repair and seal tears or punctures in the moisture barrier that may result from the construction process prior to concrete placement.

Minimizing shrinkage cracks in the slab on-grade can further minimize moisture vapor emissions. A properly cured slab utilizing low-slump concrete will reduce the risk of shrinkage cracks in the slab as described herein.

The concrete contractor should make the necessary changes in the concrete placement and curing for concrete placed directly over the retarder. Placing the concrete directly on top of the moisture vapor retarder layer allows the layer to be observed for damage directly prior to concrete placement.

The slabs should be tested for moisture content prior to the selection of the flooring and adhesives. Moisture in the slabs should not exceed the flooring manufacture's specifications. The concrete surface should be sealed per the manufacture's specifications if the moisture readings are excessive. It may be necessary to select floor coverings that are applicable to high moisture conditions.

5.9. BASEMENT RETAINING WALLS

5.9.1. Foundations

Allowable bearing capacities and lateral resistance provided herein for conventional footings may be used for retaining/subterranean wall design.

5.9.2. Lateral Earth Pressures

Retaining walls restrained at the top should be designed for a minimum lateral earth pressure equal to 30H with a trapezoidal distribution. The lateral earth pressure at the ground surface may be taken as zero. The pressure will increase with depth to 30H at a depth of .2H below the ground surface. The pressure would then extend uniformly at 30H to a depth of 0.8H and decrease uniformly to zero at the base of the excavation. (see Figure 4 on the following page). H is the supported height of wall. The resultant of 30H is in units of psf. Surcharges from adjacent loading should be added to the wall pressure.

As an alternate to a trapezoidal pressure distribution, basement walls may be design using an equivalent at rest pressure of 60 pounds per cubic foot. The resultant may be applied at one third the wall height measured from the bottom of the wall.

5.9.3. Lateral Seismic Pressure

The restrained basement wall lateral seismic soil pressure for walls over 6 feet high is 26 pcf and is calculated as $\Delta Pae = ½\ \gamma H^2\ (0.68\ PGA_M/g)$ (where PGA_M = .66 and γ in-situ = 118 pcf). Walls should be designed for a total seismic load of the static and dynamic load increments. The seismic pressure of 26 pcf is a triangular pressure with the base of the triangle at the base of the wall. For the onsite soils, the point of application may be 1/3H from the base of the wall.

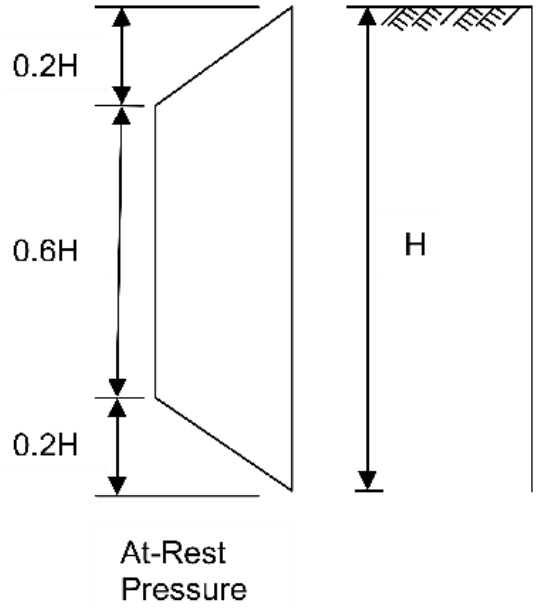

Figure 4

5.9.4. Waterproofing

Basement walls should be waterproofed on the exterior in addition to installing the drainage system and wall backfill. The waterproofing and backdrain system should be designed by a waterproofing consultant experienced with this type of structure.

5.9.5. Drainage

A drainage system should be constructed behind the basement and site retaining walls to relieve buildup of hydrostatic pressures. The drainage system for basement walls may consist of a prefabricated drainage composite consisting of a filter fabric bonded to a corrugated panel. The drainage system should extend to within 2 feet of finish grade with the upper 2 feet backfilled with native material. The drainage system should be hydraulically connected to a perimeter pipe drain consisting of a minimum 4-inch diameter perforated PVC (Schedule 40) pipe or equivalent. The pipe may be laid horizontally on the footing; however, the pipe invert should be at least 6 inches below the top of slab-on-grade. The outlet pipe from the perimeter drain should be a non-perforated 4-inch diameter PVC (Schedule 40) pipe that is sloped to and connected to a storm drain system or sump. An as-built plan should be prepared detailing the location of the wall drainage system.

5.9.6. Backfilling

Basement walls should be backfilled where necessary with granular material or soils having a low expansion potential. The backfill should be placed in 6-inch lifts at slightly over optimum moisture content and compacted to at least 90% relative compaction. If the backcut is flatter than ½(h):1(v), the backfill should be benched into the backcut slope. Light equipment should be used immediately behind the walls to prevent possible over-stressing. Bracing needed to resist basement wall movement should be in-place prior to placing the backfill.

5.10. SOIL CORROSIVITY

The results of the analytical laboratory testing to evaluate the potential for corrosion of materials in contact with the onsite soils are presented in Appendix B. The testing was performed on a soil sample considered to represent the onsite soils. From ACI Table 19.3.1.1 the evaluated soil is categorized as Class S0. The required concrete design requirements for this exposure class can be obtained from ACI Table 19.3.2.1. The potential for corrosion of metals in contact with the site soils is mildly corrosive as determined from Table 1 in Appendix B. For specific recommendations, a corrosion engineer should be consulted.

5.11. SITE DRAINAGE

Positive drainage should be continuously provided and maintained away from the structure during and after construction in accordance with applicable building codes and/or the approved grading plan. Regarding landscaping, planters adjacent a structure should be constructed so that irrigation water will not saturate the soils behind the basement walls or underlying the building footings and slabs. Trees should not be planted adjacent a structure where roots could grow under the foundations or slabs.

5.12. GUTTERS AND DOWNSPOUTS

Gutters and downspouts should be installed on the building to collect roof water and direct the water away from the structure. Downspouts should drain into PVC collector pipes that will carry the water away from the building.

5.13. PAVEMENT DESIGN

The anticipated structural section would be 3 inches of asphaltic concrete over 6 inches of aggregate base for parking areas. The structural section should be increased to be 3 inches of asphaltic concrete over 8 inches of aggregate base for drive areas. The final structural sections should be confirmed at the conclusion of grading. The upper 6 inches of subgrade and the base materials should be compacted to at least 90% and 95% of the maximum dry density, respectively.

Planter areas should be graded so excess water drains away from adjacent AC pavement and curbs. Also, adjacent the planters, consideration should be given to deepening the curbs so that water is not allowed to saturate the pavement subgrade.

5.14. PLAN REVIEW(S)

As the development process continues and final detailed grading and site/foundation plans and specifications are developed, they should be reviewed by Gorian and Associates, Inc. Additional geotechnical recommendations may be warranted at that time.

6. CLOSURE

This report was prepared under the direction of State registered geotechnical engineer for the addressee and design consultants solely for design and construction of the project as described herein. No warranty, express or implied, is made as to conclusions and professional advice included in this report. Gorian and Associates, Inc. disclaim any and all responsibility and liability for problems that may occur if the recommendations presented in this report are not followed.

This report may not contain sufficient information for other uses or the purposes of other parties. Recommendations should not be extrapolated to other areas or used for other facilities without consulting Gorian and Associates, Inc. Services of this office should not be construed to relieve the owner or contractors of their responsibilities or liabilities.

The scope of the services provided by Gorian and Associates, Inc. and its staff, excludes responsibility and/or liability for work conducted by others. Such work includes, but is not limited to, means and meth-

ods of work performance, quality control of the work, superintendence, sequencing of construction and safety in, on, or about the jobsite.

The recommendations are based on interpretations of the subsurface conditions concluded from information gained from subsurface explorations and a surficial site reconnaissance. The interpretations may differ from actual subsurface conditions, which can vary horizontally and vertically across the site. Due to possible subsurface variations, this office should observe all aspects of field construction addressed in this report. Individuals using this report for bidding or construction purposes should perform such independent investigations as they deem necessary.

oOo

Please contact our office if you have questions regarding the information and recommendations contained in this report, or require additional consultation.

Respectfully submitted,

Gorian and Associates, Inc.

By: Jerome J. Blunck, GE 151
Principal Geotechnical Engineer

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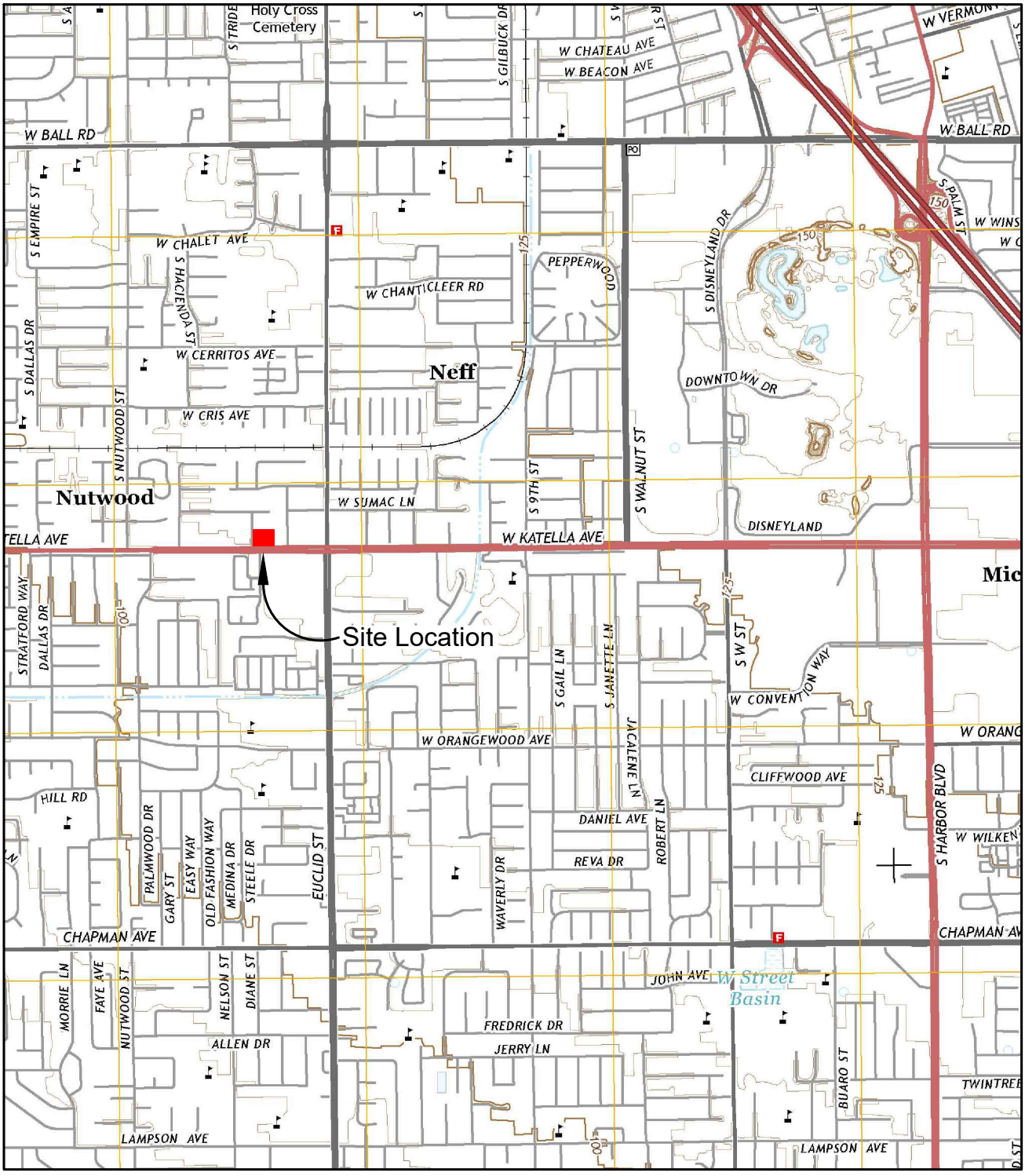
United States Geological Survey (USGS) interactive web application, *Unified Hazard Tool*. https://earthquake.usgs.gov/hazards/interactive/.

