APPENDIX G

WATER QUALITY MANAGEMENT PLAN (WQMP) AND PRELIMINARY HYDROLOGIC & HYDRAULIC DRAINAGE REPORT

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Water Quality Management Plan (WQMP)

Project Name:

Enterprise Business Center

26200 Enterprise Way

Prepared for:

IPT Enterprise Business Center LLC

4675 MacArthur Court, Suite 625

Newport Beach, California, 92660

(949) 892-4911

Prepared by:

Kier + Wright

October 15, 2024

Engineer David G. Readler Registration No. 76867

8955 Research Drive

Irvine, California, 92618

(949) 508-0202

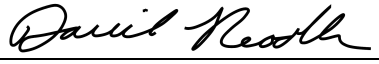
Project Owner's Certification

Permit/Application No.	06-21-5437	Grading Permit No.	
Tract/Parcel Map No.	APN: 610-401-06	Building Permit No.	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract)			

This Water Quality Management Plan (WQMP) has been prepared for IPT Enterprise Business Center LLC. by Kier & Wright. The WQMP is intended to comply with the requirements of the local 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 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: IPT Enterprise Business Center LLC.			
Name	Christopher Sanford		
Company	IPT Enterprise Business Center LLC.		
Address	4675 MacArthur Court, Suite 625, Newport Beach, CA 92660		
Email	Chris.sanford@aresmgmt.com		
Telephone #	(949) 892-4911		
Signature		Date	

Preparer (Engineer): David G. Readler, PE, QSD			
Title	Principal	PE Registration #	76867
Company	Kier & Wright		
Address	8955 Research Drive, Irvine, CA 92618		
Email	Greadler@kierwright.com		
Telephone #	(949) 508-0202		
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	10/15/2024
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Section I Discretionary Permit(s) and Water Quality Conditions

Project Information			
Permit/Application No.	06-21-5437	Tract/Parcel Map No.	APN: 610-401-06
Additional Information/ Comments:			
Water Quality Conditions			
Water Quality Conditions (list verbatim)	• New development projects that create 10,000 square feet or more of impervious surface. This category includes commercial, industrial, residential housing subdivisions, mixed-use, and public projects on private or public property that falls under the planning and building authority or the Permittees.Parking lot area of 5,000 square feet or more, or with 15 of more parking spaces, and potentially urban runoff. • 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. • Parking lots 5,000 square feet or more including associated drive aisle, and potentially exposed to urban stormwater runoff. A parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. • WQMP must be approved prior to issuance of grading permit.		
Watershed-Based Plan Conditions			
Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	Newport Bay Watershed WIHMP		

Section II Project Description

II.1 Project Description

The proposed project is classified as a "priority" project. The proposed project includes the demolition and removal of one two-story building of 74,960 sf footprint with 144,906 total square footage, as well a majority of the parking lot. The existing parking lot area was 265,897 sf. The existing site drained to various curb inlets thoughout the parking lot where it then was routed out to the public network. The proposed building will be 160,810 sf and the proposed parking area will be 159,444 sf. The proposed landscape for the site will be 36,519 sf. The proposed site will flow to various new inlets and one existing inlet where they will be treated by linear modular wetland systems. After treatment, the stormwater will exit the site using the existing connections to the public network. The peak flow leaving the site will be reduced by 47% by the use of an underground detention system and orifice. The total disturbed soil area is 366,687 square feet.

Description of Proposed Project

Development Category (Verbatim from WQMP):	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			
Project Area (ft_2): 367,447	Number of Dwelling Units: 0		SIC Code: 4226	
Narrative Project Description:	Single story spec warehouse with parking, landscaping, and two floors of office space. Existing site to be demolished.			
Project Area	Pervious		Impervious	
	Area (acres or sq ft)	Percentage	Area (acres or sq ft)	Percentage
Pre-Project Conditions	70,311 sf	19.1%	297,107 sf	80.9%
Post-Project Conditions	40,145 sf	10.9%	327,302 sf	89.1%
Drainage Patterns/Connections	The existing drainage patterns will be preserved.			

II.2 Potential Stormwater Pollutants

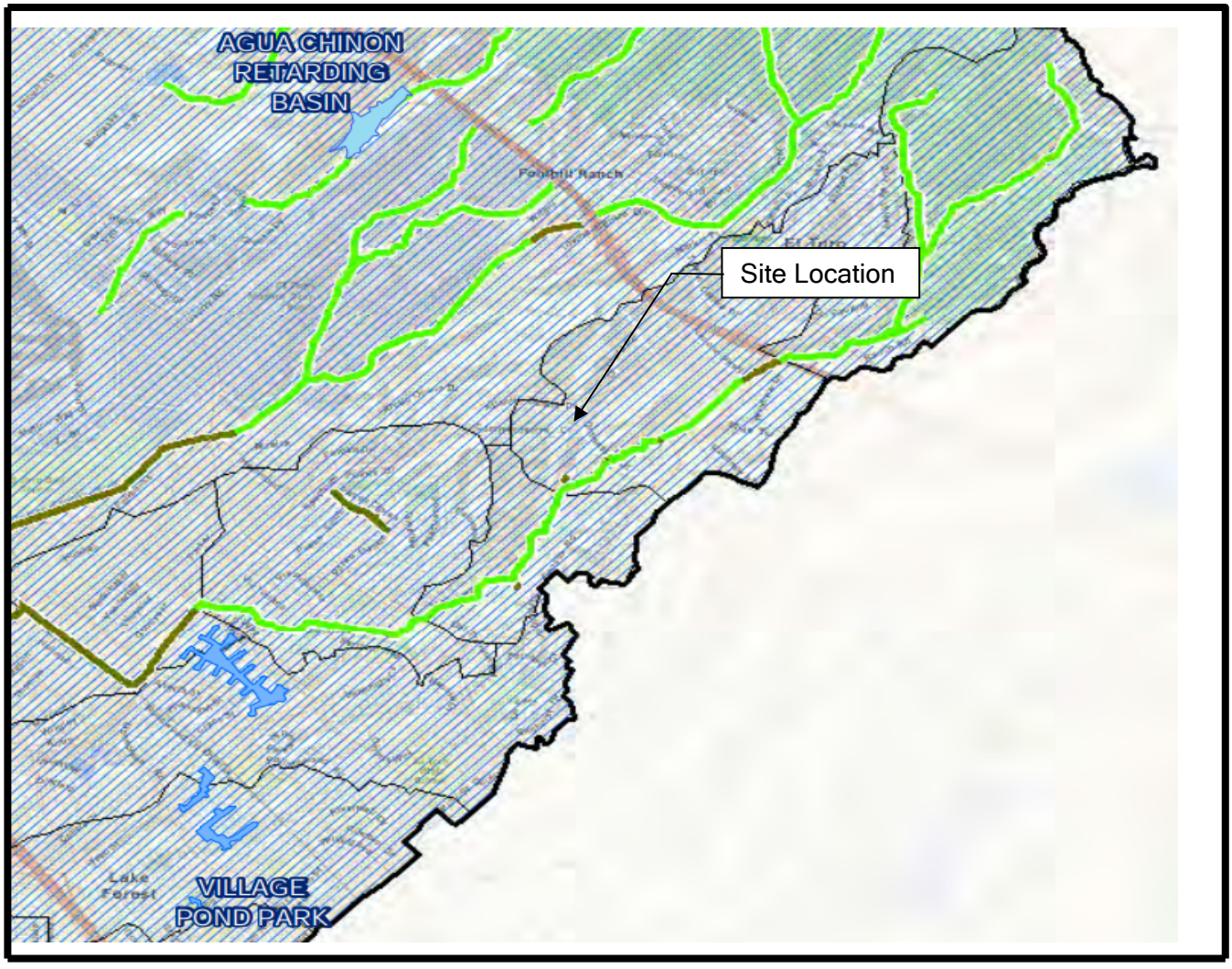
Pollutants of Concern			
Pollutant	Circle One: E=Expected to be of concern N=Not Expected to be of concern		Additional Information and Comments
Suspended-Solid/ Sediment	(E)	N	Erosion control to be provided. Runoff will be treated before being discharged.
Nutrients	(E)	N	Runoff will be treated before being discharged.
Heavy Metals	(E)	N	Per TGD Table 2.1 in Section 2.2.2.2
Pathogens (Bacteria/Virus)	(E)	N	Per TGD Table 2.1 in Section 2.2.2.2
Pesticides	(E)	N	Per TGD Table 2.1 in Section 2.2.2.2
Oil and Grease	(E)	N	From parked vehicles and trucks. Runoff will be treated before being discharged.
Toxic Organic Compounds	(E)	N	Per TGD Table 2.1 in Section 2.2.2.2
Trash and Debris	(E)	N	Trash will be disposed of within dumpsters. Site maintenance will be provided by local congregations on a weekly basis.

II.3 Hydrologic Conditions of Concern

☐ No

☒ Yes

Figure XVI-3 from the TGD indicates the site is in an area with downstream streams that are susceptible to potential erosion.



II.4 Post Development Drainage Characteristics

The proposed site will be split into three drainage areas where the runoff will be treated and then discharged into the public system. Drainage will be routed to underground detention chambers before treatment to reduce the peak flow leaving. Since the existing parking is being demolished and removed, new curb and gutter will be utilized to flow runoff to these curb inlets. We will utilize the two existing connections to the public storm drain network to convey the flow off the site. The site has little offsite flow as the developed areas around it contain their own runoff. The existing public storm drain outfalls to Serrano Creek southwest of our site at the end Prism Place.

II.5 Property Ownership/Management

Describe property ownership/management. *Refer to Section 2.2.5 in the TGD.*

The owner of the property is **IPT ENTERPRISE BUSINESS CENTER LLC.**

Section III Site Description

III.1 Physical Setting

Planning Area/ Community Name	Pacific Commercentre Planned Community
Location/Address	26200 Enterprise Way
	Lake Forest, CA, 92630
Land Use	Office Space / Industrial
Zoning	LI – Light Industrial
Acreage	8.43
Predominant Soil Type	Group D Soils/Dense Silty Sands with varying clay content

III.2 Site Characteristics

Precipitation Zone	Type I rainfall distribution
Topography	The terrain slopes northeast to southwest with slopes generally less than 6%.
Drainage Patterns/Connections	The existing parking lot utilizes gutters to convey flow to catch basins throughout the lot
Soil Type, Geology, and Infiltration Properties	Soil Type D/ Dense Silty Sand with 0.1-0.3 in/hr Infiltration (See Appendix E – Web Soil Survey, Appendix C – Geotechnical Soils Report, and Appendix D – Infiltration Report)

Site Characteristics (continued)	
Hydrogeologic (Groundwater) Conditions	Groundwater was not encountered during any drilling of any of the bores. Due to this, the static groundwater table is considered to have existed at a depth in excess of 30 feet at the time.
Geotechnical Conditions (relevant to infiltration)	The majority of the site is silty sands and clayey sands with a very slow infiltration rate.
Off-Site Drainage	No offsite drainage is entering or crossing the site.
Utility and Infrastructure Information	Electrical, sanitary, and water will be supplied to the building.

III.3 Watershed Description

Receiving Waters	Serrano Creek to San Diego Creek to the Pacific Ocean
303(d) Listed Impairments	Ammonia (unionized), benthic community effects, indicator bacteria, pH, toxicity
Applicable TMDLs	Sediment, Nutrient, Toxic
Pollutants of Concern for the Project	Metals
Environmentally Sensitive and Special Biological Significant Areas	Serrano Creek susceptible to erosion due to high flows leaving the site. See Appendix I

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

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

- If the project has an approved WIHMP or equivalent, then any watershed specific criteria must be used, and the project can evaluate participation in the approved regional or sub- regional opportunities. The local Permittee planning or NPDES staff should be consulted regarding the existence of an approved WIHMP or equivalent.
- Determine applicable hydromodification control performance criteria. *Refer to Section 7.II- 2.4.2.2 of the Model WQMP.*
- Determine applicable LID performance criteria. *Refer to Section 7.II-2.4.3 of the Model WQMP.*
- Determine applicable treatment control BMP performance criteria. *Refer to Section 7.II-*3.2.2 *of the Model WQMP.*
- Calculate the LID design storm capture volume for the project. *Refer to Section 7.II-2.4.3 of the Model WQMP.*

(NOC Permit Area only) Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?	YES ☐	NO ☒
If yes, describe WIHMP feasibility criteria or regional/sub-regional LID opportunities.		

Project Performance Criteria (continued)	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	Hydrologic Condition of Concern does exist in the discharge to Serrano Creek. The 100-year peak flow contributing to Serrano Creek must be reduced by 40%
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	Underground pipe storage system is being used to reduce the discharge by 47% as requested per Appendix G.
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	Modular Wetland Systems for treatment of runoff.
Calculate LID design storm capture volume for Project.	Calculations shown on following sheet (IV.2. SITE DESIGN AND DRAINAGE PLAN) page 13.

IV.2. SITE DESIGN AND DRAINAGE PLAN

Describe site design and drainage plan including

- The site will be split into three drainage areas where flow will be directed to curb inlets and treated. Parts of the existing curb and gutter will be utilized to convey flow towards proposed catch basins. The roof drains will discharge to the treatment area before being sent to an underground pipe storage system for detention and outflow control.
- Three DMA's have been designed with catch basins and treatment systems to capture flow
- WQMP plot plan: see sheets PG and Storm Water Quality Control Plan for the conceptual grading and drainage plan.
- Volume based design was used to size the DMB's for each drainage area:

DMA No.	Area (SF)	Area (AC)	Landscape (SF)	Landscape (AC)	Imperv. (SF)	Imperv. (AC)	TREATMENT VOL. (CF)	BIOCLEAN MODEL NUMBER
1	190,975	4.38	17,549	0.4	173,426	3.98	12,565	MWS-L-6-8-9'-5"-V
2	65,792	1.51	7,947	0.18	57,845	1.33	4,216	MWS-L-4-8-7'-7"-V
3	110,680	2.54	14,649	0.34	96,031	2.2	7,016	MWS-L-6-8-11'-3"-V-HC

MEDIA FILTER SIZING CALCULATIONS

d (IN)= 0.95
C= (0.75*Imp. Area)+0.15
A (SF)= Tributary Area
DCV= Design Capture Volume (CF)= C*d*A/12

DMA No.	Total Area (SF)	Impervious Area (SF)	% Impervious	Pervious Area (SF)	% Pervious
1	190,975	173,426	0.91	17,549	0.09
2	65,792	57,845	0.88	7,947	0.12
3	110,680	96,031	0.87	14,649	0.13
Total	256,767				

C	d	A (SF)	DCV (CF)	A (AC)
0.831081	0.95	190,975	12,565	4.38
0.809408	0.95	65,792	4,216	1.51
0.800734	0.95	110,680	7,016	2.54
		Total	16,781	

IV.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS

IV.3.1 Hydrologic Source Controls

Hydrological source control BMPs are not used on our project as we are treating all of the stormwater on site and controlling the flow once it has been treated to meet a 40% reduction in total flow leaving the site. We are treating the site's stormwater with modular wetland systems placed throughout the site where runoff will be treated before being released. We are achieving the reduction in flow by storing a large portion of the runoff and releasing it at a controlled rate.

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

IV.3.2 Infiltration BMPs

Infiltration BMPs are not to be used on this project. From the Infiltration Report found in Appendix D, "Based on the results of the infiltration testing at the subject site, infiltration is not considered feasible at this site due to the presence of dense engineered fill soils, comprised of silty sands and clayey sands, which possess very poor infiltration characteristics."

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

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

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

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

Underground detention system is to reduce the overall flow leaving the site by 40%.

IV.3.4 Biotreatment BMPs

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

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: Modular Wetland Systems	☒
Other:	☐

IV.3.5 Hydromodification Control BMPs

Flow leaving the site must be reduced by 40%. This is achieved by having the largest DMA flow to an underground pipe storage system and controlling the outflow.

Hydromodification Control BMPs	
BMP Name	**BMP Description**
Underground pipe storage system	Flow is sent here and the outlet is controlled to allow for a 40% reduction in overall flow. Flow is then treated before leaving the site.

IV.3.6 Treatment Control BMPs

Modular wetland systems will be used to treat stormwater on site.

Treatment Control BMPs	
BMP Name	**BMP Description**

IV.3.7 Non-structural Source Control BMPs

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

Non-Structural Source Control BMPs

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

IV.3.8 Structural Source Control BMPs

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

Structural Source Control BMPs

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 material stored outside.
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	☒	☐	
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☒	No dewatering on site.
S6	Dock areas	☒	☐	
S7	Maintenance bays	☐	☒	No maintenance bays.
S8	Vehicle wash areas	☐	☒	No vehicle wash areas.
S9	Outdoor processing areas	☐	☒	No outdoor processing areas.
S10	Equipment wash areas	☐	☒	No equipment wash areas,
S11	Fueling areas	☐	☒	No fueling areas
S12	Hillside landscaping	☒	☐	
S13	Wash water control for food preparation areas	☐	☒	No food prep areas.
S14	Community car wash racks	☐	☒	No car wash racks.

IV.4 ALTERNATIVE COMPLIANCE PLAN (IF APPLICABLE)

IV.4.1 Water Quality Credits

Water quality credits are not applicable.

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

IV.4.2 Alternative Compliance Plan Information

Alternative compliance plan is not applicable.

Section V Inspection/Maintenance Responsibility for BMPs

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

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
Modular Wetland System	Owner	Remove trash	Remove trash every 6-12 months
Modular Wetland System	Owner	Remove sediment	Remove sediment every 12-24 months
Modular Wetland System	Owner	Replace cartridge filter,	Replace cartridge filter every 12-24 months
Modular Wetland System	Owner	Replace drain down filter.	Replace drain down filter every 12-24 months
Education of property owners, tenants, and occupants	Owner	Distribute practical information materials that contribute to the protection of stormwater quality.	Prior to construction and as needed
Activity restrictions	Owner	Restricts activities that compromise the surface water quality	As needed
Common area landscape management	Owner	Refer to CASQA BMP Handbook (SC-73)	Weekly and as needed

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
Underground storage tank compliance	Owner	Ensure that underground storage tanks comply with state regulations	As needed
Uniform fire code implementation	Owner	Compliance with Article 80 of the Uniform Fire Code	During construction and as needed
Common area litter control	Owner	Refer to CASQA BMP Handbook (SC-60)	Weekly and as needed
Employee training	Owner	Training employees of businesses on practical information materials that contribute to the protection of stormwater quality	At hire and as needed
Houekeeping of loading docks	Owner	Refer to CASQA BMP Handbook (S-31)	Weekly and as needed
Common area catch basin inspection	Owner	Refer to CASQA BMP Handbook (SC-74)	80% of the area inspected, cleaned, and maintained annually with 100% of the facilities included in a two-year period
Street sweeping private streets and parking lots	Owner	Refer to CASQA BMP Handbook (SC-43 and SC-70)	Swept prior to the storm season and prior of the rainy season
Provide storm drain system stenciling and signange	Owner	Refer to CASQA BMP Handbook (SD-13)	Prior to construction and as needed

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
Design and construct trash and waste storage areas to reduce pollution introduction	Owner	Refer to CASQA BMP Handbook (SD-32)	During design and construction phase
Use efficient irrigation systems and landscape design, water conservation, smart controllers, and source control	Owner	Refer to CASQA BMP Handbook (SD-12)	During design and construction phase
Protect slopes and channels and provide energy dissipation	Owner	Install permanent stabilization BMP's on disturbed slopes and inspect for large debris that would disrupt flow	Prior to a rain event and as needed, check monthly.
Dock areas	Owner	Refer to CASQA BMP Handbook (SD-31)	Weekly and as needed
Hillside landscaping	Owner	Refer to CASQA BMP Handbook (SD-10)	Prior to a rain event and as needed

Section VI Site Plan and Drainage Plan

VI.1 SITE PLAN AND DRAINAGE PLAN

- See appendix for drainage plan.

VI.2 ELECTRONIC DATA SUBMITTAL

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

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

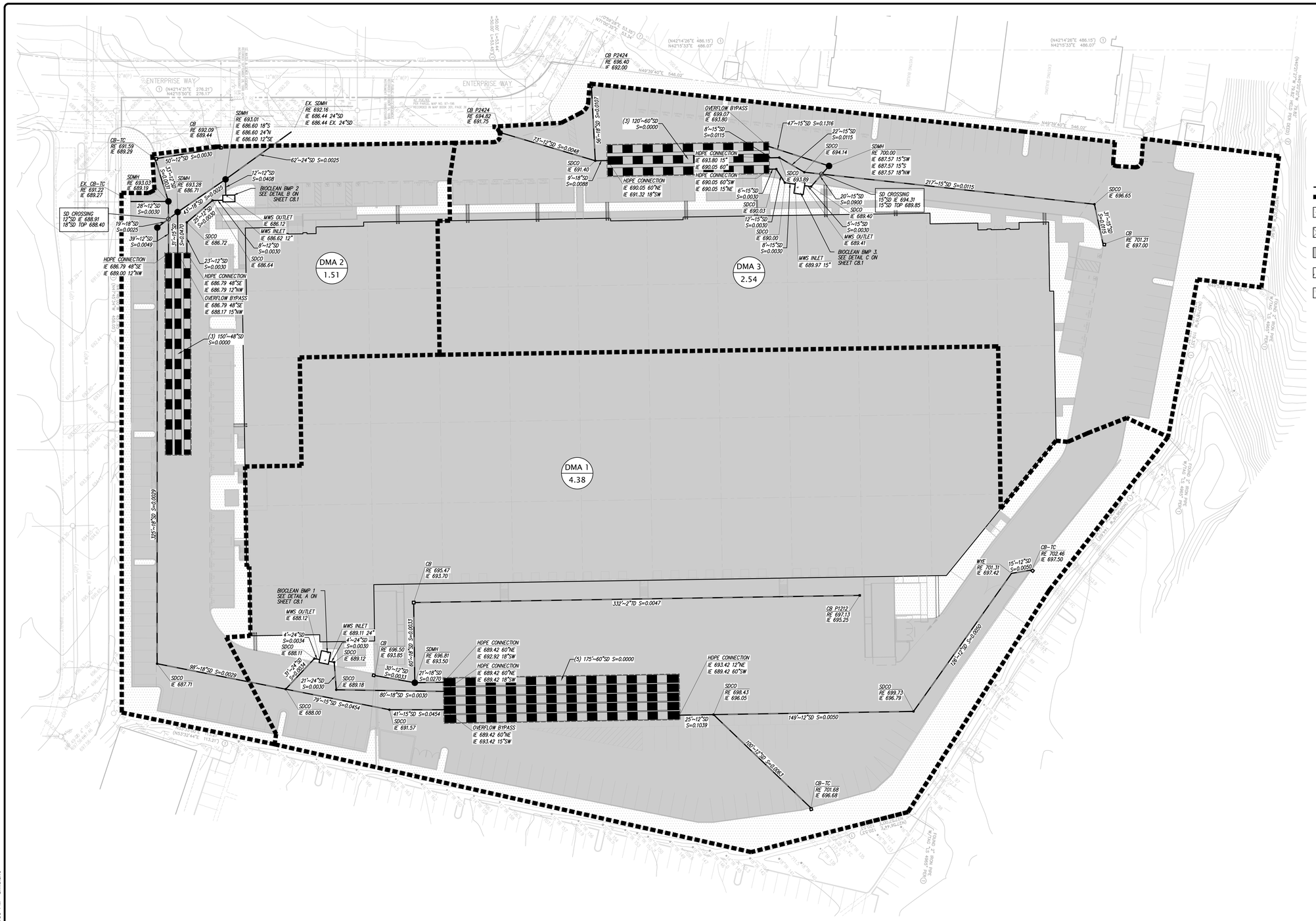
Section VII Educational Materials

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

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

Appendix A

Storm Water Quality Control Plan



DMA No.	Area (SF)	Area (AC)	Landscape (SF)	Landscape (AC)	Imperv. (SF)	Imperv. (AC)	TREATMENT VOL. (CF)	BIOCLEAN MODEL NUMBER
1	190,975	4.38	17,549	0.4	173,426	3.98	12,565	MWS-L-6-8-9'-5"-V
2	65,792	1.51	7,947	0.18	57,845	1.33	4,216	MWS-L-4-8-7'-7"-V
3	110,680	2.54	14,649	0.34	96,031	2.2	7,016	MWS-L-6-8-11'-3"-V-HC

BY | NO. | REVISION

BY | NO. | REVISION

REGISTERED PROFESSIONAL ENGINEER
CURTIS G. WEBER
No. 76867
CIVIL
STATE OF CALIFORNIA

KIER+WRIGHT
163 Technology Drive
Irvine, CA 92620
Phone: (949) 508-0202
www.kierwright.com

STORM WATER QUALITY CONTROL PLAN
OF
26200 ENTERPRISE WAY
FOR
IPT ENTERPRISE BUSINESS CENTER LLC
LAKE FOREST, CALIFORNIA

DATE	OCTOBER, 2024
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C8.0
OF	14 SHEETS

Z:\2021\A21532\DWG\CDS\BUILDING PERMIT\A21532_CDS-SWQ.dwg 10-15-24 04:54:06 PM omiciano

Appendix B

BMP Maintenance Manual

Bio Clean

A Forterra Company

Modular Wetlands® Linear

A Stormwater Biofiltration Solution

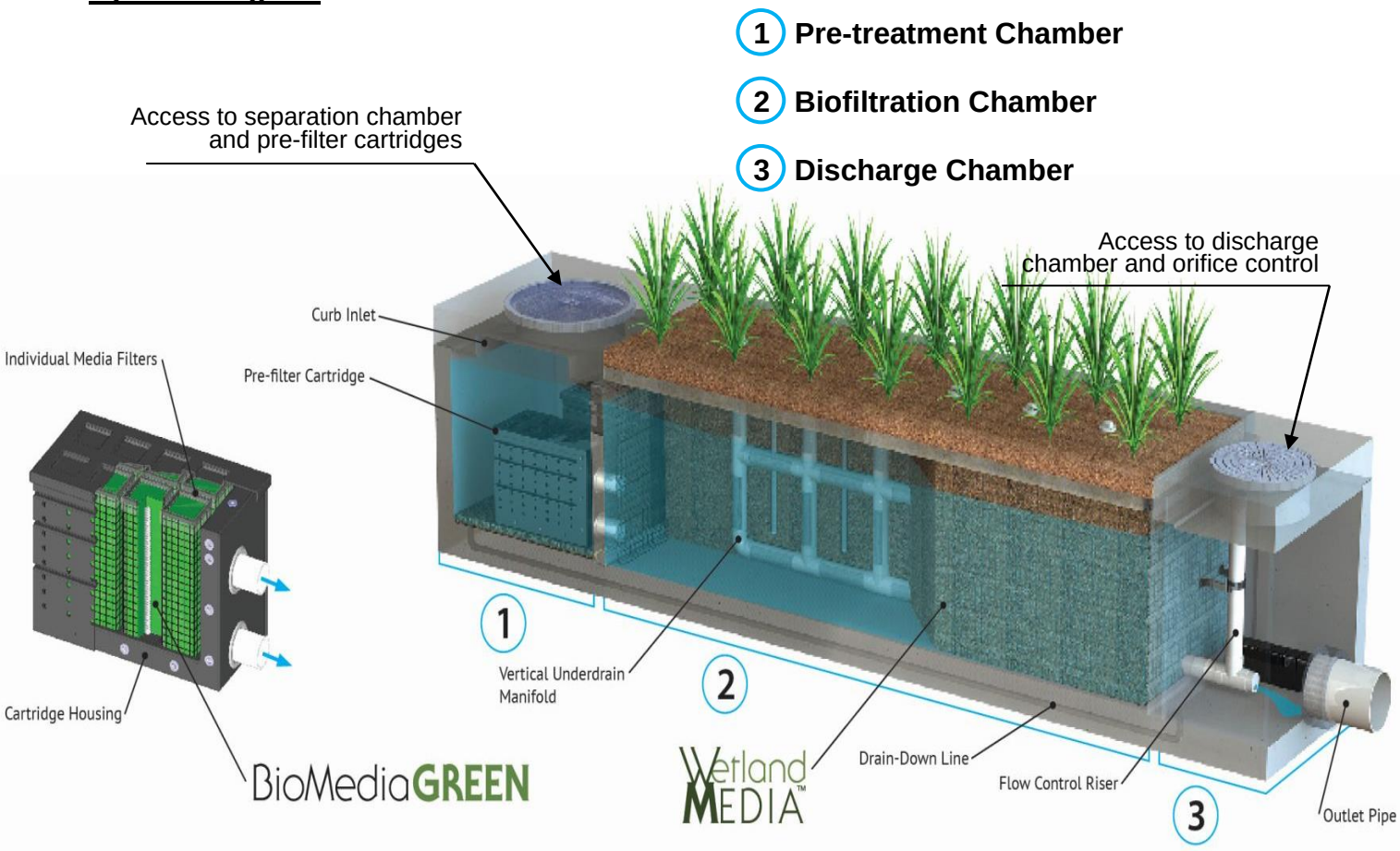
OPERATION & MAINTENANCE MANUAL

Inspection Guidelines for Modular Wetland System - Linear

Inspection Summary

- Inspect Pre-Treatment, Biofiltration and Discharge Chambers – average inspection interval is 6 to 12 months.
  - (1*5 minute average inspection time*).
- NOTE: Pollutant loading varies greatly from site to site and no two sites are the same. Therefore, the first year requires inspection monthly during the wet season and every other month during the dry season in order to observe and record the amount of pollutant loading the system is receiving.

System Diagram



Inspection Overview

As with all stormwater BMPs inspection and maintenance on the MWS Linear is necessary. Stormwater regulations require that all BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess the site specific loading conditions. This is recommended because pollutant loading and pollutant characteristics can vary greatly from site to site. Variables such as nearby soil erosion or construction sites, winter sanding on roads, amount of daily traffic and land use can increase pollutant loading on the system. The first year of inspections can be used to set inspection and maintenance intervals for subsequent years to ensure appropriate maintenance is provided. Without appropriate maintenance a BMP will exceed its storage capacity which can negatively affect its continued performance in removing and retaining captured pollutants.

Inspection Equipment

Following is a list of equipment to allow for simple and effective inspection of the MWS Linear:

- Modular Wetland Inspection Form
- Flashlight
- Manhole hook or appropriate tools to remove access hatches and covers
- Appropriate traffic control signage and procedures
- Measuring pole and/or tape measure.
- Protective clothing and eye protection.
- 7/16” open or closed ended wrench.
- Large permanent black marker (initial inspections only – first year)
- Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system.

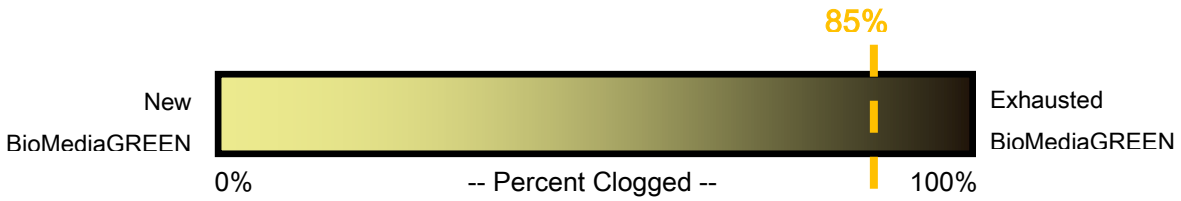
Inspection Steps

The core to any successful stormwater BMP maintenance program is routine inspections. The inspection steps required on the MWS Linear are quick and easy. As mentioned above the first year should be seen as the maintenance interval establishment phase. During the first year more frequent inspections should occur in order to gather loading data and maintenance requirements for that specific site. This information can be used to establish a base for long term inspection and maintenance interval requirements.

The MWS Linear can be inspected though visual observation without entry into the system. All necessary pre-inspection steps must be carried out before inspection occurs, especially traffic control and other safety measures to protect the inspector and near-by pedestrians from any dangers associated with an open access hatch or manhole. Once these access covers have been safely opened the inspection process can proceed:

- Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other info (see inspection form).
- Observe the inside of the system through the access hatches. If minimal light is available and vision into the unit is impaired utilize a flashlight to see inside the system and all of its chambers.
- Look for any out of the ordinary obstructions in the inflow pipe, pre-treatment chamber, biofiltration chamber, discharge chamber or outflow pipe. Write down any observations on the inspection form.
- Through observation and/or digital photographs estimate the amount of trash, debris and sediment accumulated in the pre-treatment chamber. Utilizing a tape measure or measuring stick estimate the amount of trash, debris and sediment in this chamber. Record this depth on the inspection form.

- Through visual observation inspect the condition of the pre-filter cartridges. Look for excessive build-up of sediments on the cartridges, any build-up on the top of the cartridges, or clogging of the holes. Record this information on the inspection form. The pre-filter cartridges can further be inspected by removing the cartridge tops and assessing the color of the BioMediaGREEN filter cubes (requires entry into pre-treatment chamber – see notes above regarding confined space entry). Record the color of the material. New material is a light green in color. As the media becomes clogged it will turn darker in color, eventually becoming dark brown or black. Using the below color indicator record the percentage of media exhausted.



- The biofiltration chamber is generally maintenance free due to the system's advanced pre-treatment chamber. For units which have open planters with vegetation it is recommended that the vegetation be inspected. Look for any plants that are dead or showing signs of disease or other negative stressors. Record the general health of the plants on the inspection and indicate through visual observation or digital photographs if trimming of the vegetation is needed.
- The discharge chamber houses the orifice control structure, drain down filter and is connected to the outflow pipe. It is important to check to ensure the orifice is in proper operating conditions and free of any obstructions. It is also important to assess the condition of the drain down filter media which utilizes a block form of the BioMediaGREEN. Assess in the same manner as the cubes in the Pre-Filter Cartridge as mentioned above. Generally, the discharge chamber will be clean and free of debris. Inspect the water marks on the side walls. If possible, inspect the discharge chamber during a rain event to assess the amount of flow leaving the system while it is at 100% capacity (pre-treatment chamber water level at peak HGL). The water level of the flowing water should be compared to the watermark level on the side walls which is an indicator of the highest discharge rate the system achieved when initially installed. Record on the form is there is any difference in level from watermark in inches.

- NOTE: During the first few storms the water level in the outflow chamber should be observed and a 6” long horizontal watermark line drawn (using a large permanent marker) at the water level in the discharge chamber while the system is operating at 100% capacity. The diagram below illustrates where a line should be drawn. This line is a reference point for future inspections of the system:

Using a permanent marker draw a 6 inch long horizontal line, as shown, at the higher water level in the MWS Linear discharge chamber.

- Water level in the discharge chamber is a function of flow rate and pipe size. Observation of water level during the first few months of operation can be used as a benchmark level for future inspections. The initial mark and all future observations shall be made when system is at 100% capacity (water level at maximum level in pre-treatment chamber). If future water levels are below this mark when system is at 100% capacity this is an indicator that maintenance to the pre-filter cartridges may be needed.
- Finalize inspection report for analysis by the maintenance manager to determine if maintenance is required.

Maintenance Indicators

Based upon observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components or cartridges.
- Obstructions in the system or its inlet or outlet.
- Excessive accumulation of floatables in the pre-treatment chamber in which the length and width of the chamber is fully impacted more than 18”.

- Excessive accumulation of sediment in the pre-treatment chamber of more than 6” in depth.

- Excessive accumulation of sediment on the BioMediaGREEN media housed within the pre-filter cartridges. The following chart shows photos of the condition of the BioMediaGREEN contained within the pre-filter cartridges. When media is more than 85% clogged replacement is required.

- Excessive accumulation of sediment on the BioMediaGREEN media housed within the drain down filter. The following photos show of the condition of the BioMediaGREEN contained within the drain down filter. When media is more than 85% clogged replacement is required.

- Overgrown vegetation.

- Water level in discharge chamber during 100% operating capacity (pre-treatment chamber water level at max height) is lower than the watermark by 20%.

Inspection Notes

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

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

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

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

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

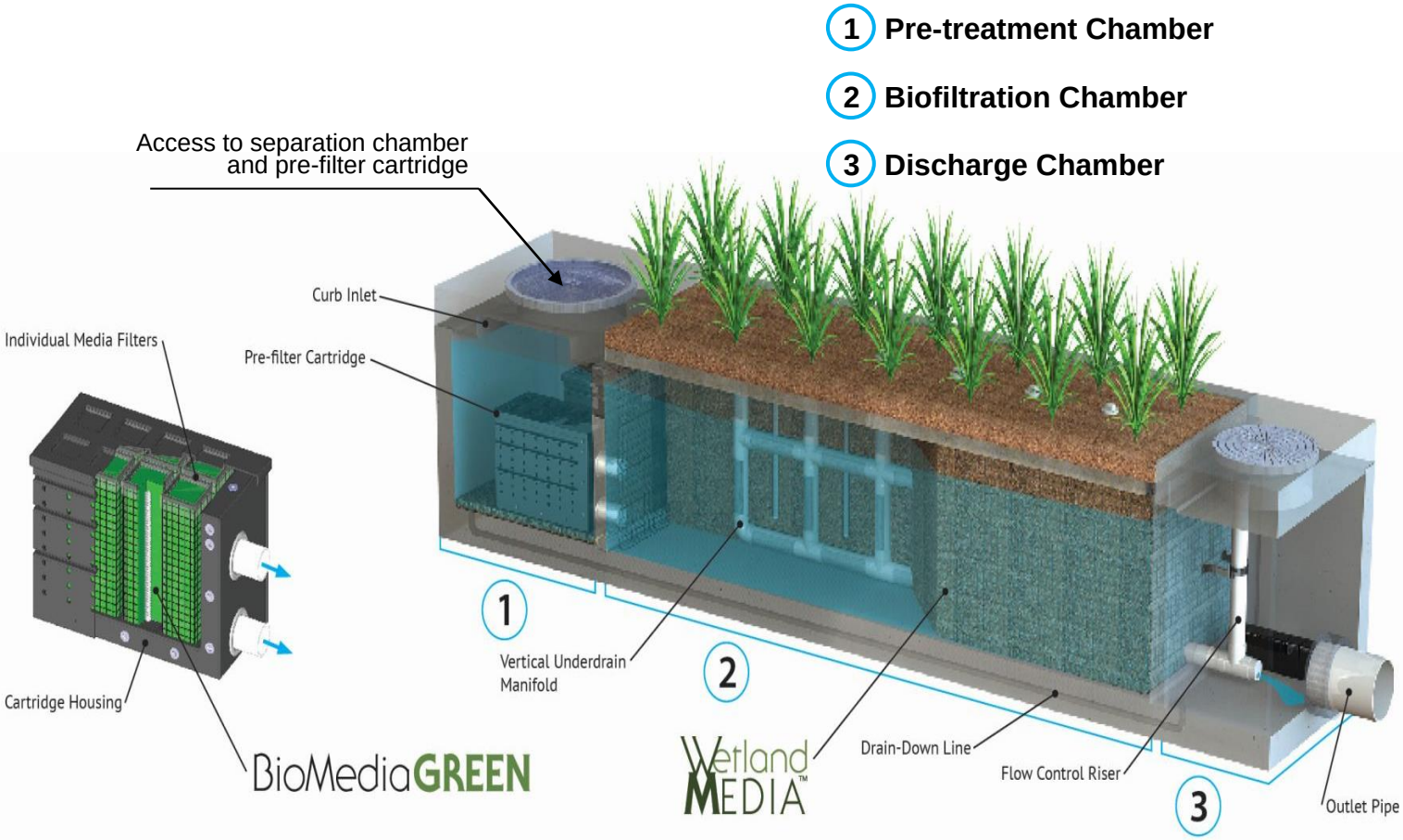
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may not require irrigation after initial establishment.

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Sediment from Pre-Treatment Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Pre-Filter Cartridge Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Maintenance Overview

The time has come to maintain your Modular Wetland System Linear (MWS Linear). To ensure successful and efficient maintenance on the system we recommend the following. The MWS Linear can be maintained by removing the access hatches over the systems various chambers. All necessary pre-maintenance steps must be carried out before maintenance occurs, especially traffic control and other safety measures to protect the inspector and near-by pedestrians from any dangers associated with an open access hatch or manhole. Once traffic control has been set up per local and state regulations and access covers have been safely opened the maintenance process can begin. It should be noted that some maintenance activities require confined space entry. All confined space requirements must be strictly followed before entry into the system. In addition the following is recommended:

- Prepare the maintenance form by writing in the necessary information including project name, location, date & time, unit number and other info (see maintenance form).
- Set up all appropriate safety and cleaning equipment.
- Ensure traffic control is set up and properly positioned.
- Prepare a pre-checks (OSHA, safety, confined space entry) are performed.

Maintenance Equipment

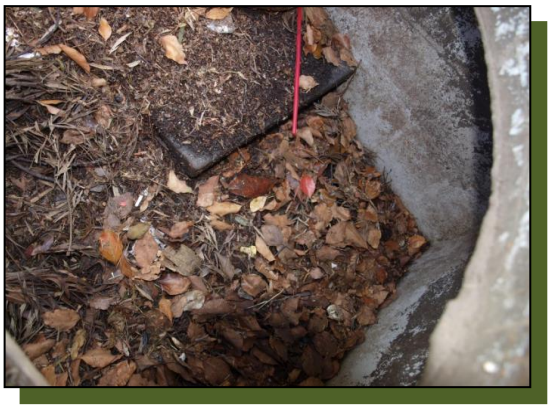
Following is a list of equipment required for maintenance of the MWS Linear:

- Modular Wetland Maintenance Form
- Manhole hook or appropriate tools to access hatches and covers
- Protective clothing, flashlight and eye protection.
- 7/16” open or closed ended wrench.
- Vacuum assisted truck with pressure washer.
- Replacement BioMediaGREEN for Pre-Filter Cartridges if required (order from manufacturer).

Maintenance Steps

1. Pre-treatment Chamber (bottom of chamber)

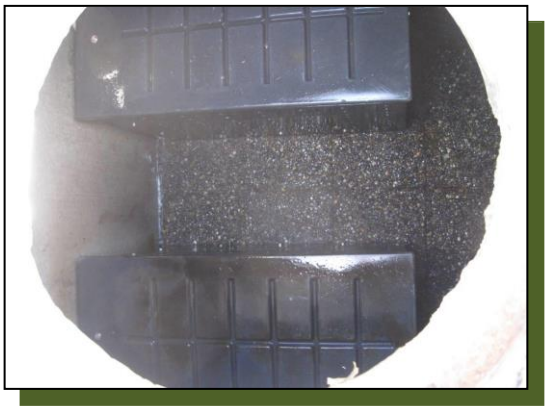
   A. Remove access hatch or manhole cover over pre-treatment chamber and position vacuum truck accordingly.
   B. With a pressure washer spray down pollutants accumulated on walls and pre-filter cartridges.
   C. Vacuum out Pre-Treatment Chamber and remove all accumulated pollutants including trash, debris and sediments. Be sure to vacuum the floor until pervious pavers are visible and clean.
   D. If Pre-Filter Cartridges require media replacement move onto step 2. If not, replace access hatch or manhole cover.



Removal of access hatch to gain access below.

Insertion of vacuum hose into separation chamber.

Removal of trash, sediment and debris.



Fully cleaned separation chamber.

2. Pre-Filter Cartridges (attached to wall of pre-treatment chamber)

A. After finishing step 1 enter pre-treatment chamber.

B. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.

Pre-filter cartridges with tops on.

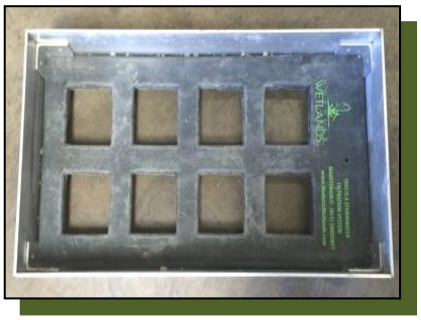
Inside cartridges showing media filters ready for replacement.

C. Place the vacuum hose over each individual media filter to suck out filter media.

Vacuuming out of media filters.

D. Once filter media has been sucked use a pressure washer to spray down inside of the cartridge and it's containing media cages. Remove cleaned media cages and place to the side. Once removed the vacuum hose can be inserted into the cartridge to vacuum out any remaining material near the bottom of the cartridge.

E. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase. Utilize the manufacture provided refilling trey and place on top of cartridge. Fill trey with new bulk media and shake down into place. Using your hands slightly compact media into each filter cage. Once cages are full removed refilling trey and replace cartridge top ensuring bolts are properly tightened.



Refilling trey for media replacement.

Refilling trey on cartridge with bulk media.

F. Exit pre-treatment chamber. Replace access hatch or manhole cover.

3. Biofiltration Chamber (middle vegetated chamber)

A. In general, the biofiltration chamber is maintenance free with the exception of maintaining the vegetation. Using standard gardening tools properly trim back the vegetation to healthy levels. The MWS Linear utilizes vegetation similar to surrounding landscape areas therefore trim vegetation to match surrounding vegetation. If any plants have died replace plants with new ones:

4. Discharge Chamber (contains drain down cartridge & connected to pipe)

A. Remove access hatch or manhole cover over discharge chamber.

B. Enter chamber to gain access to the drain down filter. Unlock the locking mechanism and left up drain down filter housing to remove used BioMediaGREEN filter block as shown below:

C. Insert new BioMediaGREEN filter block and lock drain down filter housing back in place. Replace access hatch or manhole cover over discharge chamber.

Inspection Notes

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

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

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

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

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

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may not require irrigation after initial establishment.

Inspection Form

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

www.modularwetlands.com

Maintenance Report

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

www.modularwetlands.com

Appendix C

Geotechnical Soils Report

GEOTECHNICAL INVESTIGATION
PROPOSED WAREHOUSE

26200 Enterprise Way
Lake Forest, California
for
Black Creek Group

SoCalGeo

SOUTHERN
CALIFORNIA
GEOTECHNICAL
A California Corporation

April 7, 2021

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Black Creek Group
4675 MacArthur Court, Suite 625
Newport Beach, California 92660

Attention: Mr. Chris Sanford
Senior Vice President, Development

Project No.: **21G135-1**

Subject: **Geotechnical Investigation**
Proposed Warehouse
26200 Enterprise Way
Lake Forest, California

Dear Mr. Sanford:

In accordance with your request, we have conducted a geotechnical investigation at the subject site. We are pleased to present this report summarizing the conclusions and recommendations developed from our investigation.

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Gregory K. Mitchell, GE 2364
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
GREGORY K. MITCHELL
No. 2364
GEOTECHNICAL
STATE OF CALIFORNIA

Robert G. Trazo, GE 2655

REGISTERED PROFESSIONAL ENGINEER
ROBERT TRAZO
No. 2655
GEOTECHNICAL
STATE OF CALIFORNIA

Distribution: (1) Addressee

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APPENDICES

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Plate 2: Boring Location Plan
Plate 3: Geologic Map
B Boring Logs
C Laboratory Test Results
D Grading Guide Specifications
E Seismic Design Parameters

1.0 EXECUTIVE SUMMARY

Presented below is a brief summary of the conclusions and recommendations of this investigation. Since this summary is not all inclusive, it should be read in complete context with the entire report.

Geotechnical Design Considerations

- The site is underlain by engineered fill soils and Capistrano formation sandstone bedrock. The bedrock generally consists of medium dense to very dense, poorly consolidated fine-grained sandstone. The fill soils possess relatively high strengths and favorable consolidation/collapse characteristics, indicate of engineered fill. We performed research at the City of Lake Forest in an attempt to obtain reports documenting the placement and compaction of any such fill soils. The City has no such records.
- The existing conditions will create a bedrock/fill transition within the proposed building area. It is also expected that the upper 3± feet of soils will be disturbed during demolition of the existing development. Based on these conditions, remedial grading will be necessary within the proposed building area to provide a pad suitable for support of the proposed structure.
- The existing pavements are in fair to good condition, and consideration may be given to reusing some of the existing pavements with the new development. However, the existing pavement thicknesses are not adequate to support any significant volume of truck traffic.
- The on-site soils possess a very low expansion potential.

Site Preparation Recommendations

- Demolition of the existing development should include foundations, floor slabs, utilities, pavements and any other subsurface improvements that will not remain in place with the new development. Debris resultant from demolition should be disposed of off-site. Concrete and asphalt debris may be crushed to a maximum 2-inch particle size, well-mixed with on-site soils, and reused in new structural fills.
- Initial site preparation should include stripping of any surficial vegetation within the landscaped planters that are demolished. The surficial vegetation, and any organic soils should be properly disposed of off-site.
- Remedial grading is recommended to be performed within the proposed building area in order to mitigate the bedrock/fill transitions, and to remove all soils disturbed during demolition of the existing building. The soils within the proposed building area should be overexcavated to a depth of 5 feet below existing grade and to a depth of at least 3 feet below proposed building pad subgrade elevations, whichever is greater.
- The proposed foundation influence zones should be overexcavated to a depth of at least 3 feet below proposed foundation bearing grade.
- Additional overexcavation should be performed in the southeastern region of the building pad to mitigate the bedrock/fill transition. This area of the pad should be overexcavated to a depth of 5 feet below foundation bearing grade.
- Following completion of the overexcavation, the exposed soils should be scarified to a depth of at least 12 inches and moisture treated to 0 to 4 percent above optimum moisture content. The subgrade soils should then be recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill.

- The new pavement and flatwork subgrade soils are recommended to be scarified to a depth of 12± inches, thoroughly moisture conditioned and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Foundation Design Recommendations

- Conventional shallow foundations, supported in newly placed compacted fill.
- 3,000 lbs/ft^2 maximum allowable soil bearing pressure.
- Reinforcement consisting of at least four (4) No. 5 rebars (2 top and 2 bottom) in strip footings. Additional reinforcement may be necessary for structural considerations.