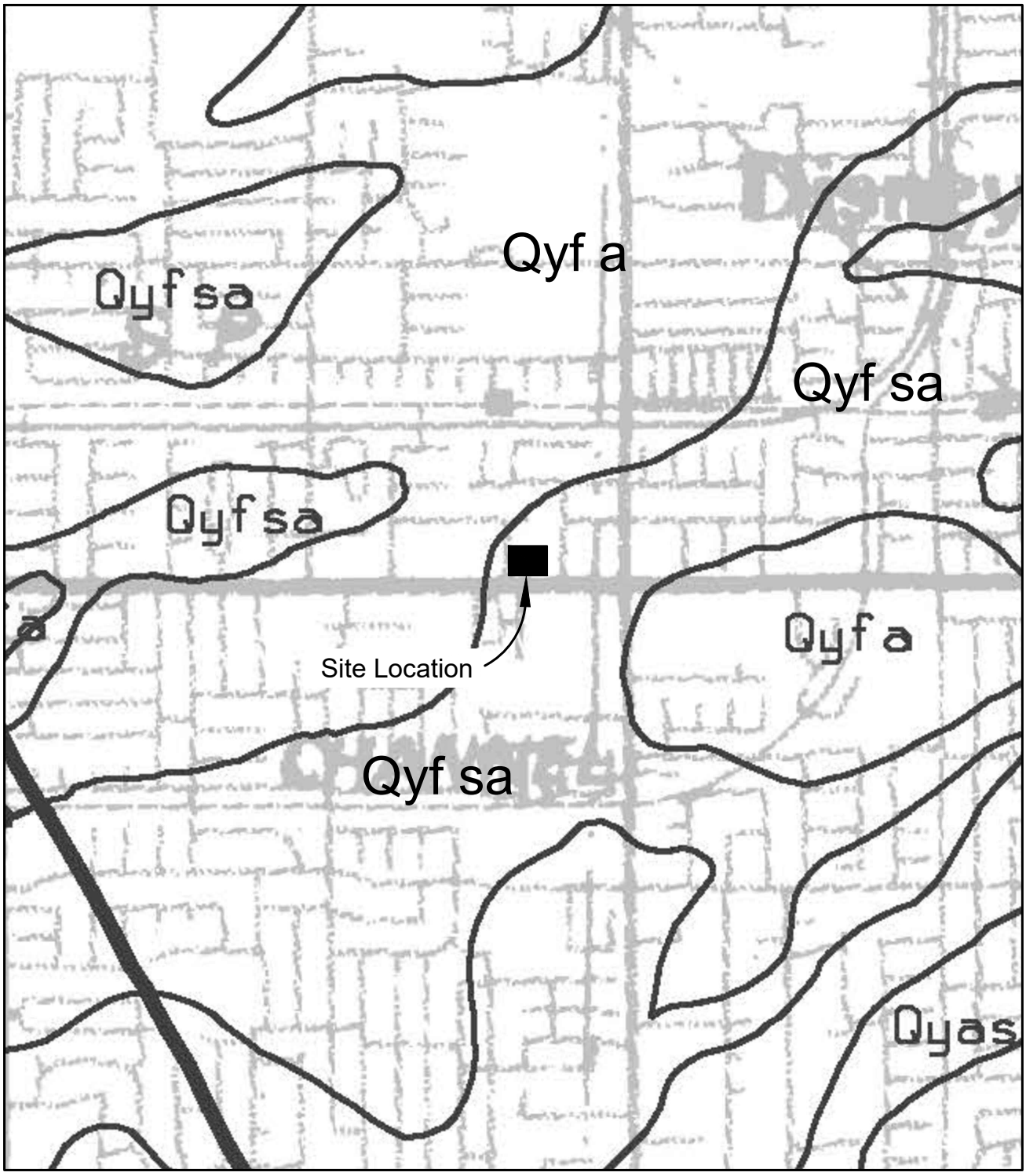


SITE VICINITY MAP

1761 West Katella Avenue
(APN 128-542-011)
Anaheim, California

Gorian & Associates, Inc. *Applied Earth Sciences*		
Job No: 3239-0-0-100		Date: March 2023
Scale: 1" = 2000'	Drawn by:	Figure 1
	Approved by:	

Source
USGS, Anaheim Quadrangle 7.5 minute series



Source: Map enlarged from U.S.G.S. 30X60-minute series

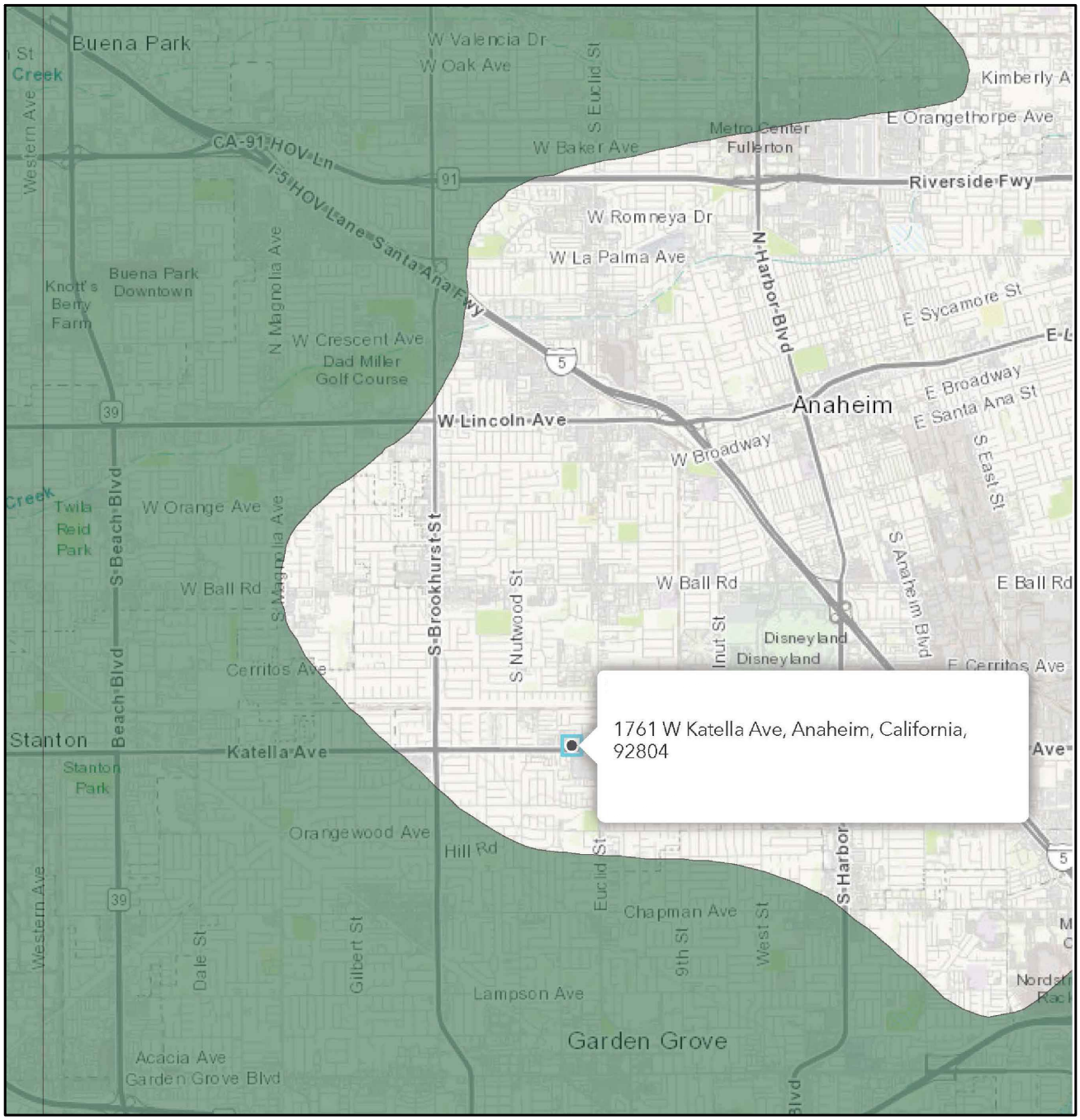
Explanation

Qyf Young deposits of alluvial fans (Holocene and late Pleistocene)—Slightly consolidated to cemented, undissected to slightly dissected deposits of unsorted boulders, cobbles, gravel, and sand that form inactive parts of alluvial fans.

REGIONAL GEOLOGIC MAP

1761 West Katella Avenue
(APN 128-542-011)
Anaheim, California

Gorian & Associates, Inc. *Applied Earth Sciences*		
Job No: 3202-0-0-100		Date: March 2023
Scale: NTS	Drawn by:	Figure 2
	Approved by:	



Explanation

Seismic Hazard Zone - Liquefaction

Outside of Seismic Hazard Zone

Source

CGS Homepage - Earthquake Zones of Required Investigation
https://maps.conservation.ca.gov/cgs/EQZApp/app/

SEISMIC HAZARD ZONE MAP

1761 West Katella Avenue
(APN 128-542-011)
Anaheim, California

Gorian & Associates, Inc. *Applied Earth Sciences*		
Job No: 3239-0-0-100		Date: March 2023
Scale: NTS	Drawn by:	Figure 3
	Approved by:	

APPENDIX A

LOGS OF SUBSURFACE DATA

Project: Extra Space Storage
1761 W. Katella, Anaheim

Work Order: 3239-0-0-100

SUBSURFACE LOG

Excavation Number: B-1

Page Number: 1

Date(s) Excavated 03/16/2023	Logged By CHD	Excavation Location See Location Map	Approximate Surface Elevation
Excavation Dimension 8" Diameter	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data 140# Auto

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0						SM		Asphaltic Concrete (2") on aggregate base (1") (damp, dense).	
								Alluvium:	
			11					Brown very silty fine SAND (moist, medium dense)	
				12.9	106.4	ML		Grayish brown SILT (moist, stiff).	
5			19	17.6	105.7	CL		Grayish brown silty CLAY (moist, very stiff).	
			18	6.6	93.3	SM		Yellowish brown to light gray silty fine SAND (moist, medium dense). Some thin silty interstratifications.	
10			19	12.7	88.9				
						SM		Light yellowish brown silty fine SAND (damp, medium dense). Friable.	
15			18	2.1	115.6				
						CL		Brown sandy CLAY (moist, very stiff).	
						SM		Light yellowish brown silty fine SAND (damp, medium dense). Friable.	
20			21	3.9	112.9				
						CL		Grayish brown silty CLAY (moist, very stiff).	
						ML		Grayish brown SILT (moist, hard).	
25			35	14.4	110.2				
						SM		Yellowish brown silty fine SAND (moist, medium dense).	
30			26	11.7	110.6				
35			21						
				19.6	102.6	ML		Yellowish clayey SILT (moist, very stiff).	
						SM		Light yellowish brown silty fine to medium SAND (damp, dense). Friable.	

Project: Extra Space Storage
1761 W. Katella, Anaheim

Work Order: 3239-0-0-100

SUBSURFACE LOG

Excavation
Number: B-1

Page Number: 2

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
40			32	1.6	105.1				
								TOTAL DEPTH 41' No Caving Observed No Groundwater Encountered Backfilled with cuttings and tamped. AC Cold Patch on top	
45									
50									
55									
60									
65									
70									
75									
80									

Project: Extra Space Storage
1761 W. Katella, Anaheim

Work Order: 3239-0-0-100

SUBSURFACE LOG

Excavation Number: B-2

Page Number: 1

Date(s) Excavated 03/16/2023	Logged By CHD	Excavation Location See Location Map	Approximate Surface Elevation
Excavation Dimension 8" Diameter	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data 140# Auto

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0								Asphaltic Concrete (7.5")	
						GM		Artificial fill: Yellowish brown pea gravel (moist, loose).	
5			5						
10			6						
15			6						
						ML		Alluvium: Grayish brown SILT (very moist to wet, stiff). Change at 17' per driller.	
20			12	26.9	89.7				
						SM		Light yellowish brown silty fine SAND (damp, dense). Friable.	
25			31	3.7	98.9				
30			30	7.4	98.4				
35			32	12.1	96.1			@35', becoming moist.	