Building Floor Slab Design Recommendations

- Conventional Slab-on-Grade: minimum 6 inches thick.
- Modulus of Subgrade Reaction: k = 150 psi/in.
- Reinforcement is not expected to be necessary for geotechnical considerations. The actual thickness and reinforcement of the floor slab should be determined by the structural engineer.

Pavement Design Recommendations

ASPHALT PAVEMENTS (R = 40)					
Materials	**Thickness (inches)**				
	Parking Stalls (TI = 4.0)	Auto Drive Lanes (TI = 5.0)	Truck Traffic		
			(TI = 6.0)	(TI = 7.0)	(TI = 8.0)
Asphalt Concrete	3	3	3½	4	5
Aggregate Base	3	4	6	7	8
Compacted Subgrade (90% minimum compaction)	12	12	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 40)				
Materials	**Thickness (inches)**			
	Automobile Parking and Drive Areas (TI = 5.0)	Truck Traffic		
		(TI =6.0)	(TI =7.0)	(TI =8.0)
PCC	5	5	5½	6½
Compacted Subgrade (95% minimum compaction)	12	12	12	12

2.0 SCOPE OF SERVICES

The scope of services performed for this project was in accordance with our Proposal No. 21P170, dated February 25, 2021. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analysis to provide criteria for preparing the design of the building foundations, building floor slab, and parking lot pavements along with site preparation recommendations and construction considerations for the proposed development. The evaluation of the environmental aspects of this site was beyond the scope of services for this geotechnical investigation.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The site is located at 26200 Enterprise Way in Lake Forest, California. The site is bounded to the north by Enterprise Way and existing commercial/industrial buildings, to the east and south by existing commercial/industrial developments, and to the west by Enterprise Court. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 in Appendix A of this report.

The site is an irregular-shaped parcel, 8.83± acres in size. The site is presently developed with one (1) commercial office building, 75,000± ft^2 in size, located in the central area of the site. The development is a two-story building of concrete tilt up construction. A series of Bloomenergy servers, are located on concrete pads along the southern property line, behind the building. The building is surrounded by asphaltic concrete pavements and limited areas of Portland cement concrete pavements. The pavements are in good condition with minor cracking throughout. Landscape planters are present throughout the site and possesses small shrubs, bushes and medium to large trees. The eastern and southern boundaries of the site possess north and west facing slopes. These slopes ascend 10 to 15 feet from the subject site to the adjacent property. A concrete-lined drainage swale is located near the midpoint of the slope. The remaining areas of the slopes are covered with dense vegetation.

Detailed topographic information was obtained from the preliminary grading and drainage plan, prepared by Kier + Wright. Based on this plan, the overall site slopes downward to the west at a gradient of 3± percent. As mentioned above, the eastern and southern boundaries of the site possess a north and west facing ascending slopes, with a gradient of approximately 3h:1v. The minimum site elevation is 690± feet mean sea level (msl), located at the west corner of the site. The maximum site elevation is 710± feet msl, located along the eastern property line.

3.2 Proposed Development

A preliminary site plan has been provided to our office by the client. Based on this plan, the site will be developed with one (1) new commercial industrial building, 161,979± ft^2 in size, located in the central region of the site. Dock-high doors will be constructed along a portion of the southern building wall. The proposed building is expected to be surrounded by asphaltic concrete pavements in the parking and drive areas, Portland cement concrete pavements in the loading dock areas, and concrete flatwork and landscaped planters throughout the site.

Detailed structural information has not been provided. It is assumed that the new building will be a single-story structure of tilt-up concrete construction, typically supported on conventional shallow foundations with a concrete slab-on-grade floor. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 100 kips and 4 to 7 kips per linear foot, respectively.

No significant amounts of below-grade construction, such as basements or crawl spaces, are expected to be included in the proposed development. Based on the assumed topography, cuts and fills of 4 to 6± feet are expected to be necessary to achieve the proposed site grades.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of six (6) borings advanced to depths of 20 to 30± feet below the existing site grades. All of the borings were logged during drilling by a member of our staff.

The borings were advanced with hollow-stem augers, by a conventional truck-mounted drilling rig. Representative bulk and relatively undisturbed soil samples were taken during drilling. Relatively undisturbed soil samples were taken with a split barrel "California Sampler" containing a series of one inch long, 2.416± inch diameter brass rings. This sampling method is described in ASTM Test Method D-3550. In-situ samples were also taken using a 1.4± inch inside diameter split spoon sampler, in general accordance with ASTM D-1586. Both of these samplers are driven into the ground with successive blows of a 140-pound weight falling 30 inches. The blow counts obtained during driving are recorded for further analysis. Bulk samples were collected in plastic bags to retain their original moisture content. The relatively undisturbed ring samples were placed in molded plastic sleeves that were then sealed and transported to our laboratory.

The approximate locations of the borings are indicated on the Boring Location Plan, included as Plate 2 in Appendix A of this report. The Boring Logs, which illustrate the conditions encountered at the boring locations, as well as the results of some of the laboratory testing, are included in Appendix B.

4.2 Geotechnical Conditions

Pavements

Asphaltic concrete pavement was encountered at the ground surface of all boring locations. The pavement sections generally consisted of 3½ to 4½± inches of asphaltic concrete, underlain by 2½ to 7± inches of aggregate base.

Engineered Fill (Afe)

Engineered fill soils were encountered at Boring Nos. B-1 and B-4 through B-6, extending to depths of 12 to more than 30± feet. Boring Nos. B-1 and B-5 were terminated in the engineered fill soils. These fill materials consist of medium dense to very dense silty sands with varying clay content. Many samples of the fill soils possess variable coloration and variable strength, indicative of their classification as fill.

Capistrano Formation – Oso member (Tco)

Capistrano Formation bedrock was encountered beneath the pavements and/or beneath the fill soils at most of the boring locations, extending to at least the maximum depth explored of 30± feet below the existing site grades. The bedrock generally consists of light gray to dark gray fine-grained poorly consolidated silty sandstone and sandstone. The samples occasionally possess trace amounts of clay, organics and iron oxide staining.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the lack of any water within the borings, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 30± feet at the time of the subsurface exploration.

As a part of our research, we reviewed available groundwater data in order to determine groundwater levels for the site. The primary reference used to determine the groundwater depths in the subject site area is the California State Water Resources Control Board website, GeoTracker, https://geotracker.waterboards.ca.gov. The nearest monitoring well on record is located 1.37± miles west of the site. Water level readings within this monitoring well indicate a groundwater level of 72± feet below the ground surface in September 2017.

4.3 Geologic Conditions

Geologic research indicates that the majority of the site is underlain by white to bluish-white, silty, marine, fine- to medium-grained, thick bedded to massive, poorly sorted arkosic sandstone. mapped as late Miocene to early Pliocene Capistrano Formation, Oso Member (Map Symbol Tco). The Holocene to Pleistocene age Slopewash (Map Symbol Qsw) is mapped in the northwestern and southeastern property lines of the site. The bedding within the Capistrano Formation is indicated to trend northwest-southeast with a dip of 14 degrees to the north, on the geologic map. The primary available reference applicable to the subject site is the Geologic Map and Sections of the South Half El Toro Quadrangle, Orange County, California, by Donald Fife, 1974. A portion of this map indicating the location of the subject site is included herein as Plate 3 in Appendix A.

Based on the materials encountered in the exploratory borings, the site is underlain by sandstone, and silty sandstone of the Capistrano Formation.

5.0 LABORATORY TESTING

The soil samples recovered from the subsurface exploration were returned to our laboratory for further testing to determine selected physical and engineering properties of the soils. The tests are briefly discussed below. It should be noted that the test results are specific to the actual samples tested, and variations could be expected at other locations and depths.

Classification

All recovered soil samples were classified using the Unified Soil Classification System (USCS), in accordance with ASTM D-2488. The field identifications were then supplemented with additional visual classifications and/or by laboratory testing. The USCS classifications are shown on the Boring Logs and are periodically referenced throughout this report.

Density and Moisture Content

The density has been determined for selected relatively undisturbed ring samples. These densities were determined in general accordance with the method presented in ASTM D-2937. The results are recorded as dry unit weight in pounds per cubic foot. The moisture contents are determined in accordance with ASTM D-2216, and are expressed as a percentage of the dry weight. These test results are presented on the Boring Logs.

Consolidation

Selected soil samples were tested to determine their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to determine their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-4 in Appendix C of this report.

Maximum Dry Density and Optimum Moisture Content

A representative bulk sample has been tested for its maximum dry density and optimum moisture content. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557 and are presented on Plate C-5 in Appendix C of this report. This test is generally used to compare the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil types or soil mixes may be necessary at a later date.

Soluble Sulfates

A representative sample of the near-surface soil was submitted to a subcontracted analytical laboratory for determination of soluble sulfate content. Soluble sulfates are naturally present in soils, and if the concentration is high enough, can result in degradation of concrete which comes

into contact with these soils. The results of the soluble sulfate testing are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	Soluble Sulfates (%)	Sulfate Classification
B-1 @ 0 to 5 feet	0.005	Not Applicable (S0)

Corrosivity Testing

One representative sample of the near-surface soils was submitted to a subcontracted corrosion engineering laboratory to identify potentially corrosive characteristics with respect to common construction materials. The corrosivity testing included a determination of the electrical resistivity, pH, and chloride and nitrate concentrations of the soils, as well as other tests. The results of some of these tests are presented below.

Sample Identification	Saturated Resistivity (ohm-cm)	pH	Chlorides (mg/kg)	Nitrates (mg/kg)
B-1 @ 0 to 5 feet	3,000	9.2	5.3	3.4

Expansion Index (EI)

The expansion potential of the on-site soils was determined in general accordance with ASTM D-4829. The testing apparatus is designed to accept a 4-inch diameter, 1-in high, remolded sample. The sample is initially remolded to 50± 1 percent saturation and then loaded with a surcharge equivalent to 144 pounds per square foot. The sample is then inundated with water, and allowed to swell against the surcharge. The resultant swell or consolidation is recorded after a 24-hour period. The result of the EI testing is as follows:

Sample Identification	Expansion Index	Expansive Potential
B-1 @ 0 to 5 feet	12	Very Low

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our review, field exploration, laboratory testing and geotechnical analysis, the proposed development is considered feasible from a geotechnical standpoint. The recommendations contained in this report should be taken into the design, construction, and grading considerations.

The recommendations are contingent upon all grading and foundation construction activities being monitored by the geotechnical engineer of record. The recommendations are provided with the assumption that an adequate program of client consultation, construction monitoring, and testing will be performed during the final design and construction phases to verify compliance with these recommendations. Maintaining Southern California Geotechnical, Inc., (SCG) as the geotechnical consultant from the beginning to the end of the project will provide continuity of services. The geotechnical engineering firm providing testing and observation services shall assume the responsibility of Geotechnical Engineer of Record.

The Grading Guide Specifications, included as Appendix D, should be considered part of this report, and should be incorporated into the project specifications. The contractor and/or owner of the development should bring to the attention of the geotechnical engineer any conditions that differ from those stated in this report, or which may be detrimental for the development.

6.1 Seismic Design Considerations

The subject site is located in an area which is subject to strong ground motions due to earthquakes. The performance of a site-specific seismic hazards analysis was beyond the scope of this investigation. However, numerous faults capable of producing significant ground motions are located near the subject site. Due to economic considerations, it is not generally considered reasonable to design a structure that is not susceptible to earthquake damage. Therefore, significant damage to structures may be unavoidable during large earthquakes. The proposed structure should, however, be designed to resist structural collapse and thereby provide reasonable protection from serious injury, catastrophic property damage and loss of life.

Faulting and Seismicity

Research of available maps indicates that the subject site is not located within an Alquist-Priolo Earthquake Fault Zone. Furthermore, SCG did not identify any evidence of faulting during the geotechnical investigations. Therefore, the possibility of significant fault rupture on the site is considered to be low.

The potential for other geologic hazards such as seismically induced settlement, lateral spreading, tsunamis, inundation, seiches, flooding, and subsidence affecting the site is considered low.

Seismic Design Parameters

The 2019 California Building Code (CBC) provides procedures for earthquake resistant structural design that include considerations for on-site soil conditions, occupancy, and the configuration of

the structure including the structural system and height. The seismic design parameters presented below are based on the soil profile and the proximity of known faults with respect to the subject site.

Based on standards in place at the time of this report, the proposed development is expected to be designed in accordance with the requirements of the 2019 edition of the California Building Code (CBC), which was adopted on January 1, 2020.

The 2019 CBC Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool, a web-based software application available at the website www.seismicmaps.org. This software application calculates seismic design parameters in accordance with several building code reference documents, including ASCE 7-16, upon which the 2019 CBC is based. The application utilizes a database of risk-targeted maximum considered earthquake (MCE_R) site accelerations at 0.01-degree intervals for each of the code documents. The table below was created using data obtained from the application. The output generated from this program is included as Plate E-1 in Appendix E of this report.

The 2019 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_1 value greater than 0.2. However, Section 11.4.8 of ASCE 7-16 also indicates an exception to the requirement for a site-specific ground motion hazard analysis for certain structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) indicates that "In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites." **Based on our understanding of the proposed development, the seismic design parameters presented below were calculated assuming that the exception in Section 11.4.8 applies to the proposed structures at this site. However, the structural engineer should verify that this exception is applicable to the proposed structures.** Based on the exception, the spectral response accelerations presented below were calculated using the site coefficients (F_a and F_v) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 16.4.4 of the 2019 CBC.

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	1.261
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.450
Site Class	---	D
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.261
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	0.833
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	0.841
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.555

It should be noted that the site coefficient F_v and the parameters S_{M1} and S_{D1} were not included in the SEAOC/OSHPD Seismic Design Maps Tool output for the 2019 CBC. We calculated these parameters-based on Table 1613.2.3(2) in Section 16.4.4 of the 2019 CBC using the value of S_1

obtained from the Seismic Design Maps Tool, assuming that a site-specific ground motion hazards analysis is not required for the proposed building at this site.

Liquefaction

Liquefaction is the loss of strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors which influence the potential for liquefaction include groundwater table elevation, soil type and grain size characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. The depth within which the occurrence of liquefaction may impact surface improvements is generally identified as the upper 50 feet below the existing ground surface. Liquefaction potential is greater in saturated, loose, poorly graded fine sands with a mean (d_{50}) grain size in the range of 0.075 to 0.2 mm (Seed and Idriss, 1971). Clayey (cohesive) soils or soils which possess clay particles (d<0.005mm) in excess of 20 percent (Seed and Idriss, 1982) are generally not considered to be susceptible to liquefaction, nor are those soils which are above the historic static groundwater table.

The Earthquake Zones of Required Investigation, El Toro Quadrangle map, published by the California Geological Survey (CGS), indicates that the subject site is not located within a designated liquefaction hazard zone. In addition, the subsurface conditions encountered at the subject site are not considered to be conducive to liquefaction. Based on the conditions encountered at the boring locations, and the mapping performed by the CGS, liquefaction is not considered to be a significant design concern for this project. This map also indicates that the site is not located with an Earthquake Induced Landslide Zone.

6.2 Geotechnical Design Considerations

General

The subsurface conditions at this site consist of engineered fill soils and moderate to high strength Capistrano formation sandstone at all of the boring locations. The engineered fill soils possess relatively high strengths and favorable consolidation and collapse characteristics. We performed research at the City of Lake Forest in an attempt to obtain reports documenting the placement and compaction of any such fill soils. The City has no such records. We did, however, obtain a copy of a previous geotechnical map for the site, prepared by Petra Geotechnical, which indicates that the site is underlain by engineered fill soils and Capistrano formation bedrock. However, he precise fill depths could not be determined from this plan. All of the data collected by SCG indicates that the existing fill soils represent engineered fill, generally suitable for support of new structures.

As a result of the previous grading, a portion of the proposed warehouse will be underlain by engineered fill soils, whereas the southeastern area of the new building will be underlain by sandstone bedrock. These existing conditions will create a bedrock/fill transition within the proposed building area. It is also expected that the upper 3± feet of soils will be disturbed during demolition of the existing development. Based on these conditions, remedial grading will be necessary within the proposed building area to provide a pad suitable for support of the proposed structure.

The existing pavements are in fair to good condition, and consideration may be given to reusing some of the existing pavements with the new development. However, the existing pavement thicknesses are not adequate to support any significant volume of truck traffic.

Settlement

The recommended remedial grading will remove a portion of the near-surface native bedrock materials and replace these materials as compacted structural fill. Disturbed soils created during demolition of the existing development will also be removed to a stable soil subgrade. The engineered fill soils and bedrock materials that will remain in place below the recommended depth of overexcavation possess relatively high strengths. Therefore, following completion of the recommended grading, post-construction settlements are expected to be within tolerable limits.

Expansion

The near-surface soils consist of silty sandstone with no appreciable clay content. The results of expansion index testing indicate that these materials are very low expansive (EI = 12). Therefore, no design considerations related to expansive soils are considered warranted for this site.

Soluble Sulfates

The results of the soluble sulfate testing indicate that the selected sample of the on-site soils contains a sulfate concentration that corresponds to Class S0 with respect to the American Concrete Institute (ACI) Publication 318-05 Building Code Requirements for Structural Concrete and Commentary, Section 4.3. Therefore, specialized concrete mix designs are not considered to be necessary, with regard to sulfate protection purposes. It is, however, recommended that additional soluble sulfate testing be conducted at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at pad grade within the building areas.

Corrosion Potential

The results of laboratory testing indicate that the tested sample of the on-site soils possesses a saturated resistivity value of 3,000 ohm-cm, and a pH value of 9.2. These test results have been evaluated in accordance with guidelines published by the Ductile Iron Pipe Research Association (DIPRA). The DIPRA guidelines consist of a point system by which characteristics of the soils are used to quantify the corrosivity characteristics of the site. Resistivity and pH are two of the five factors that enter into the evaluation procedure. Redox potential, relative soil moisture content and sulfides are also included. Although sulfide testing was not part of the scope of services for this project, we have evaluated the corrosivity characteristics of the on-site soils using resistivity, pH and moisture content. **Based on these factors, and utilizing the DIPRA procedure, the on-site soils are considered to be moderately corrosive to ductile iron pipe.** Therefore, polyethylene protection may be required for cast iron or ductile iron pipes.

A relatively low concentration (5.3 mg/kg) of chlorides was detected in the sample submitted for corrosivity testing. In general, soils possessing chloride concentrations in excess of 500 parts per million (ppm) are considered to be corrosive with respect to steel reinforcement within reinforced

concrete. Based on the lack of any significant chlorides in the tested sample, the site is considered to have a C1 chloride exposure in accordance with the American Concrete Institute (ACI) Publication 318 Building Code Requirements for Structural Concrete and Commentary. Therefore, a specialized concrete mix design for reinforced concrete for protection against chloride exposure is not considered warranted.

Nitrates present in soil can be corrosive to copper tubing at concentrations greater than 50 mg/kg. The tested sample possesses a nitrate concentration of 3.4 mg/kg. Based on this test result, the on-site soils are not considered to be corrosive to copper pipe. Since SCG does not practice in the area of corrosion engineering, the client may wish to contact a corrosion engineer to provide a more thorough evaluation.

It should be noted that SCG does not practice in the field of corrosion engineering. Therefore, the client may wish to contact a corrosion engineer to provide a more thorough evaluation.

Shrinkage/Subsidence

Removal and recompaction of the existing fill soils is estimated to result in an average shrinkage of 3 to 10 percent. Bedrock materials are expected to result in less than 5% shrinkage or bulking when removed and replaced as compacted fill. These shrinkage/bulking estimates are based on the assumption that the onsite soils will be compacted to about 92 percent of the ASTM D-1557 maximum dry density. It should be noted that these estimates are based on the results of dry density testing performed on small-diameter samples of the existing soils taken at the boring locations. If a more accurate and precise shrinkage estimate is desired, SCG can perform a shrinkage study involving several excavated test-pits where in-place densities are determined using in-situ testing methods instead of laboratory density testing on small-diameter samples. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be 0.1 feet. This estimate may be used for grading in areas that are underlain by existing engineered fill soils.

These estimates are based on previous experience and the subsurface conditions encountered at the boring locations. The actual amount of subsidence is expected to be variable and will be dependent on the type of machinery used, repetitions of use, and dynamic effects, all of which are difficult to assess precisely.

Grading and Foundation Plan Review

Detailed grading and foundation plans were not available at the time of this report. It is therefore recommended that we be provided with copies of the preliminary grading and foundation plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within this report.

6.3 Site Grading Recommendations

The grading recommendations presented below are based on the subsurface conditions encountered at the boring locations, and our understanding of the proposed development. We

recommend that all grading activities be completed in accordance with the Grading Guide Specifications included as Appendix D of this report, unless superseded by site-specific recommendations presented below.

Site Stripping and Demolition

Demolition of the existing structure should include any improvements that will not remain in place for use with the new development, including foundations, floor slabs, and utilities. Any pavements that will be reused with the new development should be protected from damage by construction traffic. Debris resultant from demolition should be disposed of off-site. All applicable federal, state and local specifications and regulations should be followed in demolition, abandonment, and disposal of the resulting debris. Concrete and asphalt debris may be crushed to a maximum 2-inch particle size, well-mixed with the on-site soils, and incorporated into new structural fills.

Initial site stripping should include removal of any vegetation, as well as any underlying topsoil or other organic materials from landscaped areas. Based on conditions observed at the time of the subsurface exploration, stripping of grass, shrubs, and trees will be required. Root masses associated with the trees should be removed in their entirety, and the resultant excavations should be backfilled with compacted structural fill soils. Any organic materials should be removed and disposed of off-site, or in non-structural areas of the property. The actual extent of site stripping should be determined in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered.

Treatment of Existing Soils: Building Pad

Remedial grading should be performed within the proposed building area in order to remove the soils disturbed during demolition and to mitigate the bedrock/fill transitions that would otherwise exist. Based on conditions encountered at the boring locations, the existing soils/bedrock within the proposed building area are recommended to be overexcavated to a depth of at least 5 feet below existing grades and to a depth of at least 3 feet below proposed building pad subgrade elevations, whichever is greater. The depth of the overexcavation should also extend to a depth sufficient to remove all undocumented fill soils and soils disturbed during demolition. Within the influence zones of the new foundations, the overexcavation should extend to a depth of at least 3 feet below proposed foundation bearing grade.

Additional overexcavation should be performed in the southeastern area of the proposed building pad, in the area of Boring Nos. B-2 and B-3, to soften the bedrock/fill transition that will exist in this area of the site. This area of the pad should be overexcavated to a depth of 5 feet below foundation bearing grade. The extent of the shallow bedrock in this area should be confirmed during grading.

The overexcavation areas should extend at least 5 feet beyond the building and foundation perimeters, and to an extent equal to the depth of fill placed below the foundation bearing grade, whichever is greater. If the proposed structure incorporates any exterior columns (such as for a canopy or overhang) the overexcavation should also encompass these areas.

Following completion of the overexcavation, the subgrade soils within the overexcavation areas should be evaluated by the geotechnical engineer to verify their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structure. This

evaluation should include proofrolling and probing to identify any soft, loose or otherwise unstable soils that must be removed. Some localized areas of deeper excavation may be required if additional fill materials or loose, porous, or low-density native soils are encountered at the base of the overexcavation.

After a suitable overexcavation subgrade has been achieved, the exposed soils/bedrock should be scarified to a depth of at least 12 inches and moisture treated to 0 to 4 percent above optimum moisture content. The subgrade soils should then be recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The building pad area may then be raised to grade with previously excavated soils or imported structural fill.

Treatment of Existing Soils: Retaining Walls and Site Walls

The existing soils within the areas of any proposed retaining walls and site walls should be overexcavated to a depth of 3 feet below foundation bearing grade and replaced as compacted structural fill as discussed above for the proposed building pad. Retaining wall or site wall foundations may also be supported within sandstone bedrock materials with no further overexcavation. Any disturbed or low strength fill soils within any of these foundation areas should be removed in their entirety. The overexcavation areas should extend at least 3 feet beyond the foundation perimeters, and to an extent equal to the depth of fill below the new foundations. Any erection pads for tilt-up concrete walls are considered to be part of the foundation system. Therefore, these overexcavation recommendations are applicable to erection pads. The overexcavation subgrade soils should be evaluated by the geotechnical engineer prior to scarifying, moisture conditioning to within 0 to 4 percent above the optimum moisture content, and recompacting the upper 12 inches of exposed subgrade soils. The previously excavated soils may then be replaced as compacted structural fill.

If the full lateral recommended remedial grading cannot be completed for the proposed retaining walls and site walls located along property lines, the foundations for those walls should be designed using a reduced allowable bearing pressure. Furthermore, the contractor should take necessary precautions to protect the adjacent improvements during rough grading. Specialized grading techniques, such as A-B-C slot cuts, will likely be required during remedial grading. The geotechnical engineer of record should be contacted if additional recommendations, such as shoring design recommendations, are required during grading.

Treatment of Existing Soils: Flatwork, Parking and Drive Areas

Based on economic considerations, overexcavation of the existing near-surface existing soils in the new flatwork, parking and drive areas is not considered warranted, with the exception of areas where lower strength or unstable soils are identified by the geotechnical engineer during grading. Subgrade preparation in the new flatwork, parking and drive areas should initially consist of removal of all soils disturbed during stripping and demolition operations.

The geotechnical engineer should then evaluate the subgrade to identify any areas of additional unsuitable soils. Any such materials should be removed to a level of firm and unyielding soil. The exposed subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to 0 to 4 percent above the optimum moisture content, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength surficial

soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 0 to 4 percent above the optimum moisture content, and compacted.
- On-site soils may be used for fill provided they are cleaned of any debris to the satisfaction of the geotechnical engineer.
- All grading and fill placement activities should be completed in accordance with the requirements of the 2019 CBC and the grading code of the city of Lake Forest.
- All fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete locations and depths, they may not be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications.

Imported Structural Fill

All imported structural fill should consist of very low expansive (EI < 20), well graded soils possessing at least 10 percent fines (that portion of the sample passing the No. 200 sieve). Additional specifications for structural fill are presented in the Grading Guide Specifications, included as Appendix D.

Utility Trench Backfill

In general, all utility trench backfill should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. As an alternative, a clean sand (minimum Sand Equivalent of 30) may be placed within trenches and compacted in place (jetting or flooding is not recommended). Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by the city of Lake Forest. All utility trench backfills should be witnessed by the geotechnical engineer. The trench backfill soils should be compaction tested where possible; probed and visually evaluated elsewhere.

Utility trenches which parallel a footing, and extending below a 1h:1v (horizontal to vertical) plane projected from the outside edge of the footing should be backfilled with structural fill soils, compacted to at least 90 percent of the ASTM D-1557 standard. Pea gravel backfill should not be used for these trenches.

Any soils used to backfill voids around subsurface utility structures, such as manholes or vaults, should be placed as compacted structural fill. If it is not practical to place compacted fill in these areas, then such void spaces may be backfilled with lean concrete slurry. Uncompacted pea gravel or sand is not recommended for backfilling these voids since these materials have a potential to settle and thereby cause distress of pavements placed around these subterranean structures.

6.4 Construction Considerations

Excavation Considerations

The near-surface soils generally consist of sands and silty sands. These materials may be subject to moderate caving within shallow excavations. Where caving does occur, flattened excavation slopes may be sufficient to provide excavation stability. On a preliminary basis, the inclination of temporary slopes should not exceed 2h:1v. Deeper excavations may require some form of external stabilization such as shoring or bracing. Maintaining adequate moisture content within the near-surface soils will improve excavation stability. All excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Groundwater

The static groundwater table is considered to have existed at a depth in excess of 30± feet at the time of the subsurface exploration. Therefore, groundwater is not expected to impact grading or foundation construction activities.

6.5 Foundation Design and Construction

Based on the preceding grading recommendations, it is assumed that the new building pad will be underlain by structural fill soils used to replace a portion of the existing fill soils, and the existing sandstone bedrock. These new structural fill soils are expected to extend to depths of at least 3 to 5 feet below proposed foundation bearing grade, underlain by 1± foot of additional soil that has been densified and moisture conditioned in place. Based on this subsurface profile, the proposed structure may be supported on conventional shallow foundations.

Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 3,000 lbs/ft^2.
- Minimum wall/column footing width: 14 inches/24 inches.
- Minimum longitudinal steel reinforcement within strip footings: Four (4) No. 5 rebars (2 top and 2 bottom).
- Minimum foundation embedment: 12 inches into suitable structural fill soils, and at least 18 inches below adjacent exterior grade. Interior column footings may be placed immediately beneath the floor slab.
- It is recommended that the perimeter building foundations be continuous across all exterior doorways. Any flatwork adjacent to the exterior doors should be doweled into the perimeter foundations in a manner determined by the structural engineer.

The allowable bearing pressures presented above may be increased by 1/3 when considering short duration wind or seismic loads. The minimum steel reinforcement recommended above is based on geotechnical considerations; additional reinforcement may be necessary for structural considerations. The actual design of the foundations should be determined by the structural engineer.

Foundation Construction

The foundation subgrade soils should be evaluated at the time of overexcavation, as discussed in Section 6.3 of this report. It is further recommended that the foundation subgrade soils be evaluated by the geotechnical engineer immediately prior to steel or concrete placement. Soils suitable for direct foundation support should consist of newly placed structural fill, compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Any unsuitable materials should be removed to a depth of suitable bearing compacted structural fill or suitable native alluvium (where reduced bearing pressures are utilized), with the resulting excavations backfilled with compacted fill soils. As an alternative, lean concrete slurry (500 to 1,500 psi) may be used to backfill such isolated overexcavations.

The foundation subgrade soils should also be properly moisture conditioned to 0 to 4 percent above the Modified Proctor optimum, to a depth of at least 12 inches below bearing grade. Since it is typically not feasible to increase the moisture content of the floor slab and foundation subgrade soils once rough grading has been completed, care should be taken to maintain the moisture content of the building pad subgrade soils throughout the construction process.

Estimated Foundation Settlements

Post-construction total and differential settlements of shallow foundations designed and constructed in accordance with the previously presented recommendations are estimated to be less than 1.0 and 0.5 inches, respectively. Differential movements are expected to occur over a 30-foot span, thereby resulting in an angular distortion of less than 0.002 inches per inch.

Lateral Load Resistance

Lateral load resistance will be developed by a combination of friction acting at the base of foundations and slab and the passive earth pressure developed by footings below grade. The following friction and passive pressure may be used to resist lateral forces:

- Passive Earth Pressure: 300 lbs/ft^3
- Friction Coefficient: 0.30

These are allowable values, and include a factor of safety. When combining friction and passive resistance, the passive pressure component should be reduced by one-third. These values assume that footings will be poured directly against compacted structural fill soils. The maximum allowable passive pressure is 3,000 lbs/ft^2.

6.6 Floor Slab Design and Construction

Subgrades which will support the new floor slabs should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report. Based on the anticipated grading which will occur at this site, the floor of the proposed structure may be constructed as a conventional slab-on-grade supported on newly placed structural fill (or densified existing soils), extending to a depth of at least 3 feet below finished pad grades. Based on geotechnical considerations, the floor slab may be designed as follows:

- Minimum slab thickness: 6 inches.

- Modulus of Subgrade Reaction: k = 150 psi/in.

- Minimum slab reinforcement: Reinforcement is not considered necessary from a geotechnical standpoint. The actual floor slab reinforcement should be determined by the structural engineer, based on the imposed slab loading.

- Slab underlayment: If moisture sensitive floor coverings will be used then minimum slab underlayment should consist of a moisture vapor barrier constructed below the entire area of the proposed slab where such moisture sensitive floor coverings are anticipated. The moisture vapor barrier should meet or exceed the Class A rating as defined by ASTM E 1745-97 and have a permeance rating less than 0.01 perms as described in ASTM E 96-95 and ASTM E 154-88. A polyolefin material such as Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with all applicable manufacturer specifications. Given that a rock free subgrade is anticipated and that a capillary break is not required, sand below the barrier is not required. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview. Where moisture sensitive floor coverings are not anticipated, the vapor barrier may be eliminated.

- Moisture condition the floor slab subgrade soils to 0 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.

- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.

The actual design of the floor slab should be completed by the structural engineer to verify adequate thickness and reinforcement.

6.7 Exterior Flatwork Design and Construction

Subgrades which will support new exterior slabs-on-grade for sidewalks, patios, and other concrete flatwork, should be prepared in accordance with the recommendations contained in the

Grading Recommendations section of this report. Assuming that the flatwork is supported on the existing soils, exterior slabs-on-grade may be designed as follows:

- Minimum slab thickness: 4½ inches.
- Minimum slab reinforcement: No. 3 bars at 18 inches on center, in both directions.
- The flatwork at building entry areas should be structurally connected to the perimeter foundation that is recommended to span across the door opening. This recommendation is designed to reduce the potential for differential movement at this joint.
- Moisture condition the slab subgrade soils to within 0 to 4 percent of optimum moisture content, to a depth of at least 12 inches. Adequate moisture conditioning should be verified by the geotechnical engineer 24 hours prior to concrete placement.
- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.
- Control joints should be provided at a maximum spacing of 8 feet on center in two directions for slabs and at 6 feet on center for sidewalks. Control joints are intended to direct cracking. Minor cracking of exterior concrete slabs on grade should be expected.

Expansion or felt joints should be used at the interface of exterior slabs on grade and any fixed structures to permit relative movement.

6.8 Retaining Wall Design and Construction

Although not indicated on the site plans, some small (less than 6 feet in height) retaining walls may be required to facilitate the new site grades. The parameters recommended for use in the design of these walls are presented below.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring locations, the following parameters may be used in the design of new retaining walls for this site. The following parameters assume that only the on-site soils will be utilized for retaining wall backfill. The near-surface soils generally consist of sands and silty sands. Based on their classification, these materials are expected to possess a friction angle of at least 30 degrees when compacted to at least 90 percent of the ASTM D-1557 maximum dry density.

If desired, SCG could provide design parameters for an alternative select backfill material behind the retaining walls. The use of select backfill material could result in lower lateral earth pressures. In order to use the design parameters for the imported select fill, this material must be placed within the entire active failure wedge. This wedge is defined as extending from the heel of the retaining wall upwards at an angle of approximately 60° from horizontal. If select backfill material behind the retaining wall is desired, SCG should be contacted for supplementary recommendations.

RETAINING WALL DESIGN PARAMETERS

Design Parameter		Soil Type
		On-site Sands and Silty Sands
Internal Friction Angle (ϕ)		30°
Unit Weight		128 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	43 lbs/ft^3
	Active Condition (2h:1v backfill)	69 lbs/ft^3
	At-Rest Condition (level backfill)	64 lbs/ft^3

The walls should be designed using a soil-footing coefficient of friction of 0.30 and an equivalent passive pressure of 300 lbs/ft^3. The structural engineer should incorporate appropriate factors of safety in the design of the retaining walls.

The active earth pressure may be used for the design of retaining walls that do not directly support structures or support soils that in turn support structures and which will be allowed to deflect. The at-rest earth pressure should be used for walls that will not be allowed to deflect such as those which will support foundation bearing soils, or which will support foundation loads directly.

Where the soils on the toe side of the retaining wall are not covered by a "hard" surface such as a structure or pavement, the upper 1 foot of soil should be neglected when calculating passive resistance due to the potential for the material to become disturbed or degraded during the life of the structure.

Seismic Lateral Earth Pressures

In accordance with the 2019 CBC, any retaining walls more than 6 feet in height must be designed for seismic lateral earth pressures. If walls 6 feet or more are required for this site, the geotechnical engineer should be contacted for supplementary seismic lateral earth pressure recommendations.

Retaining Wall Foundation Design

The retaining wall foundations should be underlain by at least 3 feet of newly placed structural fill, or undisturbed Capistrano formation bedrock. Foundations to support new retaining walls should be designed in accordance with the general Foundation Design Parameters presented in a previous section of this report.

Backfill Material

On-site soils may be used to backfill the retaining walls. However, all backfill material placed within 3 feet of the back wall face should have a particle size no greater than 3 inches. Some

sorting and/or crushing operations may be required. The retaining wall backfill materials should be well graded.

It is recommended that a minimum 1-foot thick layer of free-draining granular material (less than 5 percent passing the No. 200 sieve) be placed against the face of the retaining walls. This material should extend from the top of the retaining wall footing to within 1 foot of the ground surface on the back side of the retaining wall. This material should be approved by the geotechnical engineer. In lieu of the 1-foot thick layer of free-draining material, a properly installed prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved equivalent), which is specifically designed for use behind retaining walls, may be used. If the layer of free-draining material is not covered by an impermeable surface, such as a structure or pavement, a 12-inch thick layer of a low permeability soil should be placed over the backfill to reduce surface water migration to the underlying soils. The layer of free draining granular material should be separated from the backfill soils by a suitable geotextile, approved by the geotechnical engineer.

All retaining wall backfill should be placed and compacted under engineering controlled conditions in the necessary layer thicknesses to ensure an in-place density between 90 and 93 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D1557-91). Care should be taken to avoid over-compaction of the soils behind the retaining walls, and the use of heavy compaction equipment should be avoided.

Subsurface Drainage

As previously indicated, the retaining wall design parameters are based upon drained backfill conditions. Consequently, some form of permanent drainage system will be necessary in conjunction with the appropriate backfill material. Subsurface drainage may consist of either:

- A weep hole drainage system typically consisting of a series of 4-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 8-foot on-center spacing. The weep holes should include a 2 cubic foot pocket of open graded gravel, surrounded by an approved geotextile fabric, at each weep hole location.

- A 4-inch diameter perforated pipe surrounded by 2 cubic feet of gravel per linear foot of drain placed behind the wall, above the retaining wall footing. The gravel layer should be wrapped in a suitable geotextile fabric to reduce the potential for migration of fines. The footing drain should be extended to daylight or tied into a storm drainage system.

6.9 Pavement Design Parameters

Site preparation in the pavement area should be completed as previously recommended in the ***Site Grading Recommendations*** section of this report. The subsequent pavement recommendations assume proper drainage and construction monitoring, and are based on either PCA or CALTRANS design parameters for a twenty (20) year design period. However, these designs also assume a routine pavement maintenance program to obtain the anticipated 20-year pavement service life.

Existing Pavements

The existing pavements are generally in good condition and are suitable for reuse with the new development. However, these pavements were designed for the traffic associated with the existing office building and are consequently relatively thin sections. The pavements consist of 3½ to 4½ inches of AC over 2½ to 7 inches of AB. These pavements are only considered suitable for reuse in auto and light truck traffic areas. If these pavements are subjected to significant heavy truck traffic, they will likely experience a short service life.

Pavement Subgrades

It is anticipated that the new pavements will be primarily supported on a layer of compacted structural fill, consisting of scarified, thoroughly moisture conditioned and recompacted existing soils. The near-surface soils generally consist of sands and silty sands. These soils are generally considered to possess good to excellent pavement support characteristics, with R-values in the range of 40 to 60. The subsequent pavement design is therefore based upon an assumed R-value of 40. Any fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering controlled conditions. It is recommended that R-value testing be performed after completion of rough grading to verify that the pavement design recommendations presented herein are valid.

Asphaltic Concrete

Presented below are the recommended thicknesses for new flexible pavement structures consisting of asphaltic concrete over a granular base. The pavement designs are based on the traffic indices (TI's) indicated. The client and/or civil engineer should verify that these TI's are representative of the anticipated traffic volumes. If the client and/or civil engineer determine that the expected traffic volume will exceed the applicable traffic index, we should be contacted for supplementary recommendations. The design traffic indices equate to the following approximate daily traffic volumes over a 20-year design life, assuming six operational traffic days per week.

Traffic Index	No. of Heavy Trucks per Day
4.0	0
5.0	1
6.0	3
7.0	11
8.0	35

For the purpose of the traffic volumes indicated above, a truck is defined as a 5-axle tractor trailer unit with one 8-kip axle and two 32-kip tandem axles. All of the traffic indices allow for 1,000 automobiles per day.

ASPHALT PAVEMENTS (R = 40)					
Materials	**Thickness (inches)**				
	Parking Stalls (TI = 4.0)	Auto Drive Lanes (TI = 5.0)	Truck Traffic		
			(TI = 6.0)	(TI = 7.0)	(TI = 8.0)
Asphalt Concrete	3	3	3½	4	5
Aggregate Base	3	4	6	7	8
Compacted Subgrade (90% minimum compaction)	12	12	12	12	12

The aggregate base course should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density. The asphaltic concrete should be compacted to at least 95 percent of the batch plant-reported maximum density. The aggregate base course may consist of crushed aggregate base (CAB) or crushed miscellaneous base (CMB), which is a recycled gravel, asphalt and concrete material. The gradation, R-Value, Sand Equivalent, and Percentage Wear of the CAB or CMB should comply with appropriate specifications contained in the current edition of the "Greenbook" Standard Specifications for Public Works Construction.

Portland Cement Concrete

The preparation of the subgrade soils within concrete pavement areas should be performed as previously described for proposed asphalt pavement areas. The minimum recommended thicknesses for the Portland Cement Concrete pavement sections are as follows:

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 40)				
Materials	**Thickness (inches)**			
	Automobile Parking and Drive Areas (TI = 5.0)	Truck Traffic		
		(TI =6.0)	(TI =7.0)	(TI =8.0)
PCC	5	5	5½	6½
Compacted Subgrade (95% minimum compaction)	12	12	12	12

The concrete should have a 28-day compressive strength of at least 3,000 psi. The maximum joint spacing within all of the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness. Any reinforcement within the PCC pavements should be determined by the project structural engineer.

7.0 GENERAL COMMENTS

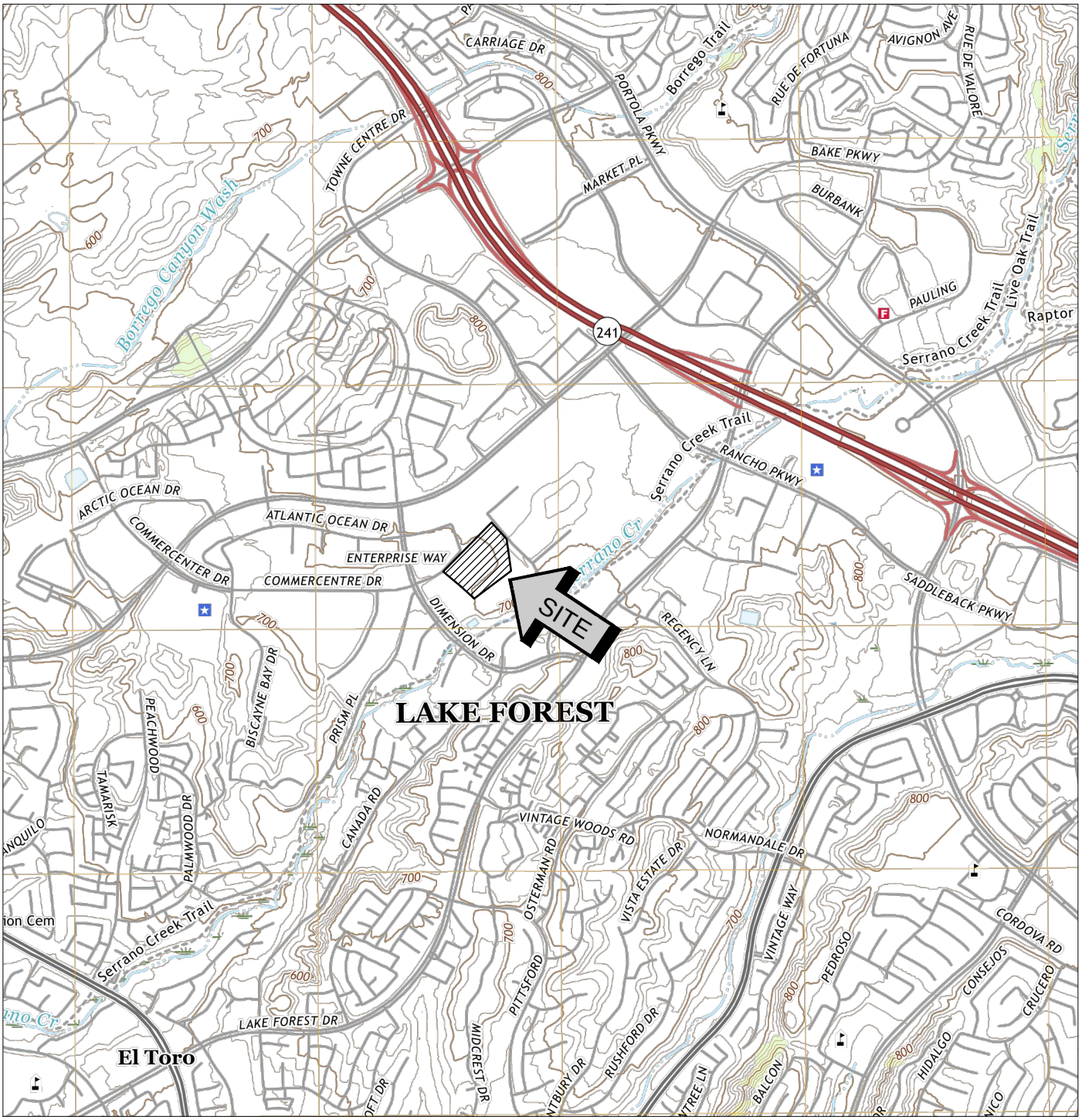
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, civil engineer, and/or structural engineer. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur. The client(s)' reliance upon this report is subject to the Engineering Services Agreement, incorporated into our proposal for this project.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and sample depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted.

The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

APPENDIX A



SOURCE: USGS TOPOGRAPHIC MAP OF LAKE FOREST QUADRANGLE, ORANGE COUNTY, CALIFORNIA, 2018

SITE LOCATION MAP

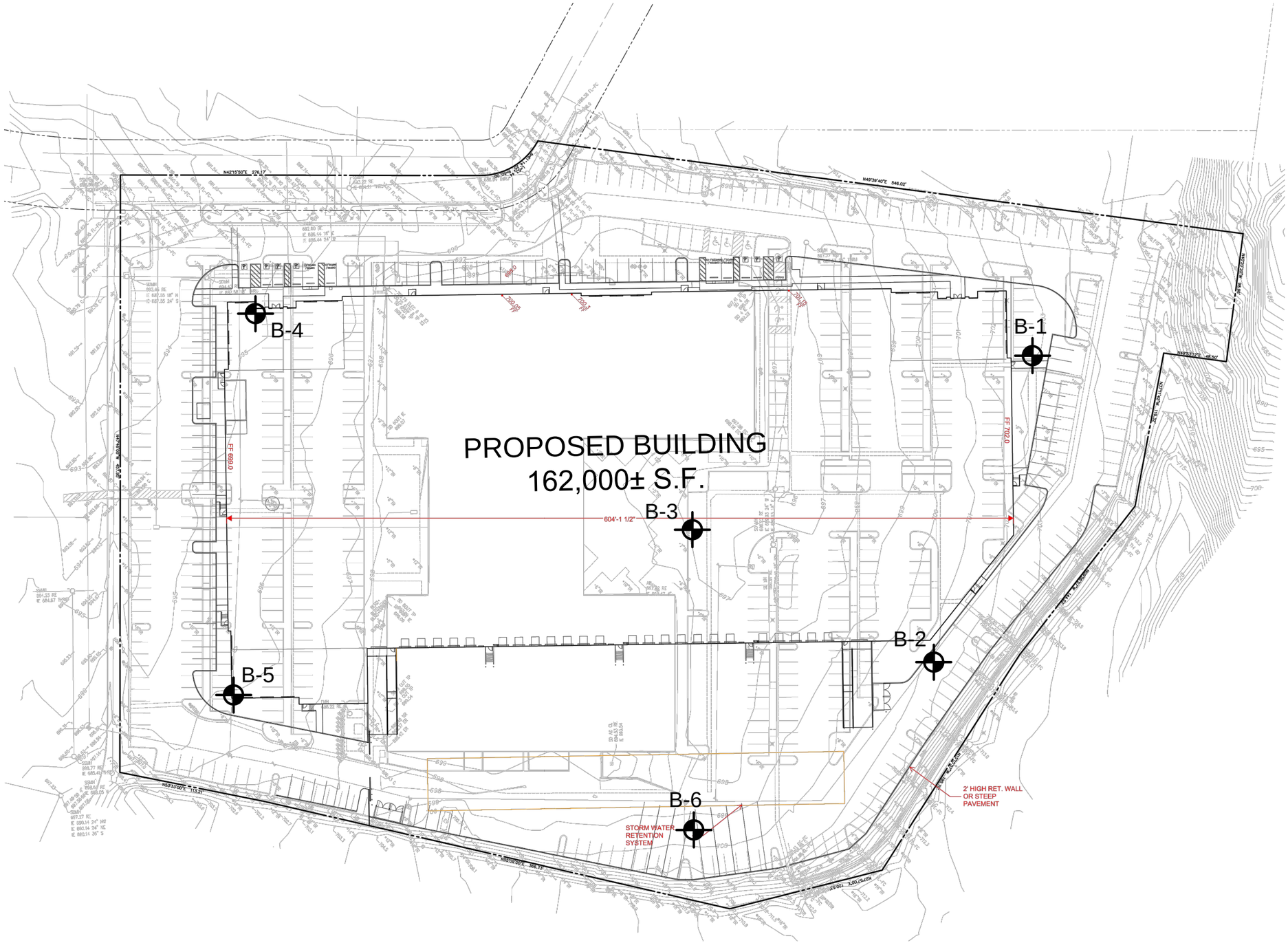
PROPOSED WAREHOUSE

LAKE FOREST, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: MD CHKD: RGT	
SCG PROJECT 21G135-1	
PLATE 1	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

APPROXIMATE BORING LOCATION

NOTE: BASE MAP PREPARED BY KIER + WRIGHT

BORING LOCATION PLAN	
PROPOSED WAREHOUSE	
LAKE FOREST, CALIFORNIA	
SCALE: 1" = 80'	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAH CHKD: RGT	
SCG PROJECT 21G135-1	
PLATE 2	

LEGEND

Qsw

SLOPEWASH. (Holocene to Pleistocene(?))

Lithology: Varies with parent materials. In general consists of light olive-gray to olive-gray, silty to clayey, organicly rich soil which is plastic when wet and hard when dry. Consists of detrital materials resulting from debris flows or creep aided by rill wash, ground water, and unchanneled surficial drainage. Accumulates near the base of slopes and at the mouths of small canyons. Includes colluvium and minor residu soils. It is commonly transitional with adjacent soils or alluvial deposits. Mapped where estimated to exceed three feet in thickness.

Tco

CAPISTRANO FORMATION, OSO MEMBER. (late Miocene to early Pliocene)

Lithology: Marine, white to bluish-white, silty, fine-to medium-grained, thick bedded to massive, poorly sorted arkosic sandstone. Commonly cross-bedded. Locally contains calcareous concretions as much as two feet in diameter. Concretionary zones commonly are found in association with marine vertebrate fossils, but locally friable sand lenses are encountered. Bentonite beds 1 to 2 inches thick, were observed in an anticline on the east flank of Aliso Creek.

SOURCE: "GEOLOGY MAP OF THE SOUTH HALF OF THE EL TORO QUADRANGLE, ORANGE COUNTY, CALIFORNIA" BY DONALD L. FIFE, 1974

GEOLOGIC MAP

PROPOSED WAREHOUSE

LAKE FOREST, CALIFORNIA

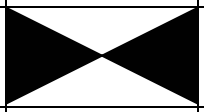
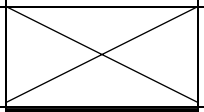
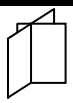
SCALE: 1" = 2000'	
DRAWN: JAH CHKD: GKM	
SCG PROJECT 21G135-1	
PLATE 3	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX B

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

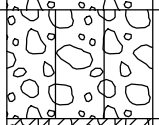
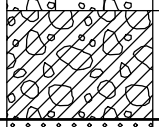
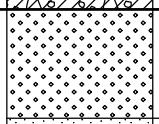
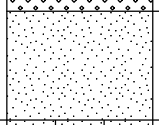
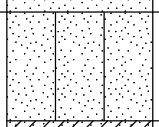
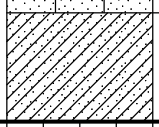
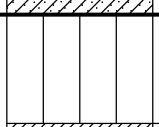
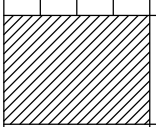
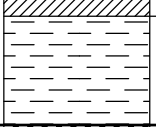
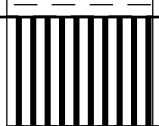
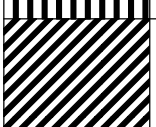
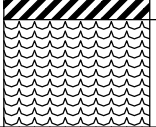
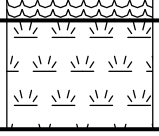
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 21G135-1
PROJECT: Proposed Warehouse
LOCATION: Lake Forest, California

DRILLING DATE: 3/12/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 28 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 702.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3½± inches Asphaltic Concrete; 3½± inches Aggregate Base							
		21			ENGINEERED FILL (Afe): Light Gray to Gray Brown Silty fine Sand, little Iron oxide staining, medium dense to dense-moist to very moist		15					EI = 12 @ 0 to 5 feet
		29					15					
5												
		25					12					
		30					12					
10												
		29					14					
15												
					ENGINEERED FILL (Afe): Dark Gray Silty fine Sand, little Clay, medium dense-moist to very moist							
		23					15					
20												
		18					15					
25												
		31			@ 28 to 30 feet, Dark Gray Brown, some Clay, dense		14					
30					Boring Terminated at 30'							

TBL 21G135-1.GPJ SOCALGEO.GDT 4/8/21

TEST BORING LOG

PLATE B-1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 21G135-1
PROJECT: Proposed Warehouse
LOCATION: Lake Forest, California

DRILLING DATE: 3/12/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 701.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					4½± inches Asphaltic Concrete; 7± inches Aggregate Base							
		78/10"			CAPISTRANO FORMATION (Tco): Light Gray fine-grained Sandstone, very dense-damp to moist	108	10					
		93/9"			@ 3 feet, little medium Sand	111	7					
5		50/5"				101	8					
		50/5"				98	8					
		50/5"				99	6					
10												
		88/9"					10					
15												
		76/10"					13					
20												
		90/11"			@ 23½ feet, little Iron oxide staining		7					
25					Boring Terminated at 25'							

TBL 21G135-1.GPJ SOCALGEO.GDT 4/8/21

TEST BORING LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-3

JOB NO.: 21G135-1
PROJECT: Proposed Warehouse
LOCATION: Lake Forest, California

DRILLING DATE: 3/12/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 17 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 697 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3½± inches Asphaltic Concrete; 3± inches Aggregate Base							
		77/10"			CAPISTRANO FORMATION (Tco): Light Gray fine-grained Sandstone, very dense-damp to moist	110	4					
		50/5"				98	6					
5		50/5.5"				104	5					
		50/5"				100	7					
		50/5"				96	7					
10												
		83/9"					8					
15												
		91/10"			@ 18½ feet, Gray Brown, trace Silt		10					
20					Boring Terminated at 20'							

TBL 21G135-1.GPJ SOCALGEO.GDT 4/8/21

TEST BORING LOG

PLATE B-3

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-4

JOB NO.: 21G135-1
PROJECT: Proposed Warehouse
LOCATION: Lake Forest, California

DRILLING DATE: 3/12/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 695 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					4± inches Asphaltic Concrete; 2½± inches Aggregate Base							
		47			ENGINEERED FILL (Afe): Gray Brown Silty fine Sand, little Iron oxide staining, medium dense to dense-moist to very moist	113	14					
		36				109	12					
5		43				110	11					
		40				109	14					
		77/11"			@ 9 feet, trace Clay, very dense	118	13					
10												
					ENGINEERED FILL (Afe): Gray to Gray Brown Silty fine Sand, trace Clay, varied coloration, dense-very moist							
		33					17					
15												
		33					16 13					
20												
					CAPISTRANO FORMATION (Tco): Light Gray Brown fine-grained Sandstone, very dense-moist							
		75/11"					10					
25												
					Boring Terminated at 25'							

TBL 21G135-1.GPJ SOCALGEO.GDT 4/8/21

TEST BORING LOG

PLATE B-4

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-5

JOB NO.: 21G135-1
PROJECT: Proposed Warehouse
LOCATION: Lake Forest, California

DRILLING DATE: 3/12/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 26 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 696 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3½± inches Asphaltic Concrete; 3± inches Aggregate Base							
		37			ENGINEERED FILL (Afe): Light Gray Brown to Gray Brown Silty fine Sand, trace Clay, little Iron oxide staining, varied coloration, medium dense to dense-moist to very moist		13					
		20					12					
5		35					14					
		26			ENGINEERED FILL (Afe): Light Gray Brown Silty fine Sand, little Clay, little Iron oxide staining, varied coloration, medium dense to very dense-moist to very moist		12					
10												
		33					13					
15												
		61/9"					15					
20												
		28					14					
25												
					ENGINEERED FILL (Afe): Dark Brown to Gray Brown Clayey fine Sand, varied coloration, dense-moist							
		36					14					
30					Boring Terminated at 30'							

TBL 21G135-1.GPJ SOCALGEO.GDT 4/8/21

TEST BORING LOG

PLATE B-5

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-6

JOB NO.: 21G135-1
PROJECT: Proposed Warehouse
LOCATION: Lake Forest, California

DRILLING DATE: 3/12/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 17 feet
READING TAKEN: At Completion

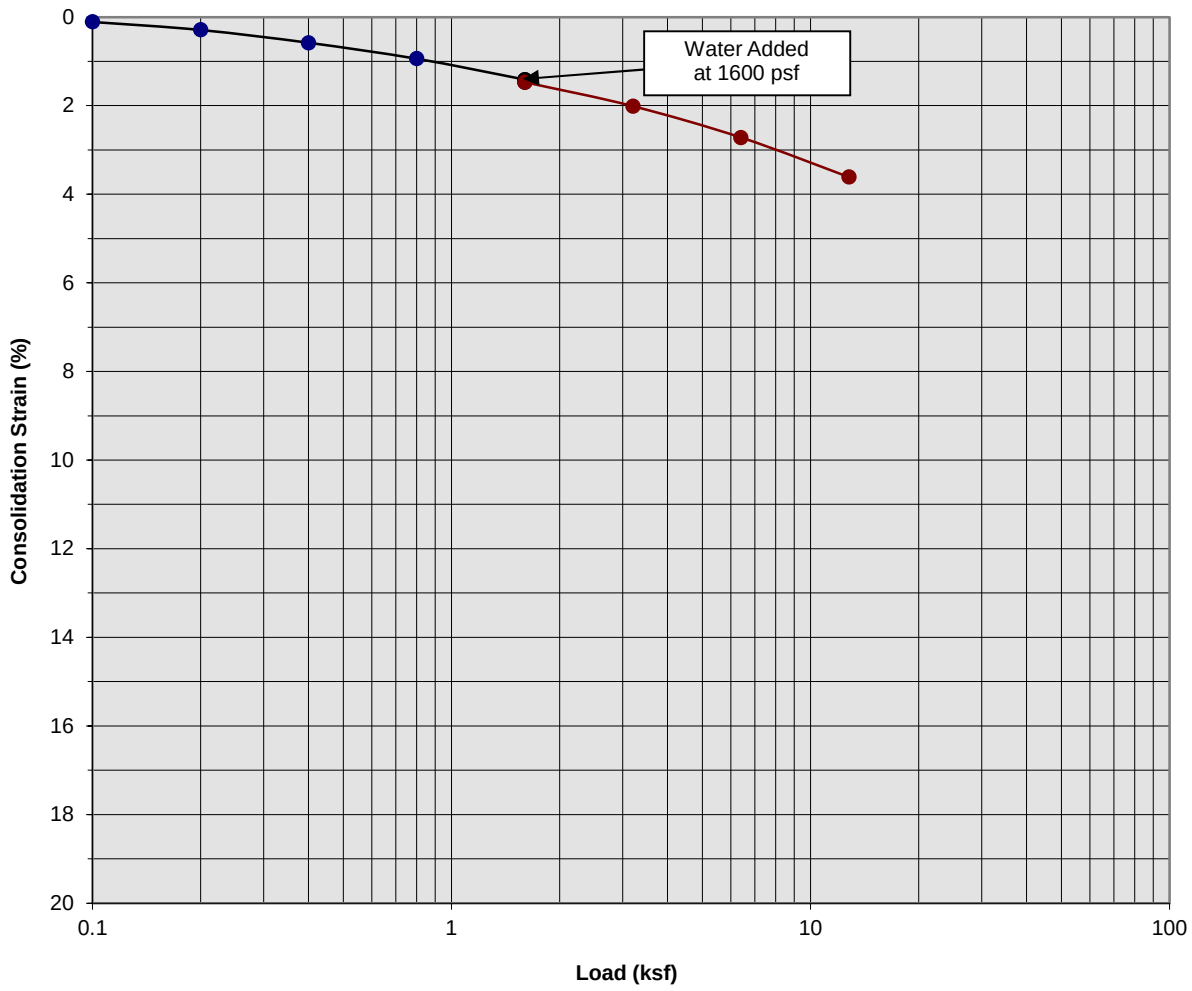
FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: 699.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					4½± inches Asphaltic Concrete; 4½± inches Aggregate Base							
					ENGINEERED FILL (Afe): Light Gray Brown Silty fine Sand, trace medium Sand, trace Clay, medium dense to very dense-moist to very moist		12					Hand Augered 0 to 5 feet due to Existing Utility
							10					
5		50			@ 6 to 8½ feet, trace to little Iron oxide staining		14					
		36					13					
10												
					CAPISTRANO FORMATION (Tco): Gray Brown fine-grained Silty Sandstone, little Iron oxide staining, poorly consolidated, dense to very dense-moist							
		39					11					
15												
		56					12					
20					Boring Terminated at 20'							

TBL 21G135-1.GPJ SOCALGEO.GDT 4/8/21

TEST BORING LOG **PLATE B-6**

APPENDIX C

Consolidation/Collapse Test Results



Classification: FILL: Gray Brown Silty fine Sand, trace Clay

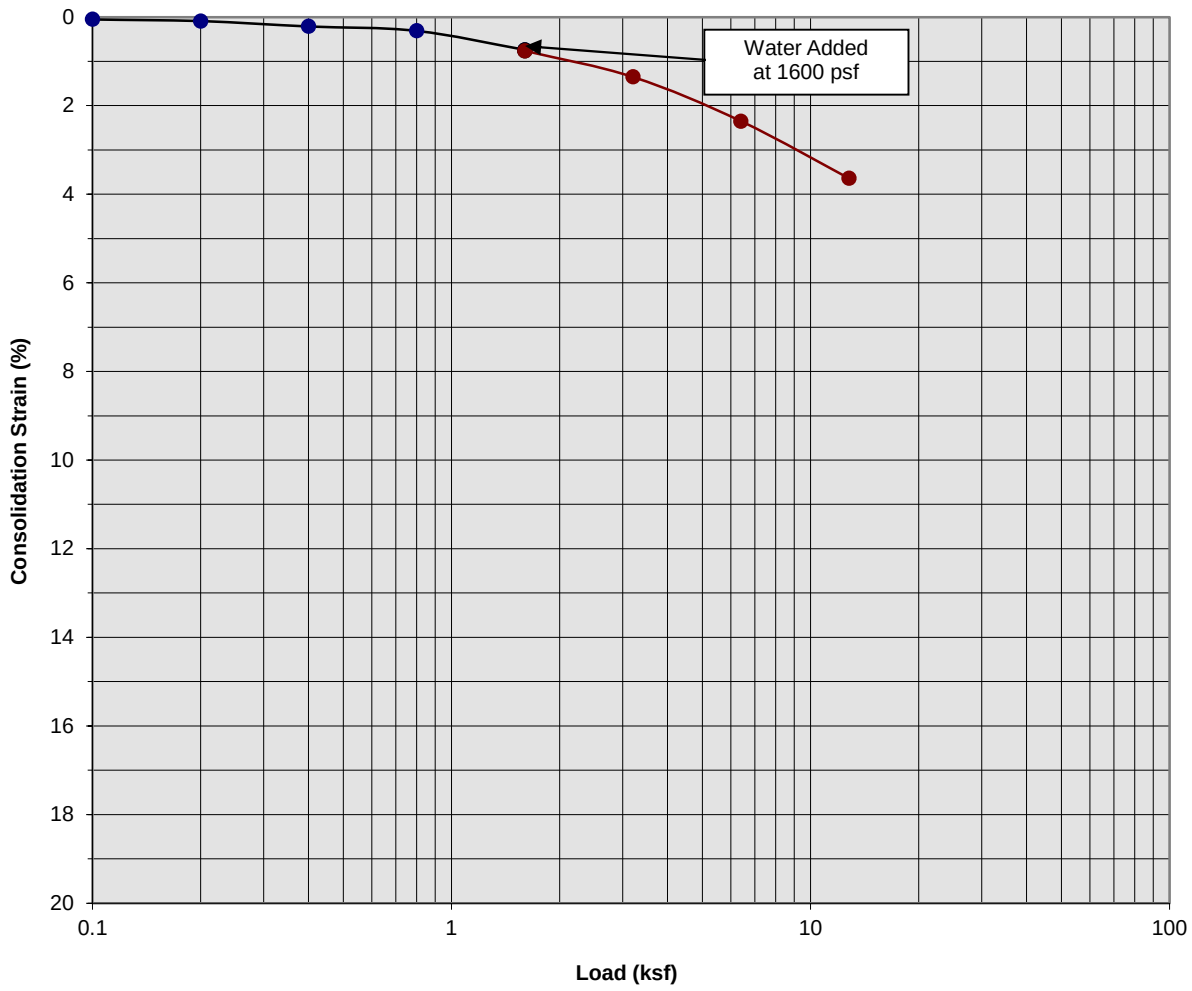
Boring Number:	B-4	Initial Moisture Content (%)	12
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	3 to 4	Initial Dry Density (pcf)	109.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	114.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.06

Proposed Warehouse
Lake Forest, California
Project No. 21G135-1

PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: FILL: Gray Brown Silty fine Sand, trace Clay

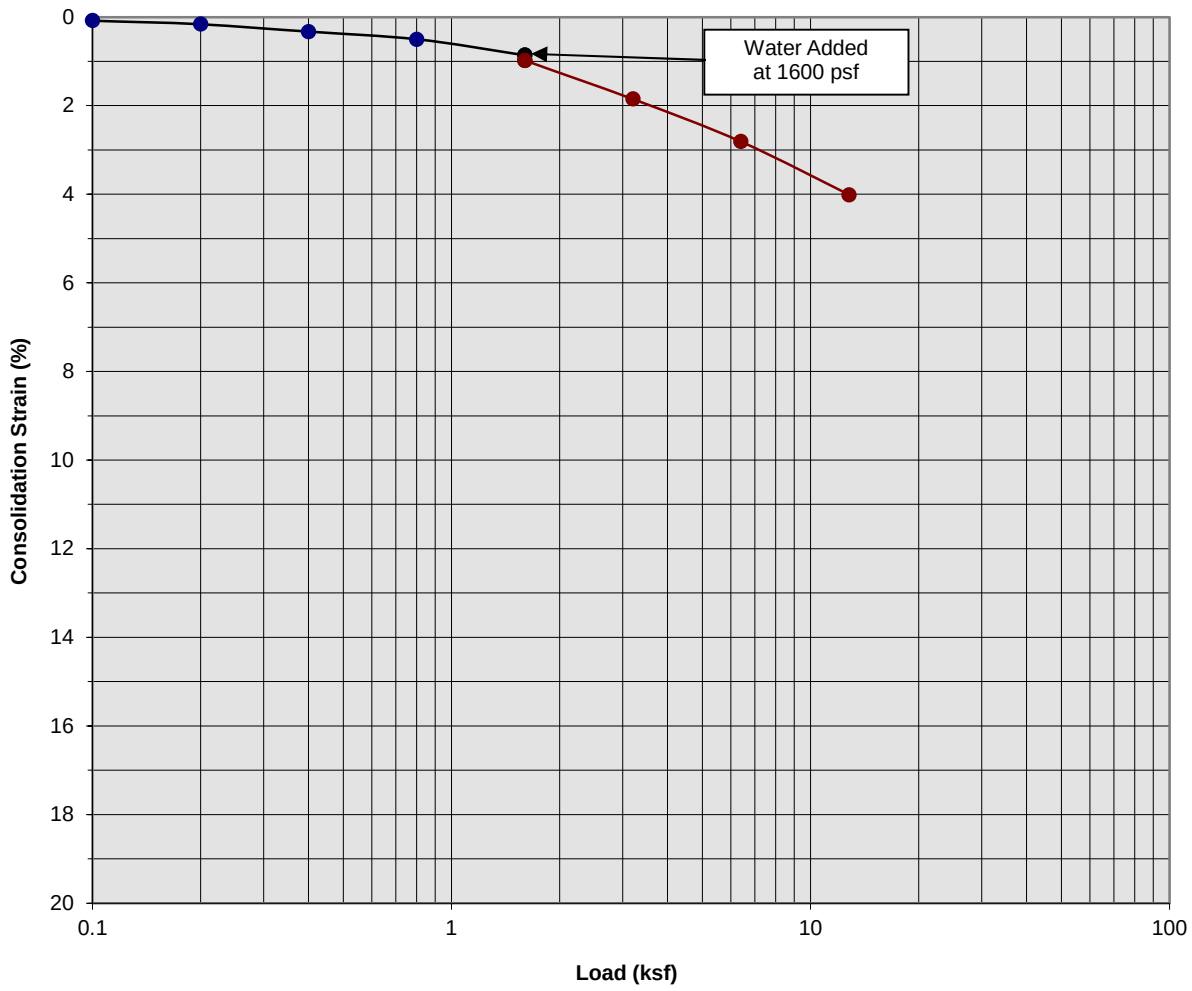
Boring Number:	B-4	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	5 to 6	Initial Dry Density (pcf)	109.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	114.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.02

Proposed Warehouse
Lake Forest, California
Project No. 21G135-1

PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: FILL: Gray Brown Silty fine Sand, trace Clay

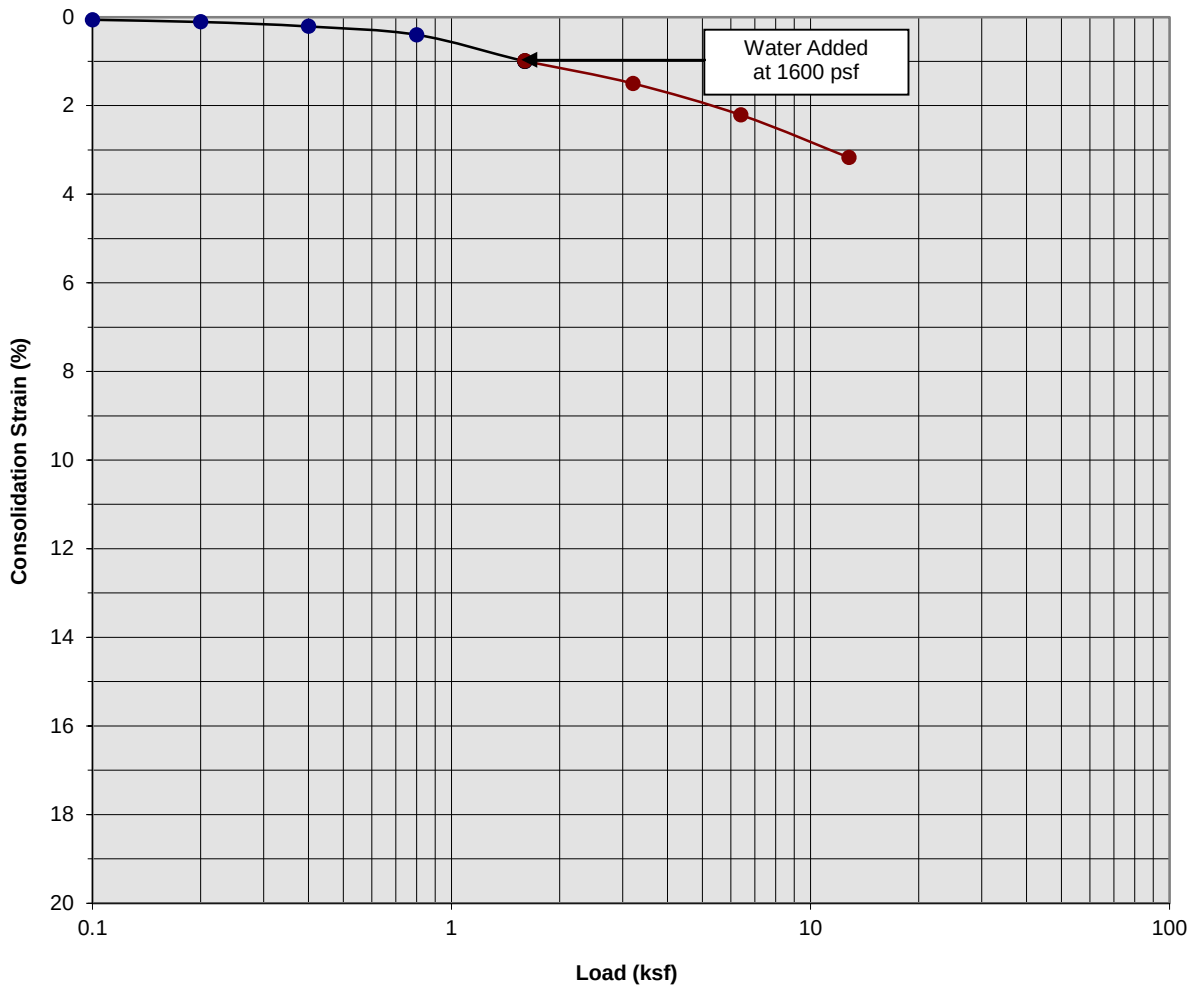
Boring Number:	B-4	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	7 to 8	Initial Dry Density (pcf)	108.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.12

Proposed Warehouse
Lake Forest, California
Project No. 21G135-1

PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: FILL: Gray Brown Silty fine Sand, trace Clay

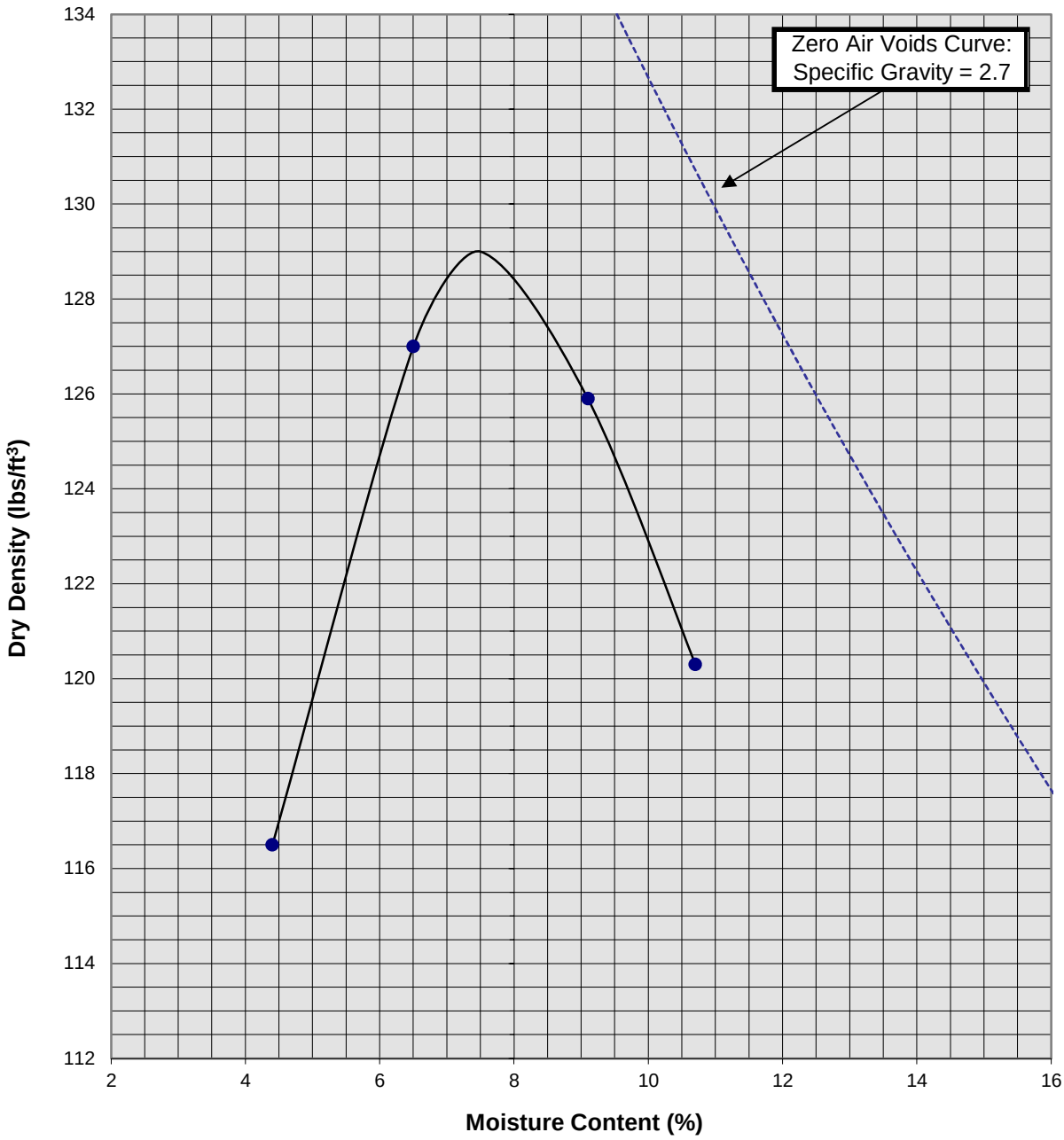
Boring Number:	B-4	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	9 to 10	Initial Dry Density (pcf)	117.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.01

Proposed Warehouse
Lake Forest, California
Project No. 21G135-1

PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Moisture/Density Relationship
ASTM D-1557



Soil ID Number	B-1 @ 0-5'
Optimum Moisture (%)	7.5
Maximum Dry Density (pcf)	130
Soil Classification	Light Gray to Gray Brown Silty fine Sand

Proposed Warehouse
Lake Forest, California
Project No. 21G135-1

PLATE C-5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX D

GRADING GUIDE SPECIFICATIONS

These grading guide specifications are intended to provide typical procedures for grading operations. They are intended to supplement the recommendations contained in the geotechnical investigation report for this project. Should the recommendations in the geotechnical investigation report conflict with the grading guide specifications, the more site specific recommendations in the geotechnical investigation report will govern.

General

- The Earthwork Contractor is responsible for the satisfactory completion of all earthwork in accordance with the plans and geotechnical reports, and in accordance with city, county, and applicable building codes.

- The Geotechnical Engineer is the representative of the Owner/Builder for the purpose of implementing the report recommendations and guidelines. These duties are not intended to relieve the Earthwork Contractor of any responsibility to perform in a workman-like manner, nor is the Geotechnical Engineer to direct the grading equipment or personnel employed by the Contractor.

- The Earthwork Contractor is required to notify the Geotechnical Engineer of the anticipated work and schedule so that testing and inspections can be provided. If necessary, work may be stopped and redone if personnel have not been scheduled in advance.

- The Earthwork Contractor is required to have suitable and sufficient equipment on the job-site to process, moisture condition, mix and compact the amount of fill being placed to the approved compaction. In addition, suitable support equipment should be available to conform with recommendations and guidelines in this report.

- Canyon cleanouts, overexcavation areas, processed ground to receive fill, key excavations, subdrains and benches should be observed by the Geotechnical Engineer prior to placement of any fill. It is the Earthwork Contractor's responsibility to notify the Geotechnical Engineer of areas that are ready for inspection.

- Excavation, filling, and subgrade preparation should be performed in a manner and sequence that will provide drainage at all times and proper control of erosion. Precipitation, springs, and seepage water encountered shall be pumped or drained to provide a suitable working surface. The Geotechnical Engineer must be informed of springs or water seepage encountered during grading or foundation construction for possible revision to the recommended construction procedures and/or installation of subdrains.

Site Preparation

- The Earthwork Contractor is responsible for all clearing, grubbing, stripping and site preparation for the project in accordance with the recommendations of the Geotechnical Engineer.

- If any materials or areas are encountered by the Earthwork Contractor which are suspected of having toxic or environmentally sensitive contamination, the Geotechnical Engineer and Owner/Builder should be notified immediately.

- Major vegetation should be stripped and disposed of off-site. This includes trees, brush, heavy grasses and any materials considered unsuitable by the Geotechnical Engineer.

- Underground structures such as basements, cesspools or septic disposal systems, mining shafts, tunnels, wells and pipelines should be removed under the inspection of the Geotechnical Engineer and recommendations provided by the Geotechnical Engineer and/or city, county or state agencies. If such structures are known or found, the Geotechnical Engineer should be notified as soon as possible so that recommendations can be formulated.

- Any topsoil, slopewash, colluvium, alluvium and rock materials which are considered unsuitable by the Geotechnical Engineer should be removed prior to fill placement.

- Remaining voids created during site clearing caused by removal of trees, foundations basements, irrigation facilities, etc., should be excavated and filled with compacted fill.

- Subsequent to clearing and removals, areas to receive fill should be scarified to a depth of 10 to 12 inches, moisture conditioned and compacted

- The moisture condition of the processed ground should be at or slightly above the optimum moisture content as determined by the Geotechnical Engineer. Depending upon field conditions, this may require air drying or watering together with mixing and/or discing.

Compacted Fills

- Soil materials imported to or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable in the opinion of the Geotechnical Engineer. Unless otherwise approved by the Geotechnical Engineer, all fill materials shall be free of deleterious, organic, or frozen matter, shall contain no chemicals that may result in the material being classified as “contaminated,” and shall be very low to non-expansive with a maximum expansion index (EI) of 50. The top 12 inches of the compacted fill should have a maximum particle size of 3 inches, and all underlying compacted fill material a maximum 6-inch particle size, except as noted below.

- All soils should be evaluated and tested by the Geotechnical Engineer. Materials with high expansion potential, low strength, poor gradation or containing organic materials may require removal from the site or selective placement and/or mixing to the satisfaction of the Geotechnical Engineer.

- Rock fragments or rocks less than 6 inches in their largest dimensions, or as otherwise determined by the Geotechnical Engineer, may be used in compacted fill, provided the distribution and placement is satisfactory in the opinion of the Geotechnical Engineer.

- Rock fragments or rocks greater than 12 inches should be taken off-site or placed in accordance with recommendations and in areas designated as suitable by the Geotechnical Engineer. These materials should be placed in accordance with Plate D-8 of these Grading Guide Specifications and in accordance with the following recommendations:

    - Rocks 12 inches or more in diameter should be placed in rows at least 15 feet apart, 15 feet from the edge of the fill, and 10 feet or more below subgrade. Spaces should be left between each rock fragment to provide for placement and compaction of soil around the fragments.

    - Fill materials consisting of soil meeting the minimum moisture content requirements and free of oversize material should be placed between and over the rows of rock or

concrete. Ample water and compactive effort should be applied to the fill materials as they are placed in order that all of the voids between each of the fragments are filled and compacted to the specified density.

- Subsequent rows of rocks should be placed such that they are not directly above a row placed in the previous lift of fill. A minimum 5-foot offset between rows is recommended.

- To facilitate future trenching, oversized material should not be placed within the range of foundation excavations, future utilities or other underground construction unless specifically approved by the soil engineer and the developer/owner representative.

- Fill materials approved by the Geotechnical Engineer should be placed in areas previously prepared to receive fill and in evenly placed, near horizontal layers at about 6 to 8 inches in loose thickness, or as otherwise determined by the Geotechnical Engineer for the project.

- Each layer should be moisture conditioned to optimum moisture content, or slightly above, as directed by the Geotechnical Engineer. After proper mixing and/or drying, to evenly distribute the moisture, the layers should be compacted to at least 90 percent of the maximum dry density in compliance with ASTM D-1557-78 unless otherwise indicated.

- Density and moisture content testing should be performed by the Geotechnical Engineer at random intervals and locations as determined by the Geotechnical Engineer. These tests are intended as an aid to the Earthwork Contractor, so he can evaluate his workmanship, equipment effectiveness and site conditions. The Earthwork Contractor is responsible for compaction as required by the Geotechnical Report(s) and governmental agencies.

- Fill areas unused for a period of time may require moisture conditioning, processing and recompaction prior to the start of additional filling. The Earthwork Contractor should notify the Geotechnical Engineer of his intent so that an evaluation can be made.

- Fill placed on ground sloping at a 5-to-1 inclination (horizontal-to-vertical) or steeper should be benched into bedrock or other suitable materials, as directed by the Geotechnical Engineer. Typical details of benching are illustrated on Plates D-2, D-4, and D-5.

- Cut/fill transition lots should have the cut portion overexcavated to a depth of at least 3 feet and rebuilt with fill (see Plate D-1), as determined by the Geotechnical Engineer.

- All cut lots should be inspected by the Geotechnical Engineer for fracturing and other bedrock conditions. If necessary, the pads should be overexcavated to a depth of 3 feet and rebuilt with a uniform, more cohesive soil type to impede moisture penetration.

- Cut portions of pad areas above buttresses or stabilizations should be overexcavated to a depth of 3 feet and rebuilt with uniform, more cohesive compacted fill to impede moisture penetration.

- Non-structural fill adjacent to structural fill should typically be placed in unison to provide lateral support. Backfill along walls must be placed and compacted with care to ensure that excessive unbalanced lateral pressures do not develop. The type of fill material placed adjacent to below grade walls must be properly tested and approved by the Geotechnical Engineer with consideration of the lateral earth pressure used in the design.

Foundations

- The foundation influence zone is defined as extending one foot horizontally from the outside edge of a footing, and proceeding downward at a ½ horizontal to 1 vertical (0.5:1) inclination.

- Where overexcavation beneath a footing subgrade is necessary, it should be conducted so as to encompass the entire foundation influence zone, as described above.

- Compacted fill adjacent to exterior footings should extend at least 12 inches above foundation bearing grade. Compacted fill within the interior of structures should extend to the floor subgrade elevation.

Fill Slopes

- The placement and compaction of fill described above applies to all fill slopes. Slope compaction should be accomplished by overfilling the slope, adequately compacting the fill in even layers, including the overfilled zone and cutting the slope back to expose the compacted core

- Slope compaction may also be achieved by backrolling the slope adequately every 2 to 4 vertical feet during the filling process as well as requiring the earth moving and compaction equipment to work close to the top of the slope. Upon completion of slope construction, the slope face should be compacted with a sheepsfoot connected to a sideboom and then grid rolled. This method of slope compaction should only be used if approved by the Geotechnical Engineer.

- Sandy soils lacking in adequate cohesion may be unstable for a finished slope condition and therefore should not be placed within 15 horizontal feet of the slope face.

- All fill slopes should be keyed into bedrock or other suitable material. Fill keys should be at least 15 feet wide and inclined at 2 percent into the slope. For slopes higher than 30 feet, the fill key width should be equal to one-half the height of the slope (see Plate D-5).

- All fill keys should be cleared of loose slough material prior to geotechnical inspection and should be approved by the Geotechnical Engineer and governmental agencies prior to filling.

- The cut portion of fill over cut slopes should be made first and inspected by the Geotechnical Engineer for possible stabilization requirements. The fill portion should be adequately keyed through all surficial soils and into bedrock or suitable material. Soils should be removed from the transition zone between the cut and fill portions (see Plate D-2).

Cut Slopes

- All cut slopes should be inspected by the Geotechnical Engineer to determine the need for stabilization. The Earthwork Contractor should notify the Geotechnical Engineer when slope cutting is in progress at intervals of 10 vertical feet. Failure to notify may result in a delay in recommendations.

- Cut slopes exposing loose, cohesionless sands should be reported to the Geotechnical Engineer for possible stabilization recommendations.

- All stabilization excavations should be cleared of loose slough material prior to geotechnical inspection. Stakes should be provided by the Civil Engineer to verify the location and dimensions of the key. A typical stabilization fill detail is shown on Plate D-5.

- Stabilization key excavations should be provided with subdrains. Typical subdrain details are shown on Plates D-6.

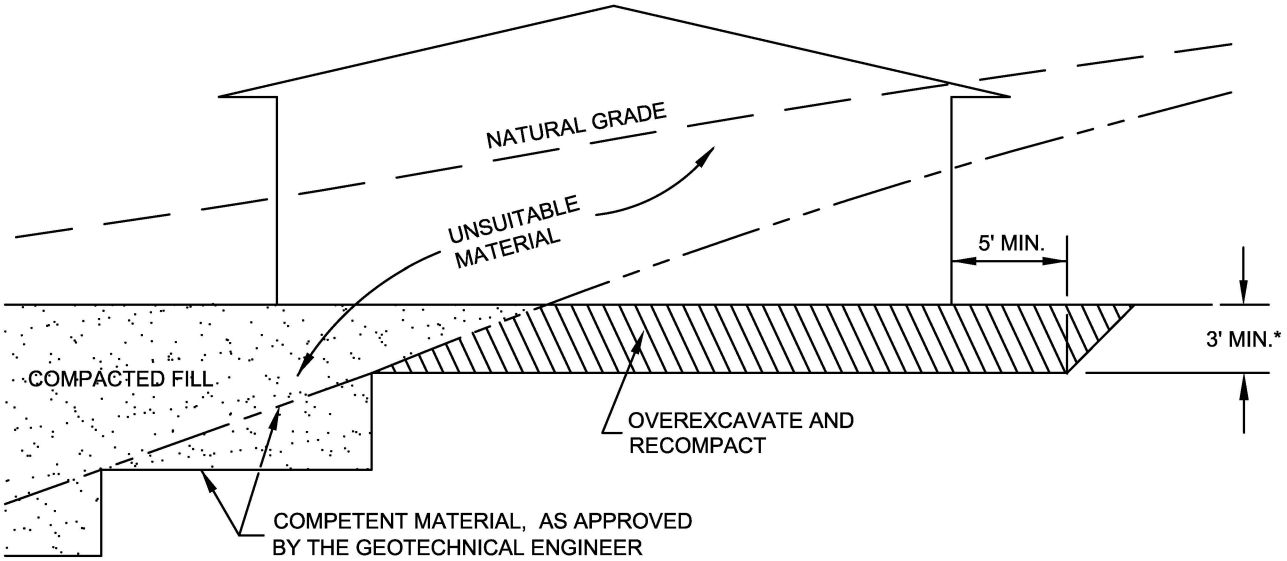
Subdrains

- Subdrains may be required in canyons and swales where fill placement is proposed. Typical subdrain details for canyons are shown on Plate D-3. Subdrains should be installed after approval of removals and before filling, as determined by the Soils Engineer.

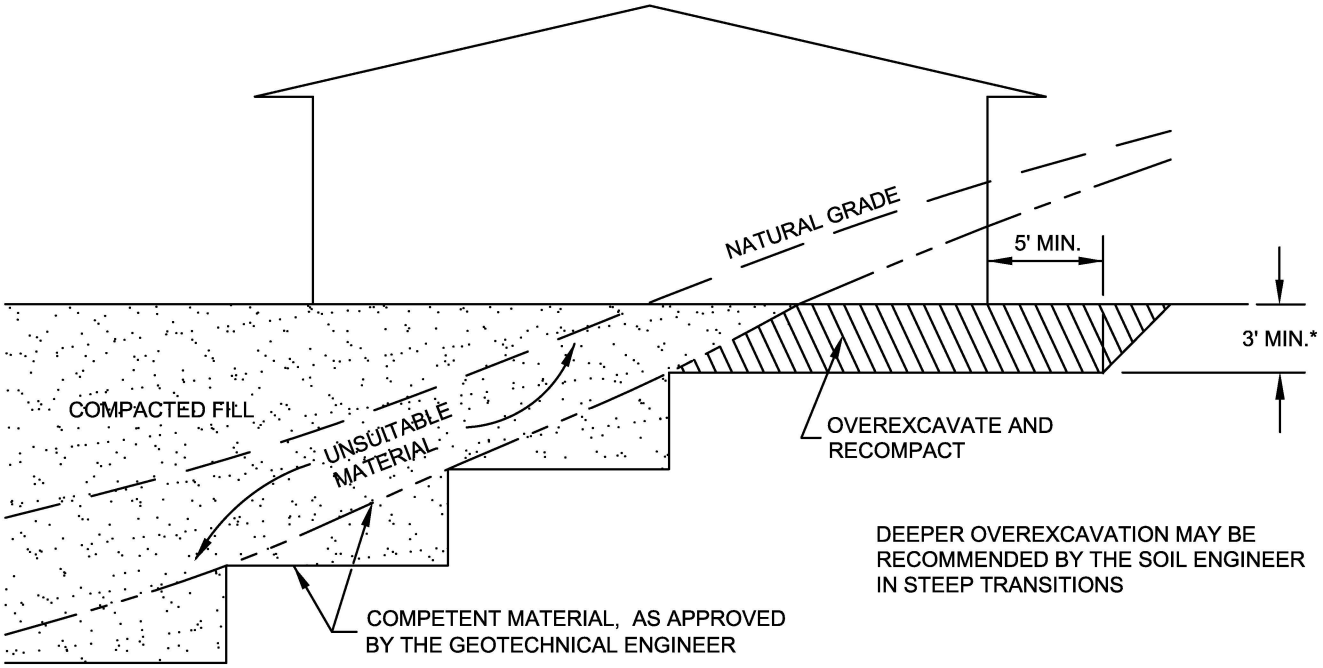
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

- Filter material for subdrains should conform to CALTRANS Specification 68-1.025 or as approved by the Geotechnical Engineer for the specific site conditions. Clean ¾-inch crushed rock may be used provided it is wrapped in an acceptable filter cloth and approved by the Geotechnical Engineer. Pipe diameters should be 6 inches for runs up to 500 feet and 8 inches for the downstream continuations of longer runs. Four-inch diameter pipe may be used in buttress and stabilization fills.

CUT LOT



CUT/FILL LOT (TRANSITION)



*SEE TEXT OF REPORT FOR SPECIFIC RECOMMENDATION. ACTUAL DEPTH OF OVEREXCAVATION MAY BE GREATER.