Project: *Extra Space Storage*
1761 W. Katella, Anaheim

Work Order: 3239-0-0-100

SUBSURFACE LOG

Excavation
Number: B-2

Page Number: 2

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
40		■	45	3.6	100.2			@40', becoming damp.	
								TOTAL DEPT 41' Caving from -1' to -17' No Groundwater Encountered Backfilled with cuttings and tamped. AC Cold Patch on top.	
45									
50									
55									
60									
65									
70									
75									
80									

Project: Extra Space Storage
1761 W. Katella, Anaheim

Work Order: 3239-0-0-100

SUBSURFACE LOG

Excavation
Number: B-3

Page Number: 1

Date(s) Excavated 03/16/2023	Logged By CHD	Excavation Location See Location Map	Approximate Surface Elevation
Excavation Dimension 8" Diameter	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data 140# Auto

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0					SM		Asphaltic Concrete (3") on Aggregate Base (4") (damp, dense).	
		19	11.4	109.4			Alluvium: Brown to yellowish brown silty fine SAND (moist, medium dense).	
5		16						
			7.7	114.1	SM		Grayish brown silty fine SAND (moist, medium dense).	
			5.3	98.7	SM		Light yellowish brown silty fine SAND (damp, medium dense).	
		15			ML		Light yellowish brown SILT (moist, very stiff).	
					SM		Light gray silty fine SAND (damp, medium dense).	
10		15	5.5	90.9				
					ML		Yellowish brown SILT (moist, very stiff) .	
15		17	10.6	104.4				
					SM		Yellowish brown silty fine SAND (damp, medium dense). Friable.	
					ML		Yellowish brown clayey SILT (very moist, very stiff).	
20		24	34.0	78.7				
					SM		Light gray very silty very fine SAND (damp, medium dense).	
					SM		Pale yellow silty fine to coarse SAND (damp, medium dense). Friable. Few fine gravels.	
25		25	0.9	107.1				
					SM		Light yellowish brown silty fine SAND (damp, dense).	
30		36	3.1	101.6				
35		32	3.5	101.2			Below 35', some silty fine to coarse SAND, friable.	

Project: Extra Space Storage
1761 W. Katella, Anaheim

Work Order: 3239-0-0-100

SUBSURFACE LOG

Excavation
Number: B-3

Page Number: 2

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
40		■	33	1.6	99.5				
								TOTAL DEPTH 41' No Caving Observed No Groundwater Encountered Backfilled with cuttings, tamped. AC Cold Patch on top.	
45									
50									
55									
60									
65									
70									
75									
80									

Project: Extra Space Storage
1761 W. Katella, Anaheim

Work Order: 3239-0-0-100

SUBSURFACE LOG

Excavation Number: IB-1

Page Number: 1

Date(s) Excavated 03/16/2023	Logged By CHD	Excavation Location See Location Map	Approximate Surface Elevation
Excavation Dimension 8" Diameter	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data 140# Auto

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0								Asphaltic Concrete	
						SM		(2') on Aggregate Base (6") (damp, dense).	
								Alluvium:	
								Brown grading to yellowish brown silty fine SAND (moist).	
5								Locally interstratified with silt to clayey silt.	
10						ML		Light yellowish brown clayey SILT (moist, very stiff).	
15			6/8/8			SM		Light yellowish brown silty fine SAND (damp, medium dense). Friable.	
			5/5/7			ML		Yellowish brown sandy clayey SILT (moist, stiff).	
20								TOTAL DEPTH 21'	
								No Caving Observed	
								No Groundwater Encountered	
								Boring converted into infiltration test well.	
								-21' to -20', medium bentonite chips.	
								-20' to -15', 2" slotted (0.02) pipe.	
25								-15' to ground surface, 2" solid pipe	
								-20' to -13', #3 sand.	
								-13' to -12', medium bentonite chips.	
								-12' to ground surface, cuttings.	
								Presoaked.	
30									
35									

Project: Extra Space Storage
1761 W. Katella, Anaheim

Work Order: 3239-0-0-100

SUBSURFACE LOG

Excavation
Number: IB-2

Page Number: 1

Date(s) Excavated 03/16/2023	Logged By CHD	Excavation Location See Location Map	Approximate Surface Elevation
Excavation Dimension 8" Diameter	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data 140# Auto

Elevation / Depth (ft.)	Bulk	Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0						ML		Asphaltic Concrete (2") on Aggregate Base (4") (damp, dense). Alluvium: Brown clsyey SILT (very moist to wet).	
5						SM		Yellowish brown silty fine SAND (damp, loose).	
			5/5/4						
10						ML		Light gray clayey SILT (moist, stiff).	
			3/6/6			CL		Gray sandy silty CLAY (moist, stiff).	
						SM		Yellowish brown silty fine SAND (moist, medium dense).	
15								TOTAL DEPTH 14' No Caving Observed No Groundwater Encountered Boring converted into infiltration test well. -14' to -13', medium bentonite chips. -13' to -8', 2" slotted (0.02) pipe. -8' to ground surface, 2" solid pipe. -13' to -6', #3 sand. -6' to -5', medium bentonite chips.-5' to ground surface, cuttings. Presoaked.	
20									
25									
30									
35									

APPENDIX B
LABORATORY TESTING

General
Laboratory test results on selected samples are presented below. Test were performed to evaluate the physical and engineering properties of the encountered earth materials, including in-situ moisture content and dry density, optimum moisture-maximum dry density relationships, expansion potential, consolidation characteristics, and shear strength parameters. Soil corrosivity testing was performed under subcontract by a corrosion engineer.

Density and Moisture Tests
In situ dry density and moisture content were determined for each undisturbed soil sample. The results are presented on the Logs of Subsurface Data (Appendix A).

Maximum Density-Optimum Moisture
A maximum density/optimum moisture test (compaction characteristics) was performed on a selected bulk sample of the soils encountered. The test was performed in general accordance with ASTM D 1557. The results are as follows:

Boring Number	Depth (feet)	Visual Classification	Maximum Dry Density – pcf	Optimum Moisture Content - %
B-1	6.0	Yellowish brown silty fine sand	125.6	10.1

Soil Expansiveness
An expansion index test was performed on a soil sample obtained from the borings to evaluate expansion potential of the subgrade soils in general accordance with the Expansion Index Test method (ASTM test method D4829-08a). The results are as follows:

Boring Number	Depth (feet)	Expansion Index	Expansion Range
B-1	6.0	0	0-20

Direct Shear Test
Direct shear tests were performed on four relatively undisturbed samples to evaluate soil shear strength parameters. The sample set was sheared under normal pressures ranging from 1000 to 4000 pounds per square foot. The results are graphically presented herein.

Consolidation Test
Three consolidation tests were performed on selected samples of the soils below anticipated foundation depths to evaluate compressibility characteristics. The sample was loaded in increments to a maximum of 8,000 pounds per square foot and then rebounded. The sample was inundated at the indicated overburden pressure to evaluate the effect of moisture infiltration on compression behavior. The load-consolidation curve is presented herein as a graphic summaries.

Corrosion Testing
The results of the analytical laboratory testing to evaluate the potential for corrosion of materials in contact with the onsite soils are presented in this appendix. The testing was performed on a soil sample considered to represent the onsite soils. From ACI Table 19.3.1.1 the evaluated soil is categorized as Class S0. The required concrete design requirements for this exposure class can be obtained from ACI Table 19.3.2.1. The potential for corrosion of metals in contact with the site soils is mildly corrosive as determined from Table 1 below. For specific recommendations, a corrosion engineer should be consulted.

ACI Table 19.3.1.1 – Exposure Categories and Classes

Category	Class	Water-soluble sulfate (SO_4^{2-}) in soil, percent by mass	Dissolved sulfate (SO_4^{2-}) in water, ppm[1]
Sulfate (S)	S0	$SO_4^{2-} < 0.10$	$SO_4^{2-} < 150$
	S1	$0.10 \le SO_4^{2-} < 0.20$	$150 \le SO_4^{2-} < 1500$ or seawater
	S2	$0.20 \le SO_4^{2-} < 2.00$	$1500 \le SO_4^{2-} < 10,000$
	S3	$SO_4^{2-} > 2.00$	$SO_4^{2-} > 10,000$

1 ppm (parts per million) = milligrams per kilogram mg/kg of dry soil weight

ACI Table 19.3.2.1 – Requirements for Concrete by Exposure Class

Exposure Class	Maximum *w/cm*	Minimum f_c', psi	Cementitious materials - Types			Calcium chloride admixture
			ASTM C150	ASTM C595	ASTM C1157	
S0	N/A	2500	No type restriction	No type restriction	No type restriction	No restriction
S1	0.50	4000	II	Types IP, IS, or IT with (MS) designation	MS	No restriction
S2	0.45	4500	V	Types IP, IS, or IT with (MS) designation	HS	Not permitted
S3	0.45	4500	V plus pozzolan or slag cement	Types IP, IS, or IT with (MS) designation plus pozzolan or slag cement	HS plus pozzolan or slab cement	Not permitted

ACI Tables 19.3.1.1 and 19.3.2.1 - ACI 318-14 Building Code Requirements for Structural Concrete

Table 1. Relationship Between Soil Resistivity and Soil Corrosivity

Soil Resistivity, ohm-cm	Classification of Soil Corrosiveness
0 to 900	Very severe corrosion
900 to 2,300	Severely corrosive
2,300 to 5,000	Moderately corrosive
5,000 to 10,000	Mildly corrosive
10,000 to >10,000	Very mildly corrosive

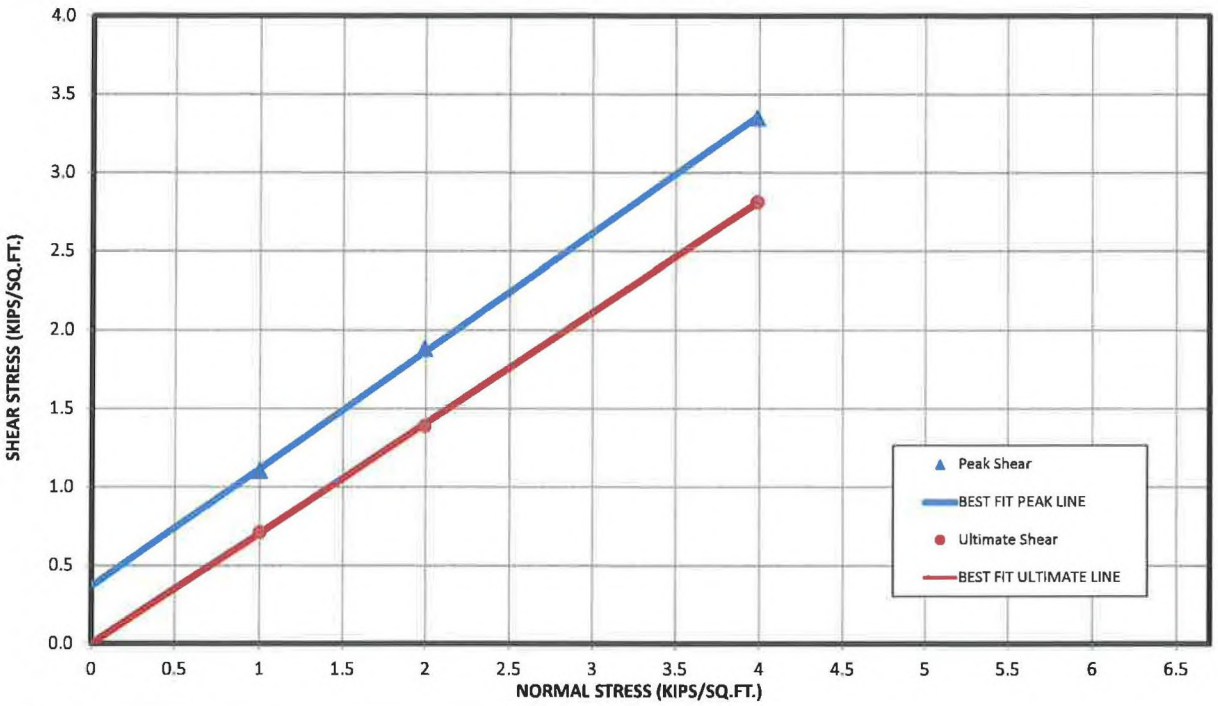
F. O. Waters, Soil Resistivity Measurements for Corrosion Control, Corrosion. 1952, Vol, No. 12, 1952, p. 407.