TRANSITION LOT DETAIL

GRADING GUIDE SPECIFICATIONS

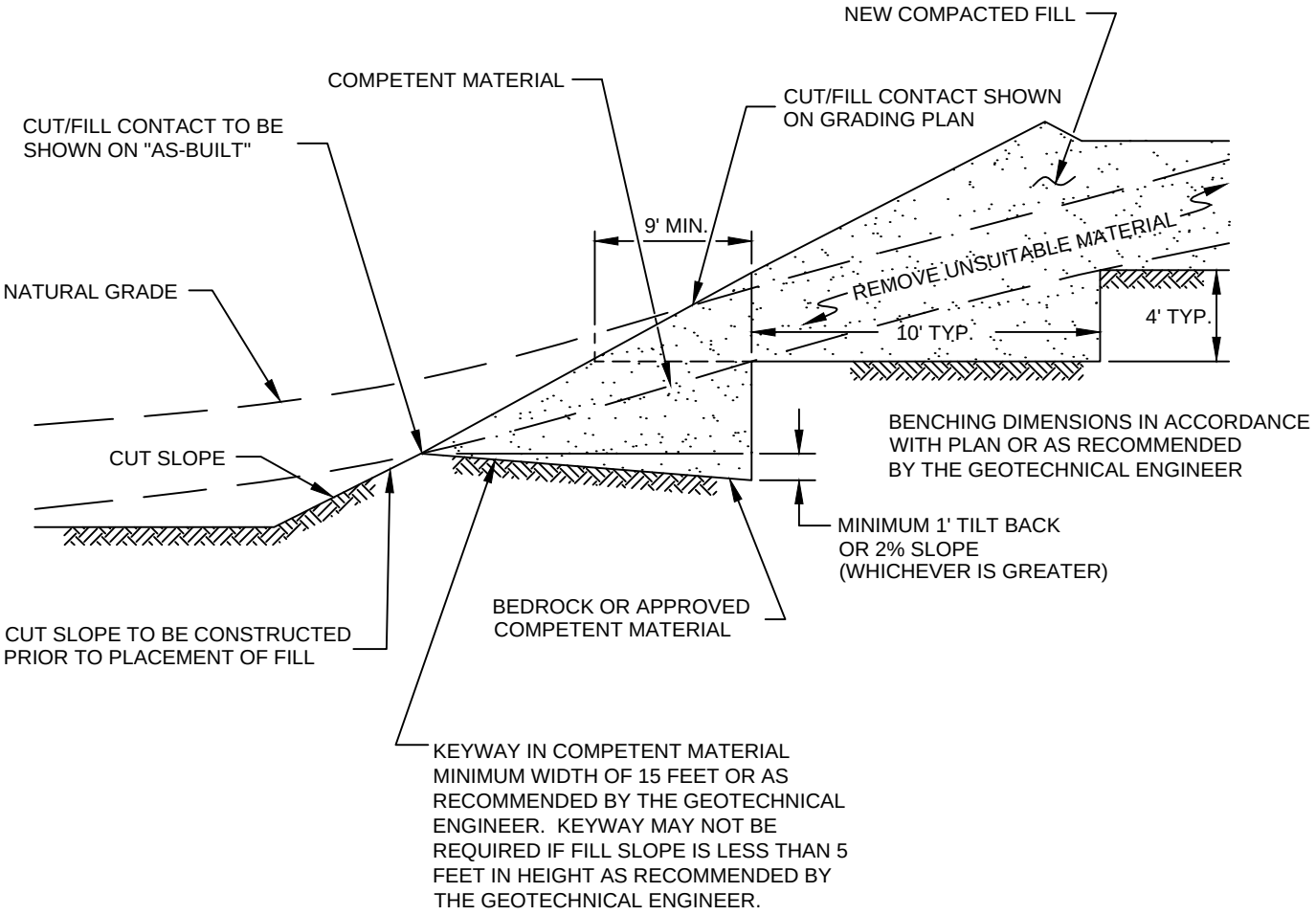
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-1

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE CUT SLOPE DETAIL

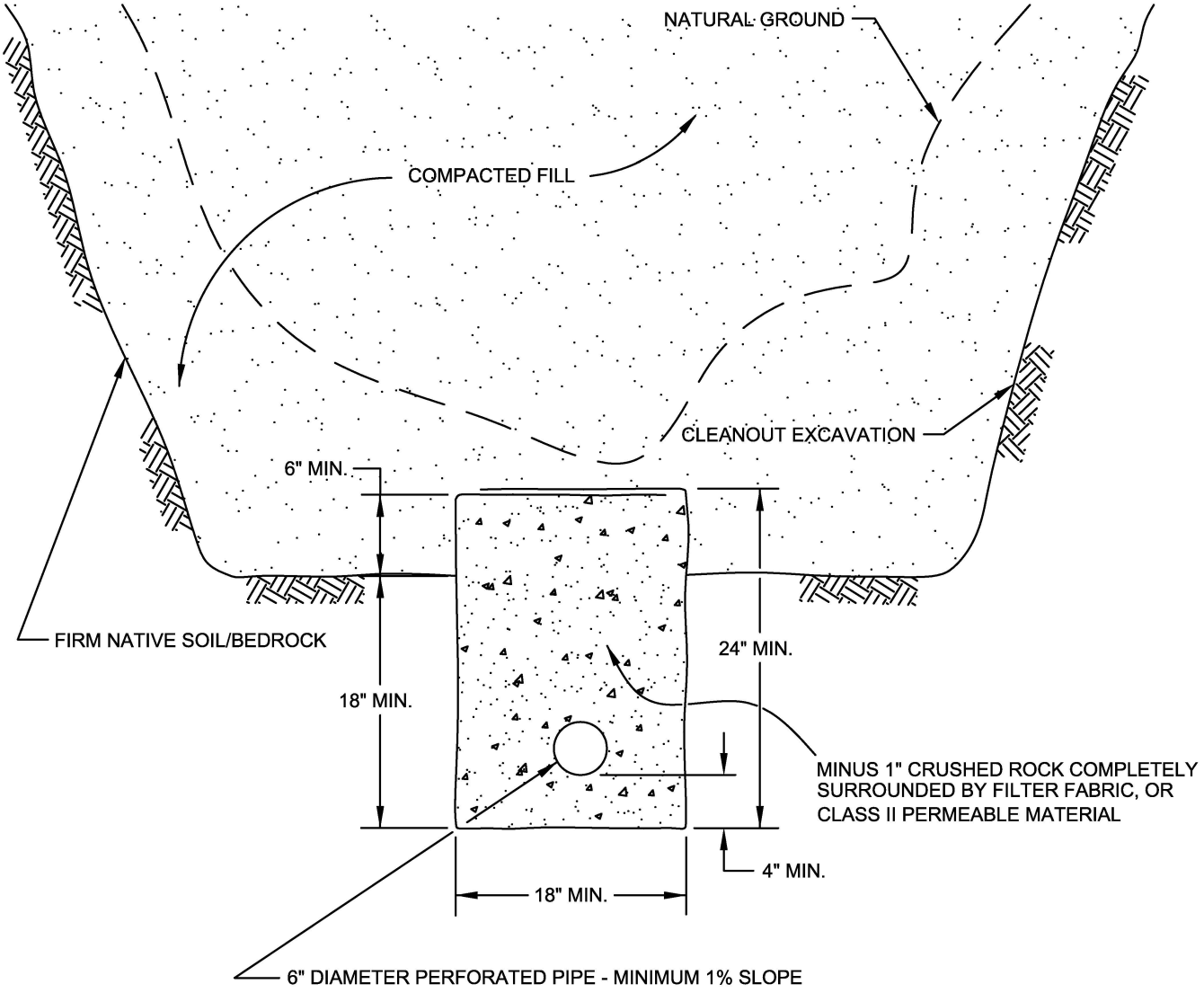
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



PIPE MATERIAL	DEPTH OF FILL OVER SUBDRAIN
ADS (CORRUGATED POLETHYLENE)	8
TRANSITE UNDERDRAIN	20
PVC OR ABS: SDR 35	35
SDR 21	100

SCHEMATIC ONLY
NOT TO SCALE

CANYON SUBDRAIN DETAIL

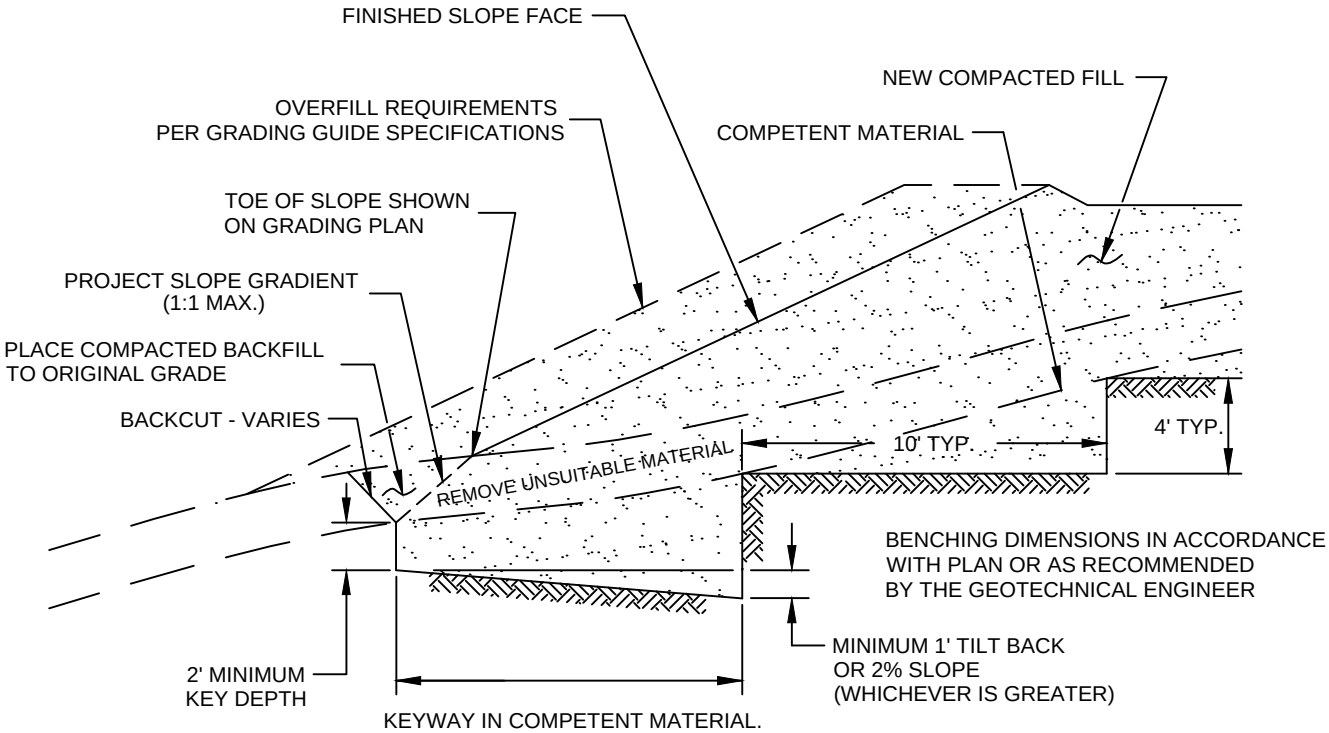
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



NOTE:
BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

FILL ABOVE NATURAL SLOPE DETAIL

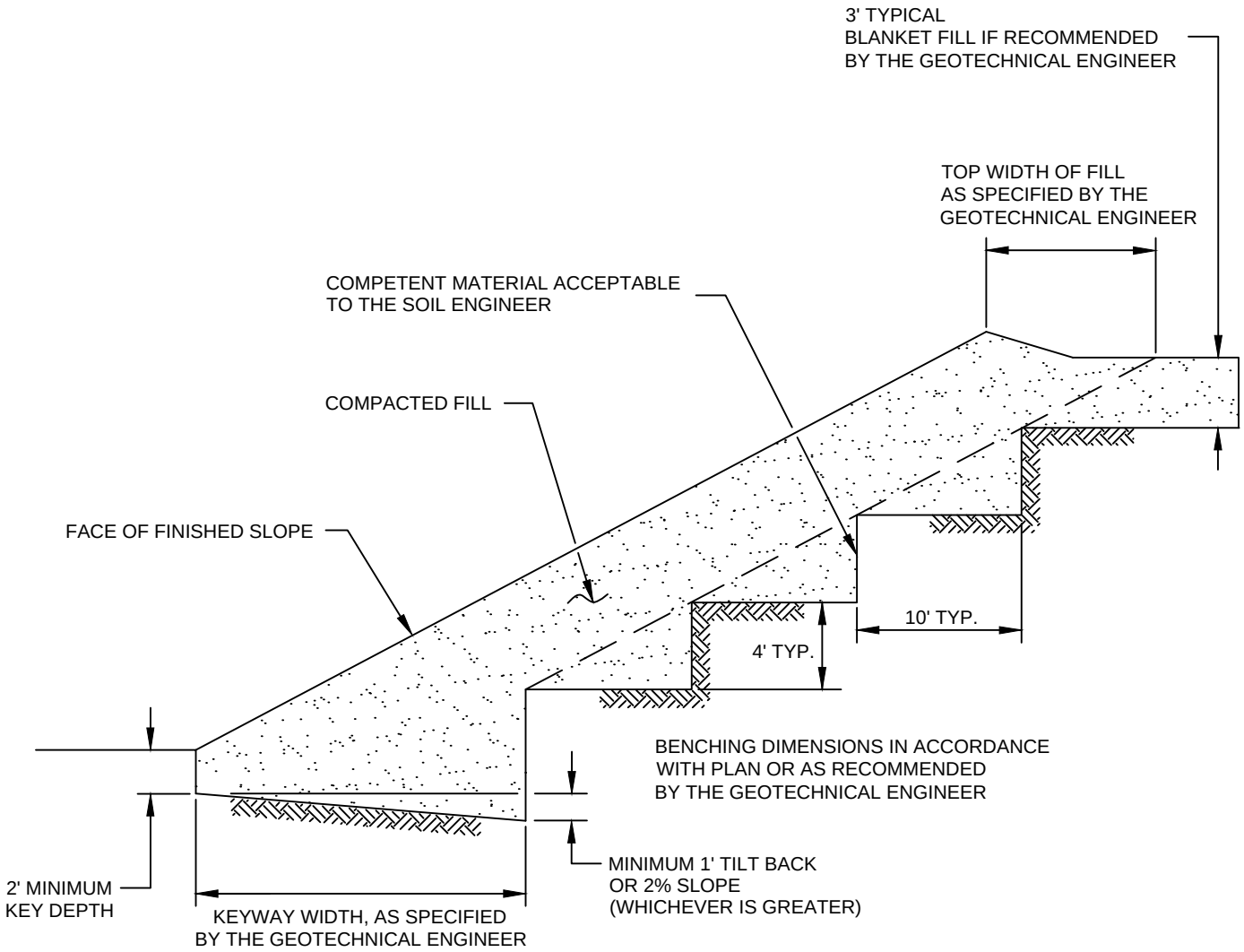
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL

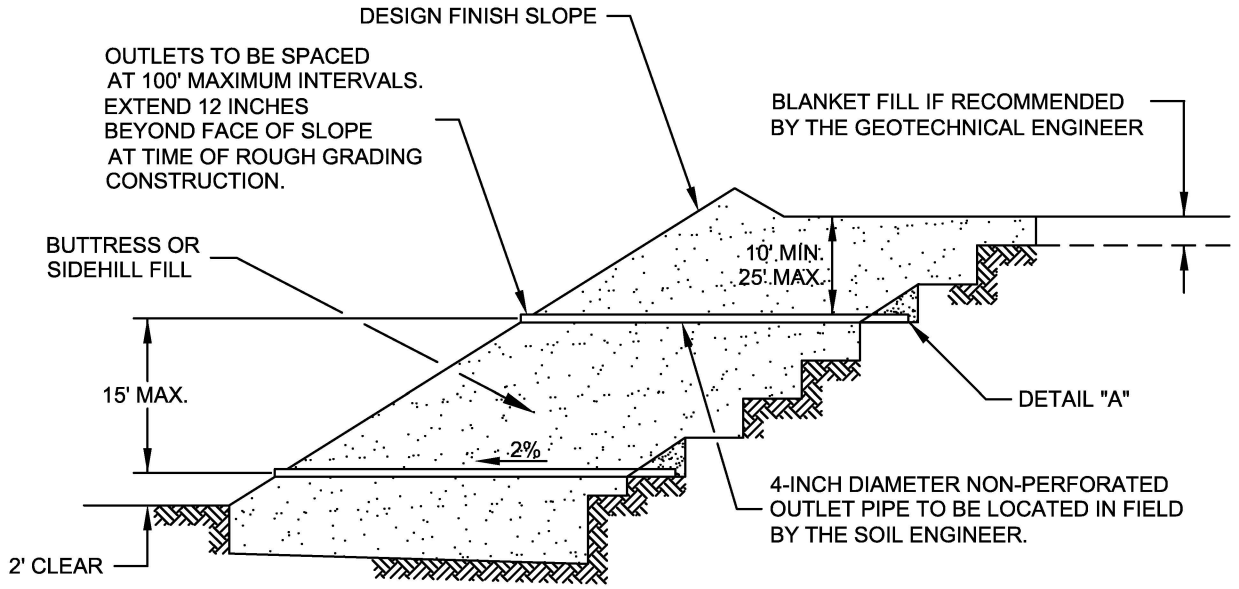
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



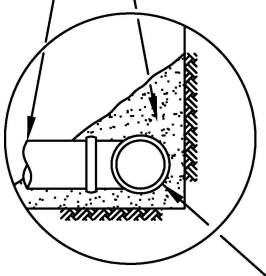
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50



DETAIL "A"

NOTES:
1. TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

SLOPE FILL SUBDRAINS

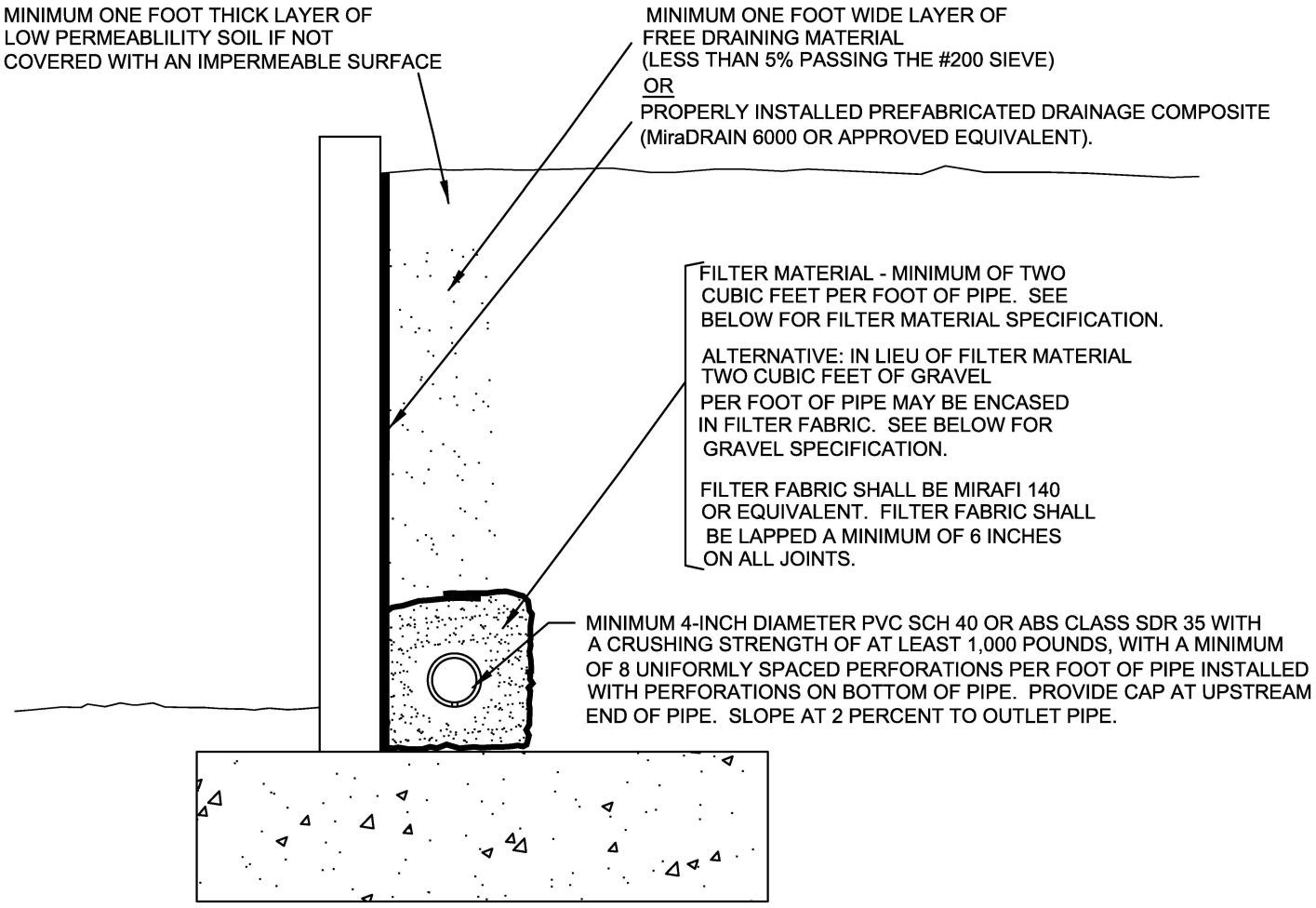
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50

RETAINING WALL BACKDRAINS

GRADING GUIDE SPECIFICATIONS

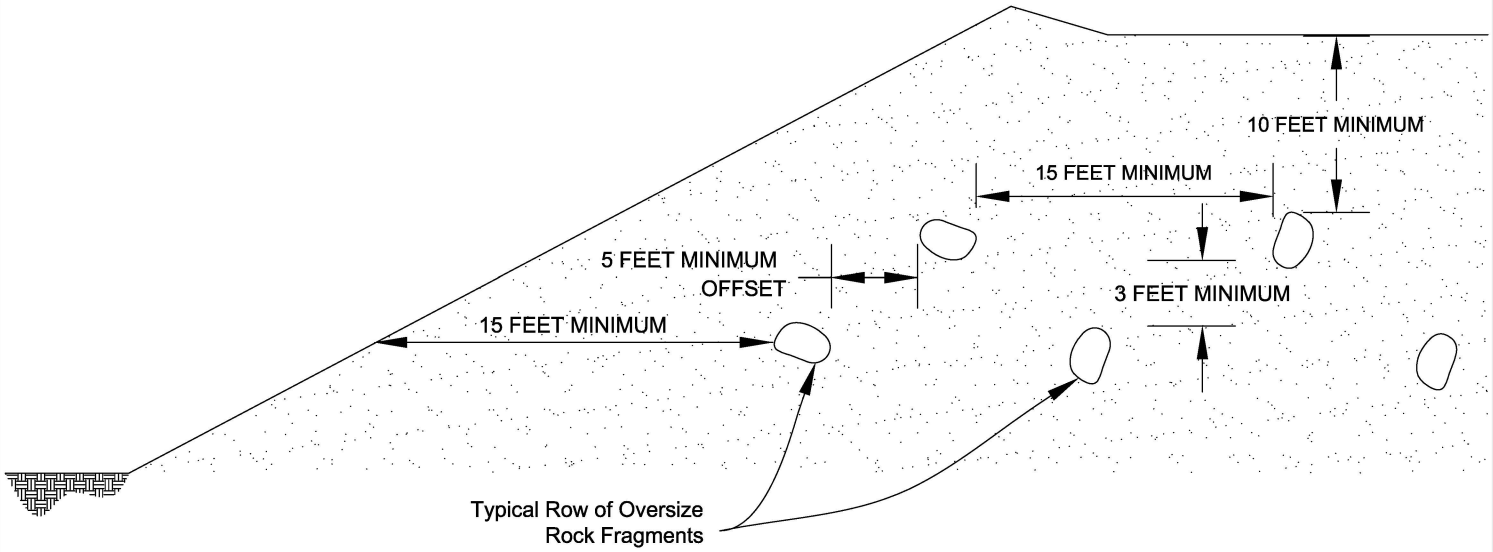
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

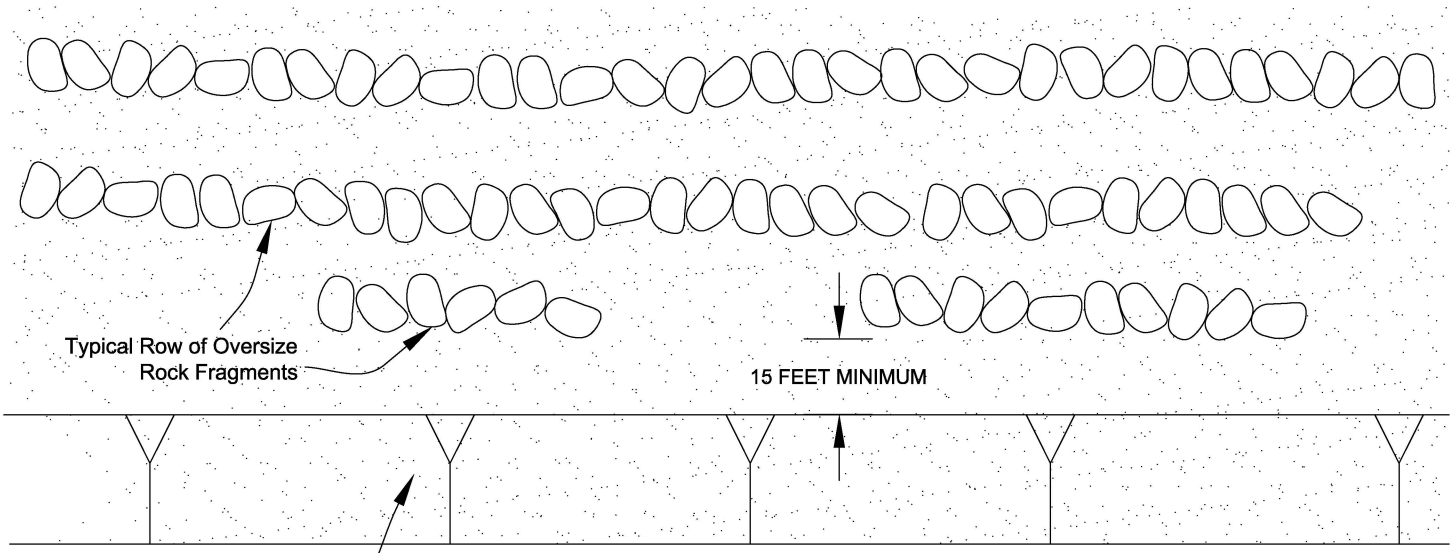
PLATE D-7

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

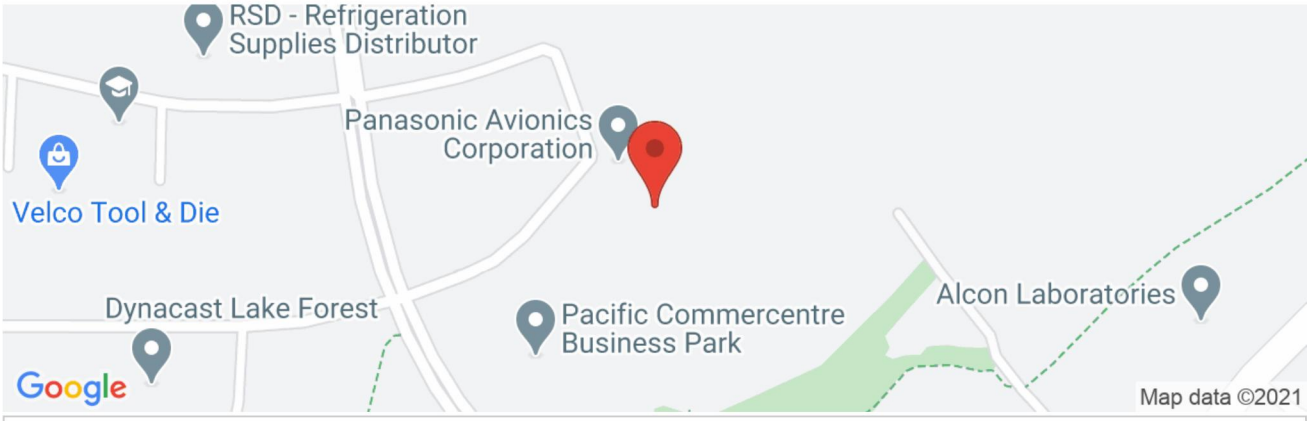
PLATE D-8

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

Latitude, Longitude: 33.665477, -117.672504



Date	3/24/2021, 1:51:33 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.261	MCE_R ground motion. (for 0.2 second period)
S_1	0.45	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.261	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	0.841	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.522	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.575	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.261	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.342	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.45	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.483	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.58	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.94	Mapped value of the risk coefficient at short periods
C_{R1}	0.932	Mapped value of the risk coefficient at a period of 1 s

SOURCE: SEAOC/OSHPD Seismic Design Maps Tool
<https://seismicmaps.org/>

SEISMIC DESIGN PARAMETERS - 2019 CBC

PROPOSED WAREHOUSE

LAKE FOREST, CALIFORNIA

DRAWN: JAH
CHKD: RGT

SCG PROJECT
21G135-1

PLATE E-1

SOUTHERN CALIFORNIA GEOTECHNICAL

Appendix D

Infiltration Report

April 8, 2021

Black Creek Group
4675 MacArthur Court, Suite 625
Newport Beach, California 92660

Attention: Mr. Chris Sanford
Senior Vice President, Development

Project No.: **21G135-2**

Subject: **Results of Infiltration Testing**
Proposed Warehouse
26200 Enterprise Way
Lake Forest, California

Reference: Geotechnical Investigation, Proposed Warehouse, 26200 Enterprise Way, Lake Forest, California, prepared by Southern California Geotechnical (SCG) for Black Creek Group, SCG Project No. 21G135-1, dated April 7, 2021.

Dear Mr. Sanford:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in accordance with our Proposal No. 21P170, dated February 25, 2021. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the onsite soils. The infiltration testing was performed in general accordance with the guidelines published by Orange County: Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs) in South Orange County, Appendix D. These guidelines were most recently updated December 21, 2018.

Site and Project Description

The site is located at 26200 Enterprise Way in Lake Forest, California. The site is bounded to the north by Enterprise Way and existing commercial/industrial buildings, to the east and south by existing commercial/industrial developments, and to the west by Enterprise Court. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The site is an irregular-shaped parcel, 8.83± acres in size. The site is presently developed with one (1) commercial office building, 75,000± ft^2 in size, located in the central area of the site. The development is a two-story building of concrete tilt up construction. A series of Bloomenergy servers, are located on concrete pads along the southern property line, behind the building. The building is surrounded by asphaltic concrete pavements and limited areas of

Portland cement concrete pavements. The pavements are in good condition with minor cracking throughout. Landscape planters are present throughout the site and possesses small shrubs, bushes and medium to large trees. The eastern and southern boundaries of the site possess north and west facing slopes. These slopes ascend 10 to 15 feet from the subject site to the adjacent property. A concrete-lined drainage swale is located near the midpoints of the slopes. The remaining areas of the slopes are covered with dense vegetation.

Proposed Development

A preliminary site plan has been provided to our office by the client. Based on this plan, the site will be developed with one (1) new commercial industrial building, 162,000± ft² in size, located in the central region of the site. Dock-high doors will be constructed along a portion of the southern building wall. The proposed building is expected to be surrounded by asphaltic concrete pavements in the parking and drive areas, Portland cement concrete pavements in the loading dock areas, and concrete flatwork and landscaped planters throughout the site.

The use of on-site storm water infiltration systems has been proposed for the new development at the site. We understand that the infiltration system may consist of below-grade chambers located in the southeastern corner of the site. The bottom of the infiltration system will be approximately 10± feet below the existing site grades.

Concurrent Study

SCG recently conducted a geotechnical investigation for this project, referred above. The subsurface exploration for this project consisted of six (6) borings advanced to depths of 20 to 30± feet below the existing site grades. Asphaltic concrete pavement was encountered at the ground surface of all boring locations. The pavement sections generally consisted of 3½ to 4½± inches of asphaltic concrete, underlain by 2½ to 7± inches of aggregate base. Engineered fill soils were encountered at Boring Nos. B-1 and B-4 through B-6, extending to depths of 12 to more than 30± feet. Boring Nos. B-1 and B-5 were terminated in the engineered fill soils. These fill materials consist of medium dense to very dense silty sands with varying clay content. Many samples of the fill soils possess variable coloration and variable strength, indicative of their classification as fill. Capistrano Formation bedrock was encountered beneath the pavements and/or beneath the fill soils at most of the boring locations, extending to at least the maximum depth explored of 30± feet below the existing site grades. The bedrock generally consists of light gray to dark gray fine-grained poorly consolidated silty sandstone. The samples occasionally possess trace amounts of clay, organics and iron oxide staining. Free water was not encountered during the drilling of any of the borings.

Geologic Conditions

Geologic research indicates that the majority of the site is underlain by white to bluish-white, silty, marine, fine- to medium-grained, thick bedded to massive, poorly sorted arkosic sandstone. mapped as late Miocene to early Pliocene Capistrano Formation, Oso Member (Map Symbol Tco). The Holocene to Pleistocene age Slopewash (Map Symbol Qsw) is mapped in the northwestern and southeastern property lines of the site. The bedding within the Capistrano Formation is indicated to trend northwest-southeast with a dip of 14 degrees to the north, on the geologic map. The primary available reference applicable to the subject site is the Geologic

Map and Sections of the South Half El Toro Quadrangle, Orange County, California, by Donald Fife, 1974. A portion of this map indicating the location of the subject site is included herein as Plate 3 in Appendix A.

Based on the materials encountered in the exploratory borings, the site is underlain by sandstone, and silty sandstone of the Capistrano Formation.

Subsurface Exploration

Scope of Exploration

The subsurface exploration conducted for the infiltration testing consisted of two (2) infiltration test borings, advanced to depths of 10± feet below the existing site grades. The infiltration borings were advanced using a conventional truck-mounted drilling rig, equipped with 8-inch-diameter hollow stem augers, and were logged during drilling by a member of our staff. The approximate locations of the infiltration test borings (identified as I-1 and I-2) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Upon the completion of the infiltration borings, the bottom of each test boring was covered with 2± inches of clean ¾-inch gravel. A sufficient length of 3-inch-diameter perforated PVC casing was then placed into each test hole so that the PVC casing extended from the bottom of the test hole to the ground surface. Clean ¾-inch gravel was then installed in the annulus surrounding the PVC casing.

Geotechnical Conditions

Pavements

Asphaltic Concrete (AC) pavements were encountered at the ground surface of both infiltration test locations. The pavements consisted of 2½ to 3½± inches of AC with 5± inches of Aggregate Base (AB) at each location.

Engineered Fill (Afe)

Engineered fill soils were encountered beneath the pavements at both infiltration test locations, extending to at least the maximum depth explored of 10± feet below ground surface. These fill materials consist of medium dense to dense silty fine sands and clayey sands. Some samples of the fill soils possess variable coloration and variable strength, indicative of their classification as fill.

Infiltration Testing

As previously mentioned, the infiltration testing was performed in general accordance with the Orange County guidelines: Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs) in South Orange County, Appendix D.

Pre-soaking

In accordance with the county infiltration standards, all of the infiltration test borings were pre-soaked prior to the infiltration testing. The pre-soaking process consisted of filling the test borings by inverting a full 5-gallon bottle of clear water supported over each hole so that the water level reaches a level of at least 5 times the hole's radius above the gravel at the bottom of each hole. The pre-soaking was completed after all of the water had percolated through each test hole or after 15 hours since initiating the pre-soak.

Infiltration Testing

Following the pre-soaking process of the infiltration test borings, SCG performed the infiltration testing. Each test hole was filled with water to a depth of at least 5 times the hole's radius above the gravel at the bottom of each test hole, and less than or equal to the water level used during the pre-soaking process. In accordance with the Orange County guidelines, since "non-sandy soils" were encountered at the bottom of both infiltration borings, readings were taken at 30-minute intervals for a total of 6 hours. After each reading, the borings were refilled to the correct water level above the gravel at the bottom of each test hole. The water level readings are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on the spreadsheets.

The infiltration rates from the test are tabulated in inches per hour. In accordance with the typically accepted practice, it is recommended that the most conservative reading from the latter part of the infiltration tests be used as the design infiltration rate. The rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Infiltration Rate (inches/hour)
I-1	10	ENGINEERED FILL: Light Gray to Brown Silty fine Sand	0.1
I-2	10	ENGINEERED FILL: Gray Brown Clayey fine Sand	0.3

Laboratory Testing

Moisture Content

The moisture contents for the recovered soil samples within the borings were determined in accordance with ASTM D-2216 and are expressed as a percentage of the dry weight. These test results are presented on the Boring Logs.

Grain Size Analysis

The grain size distribution of selected soils collected from the bottom of each infiltration test boring have been determined using a range of wire mesh screens. These tests were performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the

sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of these tests are presented on Plates C-1 through C-2 of this report.

Design Recommendations

Two (2) infiltration tests were performed at the subject site. As noted above, the infiltration rates at these locations range from 0.1 to 0.3 inches per hour.

Based on the results of the infiltration testing at the subject site, infiltration is not considered feasible at this site due to the presence of dense engineered fill soils, comprised of silty sands and clayey sands, which possess very poor infiltration characteristics.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rates contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur. The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between trench locations and testing depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted. The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

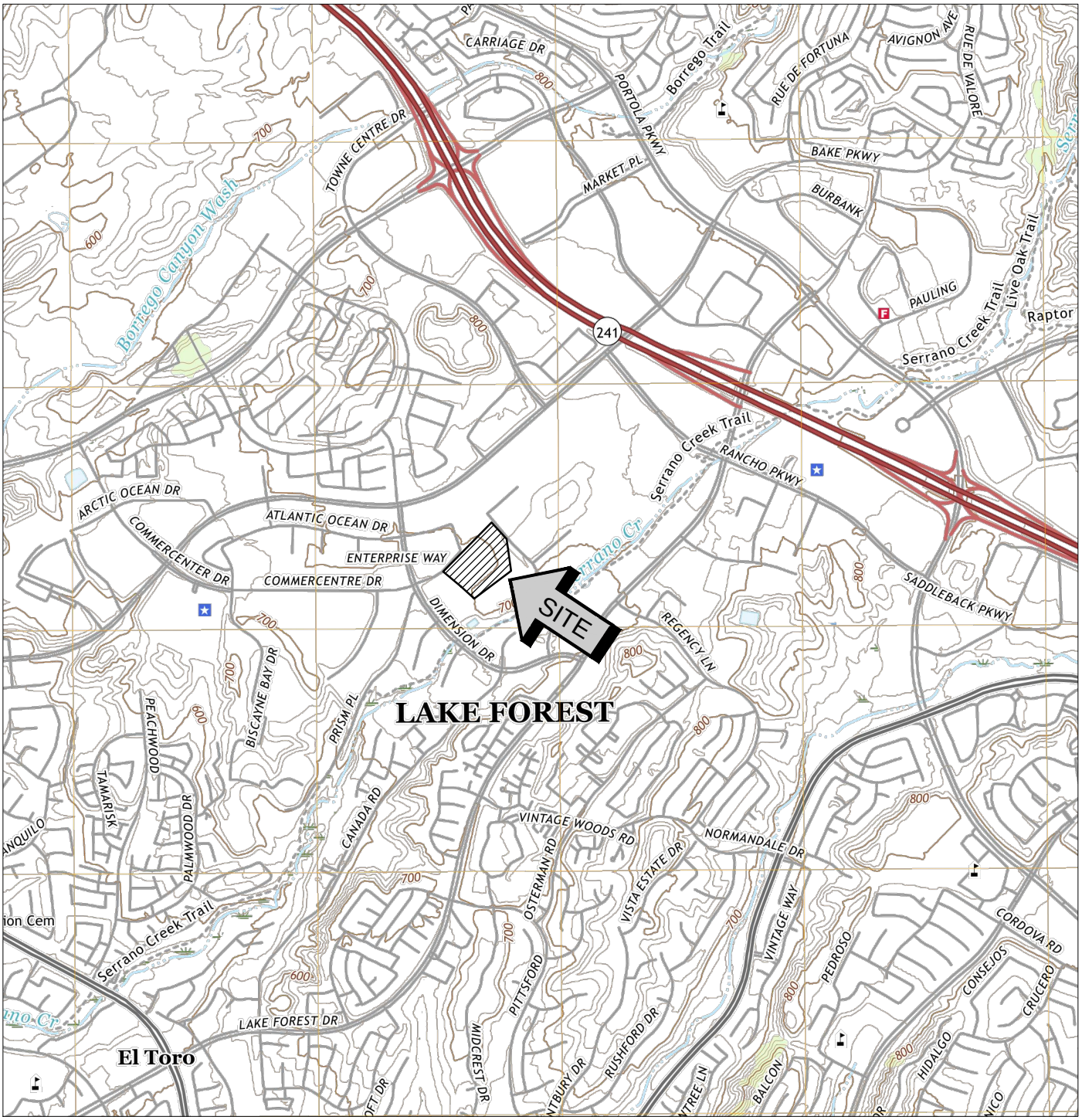
SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Jose Zuniga
Staff Engineer

Gregory K. Mitchell, GE 2364
Principal Engineer

Distribution: (1) Addressee

Enclosures:
Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Plate 3 – Geologic Map
Boring Log Legend and Logs (4 pages)
Infiltration Test Results Spreadsheets (2 pages)
Grain Size Distribution Graphs (2 pages)



SOURCE: USGS TOPOGRAPHIC MAP OF LAKE FOREST QUADRANGLE, ORANGE COUNTY, CALIFORNIA, 2018

SITE LOCATION MAP

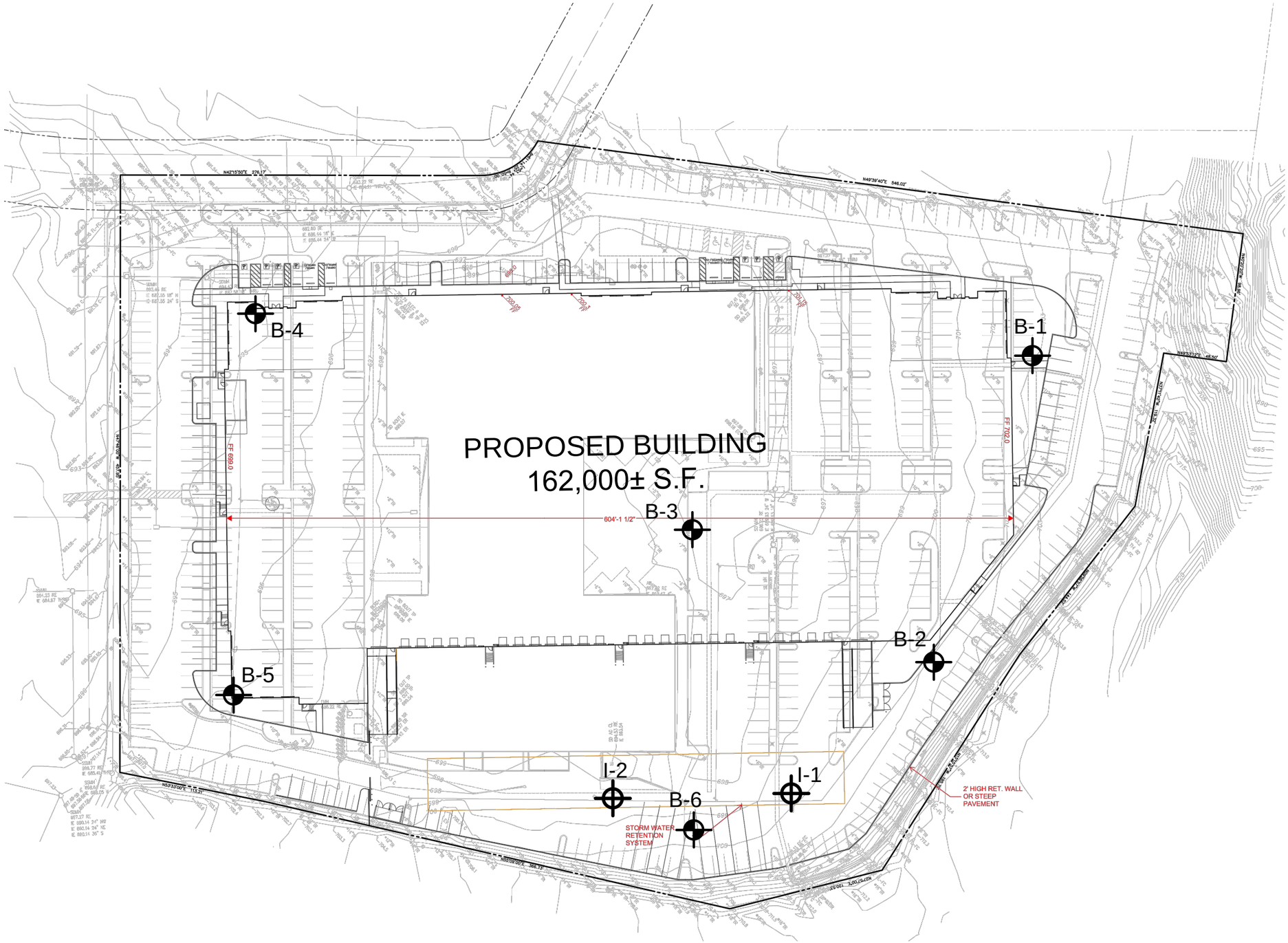
PROPOSED WAREHOUSE

LAKE FOREST, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: MD CHKD: RGT	
SCG PROJECT 21G135-2	
PLATE 1	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



NORTH
SoCalGeo

GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- APPROXIMATE BORING LOCATION

NOTE: BASE MAP PREPARED BY KIER + WRIGHT

INFILTRATION TEST LOCATION PLAN
PROPOSED WAREHOUSE
LAKE FOREST, CALIFORNIA

SCALE: 1" = 80'	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAH CHKD: GKM	
SCG PROJECT 21G135-2	
PLATE 2	

LEGEND

Qsw

SLOPEWASH. (Holocene to Pleistocene(?))

Lithology: Varies with parent materials. In general consists of light olive-gray to olive-gray, silty to clayey, organicly rich soil which is plastic when wet and hard when dry. Consists of detrital materials resulting from debris flows or creep aided by rill wash, ground water, and unchanneled surficial drainage. Accumulates near the base of slopes and at the mouths of small canyons. Includes colluvium and minor residu soils. It is commonly transitional with adjacent soils or alluvial deposits. Mapped where estimated to exceed three feet in thickness.

Tco

CAPISTRANO FORMATION, OSO MEMBER. (late Miocene to early Pliocene)

Lithology: Marine, white to bluish-white, silty, fine-to medium-grained, thick bedded to massive, poorly sorted arkosic sandstone. Commonly cross-bedded. Locally contains calcareous concretions as much as two feet in diameter. Concretionary zones commonly are found in association with marine vertebrate fossils, but locally friable sand lenses are encountered. Bentonite beds 1 to 2 inches thick, were observed in an anticline on the east flank of Aliso Creek.

SOURCE: "GEOLOGY MAP OF THE SOUTH HALF OF THE EL TORO QUADRANGLE, ORANGE COUNTY, CALIFORNIA" BY DONALD L. FIFE, 1974

GEOLOGIC MAP

PROPOSED WAREHOUSE

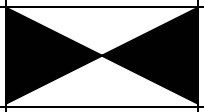
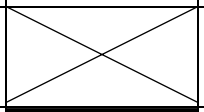
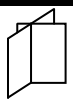
LAKE FOREST, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: JAH CHKD: GKM	
SCG PROJECT 21G135-2	
PLATE 3	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

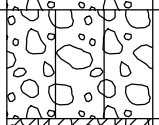
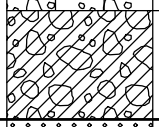
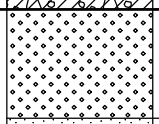
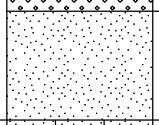
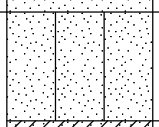
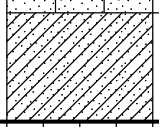
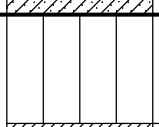
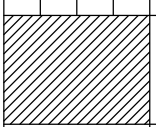
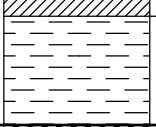
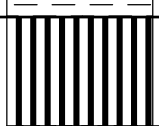
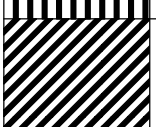
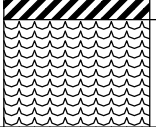
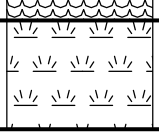
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-1

JOB NO.: 21G135-2
PROJECT: Proposed Warehouse
LOCATION: Lake Forest, California

DRILLING DATE: 3/12/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 689.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3½± Inches Asphaltic Concrete, 5± Inches Aggregate Base							
		31			ENGINEERED FILL (Afe): Light Gray Silty fine Sand, trace Iron oxide staining, dense-moist		12					
		35			@ 3 feet, moist to very moist		9					
5		39					20					
					ENIGEERED FILL (Afe): Light Gray to Brown Silty fine Sand, dense-moist to very moist		10					
		36					15			27		
10					Boring Terminated at 10'							

TBL 21G135-2.GPJ SOCALGEO.GDT 4/9/21

TEST BORING LOG **PLATE B-1**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-2

JOB NO.: 21G135-2
PROJECT: Proposed Warehouse
LOCATION: Lake Forest, California

DRILLING DATE: 3/12/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 670 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					2½± Inches Asphaltic Concrete, 5± Inches Aggregate Base							
		38			ENIGEERED FILL (Afe): Light Gray Silty fine Sand, trace Iron oxide staining, dense-moist		8					
		40			@ 3 feet, moist to very moist		11					
5		32					10					
		16			ENIGEERED FILL (Afe): Gray Brown Clayey fine Sand, trace Silt, medium dense-moist		9			29		
10					Boring Terminated at 10'							

TBL 21G135-2.GPJ SOCALGEO.GDT 4/9/21

TEST BORING LOG **PLATE B-2**

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Lake Forest, California
Project Number	21G135-2
Engineer	Oscar Sandoval

Test Hole Radius	4	(in)
Test Depth	10.2	(ft)

Infiltration Test Hole: I-1

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	8:30 AM	30.0	8.20	0.15	1.93	0.29
	Final	9:00 AM		8.35			
2	Initial	9:02 AM	30.0	8.20	0.20	1.90	0.39
	Final	9:32 AM		8.40			
3	Initial	9:34 AM	30.0	8.20	0.20	1.90	0.39
	Final	10:04 AM		8.40			
4	Initial	10:04 AM	30.0	8.20	0.20	1.90	0.39
	Final	10:34 AM		8.40			
5	Initial	10:36 AM	30.0	8.20	0.16	1.92	0.31
	Final	11:06 AM		8.36			
6	Initial	11:08 AM	30.0	8.20	0.16	1.92	0.31
	Final	11:38 AM		8.36			
7	Initial	11:40 AM	30.0	8.20	0.16	1.92	0.31
	Final	12:10 PM		8.36			
8	Initial	12:13 PM	30.0	8.20	0.16	1.92	0.31
	Final	12:43 PM		8.36			
9	Initial	12:45 PM	30.0	8.20	0.15	1.93	0.29
	Final	1:15 PM		8.35			
10	Initial	1:20 PM	30.0	8.20	0.15	1.93	0.29
	Final	1:50 PM		8.35			
11	Initial	1:52 PM	30.0	8.20	0.15	1.93	0.29
	Final	2:22 PM		8.35			
12	Initial	2:26 PM	30.0	8.20	0.15	1.93	0.29
	Final	2:56 PM		8.35			

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where:
- Q = Infiltration Rate (in inches per hour)
- ΔH = Change in Height (Water Level) over the time interval
- r = Test Hole (Borehole) Radius
- Δt = Time Interval
- H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Lake Forest, California
Project Number	21G135-2
Engineer	Oscar Sandoval

Test Hole Radius	4	(in)
Test Depth	10.2	(ft)

Infiltration Test Hole: I-1

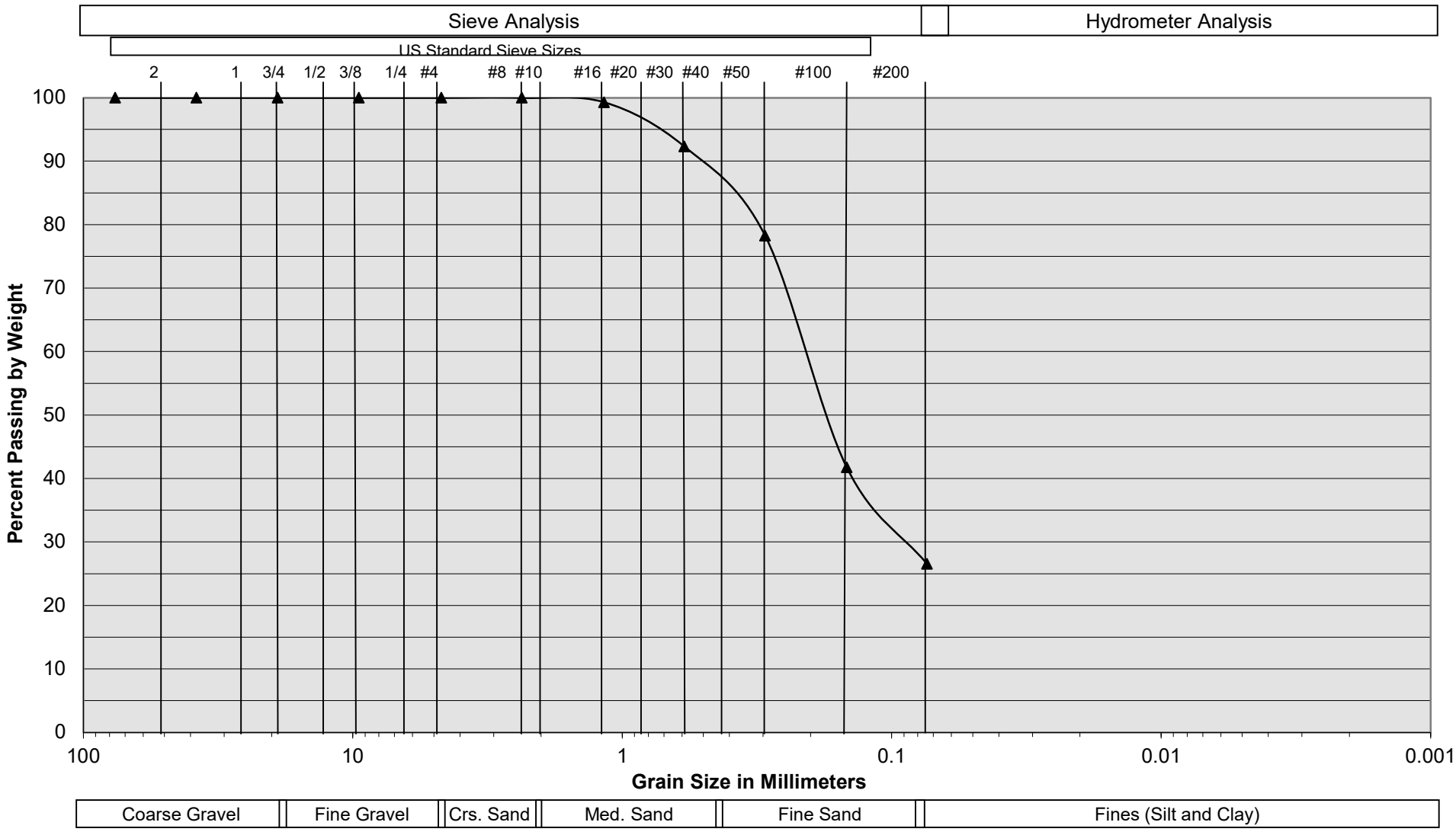
Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	7:55 AM	30.0	8.20	0.05	1.98	0.09
	Final	8:25 AM		8.25			
2	Initial	8:25 AM	30.0	8.20	0.05	1.98	0.09
	Final	8:55 AM		8.25			
3	Initial	8:55 AM	30.0	8.20	0.07	1.97	0.13
	Final	9:25 AM		8.27			
4	Initial	9:25 AM	30.0	8.20	0.07	1.97	0.13
	Final	9:55 AM		8.27			
5	Initial	9:55 AM	30.0	8.20	0.06	1.97	0.11
	Final	10:25 AM		8.26			
6	Initial	10:25 AM	30.0	8.20	0.06	1.97	0.11
	Final	10:55 AM		8.26			
7	Initial	10:55 AM	30.0	8.20	0.06	1.97	0.11
	Final	11:25 AM		8.26			
8	Initial	11:25 AM	30.0	8.20	0.06	1.97	0.11
	Final	11:55 AM		8.26			
9	Initial	11:55 AM	30.0	8.20	0.06	1.97	0.11
	Final	12:25 PM		8.26			
10	Initial	12:25 PM	30.0	8.20	0.05	1.98	0.09
	Final	12:55 PM		8.25			
11	Initial	12:55 PM	30.0	8.20	0.05	1.98	0.09
	Final	1:25 PM		8.25			
12	Initial	1:25 PM	30.0	8.20	0.05	1.98	0.09
	Final	1:55 PM		8.25			

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where:
- Q = Infiltration Rate (in inches per hour)
- ΔH = Change in Height (Water Level) over the time interval
- r = Test Hole (Borehole) Radius
- Δt = Time Interval
- H_{avg} = Average Head Height over the time interval

Grain Size Distribution



Sample Description	I-1 @ 8.5'
Soil Classification	Light Gray to Brown Silty fine Sand

Proposed Warehouse
Lake Forest, California
Project No. 21G135-2
PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution

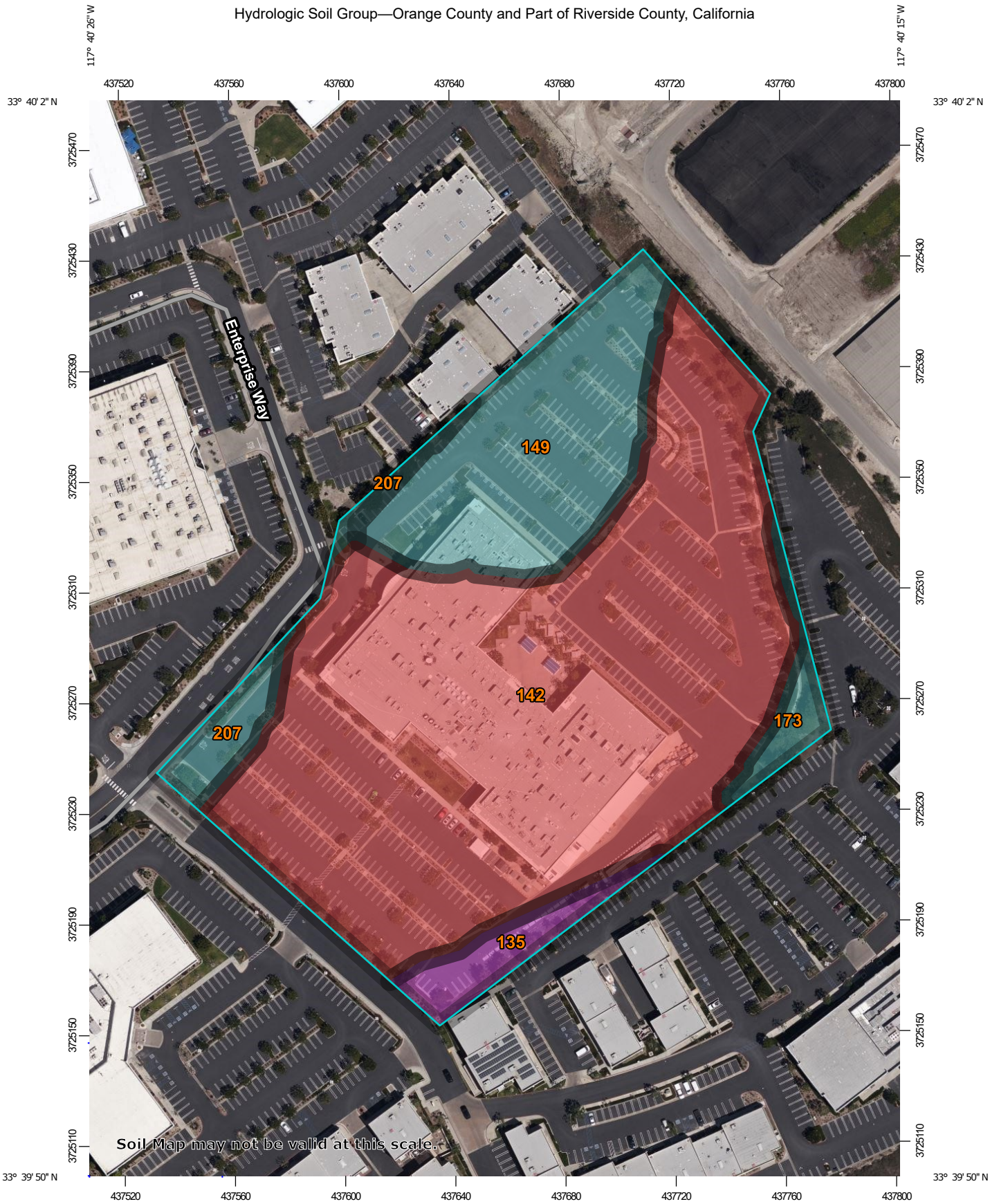
Sample Description	I-2 @ 8.5'
Soil Classification	Gray Brown Clayey fine Sand

Proposed Warehouse
Lake Forest, California
Project No. 21G135-2
PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Appendix E

Web Soil Survey



Map Scale: 1:1,900 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County and Part of Riverside County, California
Survey Area Data: Version 14, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 11, 2018—May 5, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
135	Capistrano sandy loam, 2 to 9 percent slopes	A	0.3	3.7%
142	Cieneba sandy loam, 30 to 75 percent slopes, eroded	D	6.5	71.4%
149	Cropley clay, 2 to 9 percent slopes, warm MAAT, MLRA 19	C	1.7	18.8%
173	Myford sandy loam, 2 to 9 percent slopes	C	0.2	2.5%
207	Sorrento loam, 2 to 9 percent slopes, warm MAAT, MLRA 19	C	0.3	3.5%
Totals for Area of Interest			**9.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix F

Hydrology Report

KIER+WRIGHT

HYDROLOGIC & HYDRAULIC STUDY

FOR

Proposed Warehouse Building
26200 Enterprise Way
Lake Forest, CA 92630
APNs: 610-401-06

Prepared for:

Ares Management
4675 MacArthur Court, Suite 625
Newport Beach, CA 92660

Prepared By:

Kier + Wright
8955 Research Drive
Irvine, CA 92618
(949) 508-0202

October 2024

KIER+WRIGHT

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Summary 3
Conclusion 3

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APPENDIX 1: HYDROLOGY MAPS

APPENDIX 2: GRADING PLAN

APPENDIX 3: HYDROLOGY CALCULATIONS

- CivilD Rational Method Analysis: Existing
- CivilD Rational Method Analysis: Proposed - Pre-Mitigation
- CivilD Rational Method Analysis: Proposed - Post-Mitigation

APPENDIX 4: HYDRAULIC CALCULATIONS

- HydroCAD Analysis

PURPOSE

The objective of this report is to outline an orderly drainage system for the site in accordance with the Orange County Hydrology and Hydraulics Manual. Objectives of this report are as follows:

- Determine the developed, or proposed, site hydrologic conditions, including overland runoff rates expected from the 100-year, 24-hour storm event.
- Validate the design of the proposed underground storm drain conveyance systems and provide hydraulic calculations.
- Provide storm water quality treatment in accordance with MRP NPDES Permit dated November 19, 2015.

PROJECT DESCRIPTION

The project site is located at 26200 Enterprise Way in the City of Lake Forest, Orange County, California and is bound by Enterprise Way and commercial developments to the west and other residential, commercial, and industrial developments to the north, south and east. The site area is 8.83 acres and currently consists of one (1) two-story building, parking lot, landscaping, and utilities.

This development proposes to construct an approximately 165,800 SF industrial warehouse with a new parking lot, loading dock, landscaping and irrigation, and underground utilities, including new storm drain conveyance pipes.

Location Map

METHODOLOGY

CivilDesign Hydrolgoy software, based on the Orange County Hydrology Manual and Local Drainage Manual 2nd Edition, December 2020, was used to estimate the pre- and post- development peak stormwater flow rate, time of concentration, and 100-year storm event runoff volume. HydroCAD software was used to determine the hydraulic calculations of the proposed storm system, namely the storage and ponding capacity.

PROJECT SITE DRAINAGE

Existing Site Drainage Condition:
The existing site contains two (2) drainage areas as illustrated in the existing condition hydrology map (Appendix 1). Runoff sheet flows and is collected by catch basins across the site before being conveyed via storm drain to two (2) existing onsite storm drain manholes, one on the west along Enterprise Way and the other on the north end of the site. From there, the runoff outlets to existing storm drain facilities in the public right of way, which drain to the nearby Serrano Creek.

Proposed Site Drainage Condition:
The proposed site contains three (3) drainage areas: A, B, and C as illustrated in the proposed condition hydrology map (Appendix 1). Drainage areas A and B outlet to the existing storm drain manhole on the west and drainage area C outlets to the existing storm drain manhole on the north end of the site. The project proposes to surface drain all runoff to curb inlets and route the runoff to an underground storage system for each drainage area, controlling discharge to the public storm drain. The purpose of this is to reduce the overall discharge from the site by 40% as required by the City of Lake Forest. That runoff will also be treated via three (3) modular wetland systems before discharging to the public system. The following table shows the drainage management areas (DMA's) and their corresponding detention system:

Detention System	DMA Area	Area (AC)
A	1	0.950
	2	0.881
	3	2.373
	4	0.179
B	1	0.563
	2	0.334
	3	0.613
C	1	0.664
	2	1.877

The proposed modular wetland systems were sized to meet treatment requirements. For more information, see the separate Water Quality Management Plan (WQMP).

SUMMARY

The following table summarizes the peak flow rates for the 100-year, 24-hour storm event for the pre- and post-development conditions before and after mitigation measures.

Table 1: Peak Flow Rates for Pre- and Post-Development Conditions

Condition	Total Peak Flow Rate (CFS)
Existing	37.97
Proposed: Pre-mitigation	47.37
Proposed: Post-mitigation	21.50
Percent Difference (%)	-54.62%

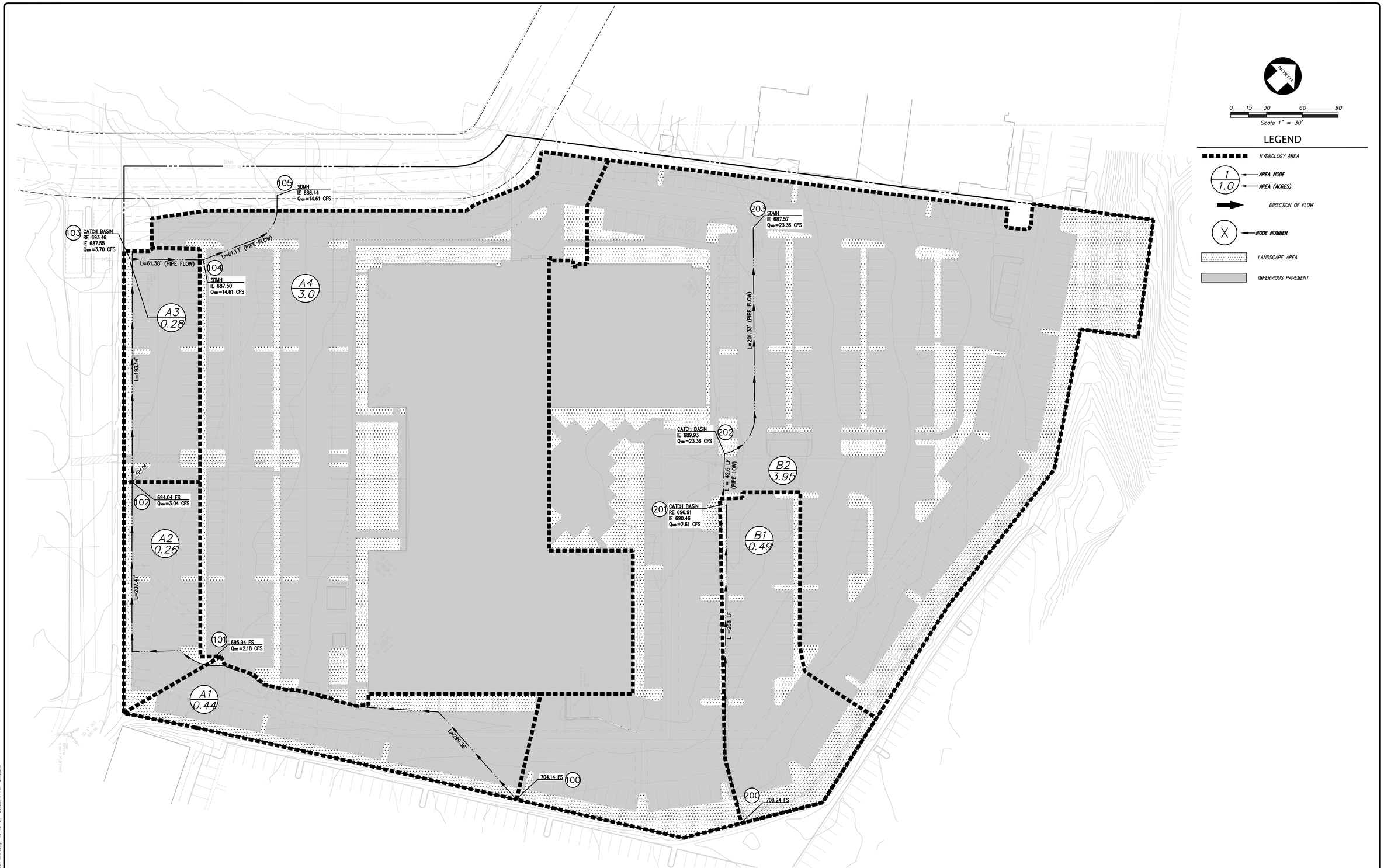
The post-development hydrology map is included in Appendix 1. Detailed hydrology and hydraulic calculations are included in Appendix 3 and Appendix 4, respectively.

CONCLUSION

The overall hydrology and hydraulics of this site are consistent with the City of Lake Forest and County of Orange guidelines for the 100-year, 24-hour storm event. The three (3) proposed modular wetland systems meet treatment criteria and the three (3) detention systems downstream mitigate the peak flow rate leaving the site by 54.62%, meeting the 40% reduction as required by the City of Lake Forest.

APPENDIX 1

Hydrology Maps



DMA No.	Area (SF)	Area (AC)	Landscape (SF)	Landscape (AC)	Imperv. (SF)	Imper. (AC)
A1	19217	0.441	5,254	0.121	13,963	0.321
A2	11262	0.259	2,109	0.048	9,153	0.210
A3	12363	0.284	318	0.007	12,045	0.277
A4	131156	3.011	17,193	0.395	113,963	2.616
B1	21463	0.493	5,994	0.138	15,469	0.355
B2	171957	3.948	39,443	0.905	132,514	3.042

NO.	REVISION	BY

NO.	REVISION	BY

KIER+WRIGHT
163 Technology Drive
Irvine, CA 92620
Phone: (949) 508-0202
www.kierwright.com

EXISTING HYDROLOGY MAP
OF
26200 ENTERPRISE WAY
FOR
ARES INDUSTRIAL MANAGEMENT
LAKE FOREST, CALIFORNIA

DATE	AUGUST 2023
SCALE	1" = 30'
DESIGNER	SCP
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C4.0
OF	6 SHEETS

Z:\2021\A21532\DWG\EXHIBITS\HYDROLOGY\A21532 EXISTING HYDROLOGY MAP.dwg 10-15-24 03:28:47 PM onGideon

ENTERPRISE WAY

EX. SDMH
RE 692.16
IE 686.44
17

L=61 LF

SDMH
IE 686.60
Qmax =13.38 CFS
16

L=77 LF

32 EX. CB-TC
RE 691.22
IE 685.27
Qmax = 5.19 CFS
Tc =7.93 MIN

L=74 LF

L=167 LF

DET B OUTLET
IE 686.79
Qmax = 5.19 CFS (PRE-MITIGATION)
Qmax = 3.71 CFS (POST-MITIGATION)
33

B3
0.61

C2
1.88

PROPOSED UNDERGROUND
DETENTION SYSTEM

B2
0.33

31 693.90 FS
Qmax = 2.55 CFS

L=631 LF

L=304 LF

B1
0.56

A4
0.18

L=106 LF

21 CB
RE 696.50
IE 693.85
Qmax =1.01 CFS

15 DET A OUTLET
IE 689.42
Qmax = 19.01 CFS (PRE-MITIGATION)
Qmax = 10.01 CFS (POST-MITIGATION)

30 698.02 FS

L=31 LF

L=60 LF

CB
RE 695.47
IE 693.70
Qmax =18.23 CFS
13

SDMH
RE 696.81
IE 693.50
Qmax =19.01 CFS
Tc =8.46 MIN
14

L=230 LF

12 696.62 FS
Qmax =8.30 CFS

PROPOSED UNDERGROUND
DETENTION SYSTEM

A3
2.37

A2
0.88

A1
0.95

CB P1212
RE 697.13
IE 695.25

L=115 LF

697.67 FS
Qmax =4.65 CFS
11

L=377 LF

42 SDCO
IE 693.89
Qmax = 11.59 CFS
Tc = 6.53 MIN

PROPOSED UNDERGROUND
DETENTION SYSTEM

L=410 LF

SDMH
IE 687.57
Qmax =8.12 CFS
44

L=58 LF

L=584 LF

DET C OUTLET
IE 690.05
Qmax = 11.59 CFS (PRE-MITIGATION)
Qmax =8.12 CFS (POST-MITIGATION)
43

CB
RE 701.27
IE 697.00
Qmax =3.65 CFS
41

L=152 LF

704.05 FS
40

703.55 FS
10

703.40

NORTH

0 15 30 60 90
Scale 1" = 30'

LEGEND

- HYDROLOGY AREA
- 1 / 1.0 — AREA NODE / AREA (ACRES)
- DIRECTION OF FLOW
- X — NODE NUMBER
- Q"x"M — MITIGATED FLOW
- LANDSCAPE AREA
- IMPERVIOUS PAVEMENT DRAINING TO BIO-SWALE
- BIO-RETENTION TREATMENT AREA

NO.	REVISION	BY

NO.	REVISION	BY

KIER+WRIGHT
163 Technology Drive
Irvine, CA 92620
Phone: (949) 598-0202
www.kierwright.com

PROPOSED HYDROLOGY MAP
OF
26200 ENTERPRISE WAY
FOR
ARES INDUSTRIAL MANAGEMENT

LAKE FOREST, CALIFORNIA

DATE	AUGUST 2023
SCALE	1" = 30'
DESIGNER	SCP
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C4.0
OF	6 SHEETS

Z:\2021\A21532\DWG\ENTITLEMENTS\EXHIBITS\HYDROLOGY\A21532 PROPOSED HYDROLOGY MAP.dwg 10-15-24 03:30:50 PM omicino

APPENDIX 2

Grading Plan

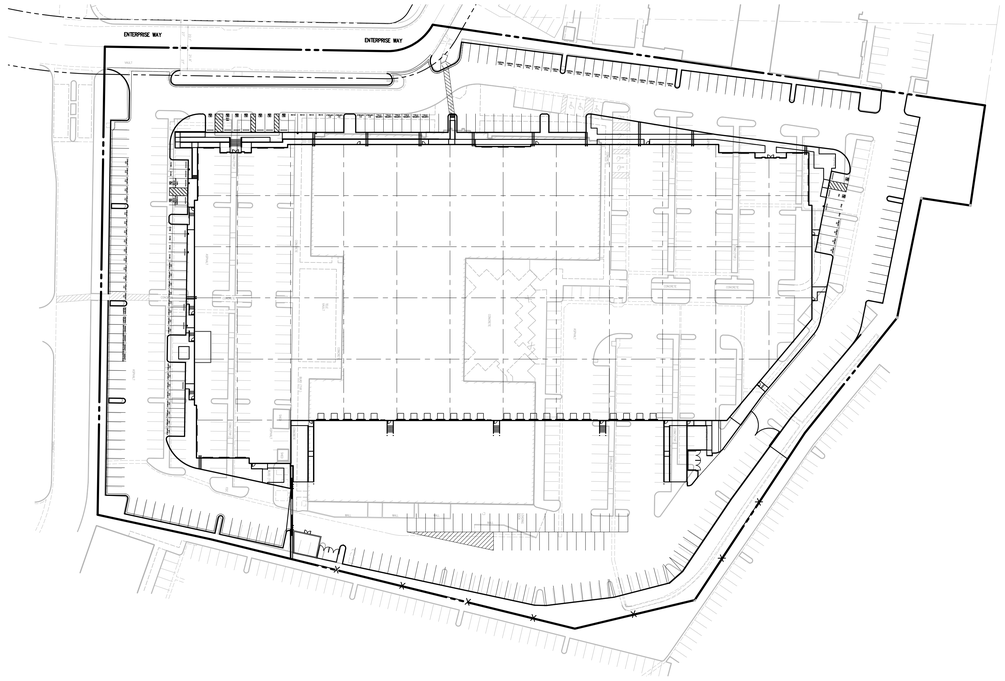
SITE IMPROVEMENT PLANS
OF
26200 ENTERPRISE WAY
FOR
IPT ENTERPRISE BUSINESS CENTER LLC
LAKE FOREST, CALIFORNIA

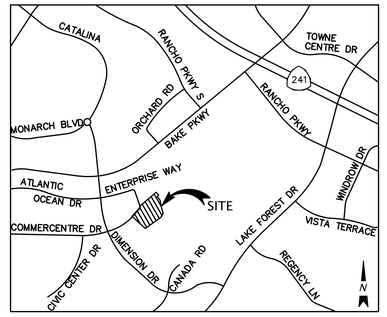
GENERAL NOTES

1. ALL WORK SHALL BE IN CONFORMANCE WITH THE CITY OF LAKE FOREST DEPARTMENT OF PUBLIC WORKS' STANDARD SPECIFICATIONS AND DETAILS. ALL WORK SHALL BE SUBJECT TO APPROVAL OF AND INSPECTION BY THE CITY ENGINEER.
2. AT LEAST ONE SET OF APPROVED PLANS SHALL BE ON THE SITE AT ALL TIMES FOR INSPECTION. ANY DEVIATION FROM THE APPROVED PLANS DURING CONSTRUCTION WILL REQUIRE 48 HOURS PRIOR NOTICE AND APPROVAL OF THE CITY ENGINEER.
3. THE PERMITTEE/CONTRACTOR SHALL NOTIFY THE CITY OF LAKE FOREST ENGINEERING DIVISION TWO (2) BUSINESS DAYS PRIOR TO THE START OF ANY WORK.
4. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN THE EXISTENCE OF ANY AND ALL UNDERGROUND FACILITIES, WHICH MAY BE SUBJECT TO DAMAGE BY REASON OF HIS OPERATIONS. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT (USA) AT (800) 642-2444, 48 HOURS PRIOR TO ANY EXCAVATION. WORK SHALL START WITHIN 5 DAYS AFTER THE ISSUANCE OF A USA INQUIRY IDENTIFICATION NUMBER. COMPLETE REMOVAL OF THE USA MARKINGS SHALL BE WITHIN 2 WORKING DAYS AFTER COMPLETION OF THE EXCAVATION, BACKFILL AND SURFACE REPLACEMENT OR FOURTEEN (14) CALENDAR DAYS FOLLOWING THE ISSUANCE OF THE INQUIRY IDENTIFICATION NUMBER WHICHEVER IS EARLIER.
5. CONTACTING USA DOES NOT RELIEVE THE CONTRACTOR FROM HIS RESPONSIBILITY TO DETERMINE LOCATION AND DEPTH OF BURIED UTILITIES OR REPAIR OF BURIED UTILITES DAMAGED BY HIS OPERATION.
6. ALL GRADING, SITE PREPARATION, PLACING AND COMPACTION OF FILL SHALL BE DONE IN ACCORDANCE WITH THE CITY OF LAKE FOREST STANDARDS, SPECIFICATIONS, SPECIFIC NOTES, DETAIL DRAWINGS AND PER THE RECOMMENDATIONS SPECIFIED IN THE "GEOTECHNICAL INVESTIGATION" BY SOUTHER CALIFORNIA GEOTECHNICAL, DATED APRIL 7, 2021, FILE NO. 21GA35-1.
7. A GRADING PERMIT IS REQUIRED PRIOR TO COMMENCEMENT OF GRADING. A COPY OF THE GRADING PERMIT IS REQUIRED TO BE ON SITE AT ALL TIMES.
8. GRADING OPERATIONS SHALL BE CONDUCTED IN ACCORDANCE WITH THE RECOMMENDATIONS CONTAINED IN THE SOILS INVESTIGATION REPORT. THE SOILS ENGINEER WILL BE RESPONSIBLE FOR THE ON SITE INSPECTION AND QUALITY CONTROL FOR THE GRADING OPERATION. PLAN REQUIREMENTS AND CONSTRUCTION CONTROL WITH RESPECT TO EARTHWORK, SLOPE STABILITY, SETTLEMENT, COMPACTION, ETC., AS SHOWN HEREIN ARE PROVIDED BY THE SOILS ENGINEER. THE CONTRACTOR SHALL READ AND BE FULLY AWARE OF THE SOILS REPORT BEFORE STARTING WORK. ALL WORK SHALL MEET THE APPROVAL OF THE SOILS ENGINEER.

   SUBSEQUENT TO THE COMPLETION OF THE WORK, THE SOILS/GEOTECHNICAL ENGINEER SHALL SUBMIT A REPORT TO THE CITY ENGINEER STATING THAT ALL WORK HAS BEEN DONE IN ACCORDANCE WITH THE "GEOTECHNICAL INVESTIGATION" PREPARED BY SOUTHER CALIFORNIA GEOTECHNICAL, DATED APRIL 7, 2021, FILE NO. 21GA35-1.
9. NOISE-PRODUCING CONSTRUCTION AND GRADING OPERATIONS SHALL BE LIMITED TO WEEKDAYS (MONDAY THROUGH FRIDAY) EXCEPT CITY HOLIDAYS AND FROM THE HOURS OF 7:30 A.M. TO 6:00 P.M. ALL EQUIPMENT SHALL BE ADEQUATELY MUFFLED AND MAINTAINED. NO CHANGES SHALL BE ALLOWED WITHOUT PRIOR WRITTEN CONSENT OF THE CITY. ALL REQUESTS FOR CHANGE MUST BE MADE A MINIMUM OF 72 HOURS PRIOR TO THE REQUEST FOR CHANGE.
10. IT SHALL BE UNDERSTOOD THAT THE TERM "CITY ENGINEER" AS USED HEREIN IS THE CITY ENGINEER OF THE CITY OF LAKE FOREST OR HIS AUTHORIZED REPRESENTATIVE.

    NO WORK SHALL BE DONE ON THIS PROJECT PRIOR TO A PRE-CONSTRUCTION CONFERENCE TO BE HELD IN THE ENGINEERING DIVISION. CONTACT THE CITY OF LAKE FOREST ENGINEERING DIVISION TO ARRANGE FOR THE CONFERENCE.
11. A PRE-CONSTRUCTION CONFERENCE SHALL BE SCHEDULED AT LEAST TWO WORKING DAYS IN ADVANCE OF COMMENCEMENT OF ANY CONSTRUCTION WORK FOR THE IMPROVEMENTS DELINEATED WITHIN THIS SET OF PLANS. THE FOLLOWING INDIVIDUALS SHALL BE IN ATTENDANCE: OWNER/DEVELOPER, CONTRACTOR (S), CITY ENGINEER, ENGINEER, SOILS ENGINEER, CONSTRUCTION INSPECTOR, OR THEIR AUTHORIZED REPRESENTATIVES.
12. THE CONTRACTOR SHALL SUBMIT A SCHEDULE OF ALL GRADING OPERATIONS AND RECEIVE APPROVAL OF SAID SCHEDULE FROM THE CITY ENGINEER PRIOR TO OR THE DAY OF THE PRE-CONSTRUCTION CONFERENCE.
13. THE CONSTRUCTION CONTRACTOR AGREES, THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
14. THE CONTRACTOR SHALL PROVIDE EMERGENCY TELEPHONE NUMBERS FOR PUBLIC WORKS, AMBULANCE, POLICE, AND FIRE DEPARTMENTS AT THE JOB SITE.
15. THE CONTRACTOR SHALL NOT DISTURB OR DESTROY ANY PERMANENT SURVEY POINTS WITHOUT THE CONSENT OF THE CITY ENGINEER. IN THE EVENT IT BECOMES NECESSARY TO REMOVE OR DISTURB A MONUMENT, THE PERSON SO DOING SHALL FIRST OBTAIN PERMISSION, IN WRITING, FROM THE CITY ENGINEER AND SHALL DEPOSIT WITH THE CITY ENGINEER A SUFFICIENT AMOUNT, BASED UPON THE CITY ENGINEER'S ESTIMATE, TO COVER THE COST OF PRELIMINARY REFERENCING AND FINAL RELOCATION OF THE MONUMENTS.
16. ALL CONSTRUCTION STAKING SHALL BE DONE BY A REGISTERED CIVIL ENGINEER OR LICENSED LAND SURVEYOR. UPON COMPLETION OF GRADING, THE CONTRACTOR SHALL REQUEST THE LICENSED LAND SURVEYOR TO CHECK THE GRADES AND CERTIFY THAT THE PADS ARE GRADED TO WITHIN ± 0.10 FOOT OF FINISH PAD GRADE.
17. THE CONTRACTOR SHALL PROVIDE FOR INGRESS AND EGRESS FOR PRIVATE PROPERTY ADJACENT TO THE WORK AREA THROUGHOUT THE PERIOD OF CONSTRUCTION.
18. THE CONTRACTOR IS RESPONSIBLE FOR MATCHING EXISTING STREETS, SURROUNDING LANDSCAPE AND OTHER IMPROVEMENTS, WITH A SMOOTH TRANSITION IN GRADE AVOIDING ANY ABRUPT OR APPARENT CHANGES IN GRADE OR CROSS SLOPE, LOW SPOTS OR HAZARDOUS CONDITIONS.
19. EXISTING CURB AND SIDEWALK WITHIN THE PROJECT LIMITS THAT ARE DAMAGED OR DISPLACED, EVEN THOUGH THEY WERE NOT TO BE REMOVED, SHALL BE REPAIRED OR REPLACED, EVEN IF THE DAMAGE OR DISPLACEMENT OCCURRED PRIOR TO ANY WORK PERFORMED BY THE CONTRACTOR. CONTRACTOR SHALL DOCUMENT CONDITION VIA PHOTOGRAPHS PRIOR TO START OF CONSTRUCTION.
20. THE CONTRACTOR SHALL CONTROL DUST BY WATERING EXPOSED SURFACES AS NEEDED. INCREASED WATERING SHALL BE REQUIRED WHEN WIND SPEEDS EXCEED 10 MPH OR WHEN DIRECTED BY THE CITY.
21. NO PERSON SHALL, WHEN HAULING ANY EARTH, SAND, GRAVEL, STONE, DEBRIS, PAPER, OR ANY OTHER SUBSTANCE OVER ANY PUBLIC STREETS OR OTHER PUBLIC PLACE, ALLOW MATERIAL TO BLOW OR SPILL OVER AND UPON SAID PUBLIC OR ADJACENT PRIVATE PROPERTY. ALL LOADS LEAVING THE SITE SHALL BE COVERED.
22. THE CONTRACTOR SHALL PROVIDE STABILIZED CONSTRUCTION ENTRANCE TO PREVENT THE TRACKING OF SOIL, DUST, MUD, OR CONSTRUCTION DEBRIS ON PUBLIC STREETS.
23. MUD TRACKED ONTO STREETS OR ADJACENT PROPERTIES SHALL BE REMOVED IMMEDIATELY, STREET SHALL BE SWEPT WITH A POWER SWEEPER (NOT PRESSURE WASHED) AS DIRECTED BY THE CITY.
24. A DISPOSAL SITE FOR ANY OFF-SITE HAUL OF DIRT MATERIALS SHALL BE APPROVED BY THE CITY PRIOR TO APPROVAL OF THE GRADING PERMIT. THE OFF-SITE HAUL ROUTE FOR EXCESS DIRT OR CONSTRUCTION DEBRIS IS SUBJECT TO APPROVAL OF THE CITY ENGINEER.
25. EXCAVATIONS SHALL BE ADEQUATELY SHORED, BRACED AND SHEETED SO THAT THE EARTH WILL NOT SLIDE OR SETTLE AND SO THAT ALL EXISTING IMPROVEMENTS OF ANY KIND WILL BE FULLY PROTECTED FROM DAMAGE. ANY DAMAGE RESULTING FROM A LACK OF ADEQUATE SHORING, BRACING AND SHEETING, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND THE CONTRACTOR SHALL EFFECT NECESSARY REPAIRS OR RECONSTRUCTION AT HIS OWN EXPENSE. WHERE THE EXCAVATION FOR A TRENCH, STRUCTURE AND/OR BORING OR JACKING PIT IS FIVE FEET OR MORE IN DEPTH THE CONTRACTOR SHALL CONFORM TO THE APPLICABLE CONSTRUCTION SAFETY ORDERS OF THE DIVISION OF INDUSTRIAL SAFETY OF THE STATE OF CALIFORNIA.
26. ALL TRENCHES IN EXISTING CITY STREETS SHALL BE BACKFILLED AND PAVED WITHIN 24 HOURS OF EXCAVATION. STEEL PLATES MAY BE PLACED OVER UNBACKFILLED TRENCHES BEYOND THE 24 HOUR PERIOD WITH THE SPECIFIC APPROVAL OF THE CITY ENGINEER.
27. ALL REINFORCED CONCRETE PIPE SHALL BE CLASS III OR BETTER, UNLESS OTHERWISE NOTED.
28. OPERATION OF VALVES ON THE IRVINE RANCH WATER DISTRICT WATER SYSTEM SHALL BE PERFORMED BY WATER DISTRICT PERSONNEL ONLY.





VICINITY MAP
NOT TO SCALE

SHEET INDEX

SHEET	DESCRIPTION
CIVIL	
C1.0	COVER SHEET
C2.0	TOPOGRAPHIC SURVEY
C2.1	TOPOGRAPHIC SURVEY
C3.0	DEMOLITION PLAN
C4.0	HORIZONTAL CONTROL & PAVING PLAN
C5.0	GRADING & DRAINAGE PLAN
C5.1	GRADING DETAILS
C6.0	UTILITY PLAN
C7.0	EROSION CONTROL PLAN
C8.0	STORM WATER QUALITY CONTROL PLAN
C8.1	STORM WATER QUALITY CONTROL DETAILS
C9.0	DETAILS
C9.1	DETAILS
C10.0	SECTIONS

EARTHWORK SUMMARY

CUT:	8,000 CY	
FILL:		12,500 CY
EST. SPOILS FROM FOUNDATION / FILL FROM EX. ONSITE CONCRETE:	5,300 CY	
TOTAL:	13,300 CY	12,500 CY
NET EXPORT:		800 CY

NOTE: THE EARTHWORK QUANTITIES LISTED ON THESE PLANS ARE STATED ONLY FOR CALCULATION OF GRADING AND BUILDING PERMIT FEES. THE CONTRACTOR SHALL DETERMINE HIS OWN EARTHWORK QUANTITIES AND BASE HIS BID ACCORDINGLY.

DEVELOPER
ARES MANAGEMENT
ATTN: CHRISTOPHER SANFORD
4675 MACARTHUR COURT, SUITE 625
NEWPORT BEACH, CA 92660
949-892-4911

CIVIL ENGINEER
KIER & WRIGHT CIVIL ENGINEERS & SURVEYORS, INC.
ATTN: GARRETT READLER, P.E.
2850 COLLIER CANYON ROAD
LIVERMORE, CA 94551
925-245-8788

ELECTRICAL ENGINEER
MAMMOTH ELECTRIC
ATTN: CESAR BECERRIL
170 E LIBERTY AVE,
ANAHEIM, CA 92801
714-446-8880 EXT. 255

LANDSCAPE ARCHITECT
HUNTER LANDSCAPE
ATTN: TOM HAYES ILA 3681
711 FEE ANA STREET
PLACENTIA CA 92870
714-986-2400

ARCHITECT
RGA, OFFICE OF ARCHITECTURAL DESIGN
ATTN: CAROLINA PAZ, RA NCARB
15231 ALTON PKWY #100,
IRVINE, CA 92618
949-341-0924

STRUCURAL ENGINEER
DARIN FONG AND ASSOCIATES INC.
CONSULTING STRUCTURAL ENGINEERS
ATTN: DARIN FONG
3230 E. IMPERIAL HIGHWAY, SUITE 302
BREA, CA 92821-6747
714-494-4888 EXT. 403

CONSTRUCTION STAKING NOTE:
FOR ALL STAKING SCHEDULING AND REQUEST FOR PROPOSALS PLEASE CONTACT:
GERRY HAMMOND
(925) 245-8788 EXT. 2034 ghammond@kierwright.com

Know what's below. Call before you dig.

REGISTERED PROFESSIONAL ENGINEER GARRETT S. READLER No. 76867 CIVIL STATE OF CALIFORNIA

REVISION | NO. | BY

KIER+WRIGHT
163 Technology Drive
Irvine, CA 92620
Phone: (949) 508-0202
www.kierwright.com

COVER SHEET
OF
26200 ENTERPRISE WAY
FOR
IPT ENTERPRISE BUSINESS CENTER LLC
LAKE FOREST, CALIFORNIA

DATE	OCTOBER, 2024
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C1.0
OF	14 SHEETS

Z:\2021\A21532\DWG\CDS\BUILDING PERMIT\A21532 COS.dwg 10-15-24 04:50:53 PM omiciano

REFERENCES

1	PARCEL MAP	(PM 97-196)
2	DEED	(2017000317884)

LEGEND

	BUILDING LINE
	CENTERLINE
COM	COMMUNICATION LINE
	CONCRETE/BLOCK WALL
	CONCRETE CURB
	CONCRETE CURB & GUTTER
700	CONTOUR LINE
700	OBSCURED CONTOUR LINE
	DRIVEWAY
	EASEMENT LINE
	EDGE OF WATER/FLOWLINE
E	ELECTRIC LINE
X	FENCE LINE
FO	FIBER OPTICS LINE
FS	FIRE SERVICE LINE & VALVE
G GM	GAS LINE-VALVE & METER
	LOT LINE
	PROPERTY LINE
SS	SANITARY SEWER LINE-MANHOLE & CLEANOUT
	SIDEWALK
100.00	SPOT ELEVATION
SD	STORM DRAIN LINE-MANHOLE & CATCH BASIN
SD	STORM DRAIN LINE-MANHOLE & CATCH BASIN
SL	STREET LIGHT CONDUIT LINE
T	TELEPHONE LINE
CTV	CABLE TELEVISION LINE
UKN	UNKNOWN UTILITY LINE
W	WATER LINE & VALVE
	ACCESSIBLE PARKING SYMBOL
AD	AREA DRAIN
	AUTOMATIC SPRINKLER RISER
	BACKFLOW PREVENTION DEVICE
	FIRE DEPARTMENT CONNECTION
	FIRE HYDRANT
	HUB & TACK FOUND
	IRON PIPE FOUND
	POST INDICATOR VALVE
CNTRL	SURVEY CONTROL POINT
	TRANSFORMER
	TRAFFIC SIGNAL POLE
	TRAFFIC SIGN
	TREE
	UTILITY BOX
	WATER VALVE

ABBREVIATIONS

AC	ASPHALT CONCRETE
AD	AREA DRAIN
AP	ANGLE POINT
ASR	AUTO SPRINKLER RISER
BC	BACK OF CURB
BLRD	BOLLARD
BTM	BOTTOM
CL	CENTER LINE
COR	CORNER
DDCV	DOUBLE DETECTOR CHECK VALVE
DOCK	DOCK
DUCT	CONDUIT DUCT BANK
E	EAST
EB	ELECTRIC BOX
EC	EDGE OF CONCRETE
ELEC	ELECTRICAL LINE
EMH	ELECTRICAL MANHOLE
ER	ELECTRICAL RISER
ET	ELECTRICAL TRANSFORMER
EV	ELECTRICAL VAULT
EX	EXISTING
FDC	FIRE DEPARTMENT CONNECTION
FH	FIRE HYDRANT
FS	FIRE SERVICE
GB	GRADE BREAK
GRN	GROUND
GV	GAS VALVE
IB	IRRIGATION BOX
IE	INVERT ELEVATION
LIP	LIP OF GUTTER
LT	LIGHT
MH	MANHOLE
N	NORTH
PB	PULL BOX
POC	POINT OF CONNECTION
RE	RIM ELEVATION
S	SOUTH
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SL	STREET LIGHT
SSMH	SANITARY SEWER MANHOLE
TELE	TELEPHONE LINE
THRU	THROUGH
TOE	GRADE BREAK LINE TOE
TOP	GRADE BREAK LINE TOP
TP	TELEPHONE POLE
TRANS	TRANSFORMER
TW	TOP OF WALL
TYP.	TYPICAL
VLT	VAULT
W	WEST
WM	WATER METER
WR	WATER RISER
WV	WATER VALVE

NOTES

1. THIS SURVEY WAS PREPARED FROM INFORMATION FURNISHED IN A PRELIMINARY TITLE REPORT, PREPARED BY FIRST AMERICAN TITLE INSURANCE COMPANY, DATED AS OF MARCH 26, 2021, ORDER NUMBER NCS-1052381-SC, FURNISHED TO KIER & WRIGHT CIVIL ENGINEERS & SURVEYORS, INC BY ALLEN MATKINS ON APRIL 7, 2021. NO LIABILITY IS ASSUMED FOR MATTERS OF RECORD NOT STATED IN SAID REPORT THAT MAY AFFECT THE TITLE LINES, OR EXCEPTIONS, OR EASEMENTS OF THE PROPERTY.

2. ALL DISTANCES AND ELEVATIONS SHOWN HEREON ARE IN FEET AND DECIMALS THEREOF.

3. THE TYPES, LOCATIONS, SIZES AND/OR DEPTHS OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THIS TOPOGRAPHIC SURVEY WERE OBTAINED FROM SOURCES OF VARYING RELIABILITY. THE CONTRACTOR IS CAUTIONED THAT ONLY ACTUAL EXCAVATION WILL REVEAL THE TYPES, EXTENT, SIZES, LOCATIONS AND DEPTHS OF SUCH UNDERGROUND UTILITIES. (A REASONABLE EFFORT HAS BEEN MADE TO LOCATE AND DELINEATE ALL KNOWN UNDERGROUND UTILITIES). HOWEVER, THE ENGINEER CAN ASSUME NO RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF ITS DELINEATION OF SUCH UNDERGROUND UTILITIES WHICH MAY BE ENCOUNTERED, BUT WHICH ARE NOT SHOWN ON THESE DRAWINGS.

4. UTILITY INFORMATION HEREON IS PROGRESS AT THIS TIME. A REQUEST WAS MADE TO TO THE RESPECTIVE AGENCIES FOR INFORMATION REGARDING THE LOCATION OF THEIR FACILITIES ON THIS SITE. AS OF 3-26-2021, THEY HAD NOT RESPONDED WITH THIS INFORMATION. UNTIL WE RECEIVE THIS INFORMATION AND ARE ABLE TO DELINEATE THESE FACILITIES, ALL PARTIES SHOULD CONSIDER THIS SURVEY AS PRELIMINARY WITH REGARDS TO THE LOCATION OF UTILITY FACILITIES. UPON RECEIPT OF THIS INFORMATION KIER & WRIGHT WILL UPDATE THIS SURVEY AND REISSUE IT.

5. BENCHMARK:

   ELEVATIONS SHOWN HEREON ARE BASED ON THE 3 3/4" ALUMINUM BENCHMARK DISK STAMPED "3JJ-18-90" AS DESCRIBED IN THE ORANGE COUNTY PUBLIC WORKS VERTICAL CONTROL DATA SHEET.

   ELEVATION: 705.603 FEET DATUM:NAVD88

6. BASIS OF BEARINGS:
   THE BEARING OF NORTH 23° 44' 05" WEST WAS TAKEN BETWEEN GPS MONUMENTS NO. 0986 AND 6742R1PER THE ORANGE COUNTY PUBLIC WORKS HORIZONTAL CONTROL DATA SHEETS. TAKEN FROM THE COUNTY OF ORANGE PUBLIC WORKS LAND RECORDS WEB SITE:
   HTTPS://WWW.OCGIS.COM/OCPW/LANDRECORDS

7. CORNER RECORD NOTE:
   THE DEVELOPER AND/OR CONTRACTOR SHALL BE RESPONSIBLE FOR THE PREPARATION AND FILING OF PRE-CONSTRUCTION AND POST-CONSTRUCTION CORNER RECORDS FOR ANY MONUMENTS OR PROPERTY CORNERS SHOWN HEREON THAT MAY BE DESTROYED DURING IMPROVEMENTS TO THE SUBJECT PROPERTY AS DEFINED IN SECTION 8771(B) OF THE PROFESSIONAL LAND SURVEYORS ACT.

8. APN: 610-401-06

9. THE SUBJECT PROPERTY IS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) FOR ORANGE COUNTY, CALIFORNIA, MAP NUMBER 06059C0316J FOR COMMUNITY NUMBER 060759 (CITY OF LAKE FOREST), WITH AN EFFECTIVE DATE OF DECEMBER 3, 2009, AS BEING LOCATED IN FLOOD ZONE "X", ACCORDING TO FEMA THE DEFINITION OF ZONE "X" IS: AREA OF MODERATE FLOOD HAZARD, USUALLY THE AREA BETWEEN THE LIMITS OF THE 100-YEAR AND 500-YEAR FLOODS.

   INFORMATION WAS OBTAINED FROM THE FEMA FLOOD MAP STORE WEBSITE ON MARCH 25, 2021.

10. THE AERIAL MAPPING WAS PREPARED USING COMPUTER ASSISTED, PHOTOGRAMMETRIC METHODS BY KIER & WRIGHT. JOB NUMBER A21532. IN AREAS OF DENSE VEGETATION, ACCURACY OF CONTOURS MAY DEVIATE FROM ACCEPTED ACCURACY STANDARDS. DATE OF PHOTOGRAPHY 3-8-2021, ORIGINAL COMPILED MAP SCALE 1"=20', CONTOUR INTERVAL 1 FOOT. CONTROL SURVEY PERFORMED BY KIER & WRIGHT, LIVERMORE, CA.