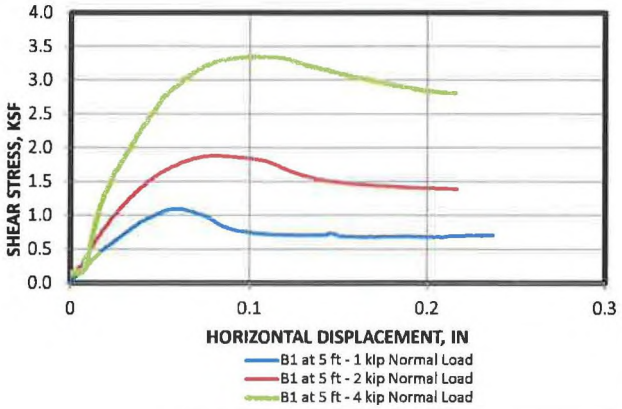
Grain Size Distribution

Grain size distribution was determined for two soil samples below the depth of the intended stormwater infiltration. The graphed results are attached hereto.

DIRECT SHEAR TEST RESULTS

Undisturbed Sample





PROJECT:	Extra Space 1761 Katella
W.O:	3239.-0-0-100
EXCAVATION:	B1
DEPTH:	5 ft

TEST DATA:	#1	#2	#3
NORM. PRES. (KSF)	1.0	2.0	4.0
ULTIMATE			
SHEAR STRESS (KSF):	0.71	1.39	2.81
H.DISPL. (IN)	0.26	0.25	0.24
DISP. RATE (IN/MIN)	0.01	0.01	0.01
PEAK			
SHEAR STRESS (KSF):	1.10	1.88	3.35
H.DISPL. (IN)	0.08	0.11	0.13

	PEAK	ULT.	RES.
COHESION (KSF):	0.375	0.000	
PHI (DEG):	37	35	

PRESHEAR DRY DENSITY (PCF):	105.8	106.1	107.6
PRESHEAR MOISTURE (% OF DD):		23.0	
EST.VOID RATIO, e (preshear):	0.53	0.53	0.51

TEST FILES:

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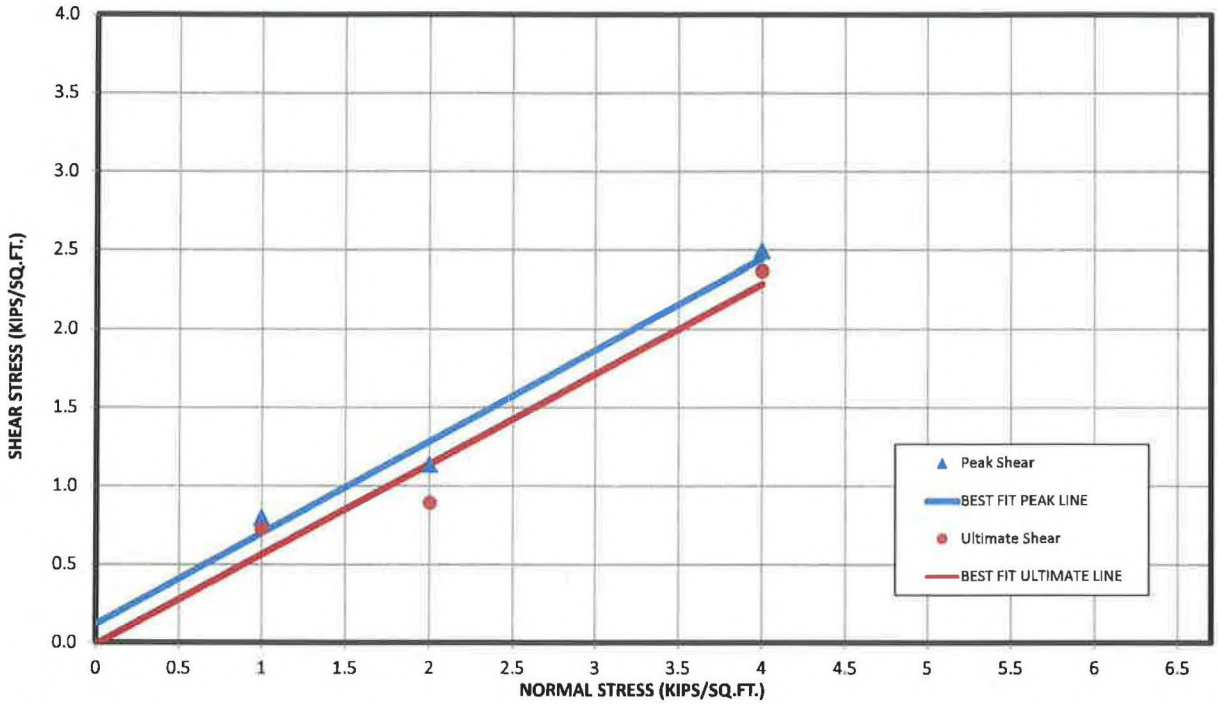
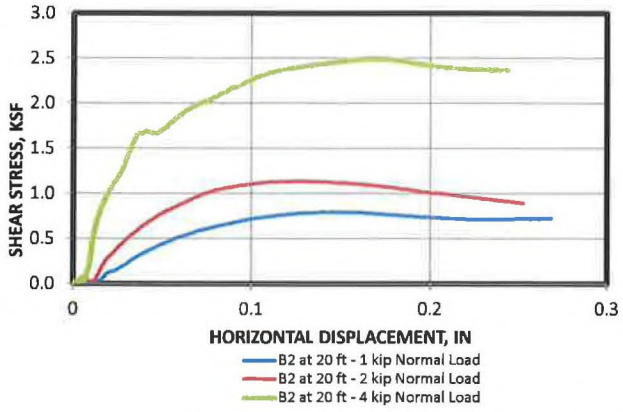
GORIAN & ASSOCIATES, INC.

DIRECT SHEAR TEST RESULTS

Undisturbed Sample





PROJECT:	Extra Space 1761 Katella
W.O:	3239.-0-0-100
EXCAVATION:	B2
DEPTH:	20 ft

TEST DATA:	#1	#2	#3
NORM. PRES. (KSF)	1.0	2.0	4.0
ULTIMATE			
SHEAR STRESS (KSF):	0.73	0.89	2.37
H.DISPL. (IN)	0.27	0.27	0.25
DISP. RATE (IN/MIN)	0.01	0.01	0.01
PEAK			
SHEAR STRESS (KSF):	0.80	1.14	2.50
H.DISPL. (IN)	0.14	0.13	0.17

	PEAK	ULT.	RES.
COHESION (KSF):	0.125	0.000	
PHI (DEG):	30	30	

PRESHEAR DRY DENSITY (PCF):	92.8	93.5	110.9
PRESHEAR MOISTURE (% OF DD):		40.0	
EST.VOID RATIO, e (preshear):	0.75	0.74	0.46

TEST FILES:

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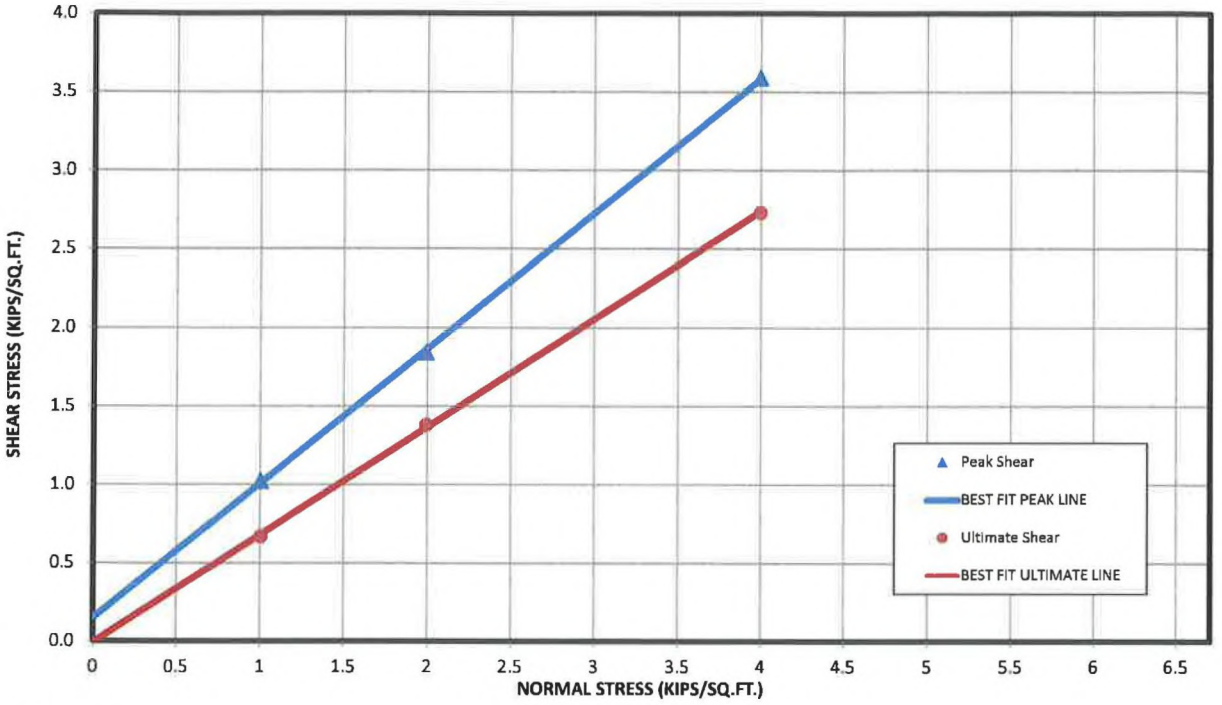
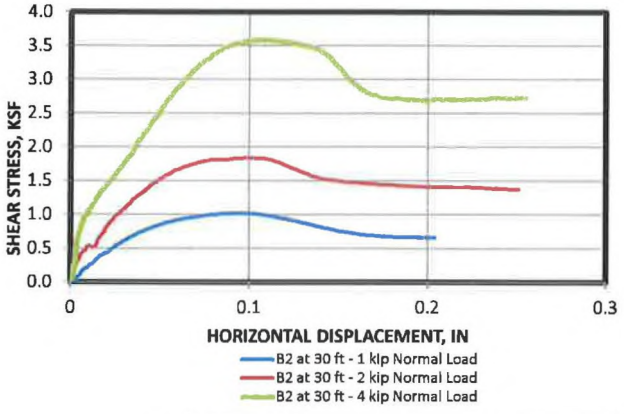
GORIAN & ASSOCIATES, INC.