11. THIS SITE HAS FIBER OPTIC LINES LOCATED ON OR ADJACENT TO IT.

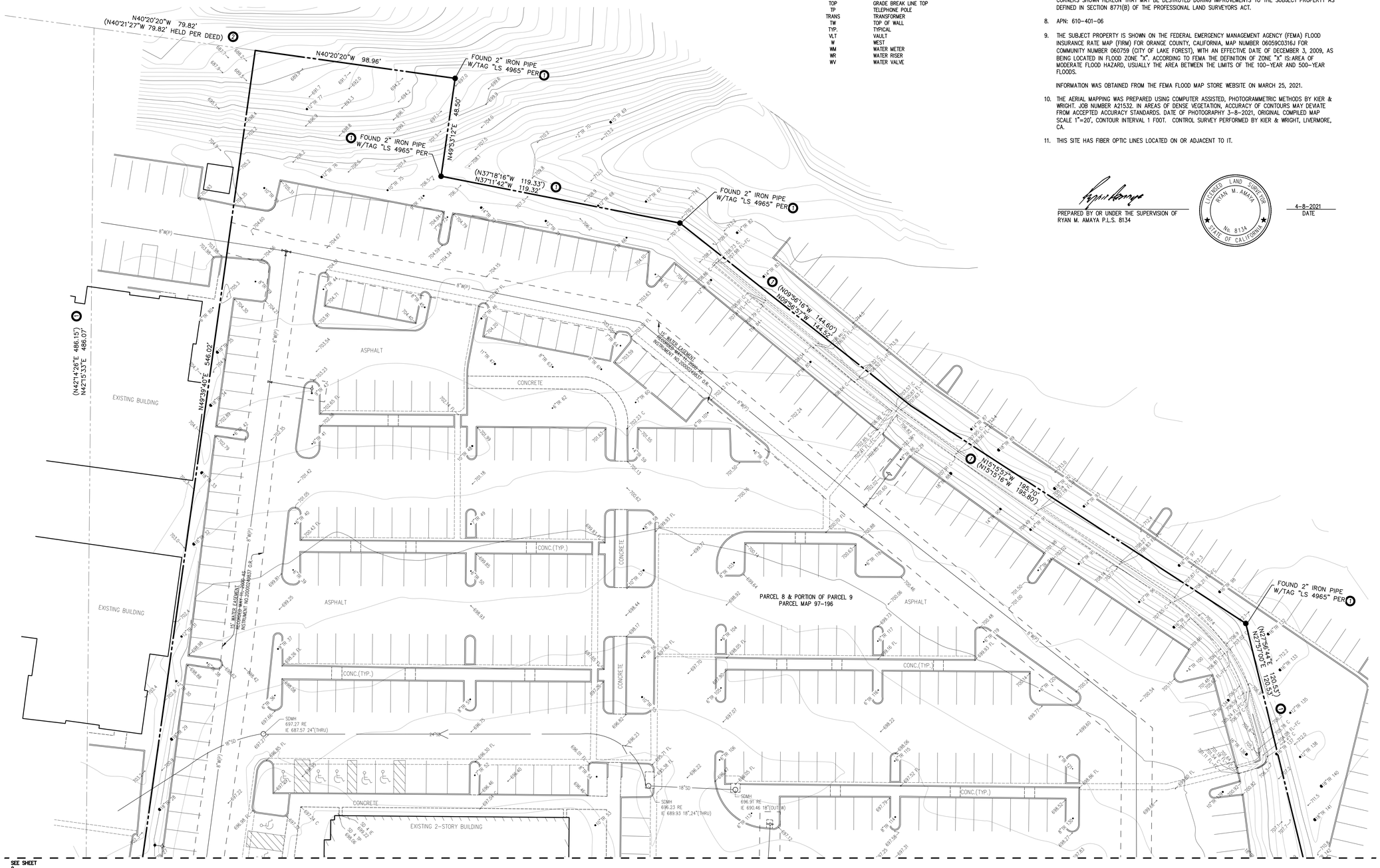
PREPARED BY OR UNDER THE SUPERVISION OF
RYAN M. AMAYA P.L.S. 8134

LICENSED LAND SURVEYOR RYAN M. AMAYA No. 8134 STATE OF CALIFORNIA

4-8-2021
DATE

NORTH

0 10 20 40 60
Scale 1" = 20'



NO.	BY	REVISION

NO.	BY	REVISION

REGISTERED PROFESSIONAL ENGINEER RICHARD G. REARDON No. 76867 CIVIL STATE OF CALIFORNIA

KIER+WRIGHT
163 Technology Drive
Irvine, CA 92618
Phone: (949) 508-6202
www.kierwright.com

TOPOGRAPHIC SURVEY
OF
26200 ENTERPRISE WAY
FOR
IPT ENTERPRISE BUSINESS CENTER LLC
LAKE FOREST, CALIFORNIA

DATE	OCTOBER, 2024
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C2.0
OF	14 SHEETS

Z:\2021\A21532\DWG\CIVIL\Build\NC_PERMIT\A21532_CHS.dwg, 10/15/24 04:50:57 PM, emiliano

TOPOGRAPHIC SURVEY
OF
26200 ENTERPRISE WAY
FOR
IPT ENTERPRISE BUSINESS CENTER LLC
LAKE FOREST, CALIFORNIA

DATE	OCTOBER, 2024
SCALE	1" = 30'
DESIGNER	EK
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SHEET	C2.1
OF	14 SHEETS

KIER+WRIGHT
163 Technology Drive
Irvine, CA 92618
Phone: (949) 508-0202
www.KierWright.com

REGISTERED PROFESSIONAL ENGINEER — No. 78887 — STATE OF CALIFORNIA — CIVIL

NO.	REVISION	BY

NO.	REVISION	BY

NORTH

Scale 1" = 20'

0 10 20 40 60

DETAIL "A"
NOT TO SCALE

(N18°50'32"E 39.31' DEED)
N18°58'05"E 39.33'
N18°58'35"E 40.00'
(N18°50'32"E 40.00')

(N53°33'00"E 113.21')
(N53°32'44"E 113.21')

(N55°08'44"E 366.73')
N55°09'00"E 366.73'

N47°46'00"W 457.85'
(N47°45'54"W 458.05')

(N42°14'31"E 276.21')
N42°15'50"E 276.17'

N49°39'40"E 546.02'
(N42°14'26"E 486.15')
N42°15'33"E 486.07'

(N7°59'38"E 53.35')
N7°00'35"E 53.34'

Δ=61°14'25" R=50.00' L=53.44'
(Δ=61°15'04" R=50.00' L=53.45')

SEE SHEET 1

SEE DETAIL "A"

26200 ENTERPRISE WAY
EXISTING 2-STORY BUILDING
BUILDING HEIGHT = 34.5'
AREA: 74,960 SQ. FT.

EXISTING 2-STORY BUILDING

BUILDING HEIGHT = 34.5'

PARCEL 8 & PORTION OF PARCEL 9
PARCEL MAP 97-196

ENTERPRISE WAY

ENTERPRISE WAY

42' PUBLIC UTILITY EASEMENT
RECORDED OCTOBER 14, 1998 AS
INSTRUMENT NO. 19981725566 O.R.

42' PUBLIC UTILITY EASEMENT
RECORDED IN MAP BOOK 301, PAGE 36
PER PARCEL MAP NO. 97-196

15' WATER EASEMENT
RECORDED MAY 11, 2000 AS
INSTRUMENT NO.20000219837 O.R.

15' WATER EASEMENT
RECORDED MAY 11, 2000 AS
INSTRUMENT NO.20000219837 O.R.

15' WATER & SEWER EASEMENT
RECORDED SEPTEMBER 28, 1998 AS
INSTRUMENT NO. 19980506967 O.R.

DISTRICTION EASEMENT
RECORDED MARCH 22, 2000 AS
INSTRUMENT NO. 20000148505 O.R.

DISTRICTION EASEMENT
RECORDED MARCH 22, 2000 AS
INSTRUMENT NO. 20000148505 O.R.

10' WATER EASEMENT
RECORDED MAY 11, 2000 AS
INSTRUMENT NO.20000219837 O.R.

LOADING DOCK

WALL

SHED

TELE VAULT

COMMUNICATION VAULT

ELEC VAULT

ASPHALT

CONCRETE

CONC.(TYP.)

BLDG (TYP.)

EV

ET

SSMH

SDMH

SD

FDC

FH

AD

SSCO

SSMH 693.23 RE IE 689.93 18"x24"(INFIL)

SDMH 697.27 RE IE 690.14 24"-36"(INFIL)

SDMH 697.14 RE IE 688.10 (INFIL)

SDMH 696.98 RE IE 688.41 18"(INFIL)

SDMH 693.43 RE IE 687.58 18"(INFIL)

SDMH 693.46 RE IE 688.55 18"(INFIL)

SDMH 693.23 RE IE 688.67 (INFIL)

SDMH 693.22 RE IE 688.67 (INFIL)

AD 694.53 RE IE 693.54 (OUT)

AD 697.42 RE IE 692.47 4"(OUT)

SD 1 OUT IE 689.34

SD 2 OUT IE 689.34

SD 3 OUT IE 689.34

SD 4 IE 689.34

SD 5 OUT IE 689.34

SD 6 OUT IE 689.37

SD 7 IE 689.37

SD 8 IE 689.37

SD 9 IE 689.37

SD 10 IE 689.37

SD 11 IE 689.37

SD 12 IE 689.37

SD 13 IE 689.37

SD 14 IE 689.37

SD 15 IE 689.37

SD 16 IE 689.37

SD

DEMOLITION PLAN
OF
2620O ENTERPRISE WAY
FOR
IPT ENTERPRISE BUSINESS CENTER LLC
LAKE FOREST, CALIFORNIA

DATE	OCTOBER, 2024
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C3.0
OF	14 SHEETS

KIER+WRIGHT
163 Technology Drive
Irvine, CA 92620
Phone: (949) 508-0202
www.kierwright.com

REGISTERED PROFESSIONAL ENGINEER
Steven Richard Kier
No. 78887
STATE OF CALIFORNIA

NO.	REVISION	BY	NO.	REVISION	BY

NORTH
0 15 30 60 90
Scale 1" = 30'

LEGEND

- EXISTING CURB & LANDSCAPE TO BE REMOVED
- EXISTING BUILDING TO BE DEMOLISHED
- EXISTING AC PAVEMENT TO BE REMOVED
- EXISTING CONCRETE TO BE REMOVED
- EXISTING LANDSCAPING TO BE REMOVED
- SAWCUT LINE
- PROJECT EXISTING CONCRETE CURB
- EXISTING TREE TO BE REMOVED
- UNDERGROUND UTILITIES TO BE REMOVED
- UNDERGROUND UTILITIES TO BE ABANDONED
- PLUG AND CAP END
- 1 PROTECT EXISTING CONCRETE CURB
- 2 REMOVE CONCRETE CURB
- 3 REMOVE IRRIGATION & LANDSCAPING
- 4 REMOVE EXISTING CATCH BASINS
- 5 EXISTING FIRE HYDRANT TO BE REMOVED & SALVAGED
- 6 REMOVE CONCRETE
- 7 EXISTING CATCH BASIN TO REMAIN & BE PROTECTED BY CONTRACTOR DURING DEMOLITION WORK
- 8 EXISTING STORM DRAIN LINE TO BE PROTECTED IN PLACE
- 9 EXISTING STORM DRAIN MANHOLE TO BE PROTECTED IN PLACE
- 10 EXISTING WATER LINE TO REMAIN & BE PROTECTED BY CONTRACTOR DURING DEMOLITION WORK
- 11 EXISTING WATER METER TO REMAIN & BE PROTECTED BY CONTRACTOR DURING DEMOLITION WORK
- 12 EXISTING SITE EQUIPMENT TO BE REMOVED BY THE UTILITY PER A SEPARATE PLAN(S)
- 13 REMOVE ELECTRICAL EQUIPMENTS CONCRETE PADS

N40°20'20"W 79.82' (N40°21'27"W 79.82' HELD PER DEED)
N40°20'20"W 98.96'
FOUND 2" IRON PIPE W/TAG "LS 4965" PER
N49°53'12"E 44.50'
(N37°18'16"W 119.33') N37°11'42"W 118.32'
(N52°56'16"E 144.60') N52°56'16"E 144.60'
(N51°53'42"E 198.80') N51°53'42"E 198.80'
(N52°32'44"E 112.81') N52°32'44"E 112.81'
N52°32'44"E 387.73' (N52°32'44"E 386.75')
N47°46'00"W 457.95' (N47°45'34"W 458.05')
(N42°43'26"E 486.15') N42°15'53"E 486.07'
N42°39'40"E 546.02'
(N42°43'26"E 486.15') N42°15'53"E 486.07'
N42°39'40"E 546.02'
N72°09'40"E 53.30' N70°50'25"E 53.30'
R=50.00' L=53.44' R=50.00' L=53.45'
ENTERPRISE WAY
ENTERPRISE WAY (N42°15'53"E 278.77') N42°15'53"E 278.77'
PARCEL 8 & PORTION OF PARCEL 9 PARCEL MAP 97-196
PARCEL 8 & PORTION OF PARCEL 9 PARCEL MAP 97-196
26200 ENTERPRISE WAY EXISTING 2 STORY BUILDING BUILDING HEIGHT = 34.3 FT AREA: 74,960 SQ. FT
EXISTING BUILDING
ASPHALT
CONCRETE
SHED
P25316/10 PAGE/0097
P25278/99 P25278/97
P24671/12 1500/1/1 P24671/1997
10' PUBLIC EASEMENT RECORDED ON SEPTEMBER 14, 1998 AS INSTRUMENT NO. 19980510000 OR
10' WATER & SEWER EASEMENT RECORDED SEPTEMBER 28, 1998 AS INSTRUMENT NO. 19980
10' WATER EASEMENT RECORDED MAY 19, 2000 AS INSTRUMENT NO. 20000
10' WATER & SEWER EASEMENT RECORDED SEPTEMBER 28, 1998 AS INSTRUMENT NO. 19980

HORIZONTAL CONTROL & PAVING PLAN

OF

26200 ENTERPRISE WAY

FOR

IPT ENTERPRISE BUSINESS CENTER LLC

LAKE FOREST, CALIFORNIA

DATE	OCTOBER, 2024
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C4.0
OF	14 SHEETS

KIER+WRIGHT

163 Technology Drive
Irvine, CA 92620

Phone: (949) 508-0202
www.kierwright.com

NO.	REVISION	BY	NO.	REVISION	BY

LEGEND

- AUTO PARKING — T.I.=4.0 — AUTO PAVEMENT: 5" PCC OVER 12" 95% R.C. SUBGRADE
- TRUCK ISLE — T.I.=4.0 — TRUCK PAVEMENT: 6.5" PCC OVER 12" 95% R.C. SUBGRADE
- CONCRETE SIDEWALK — 4.5" PCC OVER 95% R.C. SUBGRADE W/#3 BAR @ 18" O.C.E.W.

NORTH

Scale 1" = 30'

0 15 30 60 90

CONSTRUCTION STAKING NOTE:

FOR ALL STAKING SCHEDULING AND REQUEST FOR PROPOSALS PLEASE CONTACT:
FERNANDO MARGOS
(925) 245-8788 EXT. 2034 gthammond@kierwright.com

N40°20'20"W 79.82' (N40°21'27"W 79.82' HELD PER DEED)

N40°20'20"W 98.96'

FOUND 2" IRON PIPE W/TAG "LS 4965" PER

N49°53'12"E 48.50'

(N37°18'16"W 119.33') N37°11'42"W 118.32'

23.53'

36' TYP.

9' TYP.

172.17' G12

(N52°56'16"E 144.60') N52°56'16"E 144.60'

35'

10.04' B12

(N52°56'16"E 198.80') N52°56'16"E 198.80'

(N52°56'16"E 198.80') N52°56'16"E 198.80'

(N37°29'26"E 486.15') N42°53'53"E 486.07'

N49°29'40"E 546.02'

84.41' G12

38'

18' TYP.

53' TYP.

9' TYP.

(N37°29'26"E 486.15') N42°53'53"E 486.07'

N49°29'40"E 546.02'

(N37°29'26"E 53.38') N37°06'07"E 53.34'

56'

(N52°56'44"E 946.57') N52°56'20"E 946.72'

R=50.00' L=53.44'
R=50.00' L=53.45'

ENTERPRISE WAY

28'

9' TYP.

18' TYP.

PARCEL 8 & PORTION OF PARCEL 9
PARCEL MAP 97-196

26200 ENTERPRISE WAY
EXISTING 2 STORY BUILDING
BUILDING HEIGHT = 34.3 FT
AREA: 74,960 SQ. FT.

66'

66.35'

94.42' G1

67' A1

ENTERPRISE WAY

(N42°43'30"E 228.37') N42°43'30"E 228.37'

(N52°56'44"E 113.47') (N53°32'44"E 113.47')

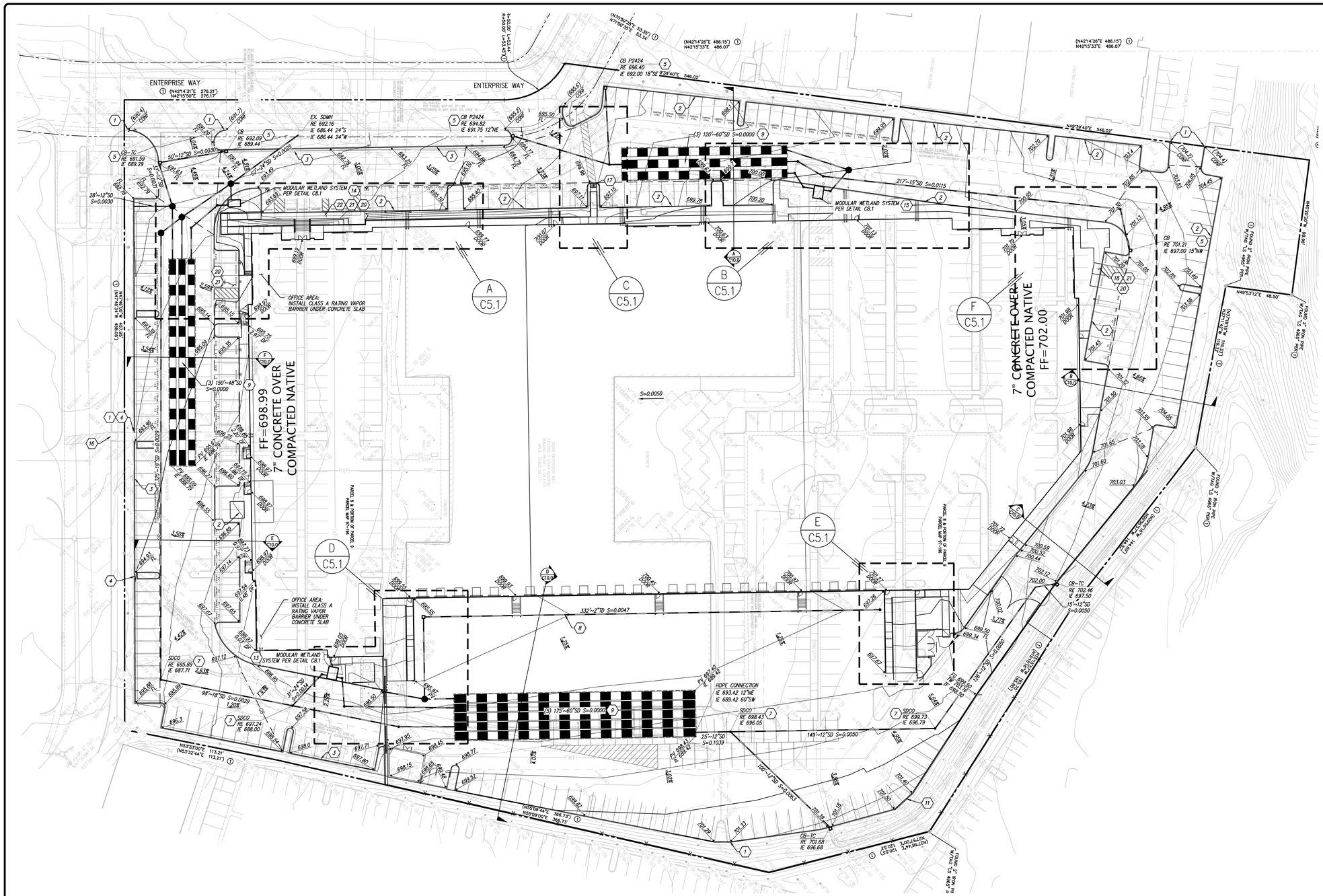
83.12' G1

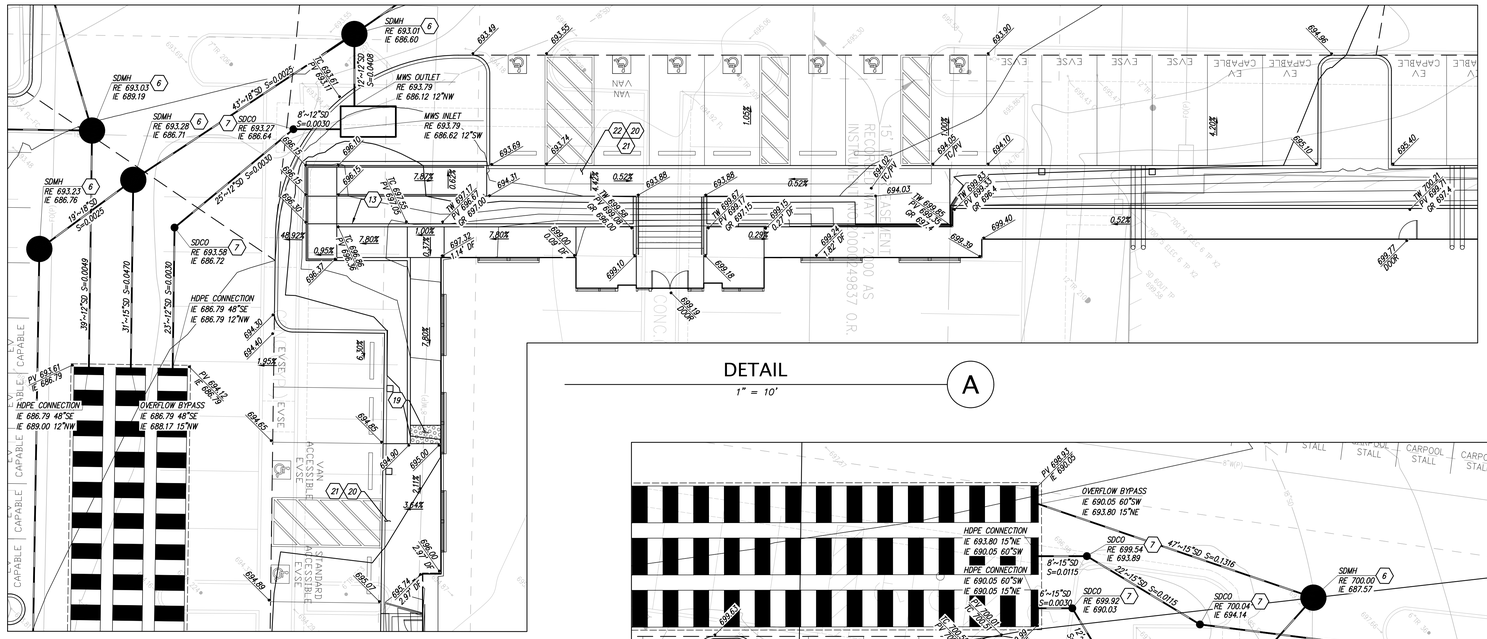
83.89' A1

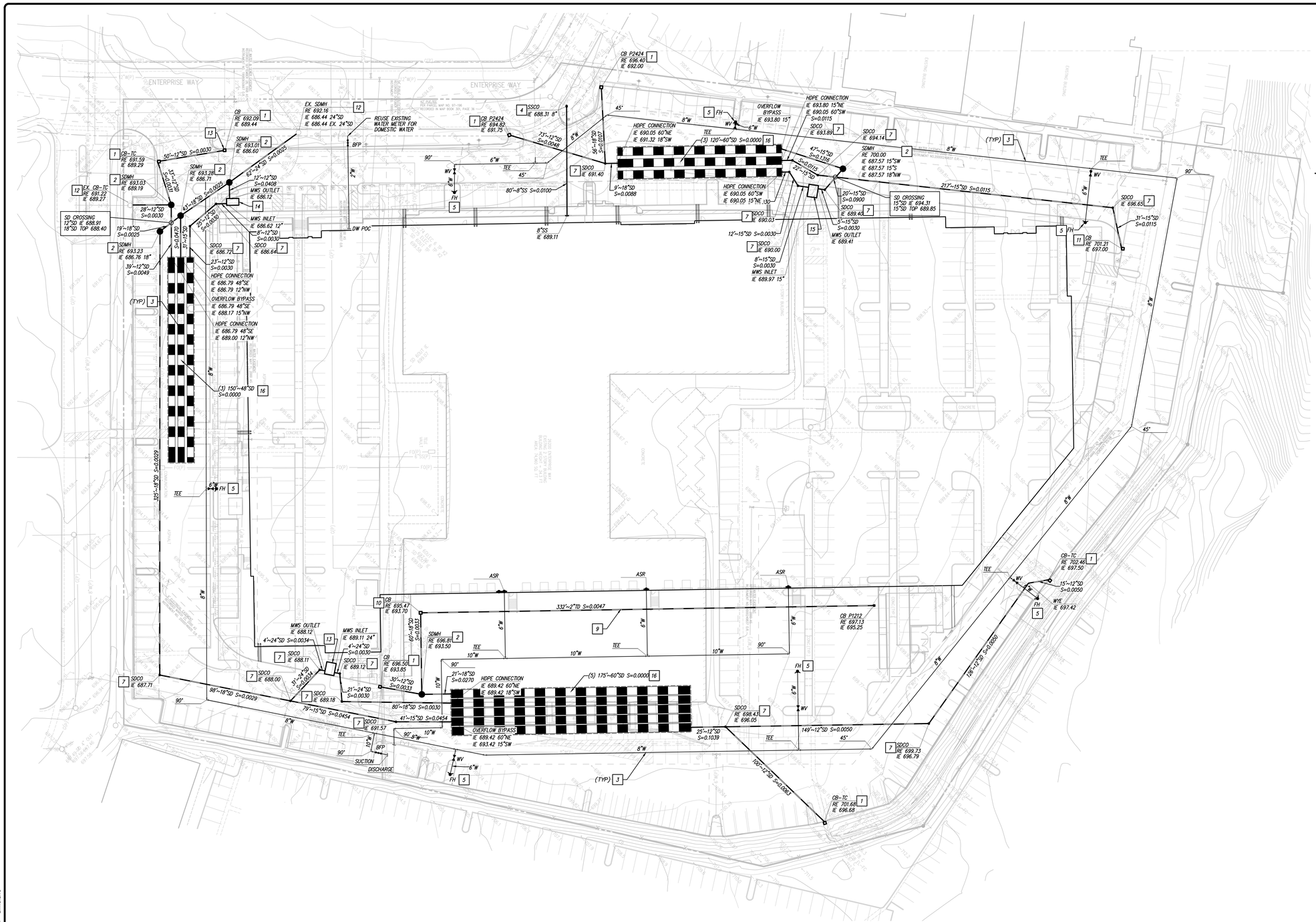
9' TYP.

N47°46'00"W 457.05'
(N47°45'34"W 458.05')

Z:\2021\A21532\DWG\CDS\BUILDING PERMIT\A21532 CDS.dwg 10-15-24 04:51:51 PM omidano


ENTERPRISE WAY
ENTERPRISE WAY
(N42°14'31"E 276.21')
N42°15'50"E 276.17'
(N42°14'28"E 486.15')
N42°15'33"E 486.07'
N48°39'40"E 546.02'
N49°33'12"E 48.50'
N53°33'00"E 113.21'
(N53°32'44"E 113.21')
(N55°09'44"E 366.73')
N55°09'00"E 366.73'
N47°09'39"E 53.36'
N47°00'36"E 53.34'
R=50.00'
L=53.44'
CB P2424
RE 696.40
IE 692.00 18"SE
CB P2424
RE 694.82
IE 691.75 12"NE
EX. SDMH
RE 692.16
IE 686.44 24"S
IE 686.44 24"W
CB
RE 692.09
IE 689.44"
CB-TC
RE 691.59
IE 689.29
CB
RE 701.21
IE 697.00 15"NW
CB-TC
RE 702.46
IE 697.50
15"-12"SD
S=0.0050
CB-TC
RE 701.68
IE 696.68
SDCO
RE 695.89
IE 687.71
SDCO
RE 697.24
IE 688.00
SDCO
RE 698.43
IE 696.05
SDCO
RE 699.73
IE 696.79
HDPE CONNECTION
IE 693.42 12"NE
IE 689.42 60"SW
PV 697.40
IE 688.42
PV 698.43
IE 688.43
MODULAR WETLAND SYSTEM PER DETAIL C8.1
OFFICE AREA: INSTALL CLASS A RATING VAPOR BARRIER UNDER CONCRETE SLAB
FF=698.99
7" CONCRETE OVER
COMPACTED NATIVE
FF=702.00
7" CONCRETE OVER
COMPACTED NATIVE
(3) 120'-60"SD S=0.0000
(3) 150'-48"SD S=0.0000
(5) 175'-60"SD S=0.0000
332'-2"TD S=0.0047
217'-15"SD S=0.0115
149'-12"SD S=0.0050
160'-12"SD S=0.0063
98'-18"SD S=0.0029
37'-24"SD S=0.0024
25'-12"SD S=0.1039
126'-12"SD S=0.0050
S=0.0050
60'-12"SD S=0.0030
28'-12"SD S=0.0030
67'-24"SD S=0.0025
325'-18"SD S=0.0029
A C5.1
B C5.1
C C5.1
D C5.1
E C5.1
F C5.1
A C10.0
B C10.0
C C10.0
D C10.0
E C10.0
F C10.0
PHASE 1 & 2 BOUNDARY
PHASE 3 & 4 BOUNDARY
PHASE 3 & 4 BOUNDARY
PHASE 1 & 2 BOUNDARY
FOUND 2" IRON PIPE
FOUND 1" IRON PIPE
FOUND 1.5" IRON PIPE
FOUND 1.5" IRON PIPE
FOUND 1.5


SDMH RE 693.01 IE 686.60
SDMH RE 693.03 IE 689.19
SDMH RE 693.28 IE 686.71
SDCO RE 693.27 IE 686.64
SDMH RE 693.23 IE 686.76
SDCO RE 693.58 IE 686.72
MWS OUTLET RE 693.79 IE 686.12 12"NW
MWS INLET RE 693.79 IE 686.62 12"SW
HDPE CONNECTION IE 686.79 48"SE IE 686.79 12"NW
HDPE CONNECTION IE 686.79 48"SE IE 689.00 12"NW
OVERFLOW BYPASS IE 686.79 48"SE IE 688.17 15"NW
8'~12"SD S=0.0030
47'~18"SD S=0.0049
25'~12"SD S=0.0030
15'~18"SD S=0.0025
35'~12"SD S=0.0049
11'~15"SD S=0.0470
21'~12"SD S=0.0030
45.92%
7.80%
0.52%
4.72%
1.00%
0.95%
1.95%
2.11%
3.44%
2.71%
0.20%
0.27%
0.62%
TW 697.17 GR 697.00
TW 696.67 GR 696.50
TW 697.15 GR 697.00
TW 699.61 GR 699.50
TW 699.41 GR 699.30
TW 700.12 GR 699.91
PV 693.61 IE 686.79
PV 694.19 IE 686.79
PV 697.24 IE 686.78
PV 698.07 IE 686.78
PV 698.07 IE 686.78
PV 698.07



LEGEND

PROPOSED	EXISTING	
		ASPHALT BERM
		BUILDING LINE
		CENTER LINE
		CONCRETE CURB
		CONCRETE CURB & GUTTER
300	300	CONTOUR LINE
		DRIVEWAY
		EDGE OF PAVEMENT
E	E	ELECTRIC LINE
X X X	X X X	FENCE LINE
FS	FS	FIRE SERVICE & VALVE
F	F	FIBER OPTICS LINE
G	G	GAS LINE - VALVE & METER
		GUARD RAIL
		LOT LINE
		MONUMENT/MONUMENT LINE
OH	OH	OVERHEAD POWER LINE
JT	JT	JOINT TRENCH LINE
RCP, PIPE	RCP, PIPE	PERFORATED STORM DRAIN PIPE
		PROPERTY LINE
SS	SS	SANITARY SEWER-MANHOLE & CLEANOUT
		SIDEWALK
100.00	100.00	SPOT ELEVATION
SD	SD	STORM DRAIN-MANHOLE & CATCH BASIN
		THRU CURB DRAIN
T	T	TELEPHONE LINE
W	W	WATER LINE & VALVE
		BACKFLOW PREVENTION DEVICE
		ELECTROLIER
		FIRE HYDRANT
		POST INDICATOR VALVE
		POWER POLE/JOINT POLE
T	T	TRANSFORMER
		TRAFFIC SIGN
		UTILITY BOX
AD	AD	AREA DRAIN
ARV	ARV	AIR RELEASE VALVE
AVP	AVP	AIR VALVE POST
ASR	ASR	AUTOMATIC SPRINKLER RISER
BFPD	BFPD	BACKFLOW PREVENTION DEVICE
BOV	BOV	BLOWOFF VALVE
CATVB	CATVB	CABLE TELEVISION BOX
CTB	CTB	CALTRANS BOX
CB	CB	CATCH BASIN
COTG	COTG	CLEANOUT TO GRADE
DS	DS	DOWN SPOUT
EB	EB	ELECTRIC BOX
ETS	ETS	ELECTROLYSIS TEST STATION
FF	FF	FINISHED FLOOR
FH	FH	FIRE HYDRANT
FL	FL	FLOW LINE
FOM	FOM	FIBER OPTICS MARKER
GLM	GLM	GAS LINE MARKER
GM	GM	GAS METER
GV	GV	GAS VALVE
GA	GA	GUY ANCHOR
IE	IE	INVERT ELEVATION
IB	IB	IRRIGATION BOX
JP	JP	JOINT POWER POLE
LT	LT	LIGHT
PBMH	PBMH	PAC BELL MANHOLE
POC	POC	POINT OF CONNECTION
PIV	PIV	POST INDICATOR VALVE
PP	PP	POWER POLE
RWL	RWL	RAIN WATER LEADER
RVP	RVP	RELEASE VALVE POST
RE	RE	RIM ELEVATION
SSCO	SSCO	SANITARY SEWER CLEANOUT
SSMH	SSMH	SANITARY SEWER MANHOLE
SMH	SMH	SPRINT MANHOLE
SM	SM	SPRINT MARKER
SDMH	SDMH	STORM DRAIN MANHOLE
SDJB	SDJB	STORM DRAIN JUNCTION BOX
SL	SL	STREET LIGHT
SLB	SLB	STREET LIGHT BOX
TB	TB	TELEPHONE BOX
TMH	TMH	TELEPHONE MANHOLE
TSB	TSB	TRAFFIC SIGNAL BOX
TSP	TSP	TRAFFIC SIGNAL POLE
WB	WB	WATER BOX
WM	WM	WATER METER
WV	WV	WATER VALVE

KEYNOTES

1	CATCH BASIN PER DETAIL 6 ON SHEET C9.0
2	STORM DRAIN MANHOLE PER DETAIL 10 ON SHEET C9.0
3	PIPE LINE BACKFILL AND BEDDING PER DETAIL 12 ON SHEET C9.0
4	SANITARY SEWER CLEANOUT PER DETAIL 13 ON SHEET C9.0
5	FIRE HYDRANT PER IRWD STANDARD DETAIL
6	FIRE DEPARTMENT CONNECTION PER IRWD STANDARD DETAIL
7	STORM DRAIN CLEANOUT PER DETAIL 11 ON SHEET C9.0
8	INSTALL WITH OPEN GRATE COVER
9	ACO S200K POWER DRAIN
10	ACO SK1-6310 CATCH BASIN WITH TRASH BUCKET
11	NOT USED
12	PROTECT IN PLACE
13	BIOCLEAN STORMWATER BIOFILTRATION SYSTEM PER DETAIL A/C8.1
14	BIOCLEAN STORMWATER BIOFILTRATION SYSTEM PER DETAIL B/C8.1
15	BIOCLEAN STORMWATER BIOFILTRATION SYSTEM PER DETAIL C/C8.1
16	ADS HDPE DETENTION SYSTEM PER ATTACHED ADS PLAN

NOTE: UTILITIES OTHER THAN STORM DRAIN TO BE REVIEWED AND APPROVED BY OTHERS

UTILITY NOTES

1. BACKFILLING AND COMPACTION FOR ALL TRENCHES SHALL BE INSPECTED AND APPROVED BY THE GEOTECHNICAL ENGINEER.
2. CONTRACTOR TO VERIFY ALL EXISTING INVERT ELEVATIONS FOR STORM DRAIN AND SANITARY SEWER CONSTRUCTION PRIOR TO ANY SITE WORK. ALL WORK FOR STORM DRAIN AND SANITARY SEWER INSTALLATION SHALL BEGIN AT THE DOWNSTREAM CONNECTION POINT. THIS WILL ALLOW FOR ANY NECESSARY ADJUSTMENTS TO BE MADE PRIOR TO THE INSTALLATION OF THE ENTIRE LINE IF THE CONTRACTOR FAILS TO BEGIN AT THE DOWNSTREAM CONNECTION POINT AND WORKS UPSTREAM, HE SHALL PROCEED AT HIS OWN RISK AND BE RESPONSIBLE FOR ANY ADJUSTMENTS NECESSARY.
3. ALL WORK ON-SITE AND IN THE PUBLIC RIGHT OF WAY SHALL CONFORM TO THE CITY OF LAKE FOREST STANDARDS AND REQUIREMENTS.
4. GENERAL CONTRACTOR SHALL COORDINATE ALL UNDERGROUND UTILITIES. PROVIDE 6" MINIMUM BETWEEN PIPES CROSSING ELECTRICAL LINES HORIZONTALLY AND 12" MINIMUM BETWEEN PARALLEL PIPES CROSSING ELECTRICAL LINES.
5. UTILITY MATERIALS AND TYPES, MUST BE PER PROJECT REGULATIONS AND REQUIREMENTS IF APPLICABLE AND NOT IDENTIFIED ON THESE PLANS.
6. WATER LINES SHALL BE 12" MINIMUM ABOVE SANITARY SEWER LINE AT ALL CROSSINGS.
7. MINIMUM COVER FOR WATER LINES IS 3.0 FEET.
8. MINIMUM COVER FOR FIRE SERVICE LINES IS 4.0 FEET.
9. SANITARY SEWER SHALL BE PVC SDR 35 EXCEPT WHERE DUCTILE IRON PIPE (DIP) IS NOTED OR AS REQUIRED BY THE LOCAL JURISDICTION. CONTRACTOR SHALL VERIFY REQUIREMENTS PRIOR TO PLACING HIS BID. DUCTILE IRON PIPE (DIP) SHALL BE CLASS 50.
10. DOMESTIC WATER LINES ¾"-3" SHALL BE SCHEDULE 40 PVC, 4" AND ABOVE SHALL BE C900 DR 18 PIPE.
11. FIRE SERVICE LINES 6"-12" SHALL BE C900 DR 14, UNLESS SPECIFIED OTHERWISE ON FIRE SHOP DRAWINGS.

UNDERGROUND FIRE PROTECTION SYSTEM NOTES

1. THE UNDERGROUND FIRE PROTECTION SYSTEM SHOWN ON THIS DRAWING IS SCHEMATIC AND IS NOT INTENDED TO BE AN INSTALLATION DRAWING. THIS DRAWING SHALL NOT BE USED AS A BASE SHEET FOR SHOP DRAWINGS WITHOUT THE WRITTEN APPROVAL OF THE PREPARER.
2. THE UNDERGROUND FIRE PROTECTION SYSTEM INSTALLER SHALL PREPARE SHOP DRAWINGS SHOWING ALL INFORMATION REQUESTED BY THE JURISDICTIONAL APPROVAL AGENCY, NFPA 13, 24 AND THE LOCAL FIRE MARSHAL.
3. THE UNDERGROUND FIRE PROTECTION SYSTEM INSTALLER SHALL SUBMIT SHOP DRAWINGS TO THE LOCAL FIRE MARSHAL/BUILDING OFFICIAL AND THE OWNER'S REVIEWING AGENT FOR PERMIT AND APPROVAL/ACCEPTANCE.
4. THE UNDERGROUND FIRE PROTECTION SYSTEM INSTALLER SHALL SUBMIT SHOP DRAWINGS TO THE ARCHITECT, ALLOWING TIME FOR REVIEW AND ACCEPTANCE, PRIOR TO START OF WORK. REQUIREMENTS FOR SHOP DRAWINGS SUBMITTAL ARE PER THE JURISDICTIONAL APPROVAL AGENCY AND THE LOCAL FIRE MARSHAL.
5. SHOP DRAWINGS, APPROVED BY THE LOCAL FIRE MARSHAL AND OWNER'S REVIEWING AGENT, SHALL BE SUBMITTED BY THE UNDERGROUND FIRE PROTECTION SYSTEM INSTALLER, TO THE ARCHITECT, PRIOR TO REQUESTING FINAL APPROVAL AND PAYMENT. REQUIREMENTS FOR SHOP DRAWINGS SUBMITTAL ARE LISTED IN SPECIFICATIONS.
6. REFER TO THE REQUIREMENTS/REGULATIONS OF THE JURISDICTIONAL APPROVAL AGENCY AND THE LOCAL FIRE MARSHAL FOR UNDERGROUND FIRE PROTECTION SYSTEM REQUIREMENTS. SPECIFICATIONS ARE PART OF THE CONTRACT DOCUMENTS AND APPLIES TO THE GENERAL CONTRACTOR AND THE FIRE PROTECTION SYSTEM INSTALLER.
7. GENERAL CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF COMPLIANCE OF THE SHOP DRAWINGS TO THE PLANS AND REQUIREMENTS/REGULATIONS OF THE JURISDICTIONAL APPROVAL AGENCY AND THE LOCAL FIRE MARSHAL PRIOR TO SUBMITTAL.
8. GENERAL CONTRACTOR SHALL NOT DIVIDE THE UNDERGROUND FIRE PROTECTION SYSTEM SCOPE OF WORK BETWEEN SUBCONTRACTORS.
9. GENERAL CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF ALL DIMENSIONS AND EQUIPMENT LOCATIONS. AUTOMATIC SPRINKLER RISER LOCATIONS ARE SHOWN ON ARCHITECTURAL DRAWINGS.
10. SEE ARCHITECTURAL FLOOR PLANS FOR DIMENSIONED AUTOMATIC SPRINKLER RISER (ASR) LOCATIONS.

NO.	BY	REVISION

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UTILITY PLAN
OF
26200 ENTERPRISE WAY
FOR
IPT ENTERPRISE BUSINESS CENTER LLC
LAKE FOREST, CALIFORNIA

DATE	OCTOBER, 2024
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C6.0
OF	14 SHEETS

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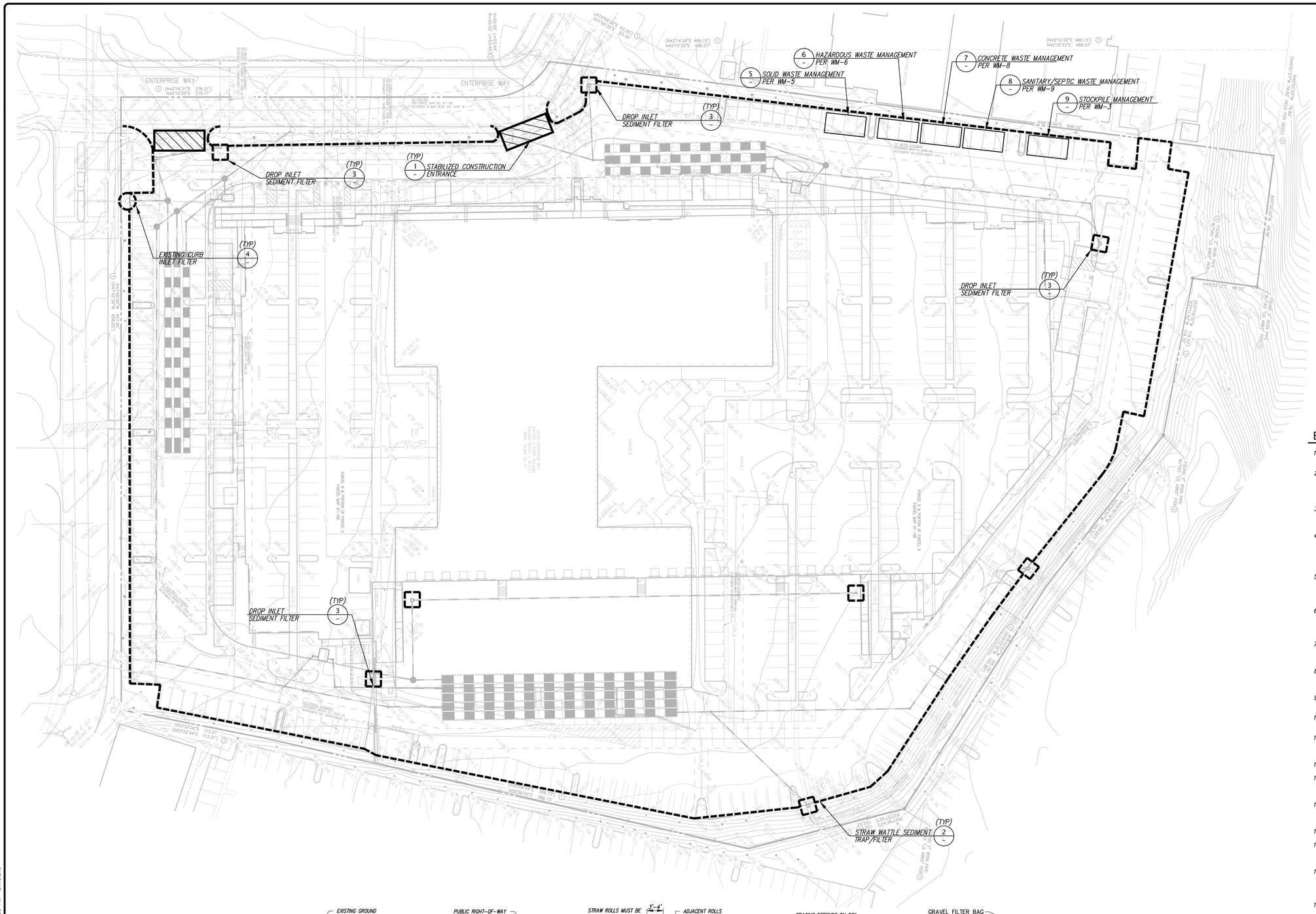


NORTH

0 15 30 60 90

Scale 1" = 30'

LEGEND

- 1 — STABILIZED CONSTRUCTION ENTRANCE
- 2 — STRAW WATTLE SEDIMENT TRAP/FILTER
- 3 — DROP INLET SEDIMENT FILTER
- 4 — EXISTING CURB INLET FILTER
- 5 — SOLID WASTE MANAGEMENT PER WM-5
- 6 — HAZARDOUS WASTE MANAGEMENT PER WM-6
- 7 — CONCRETE WASTE MANAGEMENT PER WM-8
- 8 — SANITARY/SEPTIC WASTE MANAGEMENT PER WM-9
- 9 — STOCKPILE MANAGEMENT PER WM-3

EROSION & SEDIMENT CONTROL MEASURES

1. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE EFFECTIVE FOR THE DURATION OF CONSTRUCTION.
2. AFTER THE UNDERGROUND STORM DRAIN SYSTEM IS INSTALLED, THE CATCH BASINS WILL BE INSTALLED (AS SOON AS PRACTICAL) AND ROCK BARRIER BAGS WILL BE PLACED AROUND THOSE CATCH BASINS AS SHOWN ON THE EROSION CONTROL (THE PLAN) UNTIL THE SITE IS PAVED.
3. SHOULD THE ON-SITE STORM DRAINS NOT BE INSTALLED COMPLETELY BY OCTOBER 15, THE CONTRACTOR SHALL CONSTRUCT TEMPORARY SEDIMENT BASINS AT THE EXISTING STORM PIPES STUBBED TO THE SITE.
4. PERSON RESPONSIBLE FOR IMPLEMENTATION OF EROSION AND SEDIMENTATION PLAN.

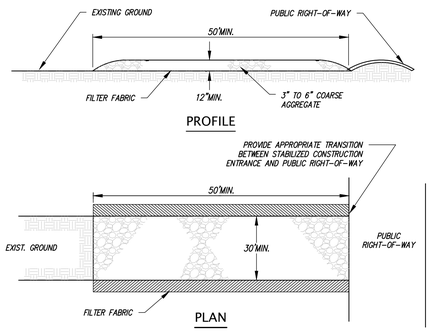
   NAME:
   ADDRESS:
   TELEPHONE:

5. THE CONTRACTOR SHALL PLACE 3"-6" COARSE AGGREGATE AS A GRAVEL ROADWAY (12" MIN. THICK FOR THE FULL WIDTH AND 50 FEET LONG) AT EACH D/W ENTRANCE TO SITE. ANY MUD THAT IS TRACKED ONTO PUBLIC STREETS SHALL BE REMOVED THAT SAME DAY AND AS REQUIRED BY THE CITY OF LAKE FOREST.
6. ALL EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL DISTURBED AREAS ARE STABILIZED AND CHANGES TO THE EROSION AND SEDIMENT CONTROL PLAN SHALL BE MADE TO MEET FIELD CONDITIONS ONLY WITH THE APPROVAL OF OR AT THE DIRECTION OF THE CITY ENGINEER.
7. ALL PAVED AREAS SHALL BE KEPT CLEAR OF EARTH MATERIAL AND DEBRIS. THE SITE SHALL BE MAINTAINED SO AS TO MINIMIZE SEDIMENT-LADEN RUN-OFF TO ANY STORM DRAINAGE SYSTEM.
8. THE PLAN COVERS ONLY THE FIRST WINTER FOLLOWING GRADING. PLANS ARE TO BE RESUBMITTED FOR CITY APPROVAL PRIOR TO THE SEPTEMBER FIRST OF EACH SUBSEQUENT YEAR UNTIL THE SITE IMPROVEMENTS ARE ACCEPTED BY THE CITY.
9. ALL EROSION CONTROL FACILITIES MUST BE INSPECTED AND REPAIRED AT THE END OF EACH WORKING DAY.
10. SEDIMENT BASINS SHALL BE CLEANED OUT WHENEVER SEDIMENT REACHES THE SEDIMENT CLEANOUT LEVEL INDICATED ON THE PLANS.
11. BORROW AREAS AND TEMPORARY STOCKPILES SHALL BE PROTECTED WITH APPROPRIATE EROSION CONTROL MEASURES TO THE SATISFACTION OF THE CITY ENGINEER.
12. ALL CUT AND FILL SLOPES ARE TO BE PROTECTED TO PREVENT OVERBANK FLOW.
13. INLETS WHICH ARE NOT USED IN CONJUNCTION WITH ROCK BARRIER BAGS OR SEDIMENT BASINS SHOULD BE COVERED, OR OTHERWISE ADJUSTED TO PREVENT INFLOW, UNLESS THE AREA DRAINED IS UNDISTURBED OR STABILIZED.
14. THE PLAN MAY NOT COVER ALL THE SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO ANTICIPATED FIELD CONDITIONS. VARIATIONS MAY BE MADE TO THE PLAN IN THE FIELD SUBJECT TO THE APPROVAL OF THE ENGINEER.
15. DETAILS FOR THE CONSTRUCTION OF FACILITIES ARE SHOWN ON THE PLANS.
16. THE PLAN IS INTENDED TO BE USED FOR EROSION CONTROL ONLY. OTHER INFORMATION SHOWN HEREIN MAY NOT BE THE MOST CURRENT. SEE SHEET C2 FOR OTHER INFORMATION.
17. IN CASE OF EMERGENCY, CONTACT THE FOLLOWING INDIVIDUAL:

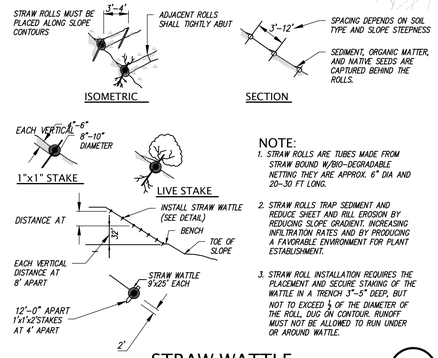
    NAME:
    TELEPHONE:

18. EQUIPMENT AND WORKERS FOR EMERGENCY WORK SHALL BE MADE AVAILABLE AT ALL TIMES DURING THE RAINY SEASON. NECESSARY MATERIALS SHALL BE AVAILABLE ONSITE OR STOCKPILED AT CONVENIENT LOCATIONS TO FACILITATE RAPID CONSTRUCTION OF TEMPORARY DEVICES WHEN RAIN IS IMMINENT.
19. EROSION CONTROL DEVICES SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE BUILDING OFFICIAL.
20. ALL REMOVABLE EROSION PROTECTIVE DEVICES SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN THE 5-DAY RAIN PROBABILITY FORECAST EXCEEDS 40 PERCENT.
21. AFTER A RAINSTORM, ALL SILT AND DEBRIS SHALL BE REMOVED FROM STREETS, CHECK BERMS, AND BASINS.
22. GRADED AREAS ON THE PERMITTED AREA PERIMETER MUST DRAIN AWAY FROM THE FACE OF SLOPES AT THE CONCLUSION OF EACH WORKING DAY. DRAINAGE TO BE DIRECTED TOWARD DESILTING FACILITIES.
23. THE PERMITTEE AND CONTRACTOR SHALL BE RESPONSIBLE AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT PUBLIC TRESPASS ONTO AREAS WHERE IMPOUNDED WATER CREATES A HAZARDOUS CONDITION.
24. THE UNDERSIGNED CIVIL ENGINEER/QSD SHALL INSPECT THE EROSION CONTROL WORK AND ENSURE THAT THE WORK IS IN ACCORDANCE WITH THE APPROVED PLANS.

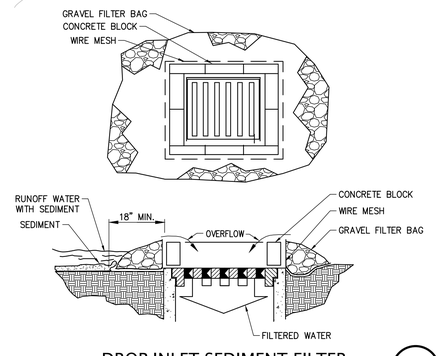
_____ _____
CIVIL ENGINEER/QSD SIGNATURE DATE



STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE — 1



STRAW WATTLE
NOT TO SCALE — 2



DROP INLET SEDIMENT FILTER
NOT TO SCALE — 3

NO.	BY	REVISION

NO.	BY	REVISION

REGISTERED PROFESSIONAL ENGINEER — CHRISTIE S. WEBER — No. 76867 — CIVIL — STATE OF CALIFORNIA

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EROSION CONTROL PLAN
OF
26200 ENTERPRISE WAY
FOR
IPT ENTERPRISE BUSINESS CENTER LLC
LAKE FOREST, CALIFORNIA

DATE	OCTOBER, 2024
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C7.0
OF	14 SHEETS

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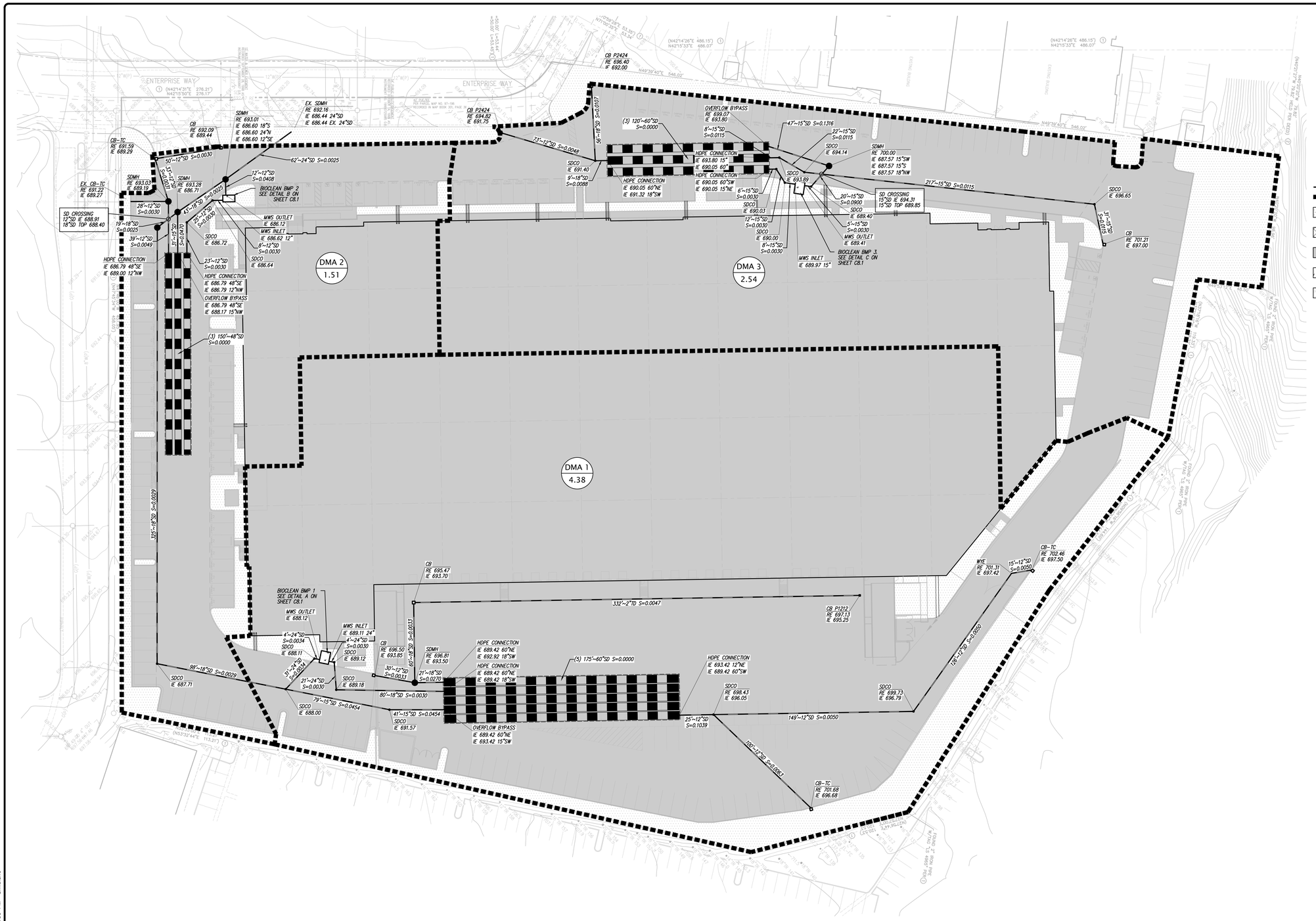

DMA No.	Area (SF)	Area (AC)	Landscape (SF)	Landscape (AC)	Imperv. (SF)	Imperv. (AC)	TREATMENT VOL. (CF)	BIOCLEAN MODEL NUMBER
1	190,975	4.38	17,549	0.4	173,426	3.98	12,565	MWS-L-6-8-9'-5"-V
2	65,792	1.51	7,947	0.18	57,845	1.33	4,216	MWS-L-4-8-7'-7"-V
3	110,680	2.54	14,649	0.34	96,031	2.2	7,016	MWS-L-6-8-11'-3"-V-HC

BY | NO. | REVISION

BY | NO. | REVISION

REGISTERED PROFESSIONAL ENGINEER
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STORM WATER QUALITY CONTROL PLAN
OF
26200 ENTERPRISE WAY
FOR
IPT ENTERPRISE BUSINESS CENTER LLC
LAKE FOREST, CALIFORNIA

DATE	OCTOBER, 2024
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C8.0
OF	14 SHEETS

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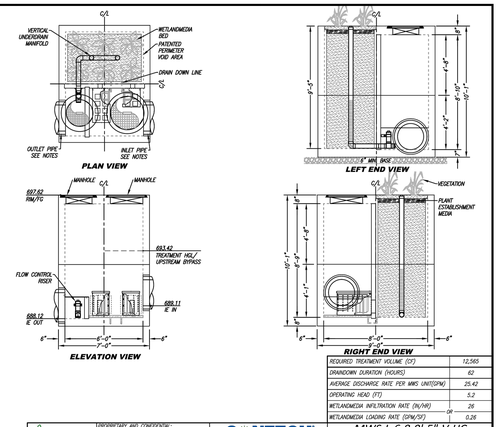
SITE SPECIFIC DATA			
PROJECT NUMBER		701248-015	
PROJECT NAME		26200 ENTERPRISE WAY	
PROJECT LOCATION		LAKE FOREST, CA	
STRUCTURE ID		DMA 1	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
12565		N/A	
TREATMENT HGL AVAILABLE (FT)			3.4
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE	689.11	HDPE	24"
OUTLET PIPE	688.12	HDPE	24"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	697.62	697.62	697.62
SURFACE LOAD	PEDESTRIAN	N/A	PEDESTRIAN
FRAME & COVER	Ø30"	OPEN PLANTER	Ø24"
METLANDMEDIA VOLUME (CF)			7.36
ORIFICE SIZE (DIA. INCHES)			Ø0.97"
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. EOR TO VERIFY RIM ELEVATION. WALL THICKNESS TO BE CONFIRMED WITH STRUCTURAL REVIEW.			

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED, WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

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



REQUIRED TREATMENT VOLUME (CF)	12,565
DRAWDOWN DURATION (HOURS)	62
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	25.42
OPERATING HEAD (FT)	5.2
METLANDMEDIA INFILTRATION RATE (IN/HR)	26
OR	
METLANDMEDIA LOADING RATE (GPM/SF)	0.26

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www.ContechES.com

MWS-L-6-8-9'-5"-V-HC
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

DETAIL "A"

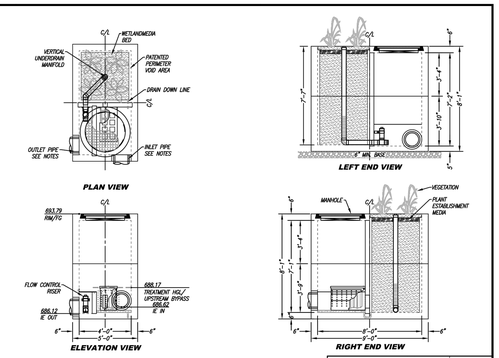
SITE SPECIFIC DATA			
PROJECT NUMBER		701248-020	
PROJECT NAME		26200 ENTERPRISE WAY	
PROJECT LOCATION		LAKE FOREST, CA	
STRUCTURE ID		DMA 2	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
4216		N/A	
TREATMENT HGL AVAILABLE (FT)			N/A
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	686.62	HDPE	12"
OUTLET PIPE	686.12	HDPE	12"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	693.79	693.79	693.79
SURFACE LOAD	PEDESTRIAN	N/A	PEDESTRIAN
FRAME & COVER	36"X	OPEN PLANTER	N/A
METLANDMEDIA VOLUME (CF)			3.85
ORIFICE SIZE (DIA. INCHES)			Ø1.68"
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. EOR TO CONFIRM RIM ELEVATION. WALL THICKNESS TO BE CONFIRMED WITH STRUCTURAL REVIEW.			

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED, WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

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



REQUIRED TREATMENT VOLUME (CF)	4,216
DRAWDOWN DURATION (HOURS)	68
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	7.70
OPERATING HEAD (FT)	2.0
METLANDMEDIA INFILTRATION RATE (IN/HR)	26
OR	
METLANDMEDIA LOADING RATE (GPM/SF)	0.26

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CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com

MWS-L-4-8-7'-7"-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

DETAIL "B"

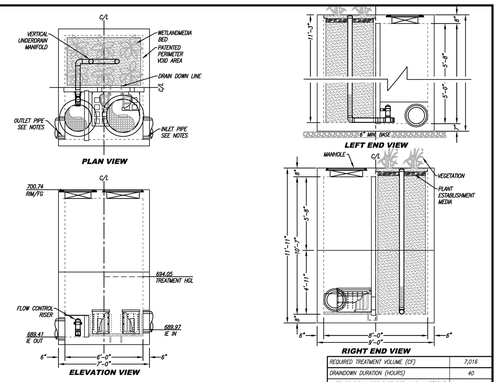
SITE SPECIFIC DATA			
PROJECT NUMBER		701248-025	
PROJECT NAME		26200 ENTERPRISE WAY	
PROJECT LOCATION		LAKE FOREST, CA	
STRUCTURE ID		DMA 3	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
7016		N/A	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	689.97	HDPE	15"
OUTLET PIPE	689.41	HDPE	15"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	700.74	700.74	700.74
SURFACE LOAD	PEDESTRIAN	N/A	PEDESTRIAN
FRAME & COVER	30"	OPEN PLANTER	24"
METLANDMEDIA VOLUME (CF)			8.78
ORIFICE SIZE (DIA. INCHES)			Ø0.93"
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. EOR TO CONFIRM RIM ELEVATION. WALL THICKNESS TO BE CONFIRMED WITH STRUCTURAL REVIEW.			

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED, WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES AND MANHOLES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

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



REQUIRED TREATMENT VOLUME (CF)	7,016
DRAWDOWN DURATION (HOURS)	40
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	22.00
OPERATING HEAD (FT)	4.5
METLANDMEDIA INFILTRATION RATE (IN/HR)	26
OR	
METLANDMEDIA LOADING RATE (GPM/SF)	0.26

PROPRIETARY AND CONFIDENTIAL:
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CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com

MWS-L-6-8-11'-3"-V-HC
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

DETAIL "C"

NO.	BY	REVISION

NO.	BY	REVISION

REGISTERED PROFESSIONAL ENGINEER
MATTHEW R. REDDER
No. 76867
CIVIL
STATE OF CALIFORNIA

KIER+WRIGHT
163 Technology Drive
Irvine, CA 92620
Phone: (949) 508-0202
www.kierwright.com

STORM WATER QUALITY CONTROL DETAILS
OF
26200 ENTERPRISE WAY
FOR
IPT ENTERPRISE BUSINESS CENTER LLC
LAKE FOREST, CALIFORNIA

DATE	OCTOBER, 2024
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532

SHEET C8.1
OF 14 SHEETS

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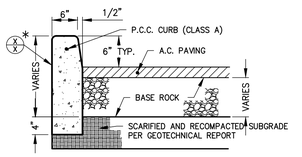
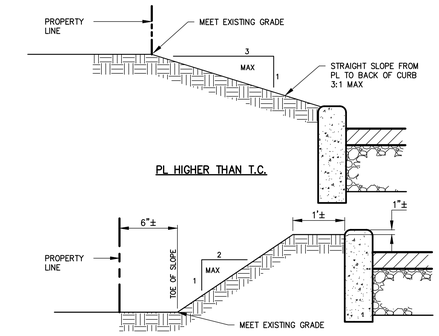
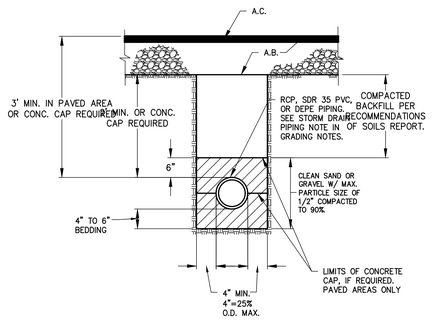


* WEEPHOLES TO BE PLACED ON ALL CURBS AND CURB & GUTTER WHERE LANDSCAPING SLOPES TOWARD CURB. WEEPHOLES SHALL BE PLACED AT 10' O.C. OR AT EACH SCORELINE OF THE CURB.

CONCRETE CURB
NOT TO SCALE — 1

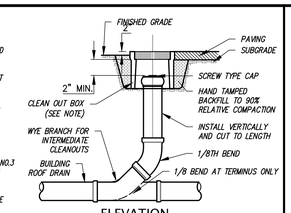


TYPICAL GRADES AT PROP. LINE
NOT TO SCALE — 5



P.V.C. & H.D.P.E. PIPE BEDDING DETAIL
NOT TO SCALE — 8

NOTES:
1. A RECTANGULAR BOX AS SHOWN ABOVE SHALL BE USED FOR CLEANOUTS THAT ARE CAPPED USING A BANDED RUBBER COUPLING.
2. CIRCULAR BOXES ARE PERMITTED FOR CLEANOUTS THAT ARE CAPPED WITH A SCREW TYPE CAP OR OTHER APPROVED TOP OPENING CAPS.
3. CIRCULAR BOXES INSTALLED IN SIDEWALK AREAS SHALL HAVE A SOLID COVER WITHOUT HOLES. APPROVED CIRCULAR BOXES ARE: CHRISTY VI BOX.
4. APPROVED RECTANGULAR BOXES ARE:
   A) CHRISTY CONCRETE PRODUCT B3 BOX WITH A B3D CONCRETE LID OR A B3C METAL LID. OR
   B) BROOKS PRODUCTS, INC. NO.3 METER BOX WITH A NO.3 HEAVY DUTY CONCRETE LID OR A NO.3 CAST IRON TRAFFIC LID. OR AN APPROVED EQUAL.
5. CONCRETE LIDS ARE ACCEPTABLE FOR USE IN NON VEHICULAR TRAFFIC AREAS, WHILE METAL LIDS MUST BE ELSEWHERE.
6. ALL CLEAN OUT BOX LIDS SHALL BE MARKED WITH A LETTER "SD" OR THE WORDS "STORM DRAIN".



ELEVATION

TERMINATE CLEAN-OUT AT CLOSEST JOINT TO SURFACE WITH TEMPORARY PLUG. AFTER ALL BACKFILL IS COMPLETE AND SUB-GRADE MADE IN AREAS TO BE PAVED THE FINAL RISER PIPE AND BOX SHALL BE INSTALLED AS SHOWN.

CAST IRON COVER — CONCRETE COVER — CONCRETE BOX

STORM DRAIN CLEAN OUT TO GRADE
NOT TO SCALE — 11

NOTES:
1. A RECTANGULAR BOX AS SHOWN ABOVE SHALL BE USED FOR CLEANOUTS THAT ARE CAPPED USING A BANDED RUBBER COUPLING.
2. CIRCULAR BOXES ARE PERMITTED FOR CLEANOUTS THAT ARE CAPPED WITH A SCREW TYPE CAP OR OTHER APPROVED TOP OPENING CAPS.
3. CIRCULAR BOXES INSTALLED IN SIDEWALK AREAS SHALL HAVE A SOLID COVER WITHOUT HOLES. APPROVED CIRCULAR BOXES ARE: CHRISTY VI BOX.
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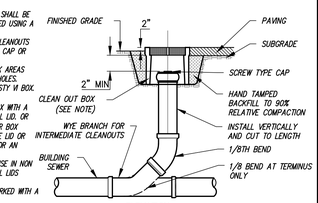
5. CONCRETE LIDS ARE ACCEPTABLE FOR USE IN NON VEHICULAR TRAFFIC AREAS, WHILE METAL LIDS MUST BE ELSEWHERE.
6. ALL CLEAN OUT BOX LIDS SHALL BE MARKED WITH A LETTER "S" OR THE WORD "SEWER".

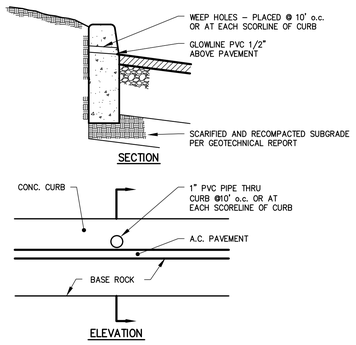


ELEVATION

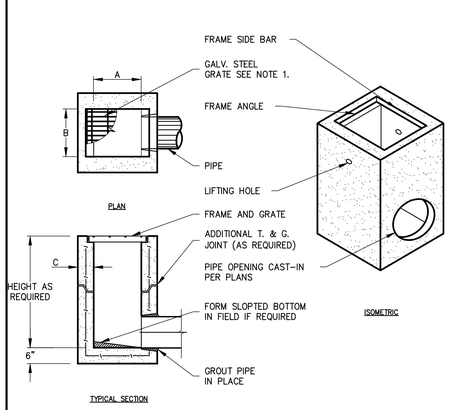
TERMINATE CLEAN OUT AT CLOSEST JOINT TO SURFACE WITH TEMPORARY PLUG. AFTER ALL BACKFILL IS COMPLETE AND SUB-GRADE MADE IN AREAS TO BE PAVED THE FINAL RISER PIPE AND BOX SHALL BE INSTALLED AS SHOWN.

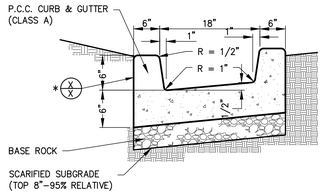
CAST IRON COVER — CONCRETE COVER — CONCRETE BOX

SEWER CLEAN OUT TO GRADE
NOT TO SCALE — 14



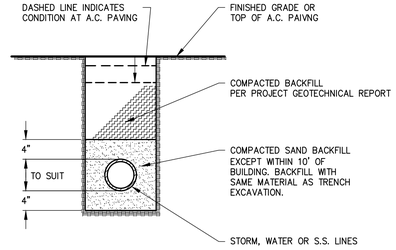
WEEP HOLE
NOT TO SCALE — 2





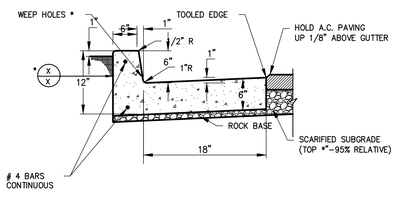
* WEEPHOLES TO BE PLACED ON ALL CURBS & GUTTER WHERE LANDSCAPING SLOPES TOWARD CURB. WEEPHOLES SHALL BE PLACED AT 10' O.C. OR AT EACH SCORELINE OF THE CURB.

LANDSCAPE ISLAND "DRAIN-THRU" GUTTER
NOT TO SCALE — 9



PIPE LINE BACKFILL AND BEDDING DETAIL
NOT TO SCALE — 12

NOTE:
SCORELINES SHALL BE 10' o.c. U.O.N.



* WEEPHOLES TO BE PLACED ON ALL CURBS AND CURB & GUTTER WHERE LANDSCAPING SLOPES TOWARD CURB. WEEPHOLES SHALL BE PLACED AT 10' O.C. OR AT EACH SCORELINE OF THE CURB.

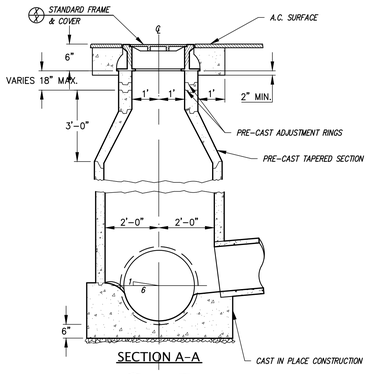
CONCRETE CURB & GUTTER
NOT TO SCALE — 3

NOTES :
1. FRAMES AND GRATES MAY BE SPECIFIED FOR PEDESTRIAN OR H20 TRAFFIC LOADING. ALL GRATES ARE BICYCLE PROOF. OPTIONAL GRATE LOCKING DEVICE AVAILABLE ON REQUEST SEE DRAWING "LOCK" ON PAGE 1-7 OF THE CENTRAL PRECAST CATALOG. CLOSED-MESH GRATES OR CAST IRON FRAME AND GRATES ARE AVAILABLE ON REQUEST.
2. FOR SURFACE AND DISCHARGE OPTIONS AVAILABLE SEE DRAWING NO. "DI-S0" PAGE 1-6 AND "DI-D0" PAGE 1-5 OF THE CENTRAL PRECAST CATALOG.
3. FRAMES AND GRATES DETAILS SEE PAGES 1-8, 1-9, AND 1-10 OF THE CENTRAL PRECAST CATALOG.
4. WALL THICKNESSES ON ALL D.I.S. CAN BE CHANGED UPON REQUEST. 5. 18" WIDE D.I.'S REPLACE THE OLD 16" WIDE BOX BK & 1K.

DROP INLET TABLE

MODEL No.	CPC MODEL NAME	A		B		C	
		IN	MM	IN	MM	IN	MM
CP1212	EK	12	300	12	300	4	100
CP1818	CK	18	450	18	450	5	125
CP1824	1K*	18	450	24	600	5	125
CP2424	2K	24	600	24	600	5	125
CP2430	3K	24	600	30	750	5	125
CP3030	5K	30	750	30	750	6	150
CP2436	1L	24	600	36	900	6	150
CP3636	1M	36	900	36	900	6	150
CP2448	3L	24	600	48	1200	6	150
CP3648	3M	36	900	48	1200	6	150
CP4848	1R	48	1200	48	1200	6	150

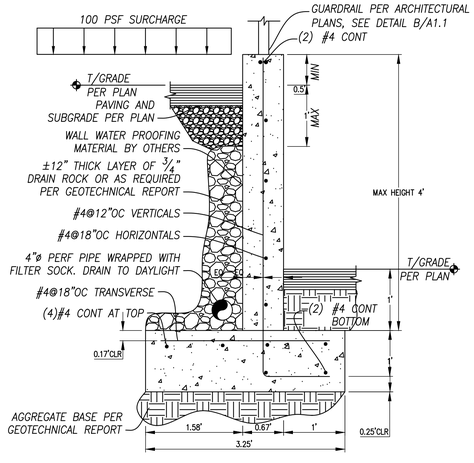
DROP INLET US CONCRETE PRECAST GROUP
NOT TO SCALE — 6



PLAN OF BASE

NOTE
1. SANITARY SEWER MANHOLES SHALL BE CONSTRUCTED PER APPROVING AGENCY SPECIFICATIONS AND REQUIREMENTS.
2. 3' I.D. MANHOLES WITH 24" HIGH CONES MAY BE USED IN CASE OF SHALLOW COVER IF PRIOR APPROVAL IS GRANTED BY THE APPROVING AGENCY ENGINEER.

STORM DRAIN MANHOLE
NOT TO SCALE — 10

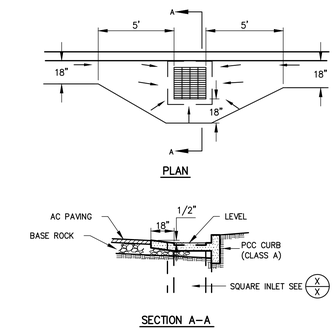


DESIGN PARAMETERS

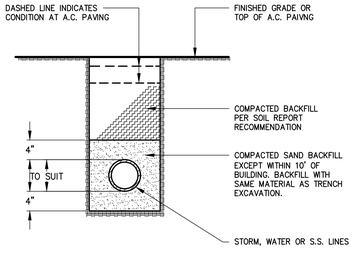
DESIGN PARAMETERS

- SOIL BEARING PRESSURE = 1500 PSF
- f'c = 2500 PSI
- Fy = 60,000 PSI
- SOIL FRICTION = 0.35
- RETAINED-EQUIVALENT FLUID PRESSURE ACTIVE = 45 PCF
- PASSIVE PRESSURE = 350 PCF (PER GEOTECH REPORT)
- SAFETY FACTOR = 1.5
- NO HYDROSTATIC PRESSURE – WALL IS WELL DRAINED
- SEISMIC LOAD OF 10H^2 AT .6H WITH 1.1 SAFETY FACTOR AGAINST OVERTURNING AND SLIDING
- LEVEL BACKFILL
- 100 PSF SURCHARGE

RETAINING WALL
NOT TO SCALE — 13



GUTTER FLARE DETAIL AT CURB
NOT TO SCALE — 4



PIPE LINE BACKFILL AND BEDDING DETAIL
NOT TO SCALE — 7

REVISION | NO. | BY

KIER+WRIGHT
163 Technology Drive
Irvine, CA 92620
Phone: (949) 508-0202
www.kierwright.com

DETAILS
OF
26200 ENTERPRISE WAY
FOR
IPT ENTERPRISE BUSINESS CENTER LLC
LAKE FOREST, CALIFORNIA

DATE	OCTOBER, 2024
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C9.0
OF	14 SHEETS

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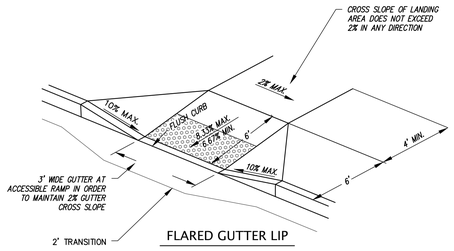
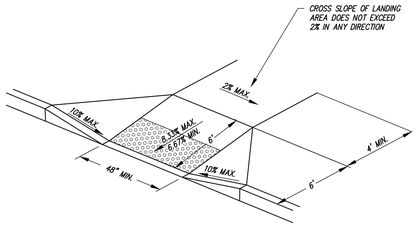


FLARED GUTTER LIP

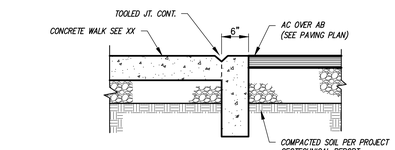


STANDARD CURB

ACCESSIBLE ACCESS RAMP WITH FLARES

NOT TO SCALE

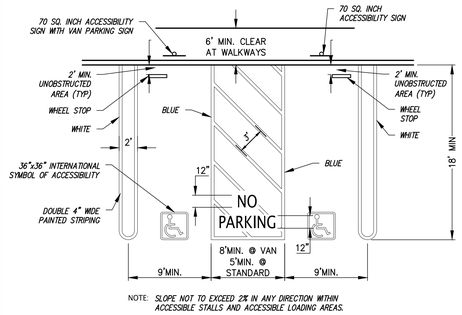
15



FLUSH CURB WITH SIDEWALK

NOT TO SCALE

18



NOTE: SLOPE NOT TO EXCEED 2% IN ANY DIRECTION WITHIN ACCESSIBLE STALLS AND ACCESSIBLE LOADING AREAS.

ACCESSIBLE PARKING

NOT TO SCALE

19

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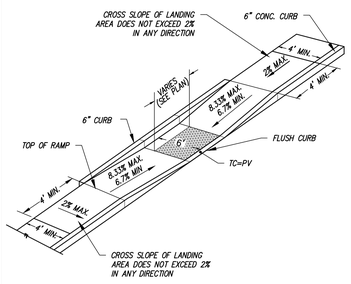
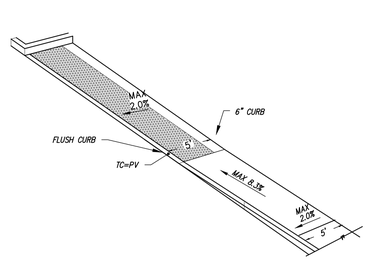


ACCESSIBLE ACCESS RAMP

NOT TO SCALE

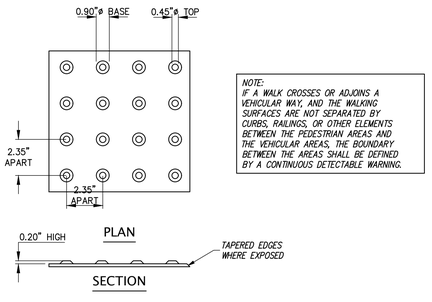
16



ACCESSIBLE ACCESS RAMP

NOT TO SCALE

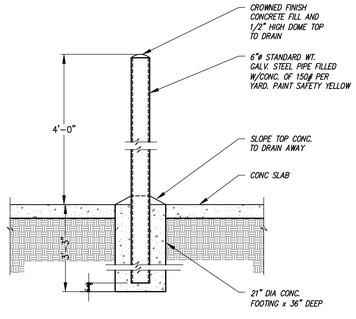
20



TRUNCATED DOMES

NOT TO SCALE

17



PIPE BOLLARD DETAIL

NOT TO SCALE

21

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BY	NO.	REVISION

BY	NO.	REVISION

REGISTERED PROFESSIONAL ENGINEER
CHRISTIE S. REDDER
No. 76867
CIVIL
STATE OF CALIFORNIA

KIER+WRIGHT
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DETAILS
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SHEET C9.1
OF 14 SHEETS

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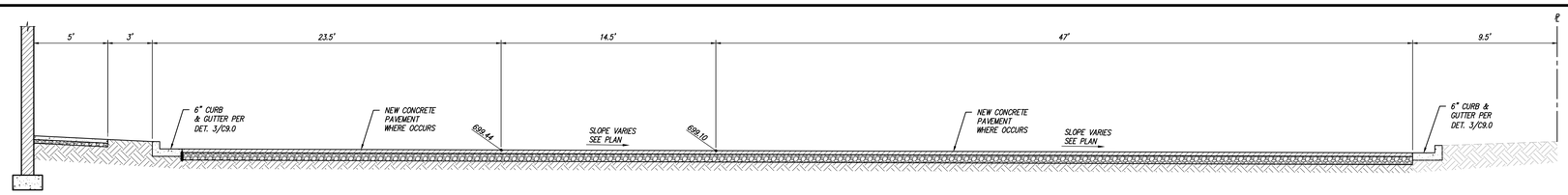
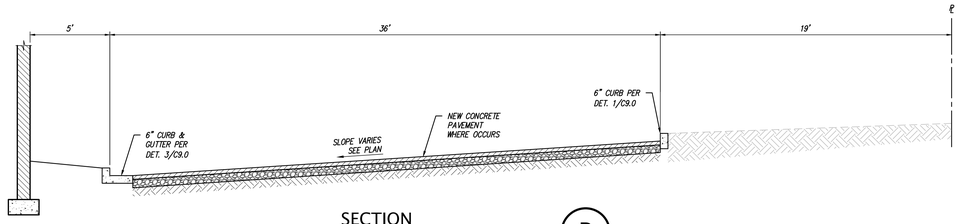


SECTION A
NOT TO SCALE



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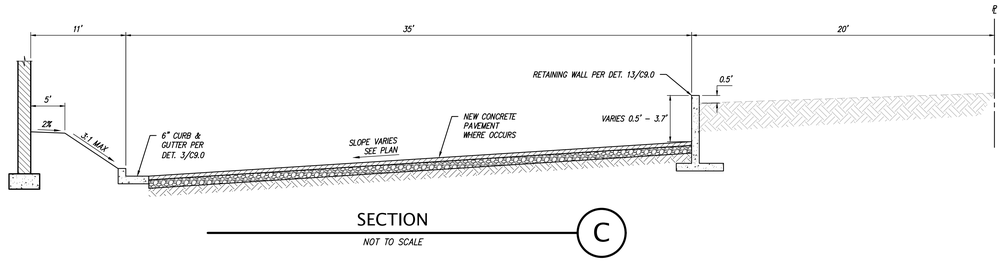

SECTION C
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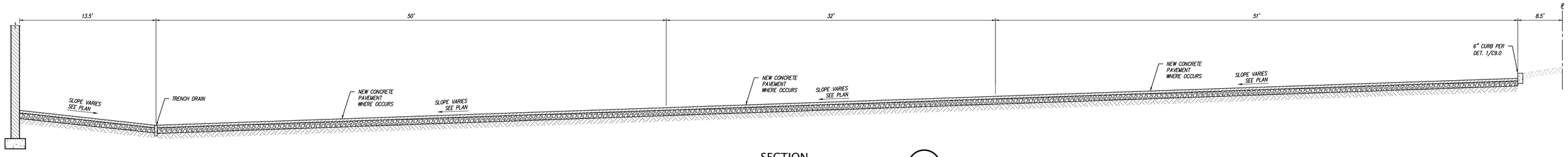

SECTION D
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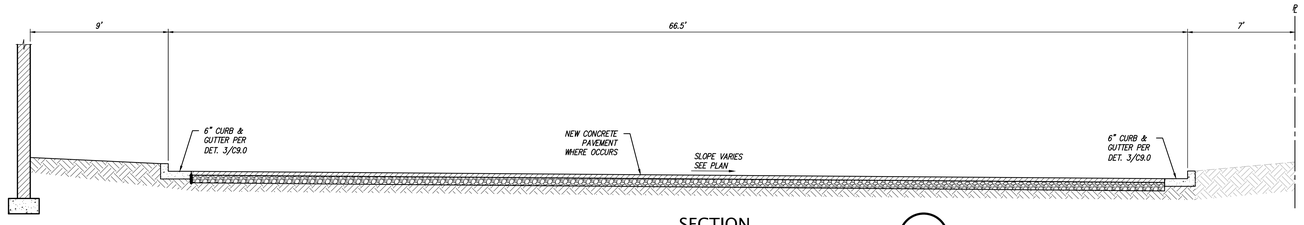

SECTION E
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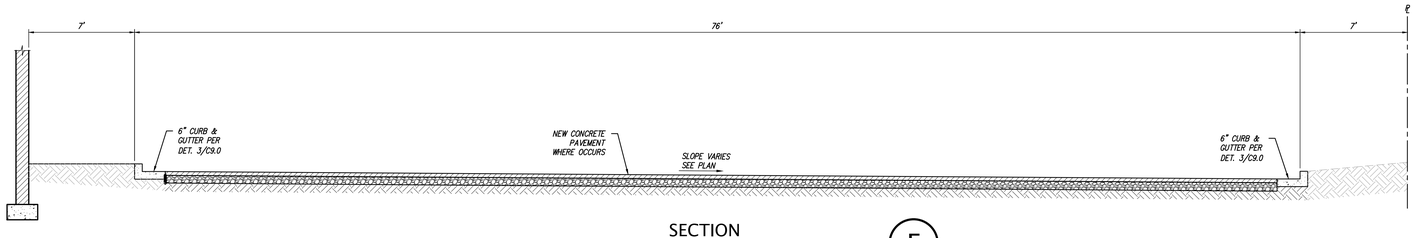

SECTION F
NOT TO SCALE

CONSTRUCTION STAKING NOTE:

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

NO.	REVISION	BY

NO.	REVISION	BY

REGISTERED PROFESSIONAL ENGINEER
CHRISTIE S. REDER
No. 76867
CIVIL
STATE OF CALIFORNIA

KIER+WRIGHT
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SECTIONS
OF
26200 ENTERPRISE WAY
FOR
IPT ENTERPRISE BUSINESS CENTER LLC
LAKE FOREST, CALIFORNIA

DATE	OCTOBER, 2024
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C10.0
OF	14 SHEETS

Z:\2021\A21532\DWG\CDS\BUILDING PERMIT\A21532_CDS.dwg 10-15-24 04:54:20 PM omiciano

APPENDIX 3

Hydrology Calculations

CIVILD RATIONAL METHOD ANALYSIS:
EXISTING CONDITION

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study, Date: 10/11/24 File Name: a21532exq10.roc

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A21532 EXISTING CONDITION
Q10

Program License Serial Number 6509

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

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Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2) = 75.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fp)= 0.200(In/Hr)
Max Catchment Loss (Fm) = 0.020(In/Hr)
Initial subarea data:
Initial area flow distance = 299.360(Ft.)
Top (of initial area) elevation = 704.140(Ft.)
Bottom (of initial area) elevation = 695.940(Ft.)
Difference in elevation = 8.200(Ft.)
Slope = 0.02739 s(%)= 2.74
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.107 min.
Rainfall intensity = 5.517(In/Hr) for a 100.0 year storm

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Effective runoff coefficient used for area (Q=KCIA) is C = 0.897
Subarea runoff =      2.177(CFS)
Total initial stream area =        0.440(Ac.)


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Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =   695.940(Ft.)
End of street segment elevation =   694.040(Ft.)
Length of street segment  =   207.470(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  35.000(Ft.)
Distance from crown to crossfall grade break  =  10.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.634(CFS)
Depth of flow =   0.333(Ft.), Average velocity =   2.202(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.341(Ft.)
Flow velocity =   2.20(Ft/s)
Travel time =    1.57 min.     TC =    7.68  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      4.839(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =      0.859(CFS) for    0.260(Ac.)
Total runoff =      3.036(CFS)  Total area =        0.70(Ac.)
Area averaged Fm value =    0.020(In/Hr)
Street flow at end of street =      3.036(CFS)
Half street flow at end of street =      3.036(CFS)
Depth of flow =   0.346(Ft.), Average velocity =   2.276(Ft/s)
Flow width (from curb towards crown)=  10.989(Ft.)
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Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =   694.040(Ft.)
End of street segment elevation =   693.460(Ft.)
Length of street segment  =   193.140(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  10.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.402(CFS)
Depth of flow =   0.429(Ft.), Average velocity =   1.523(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.600(Ft.)
Flow velocity =   1.52(Ft/s)
Travel time =    2.11 min.     TC =    9.79  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      4.210(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =      0.659(CFS) for    0.280(Ac.)
Total runoff =      3.695(CFS)  Total area =        0.98(Ac.)
Area averaged Fm value =    0.020(In/Hr)
Street flow at end of street =      3.695(CFS)
Half street flow at end of street =      3.695(CFS)
Depth of flow =   0.438(Ft.), Average velocity =   1.554(Ft/s)
Flow width (from curb towards crown)=  15.087(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   687.550(Ft.)
Downstream point/station elevation =   687.500(Ft.)
Pipe length  =    58.78(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.695(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     0.125(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      0.073(Ft.)
 Minor friction loss =      0.102(Ft.)  K-factor =   1.50
Pipe flow velocity =      2.09(Ft/s)
Travel time through pipe =    0.47 min.
Time of concentration (TC) =    10.26 min.


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Process from Point/Station      104.000 to Point/Station      104.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Time of concentration =    10.26 min.
Rainfall intensity =      4.099(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =     10.914(CFS) for    3.000(Ac.)
Total runoff =     14.609(CFS)  Total area =        3.98(Ac.)
Area averaged Fm value =    0.020(In/Hr)


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Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   687.500(Ft.)
Downstream point/station elevation =   686.440(Ft.)
Pipe length  =    90.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.609(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
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     2.272(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      1.740(Ft.)
 Minor friction loss =      1.592(Ft.)  K-factor =   1.50
Pipe flow velocity =      8.27(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    10.44 min.


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Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Initial subarea data:
Initial area flow distance =   268.000(Ft.)
Top (of initial area) elevation =   708.240(Ft.)
Bottom (of initial area) elevation =   696.910(Ft.)
Difference in elevation =    11.330(Ft.)
Slope =    0.04228  s(%)=       4.23
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.357 min.
Rainfall intensity =      5.948(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.897
Subarea runoff =      2.614(CFS)
Total initial stream area =        0.490(Ac.)


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Process from Point/Station      201.000 to Point/Station      202.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =   690.460(Ft.)
Downstream point/station elevation =   689.930(Ft.)
Pipe length  =    42.62(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.614(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     2.614(CFS)
Normal flow depth in pipe =    5.78(In.)
Flow top width inside pipe =   16.81(In.)
Critical Depth =    7.35(In.)
Pipe flow velocity =      5.34(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     5.49 min.
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Process from Point/Station      202.000 to Point/Station      202.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Time of concentration =     5.49 min.
Rainfall intensity =      5.865(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.897
Subarea runoff =     20.741(CFS) for    3.950(Ac.)
Total runoff =     23.355(CFS)  Total area =        4.44(Ac.)
Area averaged Fm value =    0.020(In/Hr)


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Process from Point/Station      202.000 to Point/Station      203.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   689.930(Ft.)
Downstream point/station elevation =   687.570(Ft.)
Pipe length  =   201.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    23.355(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    23.355(CFS)
Normal flow depth in pipe =   18.72(In.)
Flow top width inside pipe =   19.88(In.)
Critical Depth =   20.61(In.)
Pipe flow velocity =      8.88(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =     5.87 min.
End of computations, total study area =            8.42 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number (AMC 2) =  75.0
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CIVILD RATIONAL METHOD ANALYSIS:
PROPOSED CONDITION PRE-MITIGATION

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study, Date: 08/01/24 File Name: A21532PREM.roc

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A21532 ENTERPRISE
PRE MITIGATION
Q100

Program License Serial Number 6509

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

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Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2) = 75.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fp)= 0.200(In/Hr)
Max Catchment Loss (Fm) = 0.020(In/Hr)
Initial subarea data:
Initial area flow distance = 277.000(Ft.)
Top (of initial area) elevation = 703.550(Ft.)
Bottom (of initial area) elevation = 697.670(Ft.)
Difference in elevation = 5.880(Ft.)
Slope = 0.02123 s(%)= 2.12
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.230 min.
Rainfall intensity = 5.455(In/Hr) for a 100.0 year storm

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Effective runoff coefficient used for area (Q=KCIA) is C = 0.897
Subarea runoff =      4.647(CFS)
Total initial stream area =        0.950(Ac.)


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Process from Point/Station       11.000 to Point/Station       12.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =   697.670(Ft.)
End of street segment elevation =   696.620(Ft.)
Length of street segment  =   115.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  13.500(Ft.)
Distance from crown to crossfall grade break  =   0.500(Ft.)
Slope from gutter to grade break (v/hz) =  -0.020
Slope from grade break to crown (v/hz)  =  -0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.555(CFS)
Depth of flow =   0.231(Ft.), Average velocity =   2.175(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.500(Ft.)
Flow velocity =   2.18(Ft/s)
Travel time =    0.88 min.     TC =    7.11  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      5.056(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =      3.648(CFS) for    0.880(Ac.)
Total runoff =      8.295(CFS)  Total area =        1.83(Ac.)
Area averaged Fm value =    0.020(In/Hr)
Street flow at end of street =      8.295(CFS)
Half street flow at end of street =      4.148(CFS)
Depth of flow =   0.248(Ft.), Average velocity =   2.389(Ft/s)
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Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  13.500(Ft.)


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Process from Point/Station       12.000 to Point/Station       13.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =   696.620(Ft.)
Downstream point elevation =   695.470(Ft.)
Channel length thru subarea  =   230.000(Ft.)
Channel base width      =    0.670(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =     13.287(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.670(Ft.)
Flow(q) thru subarea =     13.287(CFS)
Depth of flow =   2.897(Ft.), Average velocity =   6.844(Ft/s)
!!Warning: Water is above left or right bank elevations
Channel flow top width =    0.670(Ft.)
Flow Velocity =    6.84(Ft/s)
Travel time  =    0.56 min.
Time of concentration =    7.67 min.
Critical depth =      2.313(Ft.)
ERROR - Channel depth exceeds maximum allowable depth
 Adding area flow to channel
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      4.842(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =      9.930(CFS) for    2.370(Ac.)
Total runoff =     18.225(CFS)  Total area =        4.20(Ac.)
Area averaged Fm value =    0.020(In/Hr)
Depth of flow =   3.501(Ft.), Average velocity =   7.767(Ft/s)
!!Warning: Water is above left or right bank elevations
ERROR - Channel depth exceeds maximum allowable depth
Critical depth =      2.844(Ft.)


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Process from Point/Station       13.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
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Upstream point/station elevation =   693.700(Ft.)
Downstream point/station elevation =   693.500(Ft.)
Pipe length  =    60.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    18.225(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     4.083(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      1.806(Ft.)
 Minor friction loss =      2.478(Ft.)  K-factor =   1.50
Pipe flow velocity =     10.31(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     7.77 min.


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Process from Point/Station       14.000 to Point/Station       14.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.200(Ac.)
Runoff from this stream =     18.225(CFS)
Time of concentration =    7.77 min.
Rainfall intensity =     4.807(In/Hr)
Area averaged loss rate (Fm) =    0.0200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Initial subarea data:
Initial area flow distance =   106.000(Ft.)
Top (of initial area) elevation =   698.020(Ft.)
Bottom (of initial area) elevation =   696.910(Ft.)
Difference in elevation =     1.110(Ft.)
Slope =    0.01047  s(%)=       1.05
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.886 min.
Rainfall intensity =      6.269(In/Hr) for a   100.0 year storm
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Effective runoff coefficient used for area (Q=KCIA) is C = 0.897
Subarea runoff =      1.012(CFS)
Total initial stream area =        0.180(Ac.)


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Process from Point/Station       21.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   693.850(Ft.)
Downstream point/station elevation =   693.500(Ft.)
Pipe length  =    31.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.012(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.012(CFS)
Normal flow depth in pipe =    4.24(In.)
Flow top width inside pipe =   11.47(In.)
Critical Depth =    5.07(In.)
Pipe flow velocity =      4.08(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     5.01 min.


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Process from Point/Station       21.000 to Point/Station       14.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.180(Ac.)
Runoff from this stream =      1.012(CFS)
Time of concentration =    5.01 min.
Rainfall intensity =     6.178(In/Hr)
Area averaged loss rate (Fm) =    0.0200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      4.20    18.225      7.77    0.020      4.807
2      0.18     1.012      5.01    0.020      6.178
Qmax(1) =
           1.000 *    1.000 *    18.225) +
           0.777 *    1.000 *     1.012) + =      19.012
Qmax(2) =
           1.286 *    0.645 *    18.225) +
           1.000 *    1.000 *     1.012) + =      16.143

Total of 2 streams to confluence:
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Flow rates before confluence point:
      18.225       1.012
Maximum flow rates at confluence using above data:
       19.012       16.143
Area of streams before confluence:
        4.200        0.180
Effective area values after confluence:
        4.380        2.890
Results of confluence:
Total flow rate =     19.012(CFS)
Time of concentration =     7.768 min.
Effective stream area after confluence =      4.380(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.020(In/Hr)
Study area total (this main stream) =       4.38(Ac.)