DIRECT SHEAR TEST RESULTS

Undisturbed Sample





PROJECT:	Extra Space 1761 Katella
W.O:	3239.-0-0-100
EXCAVATION:	B2
DEPTH:	30 ft

TEST DATA:	#1	#2	#3
NORM. PRES. (KSF)	1.0	2.0	4.0
ULTIMATE			
SHEAR STRESS (KSF):	0.67	1.38	2.73
H.DISPL. (IN)	0.21	0.26	0.26
DISP. RATE (IN/MIN)	0.01	0.01	0.01
PEAK			
SHEAR STRESS (KSF):	1.02	1.84	3.59
H.DISPL. (IN)	0.10	0.10	0.11

	PEAK	ULT.	RES.
COHESION (KSF):	0.150	0.000	
PHI (DEG):	41	34	

PRESHEAR DRY DENSITY (PCF):	116.9	110.0	115.5
PRESHEAR MOISTURE (% OF DD):		27.0	
EST.VOID RATIO, e (preshear):	0.39	0.48	0.41

TEST FILES:

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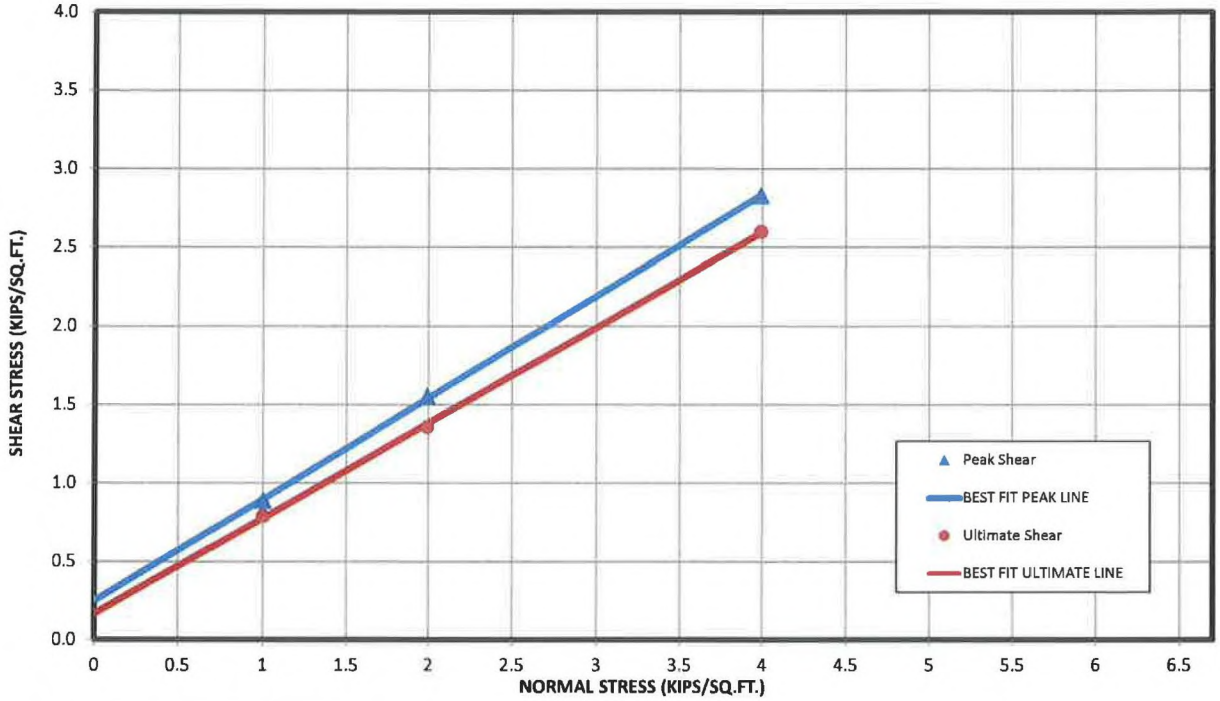
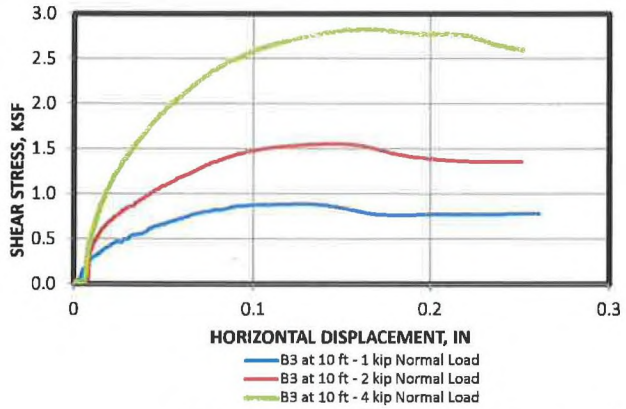
GORIAN & ASSOCIATES, INC.

DIRECT SHEAR TEST RESULTS

Undisturbed Sample





PROJECT:	Extra Space 1761 Katella
W.O:	3239.-0-0-100
EXCAVATION:	B3
DEPTH:	10 ft

TEST DATA:	#1	#2	#3
NORM. PRES. (KSF)	1.0	2.0	4.0
ULTIMATE			
SHEAR STRESS (KSF):	0.79	1.36	2.60
H.DISPL. (IN)	0.26	0.26	0.26
DISP. RATE (IN/MIN)	0.01	0.01	0.01
PEAK			
SHEAR STRESS (KSF):	0.89	1.55	2.83
H.DISPL. (IN)	0.12	0.15	0.17

	PEAK	ULT.	RES.
COHESION (KSF):	0.250	0.175	
PHI (DEG):	33	31	

PRESHEAR DRY DENSITY (PCF):	90.9	90.9	91.1
PRESHEAR MOISTURE (% OF DD):		31.0	
EST.VOID RATIO, e (preshear):	0.78	0.78	0.78

TEST FILES:

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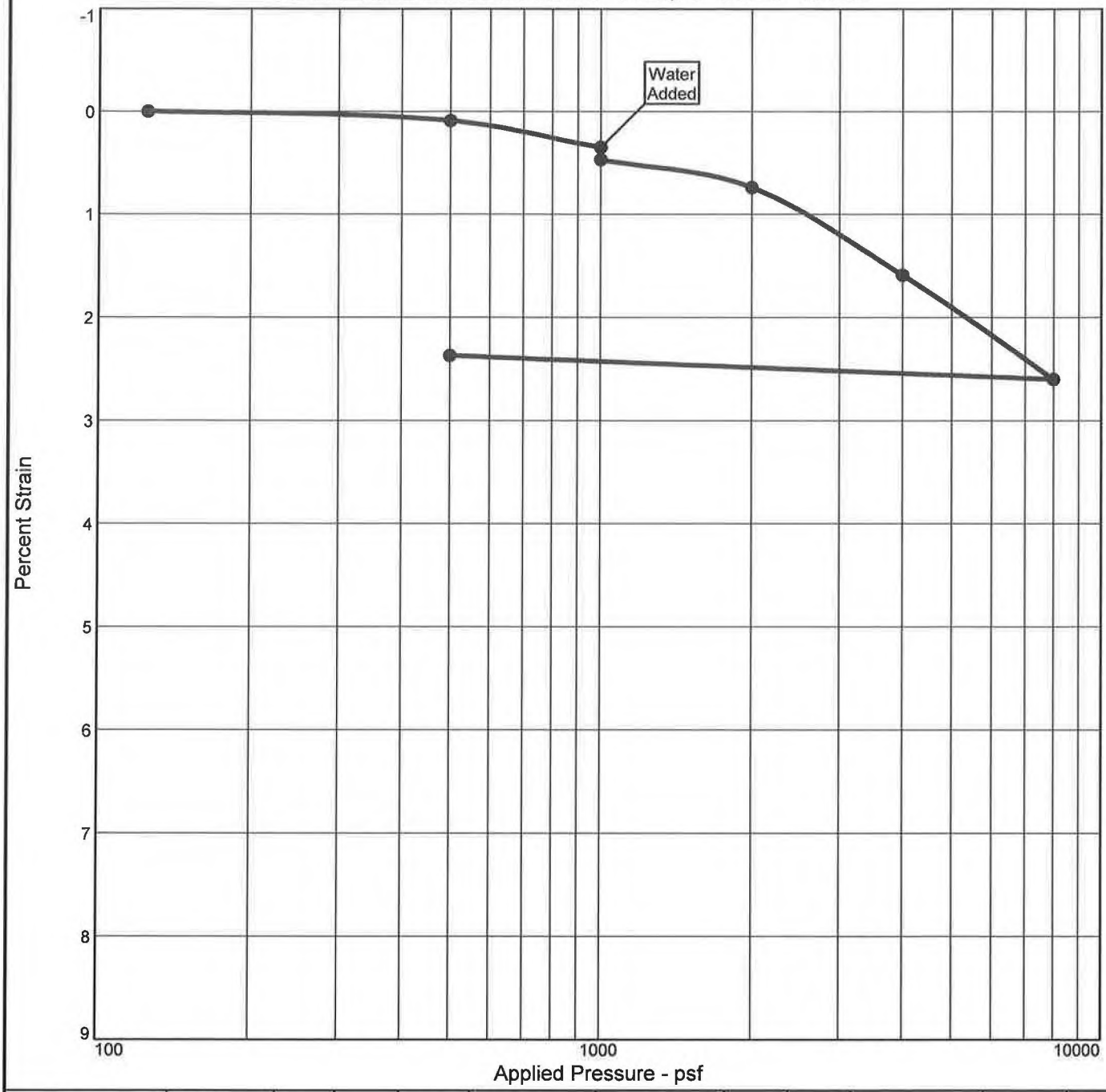
S:\GEOTEST\shears\GORIAN\TEST820.DAT
S:\GEOTEST\shears\GORIAN\TEST821.DAT

GORIAN & ASSOCIATES, INC.

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P_c (psf)	C_c	C_r	Swell Press. (psf)	Clpse. %	e_o
Sat.	Moist.											
							2207				0.1	

MATERIAL DESCRIPTION	USCS	AASHTO

Project No. 3239-0-0- **Client:** Extra Space Storage

Project: 1761 Katella

Location: B-1 @ 15'

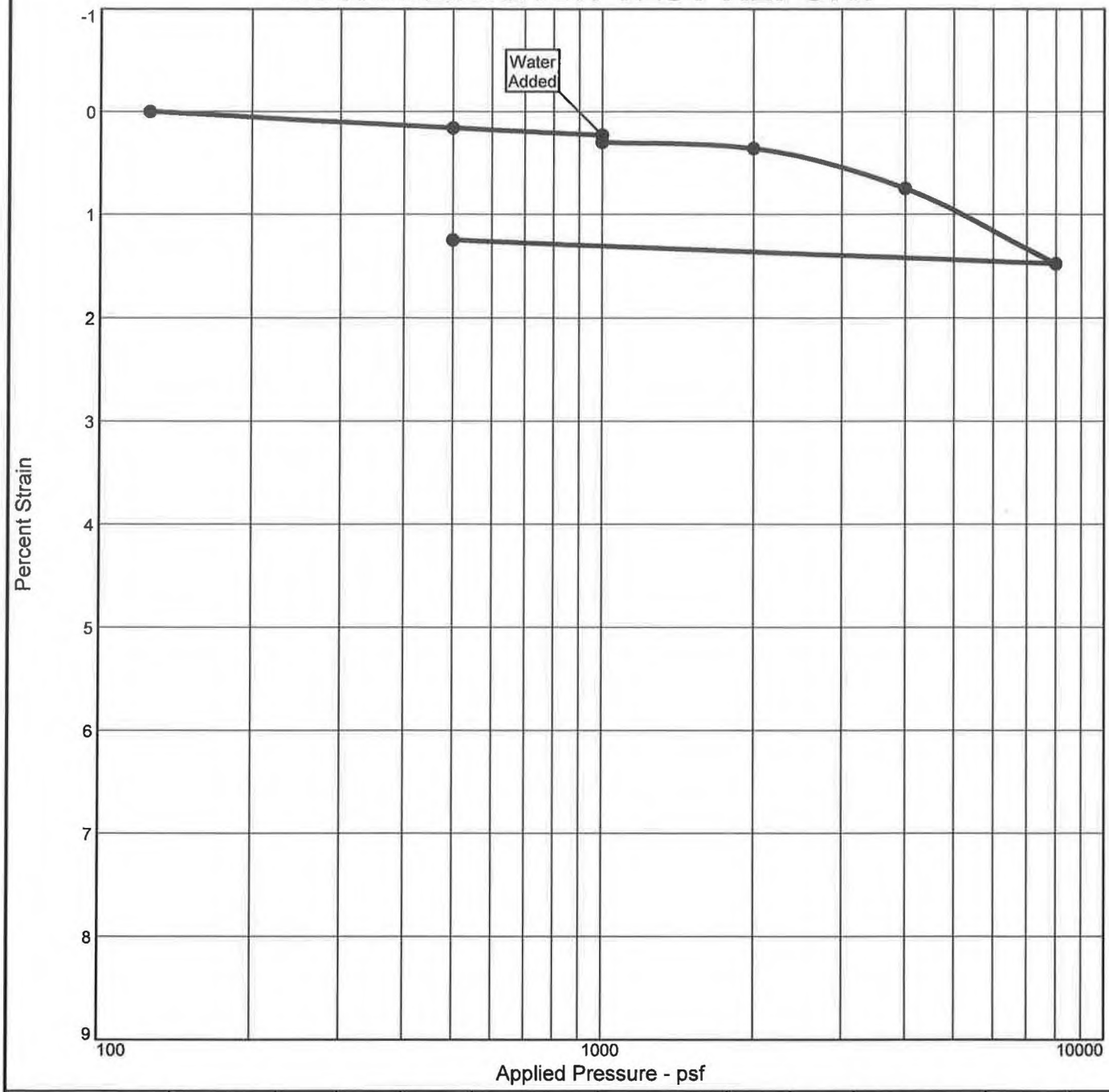
Remarks:

Gorian & Associates

Thousand Oaks, CA

Figure

CONSOLIDATION TEST REPORT



Natural Sat.	Natural Moist.	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P_c (psf)	C_c	C_r	Swell Press. (psf)	Clpse. %	e_o
							2977				0.1	

MATERIAL DESCRIPTION	USCS	AASHTO

Project No. 3239-0-0- **Client:** Extra Space Storage

Project: 1761 Katella

Location: B-2 @ 25' **Sample Number:** B-2 @ 25'

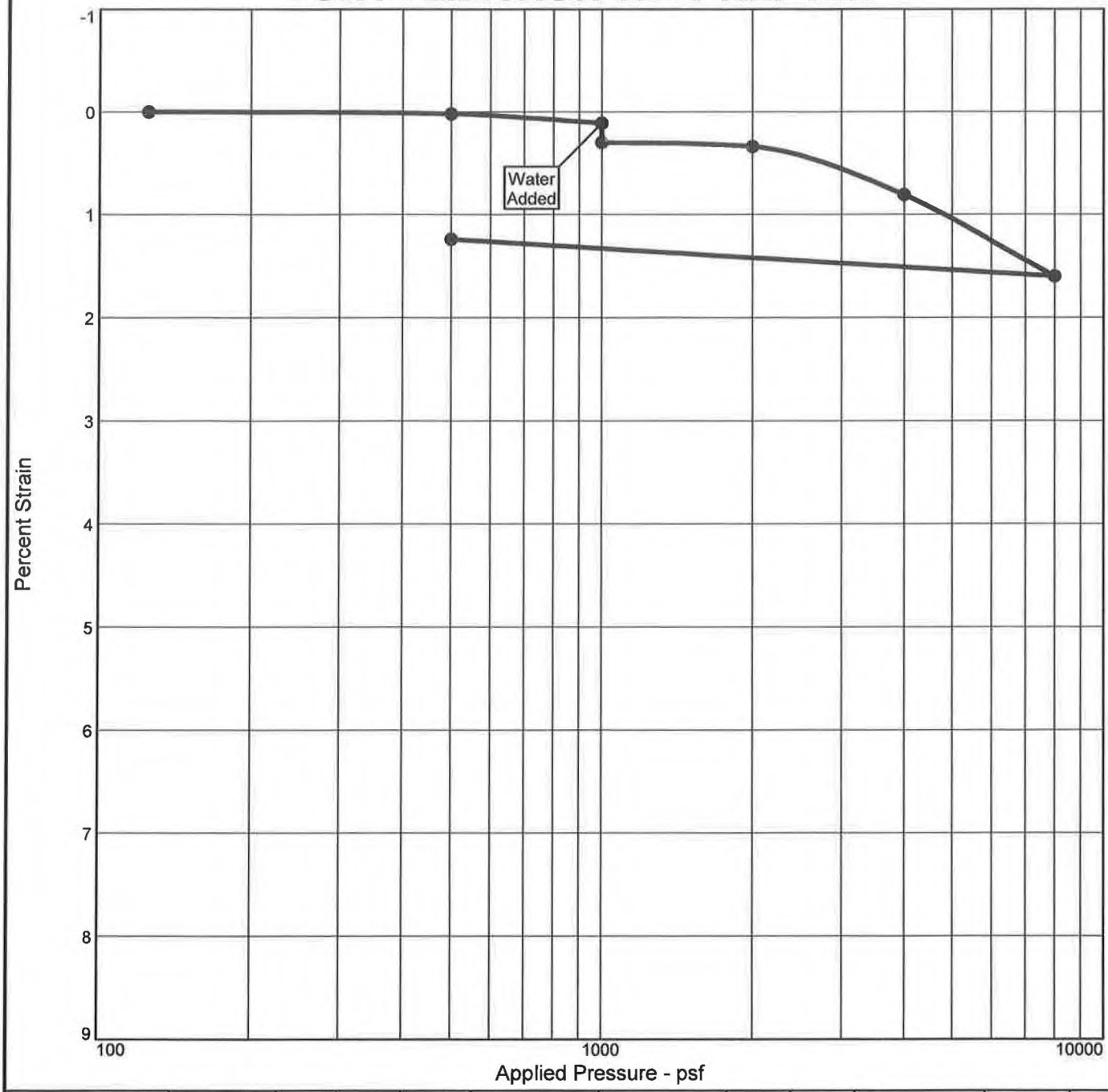
Remarks:

Gorian & Associates

Thousand Oaks, CA

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P_c (psf)	C_c	C_r	Swell Press. (psf)	Clpse. %	e_o
Sat.	Moist.											
							2784				0.2	

MATERIAL DESCRIPTION	USCS	AASHTO

Project No. 3239-0-0- **Client:** Extra Space Storage

Project: 1761 Katella

Location: B-3 @ 30' **Sample Number:** B-3 @ 30'

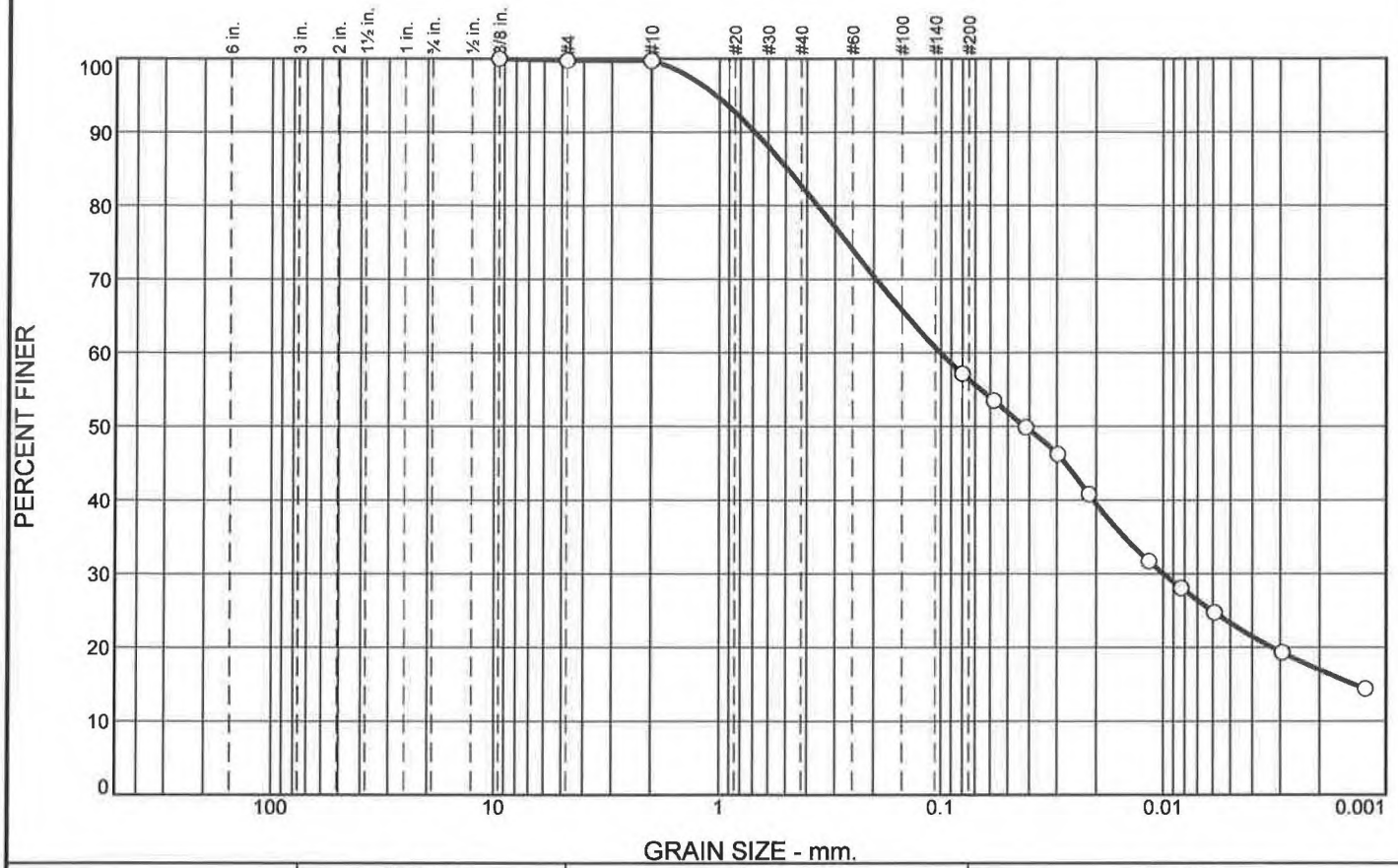
Remarks:

Gorian & Associates

Thousand Oaks, CA

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.1	16.9	26.4	33.1	23.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.8		
#10	99.7		
0.0800 mm.	57.1		
0.0576 mm.	53.5		
0.0414 mm.	49.9		
0.0298 mm.	46.2		
0.0216 mm.	40.8		
0.0116 mm.	31.7		
0.0083 mm.	28.1		
0.0059 mm.	24.8		
0.0029 mm.	19.3		
0.0012 mm.	14.4		

* (no specification provided)

Soil Description

Y.B Silty Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6890 D_{85}= 0.4895 D_{60}= 0.1005
D_{50}= 0.0420 D_{30}= 0.0100 D_{15}= 0.0014
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: IB-2 **Depth:** 11'

Date: 3/24/23

Gorian & Associates

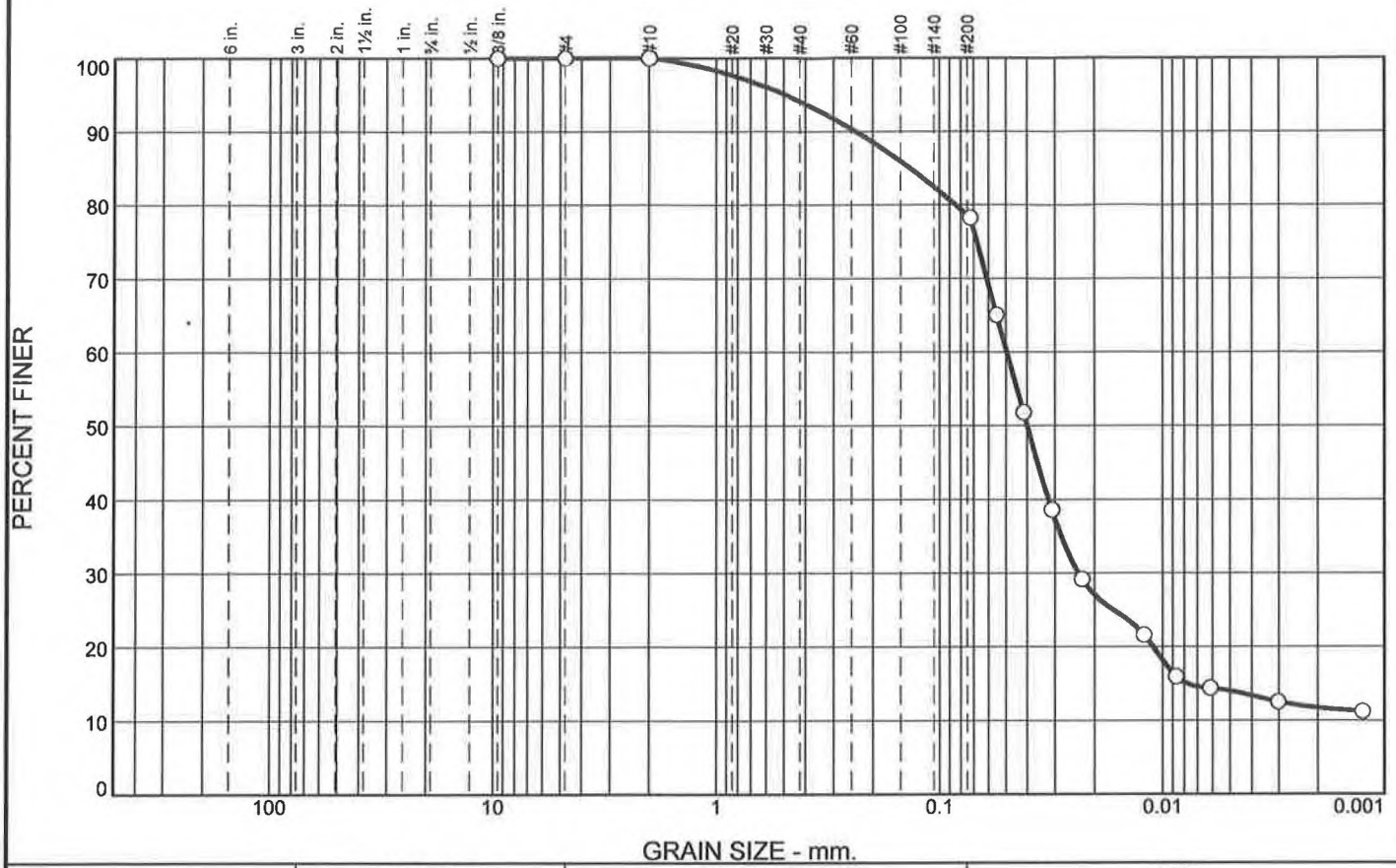
Thousand Oaks, CA

Client: Extra Space Storage
Project: 1761 Katella

Project No: 3239-0-0-100 **Figure**

Tested By: TT

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	5.9	15.5	64.6	14.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	100.0		
0.0724 mm.	78.2		
0.0550 mm.	65.0		
0.0414 mm.	51.8		
0.0310 mm.	38.6		
0.0227 mm.	29.2		
0.0121 mm.	21.6		
0.0087 mm.	16.0		
0.0061 mm.	14.4		
0.0030 mm.	12.5		
0.0013 mm.	11.2		

* (no specification provided)

Soil Description

Y.B Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2380 D_{85}= 0.1358 D_{60}= 0.0495
D_{50}= 0.0399 D_{30}= 0.0236 D_{15}= 0.0078
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: IB-1 **Depth:** 18'

Date: 3/24/23

Gorian & Associates

Thousand Oaks, CA

Client: Extra Space Storage
Project: 1761 Katella

Project No: 3239-0-0-100 **Figure**

Tested By: TT

Soil Analysis Lab Results

Client: Gorian & Associates, Inc.
Job Name: Extra Space Storage - 1761 Katella
Client Job Number: 3239-0-0-100
Project X Job Number: S230324B
March 28, 2023

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51	ASTM G200	SM 4500-D	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity** As Rec'd | Minimum		**pH**	**Redox**	**Sulfide** S^{2-}	**Nitrate** NO_3^-	**Ammonium** NH_4^+	**Lithium** Li^+	**Sodium** Na^+	**Potassium** K^+	**Magnesium** Mg^{2+}	**Calcium** Ca^{2+}	**Fluoride** F_2^{--}	**Phosphate** PO_4^{3-}
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(Ohm-cm)	(Ohm-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
B - 1 Grayish brown silty clay	6.0	318.0	0.0318	39.1	0.0039	6,566	1,541	8.3	145	0.3	37.2	1.8	ND	276.3	5.3	17.8	175.5	18.2	1.1

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

Note: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops which is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.

APPENDIX C

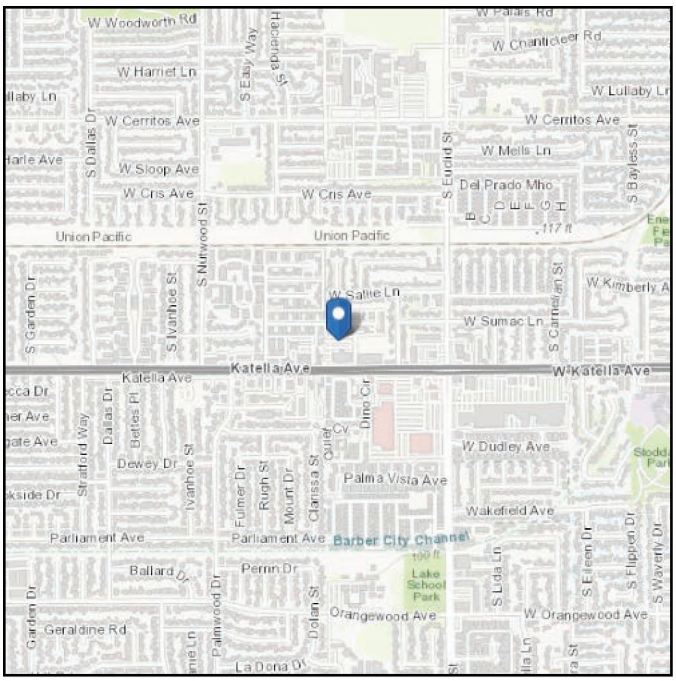
ASCE 7 HAZARDS REPORT

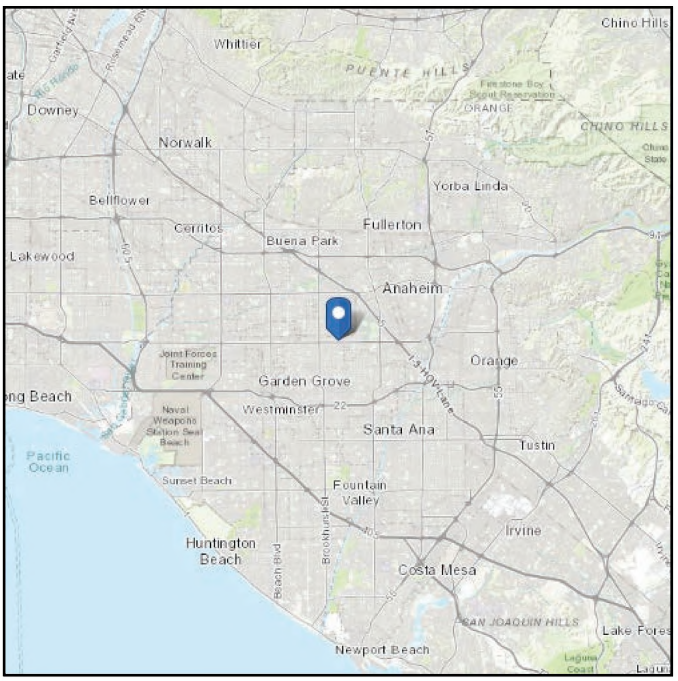
ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Latitude: 33.804
Longitude: -117.9453
Elevation: 110.92126255210495 ft (NAVD 88)





Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	1.416	S_{D1} :	N/A
S_1 :	0.5	T_L :	8
F_a :	1	PGA :	0.601
F_v :	N/A	PGA_M :	0.662
S_{MS} :	1.416	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1
S_{DS} :	0.944	C_v :	1.383

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Tue Mar 21 2023

Date Source: USGS Seismic Design Maps

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

APPENDIX D

STORMWATER INFILTRATION TESTING

Boring InfiltrationTesting Field Log

Work Order: 3239-0-0-100
Date 3/28/2023

Project Location	1761 West Katella Avenue	Boring/Test Number	IB-1	
Earth Description		Diameter of Boring (DIA)	8	inches
Tested By	TT	radius (in feet)	0.3333333	feet
Liquid Description	Clear Water	Depth of Boring	20	feet
Measurement Method	Sounder	Diameter of Casing	2	inches
Depth to Invert of BMP		Depth to Water Table	>50	feet
Start Time for Pre-Soak		Water Remaining in Boring (Y/N)	N	
		Std Time Interval Btween Rdngs	30	minutes
Start Time for Test	9:50			

Reading No.	Water Level start	Water Level end	Time start	time end	Δ Time (min)	H for surface area	h for volume	Surface Area (ft^2)	Volume (ft^3)	Raw Rate Volume / Surface Area (in/hr)
1	15	16.5	9:50	10:20	30	5	1.5	10.5	0.52	1.20
2	15	16.3	10:20	10:50	30	5	1.3	10.5	0.45	1.04
3	15	16.3	10:50	11:20	30	5	1.3	10.5	0.45	1.04
4	15	16.3	11:20	11:50	30	5	1.3	10.5	0.45	1.04
5	15	16.3	11:50	12:20	30	5	1.3	10.5	0.45	1.04
6	15	16.3	12:20	12:50	30	5	1.3	10.5	0.45	1.04
7	15	16.3	12:50	1:20	30	5	1.3	10.5	0.45	1.04
8	15	16.3	1:20	1:50	30	5	1.3	10.5	0.45	1.04

Measured Rate = ave of last 3 readings = 1.04

apply reduction factor: 2 **0.52** **in/hr**

Boring InfiltrationTesting Field Log

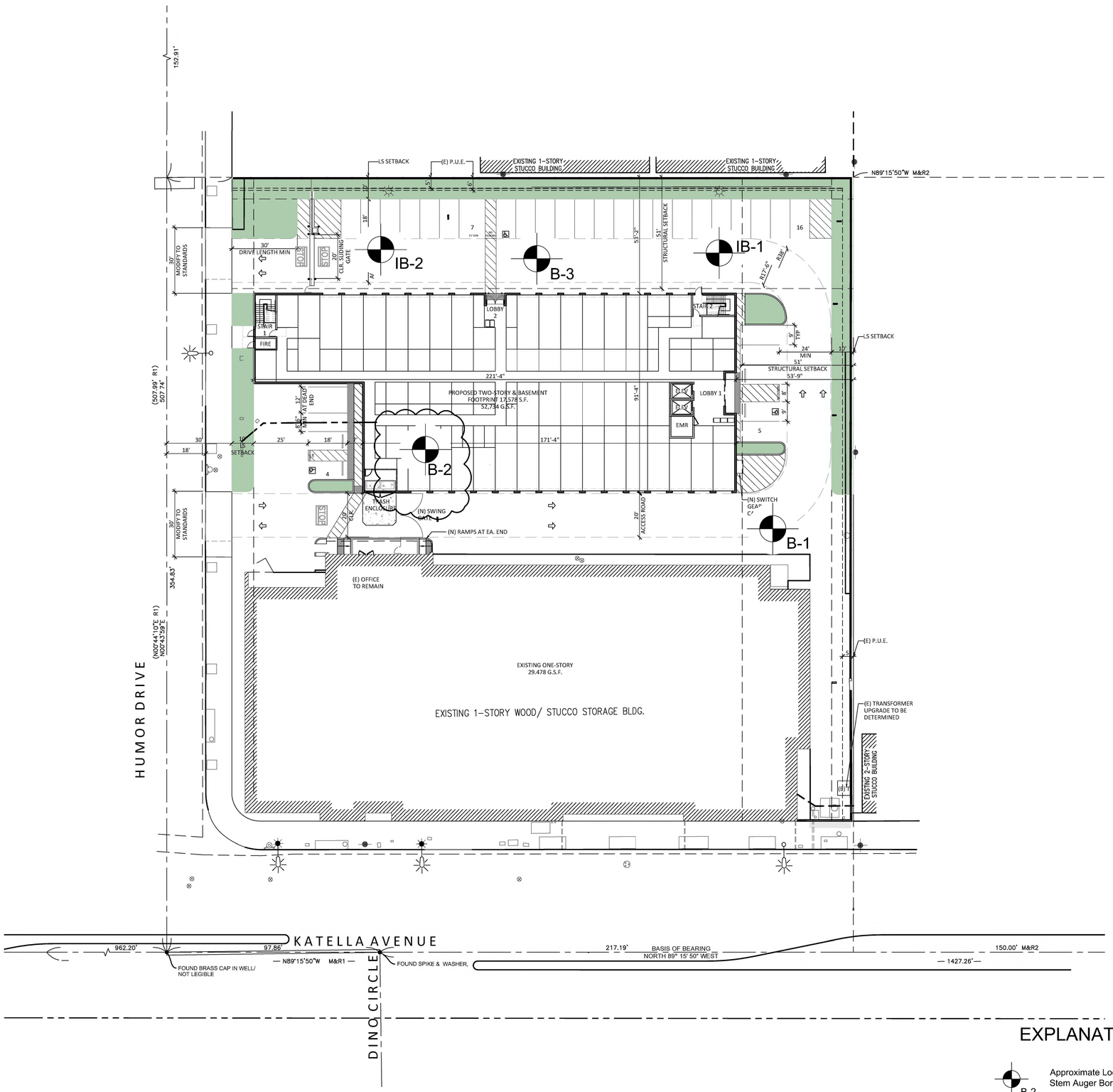
Work Order: 3239-0-0-100
Date 3/28/2023

Project Location	1761 West Katella Avenue	Boring/Test Number	IB-2	
Earth Description		Diameter of Boring (DIA)	8	inches
Tested By	TT	radius (in feet)	0.3333333	feet
Liquid Description	Clear Water	Depth of Boring	13	feet
Measurement Method	Sounder	Diameter of Casing	2	inches
Depth to Invert of BMP		Depth to Water Table	>50	feet
Start Time for Pre-Soak		Water Remaining in Boring (Y/N)	N	
		Std Time Interval Btween Rdngs	30	minutes
Start Time for Test	9:37			

Reading No.	Water Level start	Water Level end	Time start	time end	Δ Time (min)	H for surface area	h for volume	Surface Area (ft^2)	Volume (ft^3)	Raw Rate Volume / Surface Area (in/hr)
1	8	10.1	9:37	10:07	30	5	2.1	10.5	0.73	1.68
2	8	10.2	10:07	10:37	30	5	2.2	10.5	0.77	1.76
3	8	10.3	1.:37	11:07	30	5	2.3	10.5	0.80	1.84
4	8	10.3	11:07	11:37	30	5	2.3	10.5	0.80	1.84
5	8	10.3	11:37	12:07	30	5	2.3	10.5	0.80	1.84
6	8	10.3	12:07	12:37	30	5	2.3	10.5	0.80	1.84
7	8	10.3	12:37	1:07	30	5	2.3	10.5	0.80	1.84
8	8	10.3	1:07	1:37	30	5	2.3	10.5	0.80	1.84

Measured Rate = ave of last 3 readings = 1.84

apply reduction factor: 2 **0.92** **in/hr**



PROJECT DESCRIPTION

REDEVELOPMENT OF SITE WITH EXISTING ONE-STORY 29,478 S.F. SELF-STORAGE BUILDING TO REMAIN AND PROPOSED CONSTRUCTION OF TWO-STORY WITH BASEMENT SELF-STORAGE BUILDING.

PROJECT INFORMATION

PROJECT ADDRESS:	1761 W. KATELLEA AVENUE, ANAHEIM, CA 92804	
SITE APN:	128-542-011	
SITE AREA GROSS:	84,010 S.F.	OR 1.93 ACRES
EXISTING ZONE:	C-G GENERAL COMMERCIAL	
PROPOSED ZONE:	NO CHANGE	
GENERAL PLAN:	RESIDENTIAL-LOW-MEDIUM	
EXISTING USE:	SELF-STORAGE W/ CUP GRANTED	
HISTORICAL LAND USE PERMITS:	CUP3779, SUBTTM3258, VAR1376, VAR2181	
USE (PROPOSED):	SELF-STORAGE CUP REQUIRED INCLUDES VARIANCES FOR PARKING AND F.A.R.	
LOT COVERAGE MAX ALLOWED:	NONE INDICATED	
LOT COVERAGE EXISTING:	40%	
LOT COVERAGE PROPOSED:	TBD	
F.A.R. ALLOWED:	0.50	
F.A.R. EXISTING:	0.77	62,239 S.F.
F.A.R. PROPOSED:	0.98	(82,212 S.F./ 84,010 S.F.)
SETBACKS REQUIRED:		
FRONT LANDSCAPE:	10' ABUTTING LOCAL STREET	
FRONT STRUCTURAL:	10' ABUTTING LOCAL STREET	
SIDE LANDSCAPE:	10' ABUTTING RESIDENTIAL & LOCAL STREET	
STRUCTURAL ALONG RESIDENTIAL ZONE:	51'	
REAR LANDSCAPE:	10' ABUTTING RESIDENTIAL	
REAR STRUCTURAL ALONG RESIDENTIAL :	51'	
SETBACKS PROVIDED:		
FRONT LANDSCAPE:	10'	
FRONT STRUCTURAL:	36'-5"	
SIDE LANDSCAPE:	10'	
STRUCTURAL ALONG RESIDENTIAL ZONE:	52'	
REAR LANDSCAPE:	10'	
REAR STRUCTURAL ALONG RESIDENTIAL :	53'-2"	
* **STRUCTURAL HEIGHT MAX::**	28' (2-STORIES)	
STRUCTURAL HEIGHT PROPOSED:	25'-4" (2-STORIES)	

LANDSCAPE REQUIREMENTS:
LANDSCAPING SHALL BE PERMITTED AND/OR REQUIRED IN INDUSTRIAL ZONES, SUBJECT TO CHAPTER 18.46.

FENCES, WALL, & HEDGES:
FENCES, WALLS, HEDGES, AND BERMS SHALL BE PERMITTED AND/ OR REQUIRED IN INDUSTRIAL ZONES, SUBJECT TO SECTION 18.46.110.

NOTES:
* 1. THE MAX STRUCTURAL HEIGHT IS BASED ON THE DISTANCE OF THE COMMERCIAL BUILDING FROM ANY SINGLE-FAMILY ZONE.

BUILDING AREA

TOTAL BUILDING AREA OF EXISTING BLDG(S):	32,757 S.F.	(2 EXISTING BUILDINGS)
EXISTING BLDG AREA TO BE DEMOLISHED:	-3,279 S.F.	
TOTAL:	29,478 S.F.	
PROPOSED BUILDING (G.S.F.):		
BASEMENT STORAGE:	17,578 S.F.	
1ST FLOOR STORAGE:	17,578 S.F.	
2ND FLOOR STORAGE:	17,578 S.F.	
TOTAL:	52,734 S.F.	
TOTAL GROSS SQUARE FOOTAGE:	82,212 S.F.	
NET INCREASE IN BUILDING FLOOR AREA:	52,734 S.F.	

CAR & BIKE PARKING ANALYSIS

PARKING PROVIDED FOR (E) SELF-STORAGE: PER SCTION 18.42	75 SP	
PARKING REQUIRED FOR NEW BUILDING: PER SECTION 18.42	REQUIRES PARKING DEMAND STUDY	
TOTAL PARK'G PROVIDED FOR SELF-STORAGE:	32 SP	
ACCESSIBLE PARKING REQUIRED:	1 SP	
ACCESSIBLE PARKING PROVIDED: (INCLUDED IN TOTAL PROVIDED)	3 SP	
EV / CAV SPACES REQUIRED:		
CLEAN AIR VEHICLES SPACES REQ'D:	1 SP	(5.106.5.2) TBD
EV CHARGING SPACES REQ'D:	0 SP	(5.106.5.3.3 AND TABLE 11B-228.3.2
EV CHARGING/ EV/CAV PROVIDED: (INCLUDED IN TOTAL PROVIDED)	0 SP	(INCLUDES --EVCS)**

* IF THE CALCULATION OF PARKING RESULTS IN THE REQUIREMENT FOR A FRACTION OF A PARKING SPACE, SUCH A PARKING SPACE NEED NOT BE PROVIDED UNLESS THE FRACTION EXCEEDS 50%

** FUTURE CHARGING SPACES QUALIFY AS DESIGNATED PARKING AS DESCRIBED IN 5.106.5.2 DESIGNATED PARKING FOR CLEAN AIR VEHICLES

BIKE PARKING REQUIRED: (FOR INDUSTRIAL)		
LONG TERM:	TBD	
SHORT TERM:	TBD	
	0 SP	TOTAL MINIMUM
BIKE PARKING PROVIDED:	TBD	LONG TERM
	TBD	SHORT TERM

Boring Location Map

EXPLANATION

- B-2 — Approximate Location of Hollow Stem Auger Boring
- B-1 — Approximate Location of Infiltration Test Boring
- Area of Encountered Pea Gravel Limits Unknown

Gorian & Associates, Inc. *Applied Earth Sciences*		
Job No: 3239-0-0-100		Date: March 2023
Scale: 1"=20'	Drawn by:	PLATE 1
	Approved by:	

NORTH

0 5' 10' 20' 40'
scale: 1" = 20'-0"

Extra Space® Storage

1761 W. KATELLA AVENUE, ANAHEIM , CA 92804
APN 128-542-011

CONCEPTUAL SITE PLAN - STUDY
01.17.23

KSP STUDIO
architecture + engineering
23 ORCHARD ROAD, SUITE 200
LAKE FOREST,CA 92630
T 949.380.3970 F 949.380.3771

Attachment F

Notice of Transfer of Responsibility Form

Exhibit D

Water Quality Management Plan
Notice of Transfer of Responsibility

Tracking No. Assigned by the City of Anaheim: _____

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

I. Previous Owner/Previous Responsible Party Information

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

II. Information about Site Transferred

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

III. New Owner/New Responsible Party Information

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

IV. Ownership Transfer Information

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

Note: When the Previous Owner is transferring a Site that is a portion of a larger project/parcel addressed by the WQMP, as opposed to the entire project/parcel addressed by the WQMP, the General Description of the Site transferred and the remainder of the project/parcel not transferred shall be set forth as maps attached to this notice. These maps shall show those

portions of a project/parcel addressed by the WQMP that are transferred to the New Owner (the Transferred Site), those portions retained by the Previous Owner, and those portions previously transferred by Previous Owner. Those portions retained by Previous Owner shall be labeled "Previous Owner," and those portions previously transferred by Previous Owner shall be labeled as "Previously Transferred."

V. Purpose of Notice of Transfer

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

VI. Certifications

A. Previous Owner

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

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

B. New Owner

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

Printed Name of New Owner Representative	Title
Signature	Date

Attachment G

City of Anaheim Correspondence, if Applicable

Attachment H

Any Additional Pertinent Appendices