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Process from Point/Station       42.000 to Point/Station       42.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Time of concentration =     7.77 min.
Rainfall intensity =      4.807(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =      7.957(CFS) for    1.880(Ac.)
Total runoff =     26.969(CFS)  Total area =        6.26(Ac.)
Area averaged Fm value =    0.020(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   693.500(Ft.)
Downstream point/station elevation =   686.600(Ft.)
Pipe length  =   631.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    26.969(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
    40.104(Ft.)  at the headworks or inlet of the pipe(s)
```

```
 Pipe friction loss =     41.579(Ft.)
 Minor friction loss =      5.425(Ft.)  K-factor =   1.50
Pipe flow velocity =     15.26(Ft/s)
Travel time through pipe =    0.69 min.
Time of concentration (TC) =     8.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.260(Ac.)
Runoff from this stream =     26.969(CFS)
Time of concentration =    8.46 min.
Rainfall intensity =     4.578(In/Hr)
Area averaged loss rate (Fm) =    0.0200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       31.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Initial subarea data:
Initial area flow distance =   304.000(Ft.)
Top (of initial area) elevation =   698.020(Ft.)
Bottom (of initial area) elevation =   693.900(Ft.)
Difference in elevation =     4.120(Ft.)
Slope =    0.01355  s(%)=       1.36
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.073 min.
Rainfall intensity =      5.072(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.896
Subarea runoff =      2.546(CFS)
Total initial stream area =        0.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       32.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
```

```
Top of street segment elevation =   693.900(Ft.)
End of street segment elevation =   691.220(Ft.)
Length of street segment  =   167.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  56.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.035
Slope from grade break to crown (v/hz)  =   0.035
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   7.500(Ft.)
Slope from curb to property line (v/hz) =   0.050
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.200(CFS)
Depth of flow =   0.366(Ft.), Average velocity =   3.234(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   7.187(Ft.)
Flow velocity =   3.23(Ft/s)
Travel time =    0.86 min.     TC =    7.93  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      4.749(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =      1.242(CFS) for    0.330(Ac.)
Total runoff =      3.788(CFS)  Total area =        0.89(Ac.)
Area averaged Fm value =    0.020(In/Hr)
Street flow at end of street =      3.788(CFS)
Half street flow at end of street =      3.788(CFS)
Depth of flow =   0.384(Ft.), Average velocity =   3.365(Ft/s)
Flow width (from curb towards crown)=   7.709(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       32.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
```

```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Time of concentration =     7.93 min.
Rainfall intensity =      4.749(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =      1.405(CFS) for    0.330(Ac.)
Total runoff =      5.192(CFS)  Total area =        1.22(Ac.)
Area averaged Fm value =    0.020(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   689.270(Ft.)
Downstream point/station elevation =   686.600(Ft.)
Pipe length  =   173.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.192(CFS)
Given pipe size =     12.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     2.021(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      3.673(Ft.)
 Minor friction loss =      1.018(Ft.)  K-factor =   1.50
Pipe flow velocity =      6.61(Ft/s)
Travel time through pipe =    0.44 min.
Time of concentration (TC) =     8.37 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       15.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.220(Ac.)
Runoff from this stream =      5.192(CFS)
Time of concentration =    8.37 min.
Rainfall intensity =     4.606(In/Hr)
Area averaged loss rate (Fm) =    0.0200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)
```

```
1      6.26    26.969      8.46    0.020      4.578
2      1.22     5.192      8.37    0.020      4.606
Qmax(1) =
           1.000 *    1.000 *    26.969) +
           0.994 *    1.000 *     5.192) + =      32.131
Qmax(2) =
           1.006 *    0.990 *    26.969) +
           1.000 *    1.000 *     5.192) + =      32.043

Total of 2 streams to confluence:
Flow rates before confluence point:
      26.969       5.192
Maximum flow rates at confluence using above data:
       32.131       32.043
Area of streams before confluence:
        6.260        1.220
Effective area values after confluence:
        7.480        7.416
Results of confluence:
Total flow rate =     32.131(CFS)
Time of concentration =     8.457 min.
Effective stream area after confluence =      7.480(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.020(In/Hr)
Study area total (this main stream) =       7.48(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   686.600(Ft.)
Downstream point/station elevation =   686.440(Ft.)
Pipe length  =    62.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    32.131(CFS)
Given pipe size =     24.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     3.527(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      1.250(Ft.)
 Minor friction loss =      2.436(Ft.)  K-factor =   1.50
Pipe flow velocity =     10.23(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     8.56 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       41.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
```

```
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Initial subarea data:
Initial area flow distance =   152.000(Ft.)
Top (of initial area) elevation =   704.050(Ft.)
Bottom (of initial area) elevation =   701.210(Ft.)
Difference in elevation =     2.840(Ft.)
Slope =    0.01868  s(%)=       1.87
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.027 min.
Rainfall intensity =      6.168(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.897
Subarea runoff =      3.652(CFS)
Total initial stream area =        0.660(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   697.000(Ft.)
Downstream point/station elevation =   687.570(Ft.)
Pipe length  =   584.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.652(CFS)
Given pipe size =     15.00(In.)
Calculated individual pipe flow  =     3.652(CFS)
Normal flow depth in pipe =    7.01(In.)
Flow top width inside pipe =   14.97(In.)
Critical Depth =    9.27(In.)
Pipe flow velocity =      6.49(Ft/s)
Travel time through pipe =    1.50 min.
Time of concentration (TC) =     6.53 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       42.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
```

Pervious ratio(Ap) = 0.1000 Max loss rate(Fp)=   0.200(In/Hr)
Max Catchment Loss (Fm) =   0.020(In/Hr)
Time of concentration =   6.53 min.
Rainfall intensity =   5.312(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified rational method)(Q=KCIA) is C = 0.897
Subarea runoff =   11.588(CFS) for   2.540(Ac.)
Total runoff =   15.240(CFS) Total area =   3.20(Ac.)
Area averaged Fm value =   0.020(In/Hr)
End of computations, total study area =   10.68 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number (AMC 2) = 75.0

CIVILD RATIONAL METHOD ANALYSIS:
PROPOSED CONDITION POST-MITIGATION

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study, Date: 10/15/24 File Name: A21532POSTM.roc

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A21532 ENTERPRISE
POST MITIGATION
Q100

Program License Serial Number 6509

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

++

Process from Point/Station 15.000 to Point/Station 15.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2) = 75.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fp)= 0.200(In/Hr)
Max Catchment Loss (Fm) = 0.020(In/Hr)
Rainfall intensity = 4.577(In/Hr) for a 100.0 year storm
User specified values are as follows:
TC = 8.46 min. Rain intensity = 4.58(In/Hr)
Total area = 4.38(Ac.) Total runoff = 10.01(CFS)

++

Process from Point/Station 15.000 to Point/Station 16.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

```
Upstream point/station elevation =   689.420(Ft.)
Downstream point/station elevation =   686.600(Ft.)
Pipe length  =   631.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.010(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     3.656(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      5.728(Ft.)
 Minor friction loss =      0.747(Ft.)  K-factor =   1.50
Pipe flow velocity =      5.66(Ft/s)
Travel time through pipe =    1.86 min.
Time of concentration (TC) =    10.32 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.380(Ac.)
Runoff from this stream =     10.010(CFS)
Time of concentration =   10.32 min.
Rainfall intensity =     4.086(In/Hr)
Area averaged loss rate (Fm) =    0.0200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       33.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      4.577(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =   8.46 min.  Rain intensity =       4.58(In/Hr)
Total area =         1.51(Ac.)  Total runoff =      3.71(CFS)


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```
Process from Point/Station       33.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   686.790(Ft.)
Downstream point/station elevation =   686.600(Ft.)
Pipe length  =    74.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.710(CFS)
Given pipe size =     12.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     1.132(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      0.802(Ft.)
 Minor friction loss =      0.520(Ft.)  K-factor =   1.50
Pipe flow velocity =      4.72(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =     8.72 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       16.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.510(Ac.)
Runoff from this stream =      3.710(CFS)
Time of concentration =    8.72 min.
Rainfall intensity =     4.498(In/Hr)
Area averaged loss rate (Fm) =    0.0200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      4.38    10.010     10.32    0.020      4.086
2      1.51     3.710      8.72    0.020      4.498
Qmax(1) =
           1.000 *    1.000 *    10.010) +
           0.908 *    1.000 *     3.710) + =      13.378
Qmax(2) =
           1.102 *    0.845 *    10.010) +
           1.000 *    1.000 *     3.710) + =      13.031

Total of 2 main streams to confluence:
Flow rates before confluence point:
      11.010       4.710
Maximum flow rates at confluence using above data:
       13.378       13.031
```

```
Area of streams before confluence:
        4.380        1.510
Effective area values after confluence:
        5.890        5.213


Results of confluence:
Total flow rate =     13.378(CFS)
Time of concentration =    10.317 min.
Effective stream area after confluence  =      5.890(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.020(In/Hr)
Study area total =       5.89(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   686.600(Ft.)
Downstream point/station elevation =   686.440(Ft.)
Pipe length  =    62.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.378(CFS)
Given pipe size =     24.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     0.479(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      0.217(Ft.)
 Minor friction loss =      0.422(Ft.)  K-factor =   1.50
Pipe flow velocity =      4.26(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =    10.56 min.

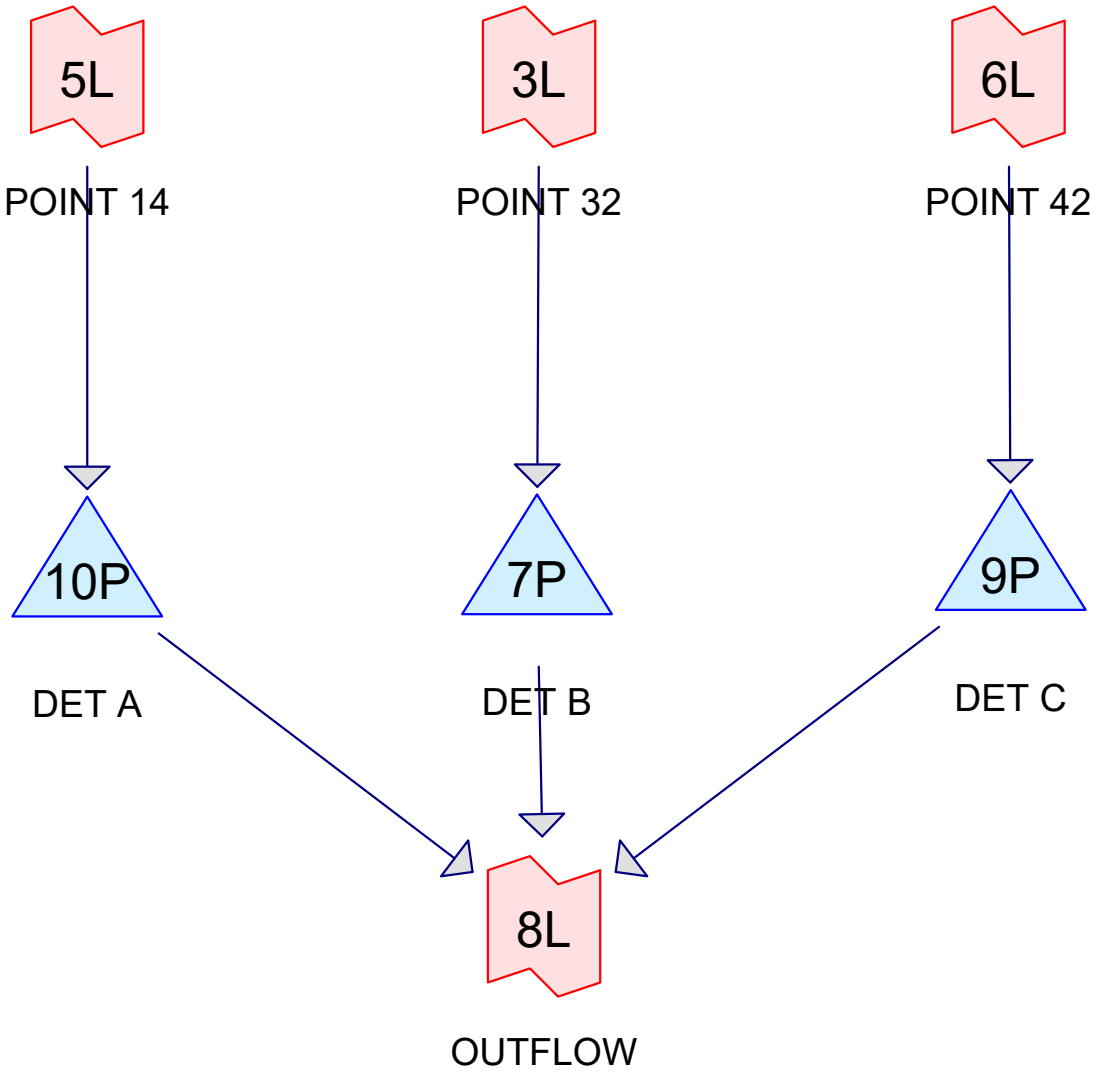

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       43.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      5.310(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =   6.53 min.  Rain intensity =       5.31(In/Hr)
Total area =         2.54(Ac.)  Total runoff =      8.12(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       44.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =   690.050(Ft.)
Downstream point/station elevation =   687.570(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.120(CFS)
Given pipe size =     15.00(In.)
Calculated individual pipe flow  =     8.120(CFS)
Normal flow depth in pipe =    8.44(In.)
Flow top width inside pipe =   14.88(In.)
Critical Depth =   13.44(In.)
Pipe flow velocity =     11.41(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     6.61 min.
End of computations, total study area =            8.43 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number (AMC 2) =  75.0
```

APPENDIX 3

Hydraulic Calculations



Subcat Reach Pond Link

Routing Diagram for A21532 HYDROCAD
Prepared by Kier & Wright, Printed 10/15/2024
HydroCAD® 10.20-5a s/n 02379 © 2023 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.000	**0**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.000		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 7P: DET B Peak Elev=689.21' Storage=0.079 af Inflow=5.60 cfs 0.569 af
Outflow=3.71 cfs 0.540 af

Pond 9P: DET C Peak Elev=692.48' Storage=0.076 af Inflow=10.47 cfs 0.957 af
Outflow=8.12 cfs 0.935 af

Pond 10P: DET A Peak Elev=691.80' Storage=0.177 af Inflow=16.24 cfs 1.651 af
Outflow=10.01 cfs 1.631 af

Link - HYDROLOGY\CALCULATIONS\CIVILD\UNIT HYDROGRAPHS\Q100\EXCEL\A21532PT32UH.csv Inflow=5.60 cfs 0.569 af
Primary=5.60 cfs 0.569 af

Link - HYDROLOGY\CALCULATIONS\CIVILD\UNIT HYDROGRAPHS\Q100\EXCEL\A21532P14UH.csv Inflow=16.24 cfs 1.651 af
Primary=16.24 cfs 1.651 af

Link - HYDROLOGY\CALCULATIONS\CIVILD\UNIT HYDROGRAPHS\Q100\EXCEL\A21532P42UH.csv Inflow=10.47 cfs 0.957 af
Primary=10.47 cfs 0.957 af

Link 8L: OUTFLOW Inflow=21.34 cfs 3.105 af
Primary=21.34 cfs 3.105 af

Summary for Pond 7P: DET B

[82] Warning: Early inflow requires earlier time span

Inflow = 5.60 cfs @ 16.17 hrs, Volume= 0.569 af
Outflow = 3.71 cfs @ 16.28 hrs, Volume= 0.540 af, Atten= 34%, Lag= 6.3 min
Primary = 3.71 cfs @ 16.28 hrs, Volume= 0.540 af
Routed to Link 8L : OUTFLOW

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 689.21' @ 16.28 hrs Surf.Area= 0.041 ac Storage= 0.079 af

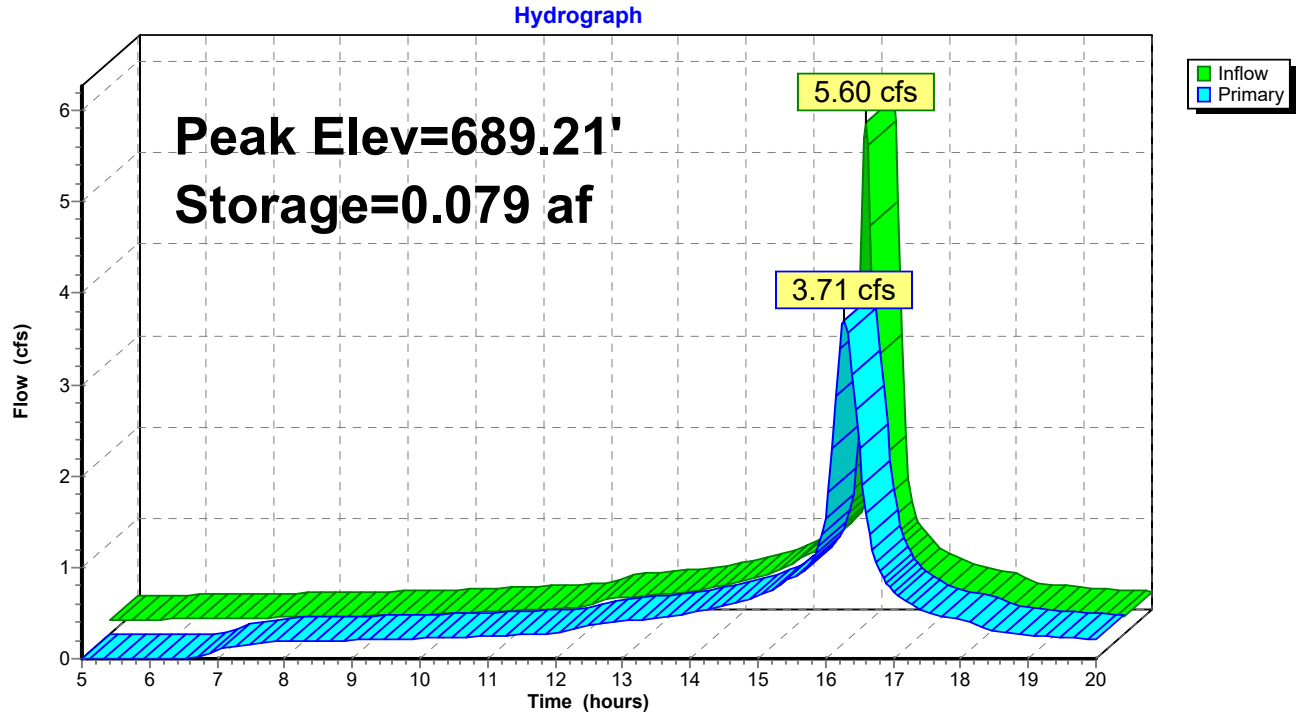
Plug-Flow detention time= 49.5 min calculated for 0.540 af (95% of inflow)
Center-of-Mass det. time= 33.2 min (894.0 - 860.8)

Volume	Invert	Avail.Storage	Storage Description
#1	686.79'	0.130 af	**48.0" Round Pipe Storage** x 3 L= 150.0' S= 0.0010 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	687.75'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.68 cfs @ 16.28 hrs HW=689.20' (Free Discharge)
1=Orifice/Grate (Orifice Controls 3.68 cfs @ 4.68 fps)

Pond 7P: DET B



Summary for Pond 9P: DET C

[82] Warning: Early inflow requires earlier time span

Inflow = 10.47 cfs @ 16.16 hrs, Volume= 0.957 af
Outflow = 8.12 cfs @ 16.21 hrs, Volume= 0.935 af, Atten= 22%, Lag= 3.3 min
Primary = 8.12 cfs @ 16.21 hrs, Volume= 0.935 af
Routed to Link 8L : OUTFLOW

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 692.48' @ 16.21 hrs Surf.Area= 0.041 ac Storage= 0.076 af

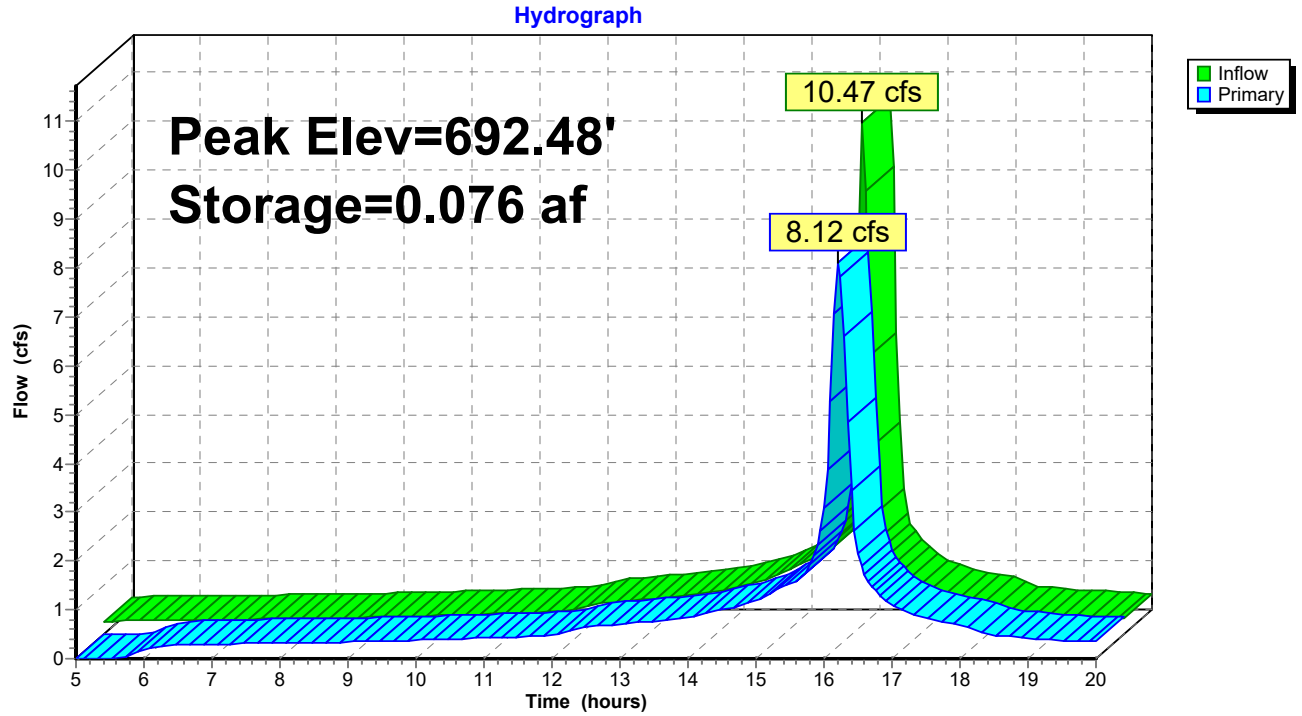
Plug-Flow detention time= 24.0 min calculated for 0.934 af (98% of inflow)
Center-of-Mass det. time= 16.0 min (875.7 - 859.6)

Volume	Invert	Avail.Storage	Storage Description
#1	690.05'	0.162 af	**60.0" Round Pipe Storage** x 3 L= 120.0' S= 0.0010 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	690.82'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.99 cfs @ 16.21 hrs HW=692.45' (Free Discharge)
1=Orifice/Grate (Orifice Controls 7.99 cfs @ 4.52 fps)

Pond 9P: DET C



Summary for Pond 10P: DET A

[82] Warning: Early inflow requires earlier time span

Inflow = 16.24 cfs @ 16.17 hrs, Volume= 1.651 af
Outflow = 10.01 cfs @ 16.29 hrs, Volume= 1.631 af, Atten= 38%, Lag= 6.9 min
Primary = 10.01 cfs @ 16.29 hrs, Volume= 1.631 af
Routed to Link 8L : OUTFLOW

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 691.80' @ 16.29 hrs Surf.Area= 0.100 ac Storage= 0.177 af

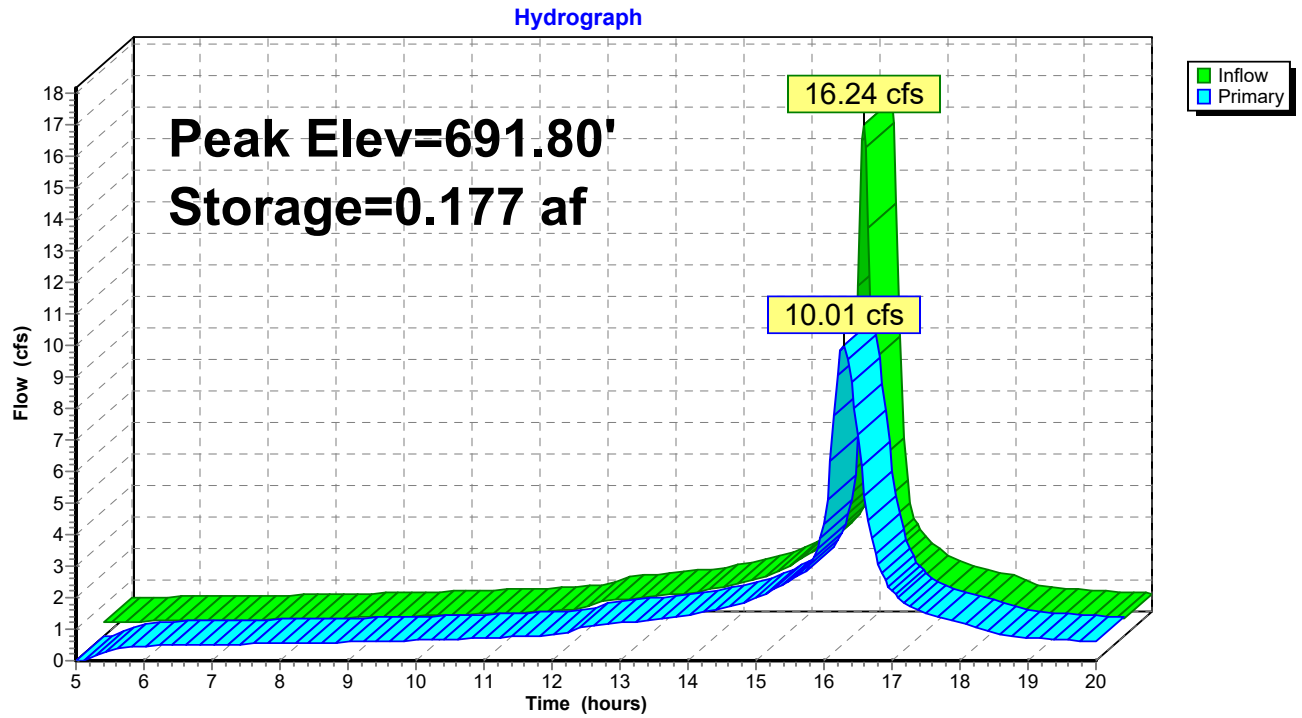
Plug-Flow detention time= 17.6 min calculated for 1.624 af (98% of inflow)
Center-of-Mass det. time= 12.9 min (873.6 - 860.7)

Volume	Invert	Avail.Storage	Storage Description
#1	689.42'	0.394 af	**60.0" Round Pipe Storage** x 5 L= 175.0' S= 0.0010 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	689.67'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=9.96 cfs @ 16.29 hrs HW=691.79' (Free Discharge)
1=Orifice/Grate (Orifice Controls 9.96 cfs @ 5.63 fps)

Pond 10P: DET A



Summary for Link 3L: POINT 32

Inflow = 5.60 cfs @ 16.17 hrs, Volume= 0.569 af
Primary = 5.60 cfs @ 16.17 hrs, Volume= 0.569 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 7P : DET B

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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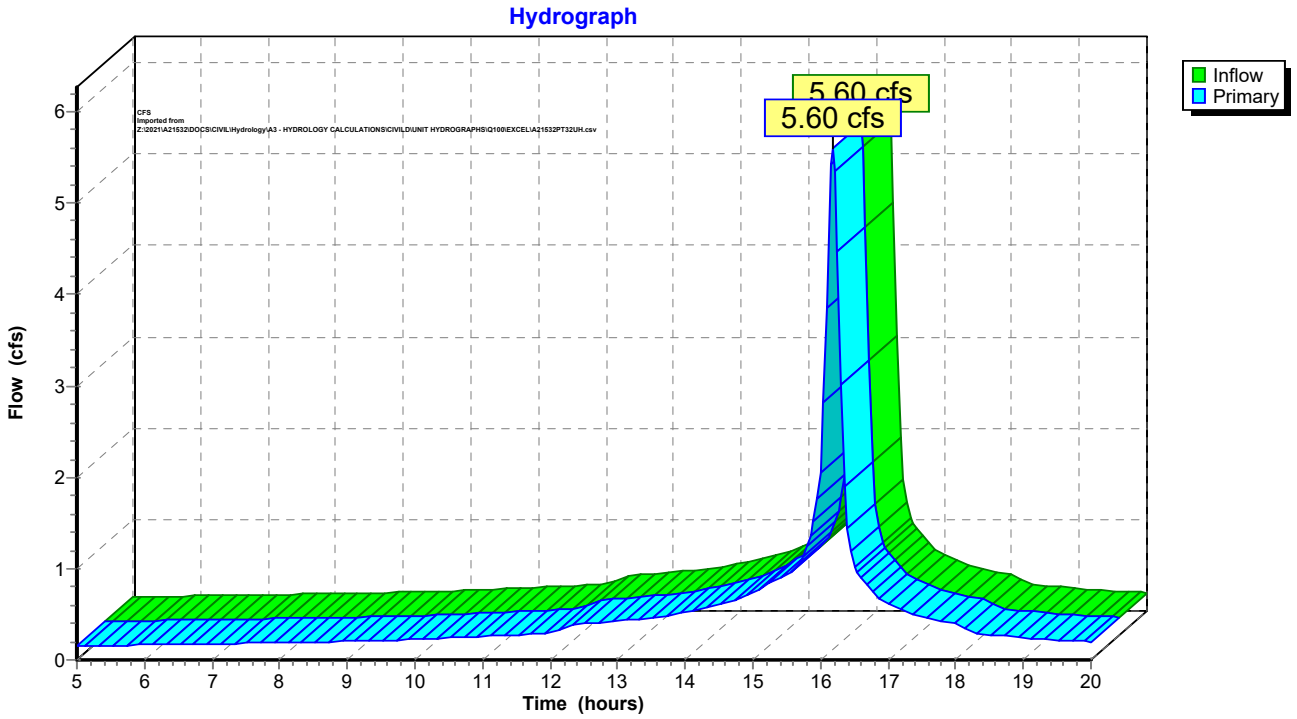
Link 3L: POINT 32



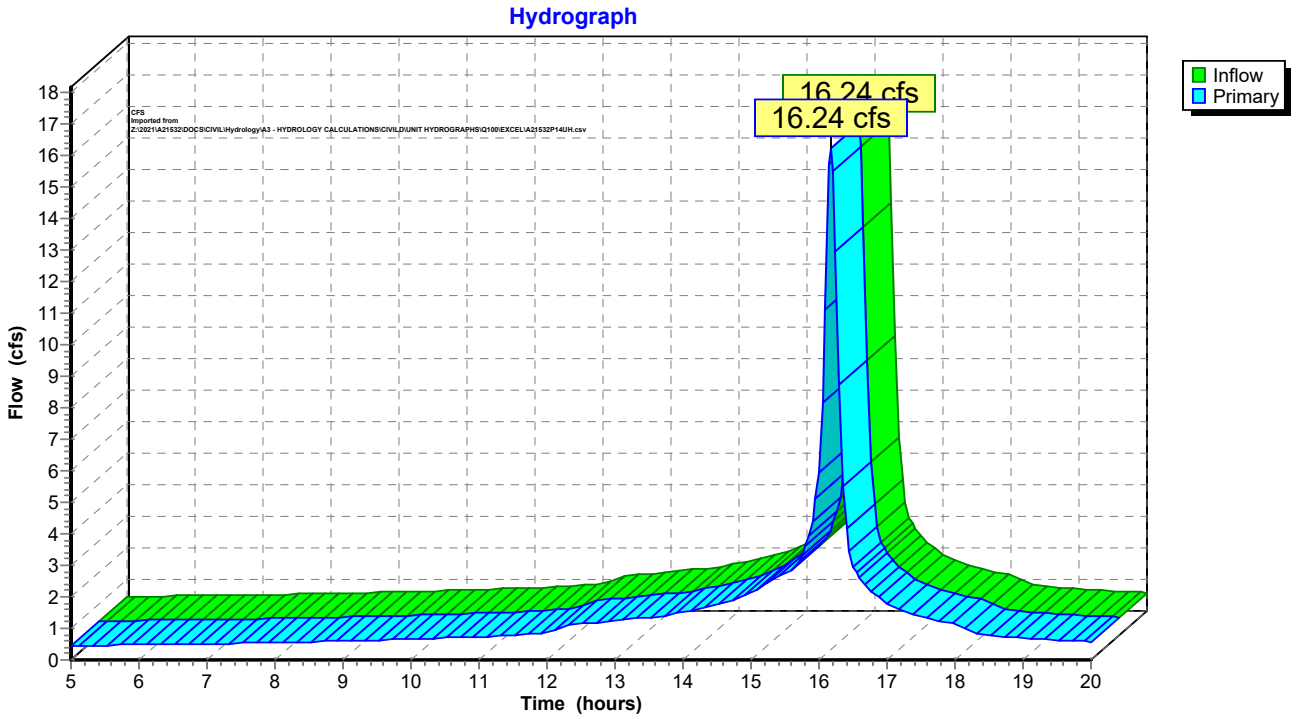
Summary for Link 5L: POINT 14

Inflow = 16.24 cfs @ 16.17 hrs, Volume= 1.651 af
Primary = 16.24 cfs @ 16.17 hrs, Volume= 1.651 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 10P : DET A

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

CFS Imported from Z:\2021\A21532\DOCS\CIVIL\Hydrology\A3 - HYDROLOGY CALCULATIONS\CIVILD\UNIT HYDF

Link 5L: POINT 14



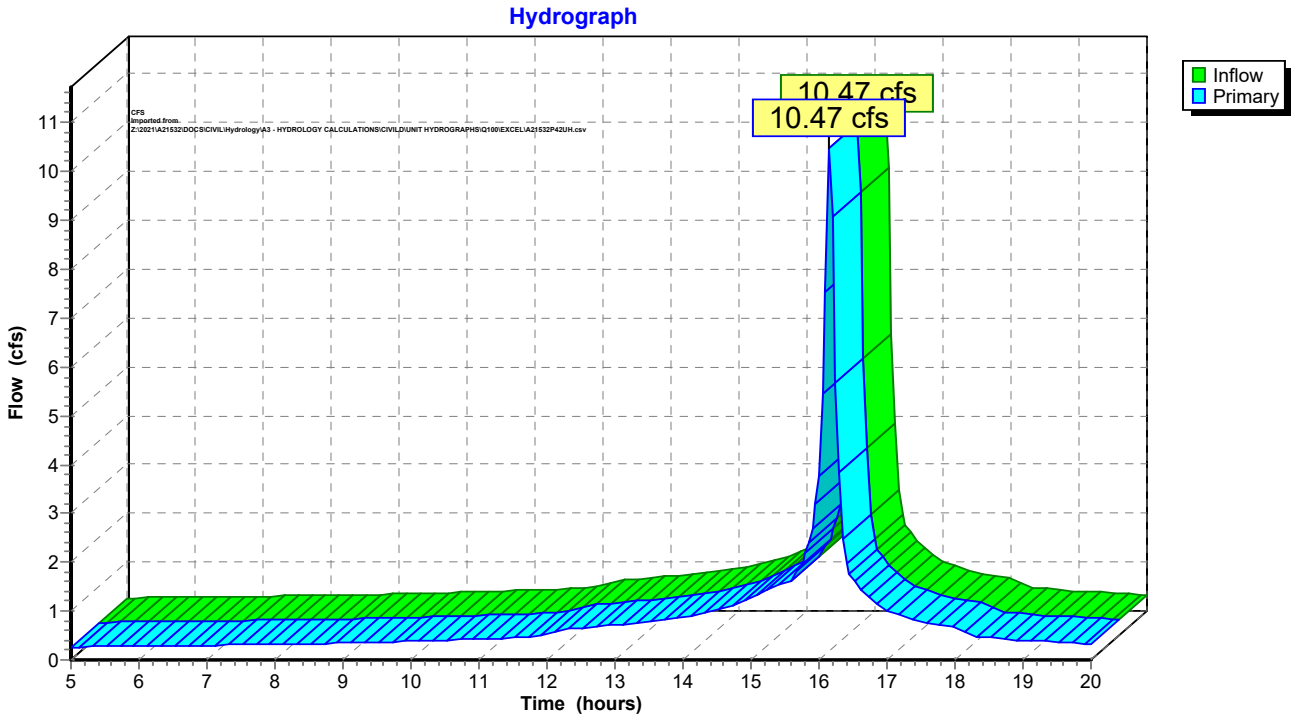
Summary for Link 6L: POINT 42

Inflow = 10.47 cfs @ 16.16 hrs, Volume= 0.957 af
Primary = 10.47 cfs @ 16.16 hrs, Volume= 0.957 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 9P : DET C

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

CFS Imported from Z:\2021\A21532\DOCS\CIVIL\Hydrology\A3 - HYDROLOGY CALCULATIONS\CIVILD\UNIT HYDF

Link 6L: POINT 42



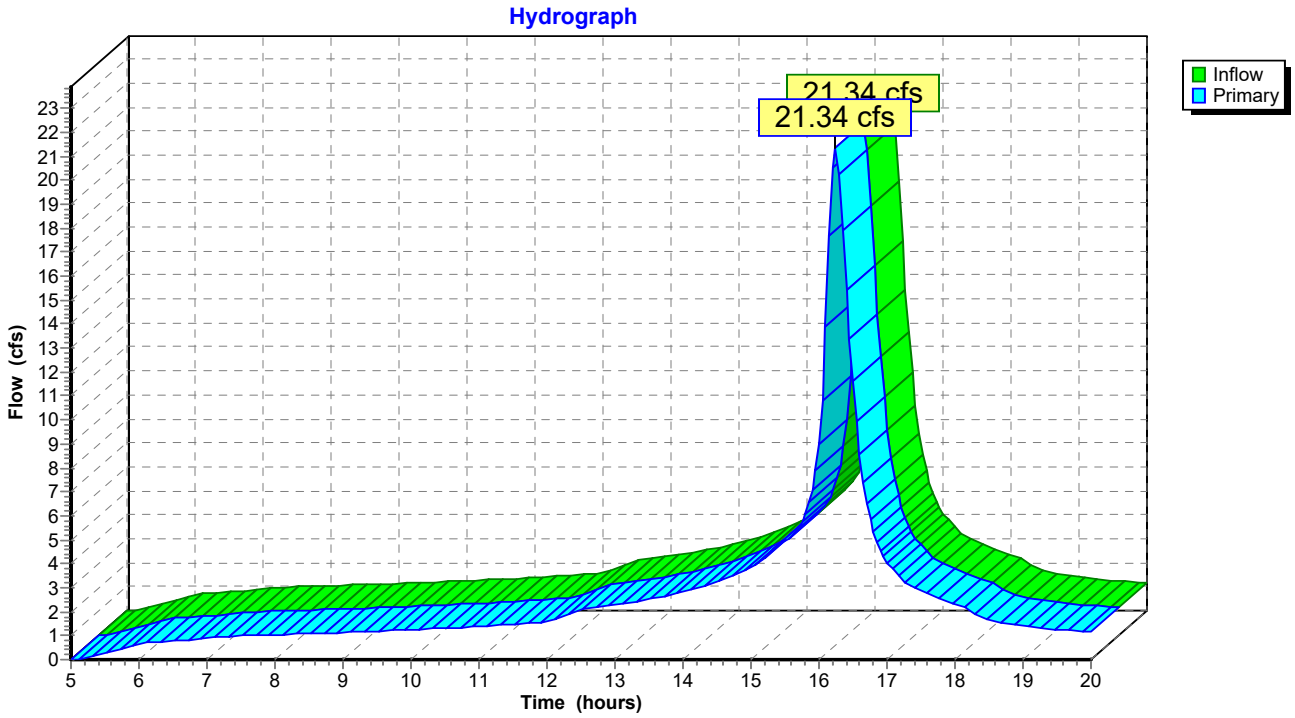
Summary for Link 8L: OUTFLOW

Inflow = 21.34 cfs @ 16.25 hrs, Volume= 3.105 af
Primary = 21.34 cfs @ 16.25 hrs, Volume= 3.105 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Fixed water surface Elevation= 686.44'

Link 8L: OUTFLOW



Appendix G

Modular Wetland System Details

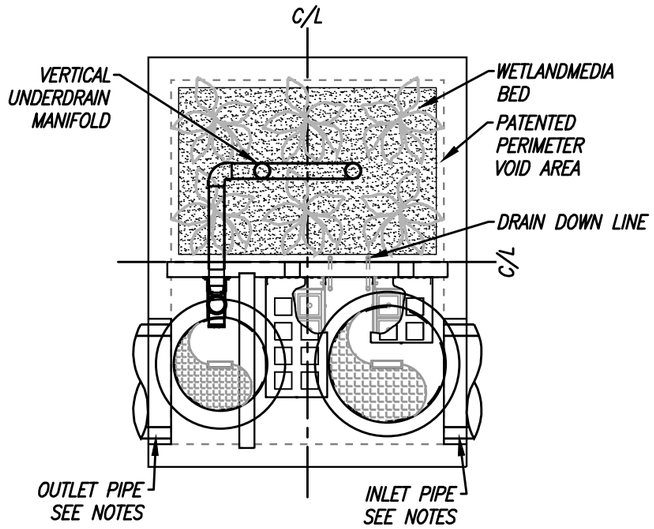
SITE SPECIFIC DATA			
PROJECT NUMBER		701248-015	
PROJECT NAME		26200 ENTERPRISE WAY	
PROJECT LOCATION		LAKE FOREST, CA	
STRUCTURE ID		DMA 1	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
12565		N/A	
TREATMENT HGL AVAILABLE (FT)			3.4
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE	689.11	HDPE	24"
OUTLET PIPE	688.12	HDPE	24"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	697.62	697.62	697.62
SURFACE LOAD	PEDESTRIAN	N/A	PEDESTRIAN
FRAME & COVER	ø30"	OPEN PLANTER	ø24"
WETLANDMEDIA VOLUME (CY)			7.36
ORIFICE SIZE (DIA. INCHES)			ø0.97"
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. EOR TO VERIFY RIM ELEVATION. WALL THICKNESS TO BE CONFIRMED WITH STRUCTURAL REVIEW.			

INSTALLATION NOTES

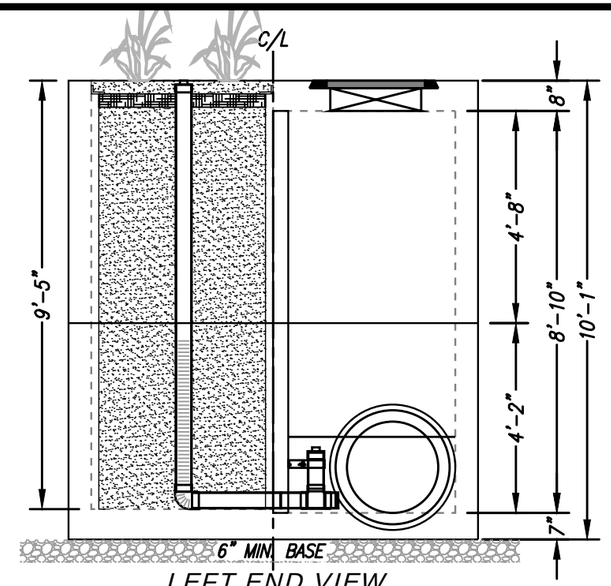
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

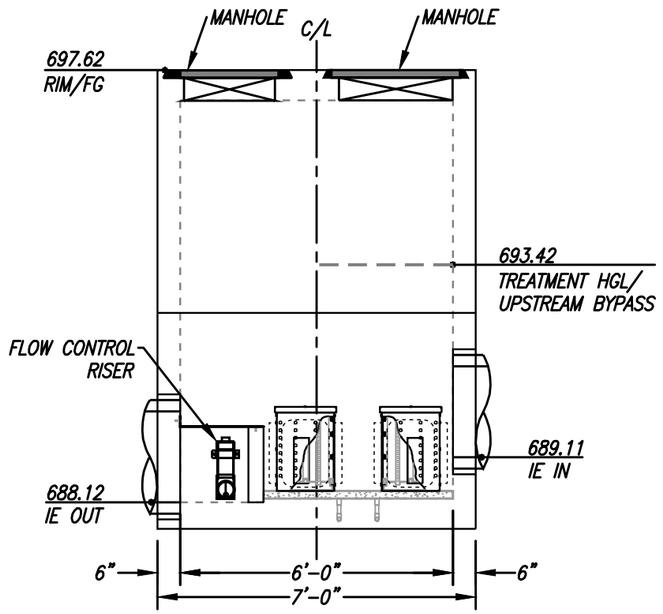
1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.



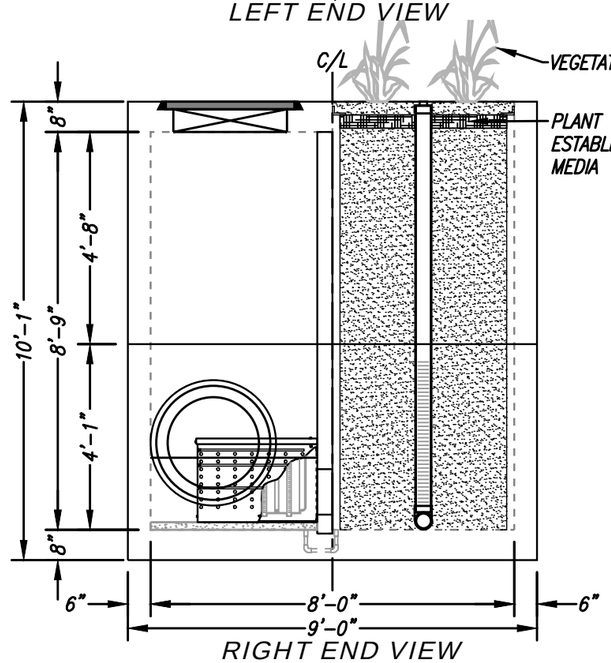
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

REQUIRED TREATMENT VOLUME (CF)	12,565
DRAINDOWN DURATION (HOURS)	62
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	25.42
OPERATING HEAD (FT)	5.2
WETLANDMEDIA INFILTRATION RATE (IN/HR) OR	26
WETLANDMEDIA LOADING RATE (GPM/SF)	0.26

MODULAR WETLANDS
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MWS-L-6-8-9'-5"-V-HC
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

10/14/24 SAMANTHA.KAWL

SITE SPECIFIC DATA			
PROJECT NUMBER		701248-020	
PROJECT NAME		26200 ENTERPRISE WAY	
PROJECT LOCATION		LAKE FOREST, CA	
STRUCTURE ID		DMA 2	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
4216		N/A	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	686.62	HDPE	12"
OUTLET PIPE	686.12	HDPE	12"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	693.79	693.79	693.79
SURFACE LOAD	PEDESTRIAN	N/A	PEDESTRIAN
FRAME & COVER	36"ø	OPEN PLANTER	N/A
WETLANDMEDIA VOLUME (CY)			3.85
ORIFICE SIZE (DIA. INCHES)			ø0.68"
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. EOR TO CONFIRM RIM ELEVATION. WALL THICKNESS TO BE CONFIRMED WITH STRUCTURAL REVIEW.			

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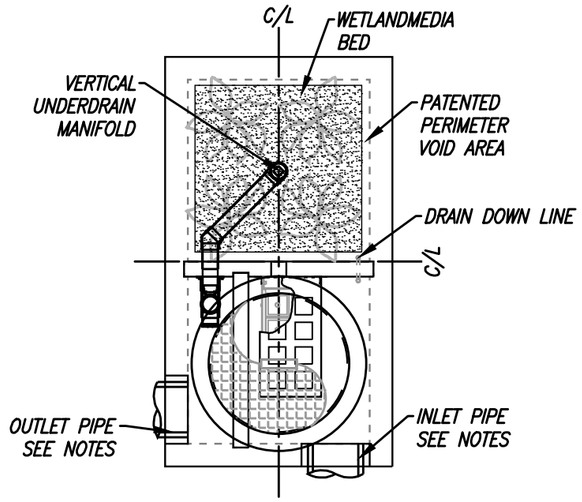
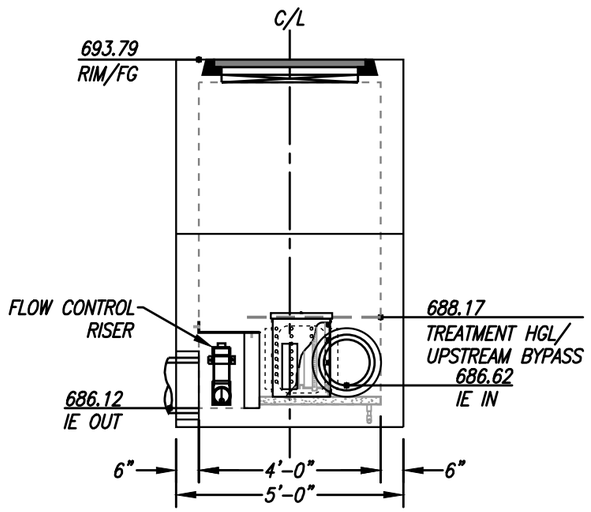
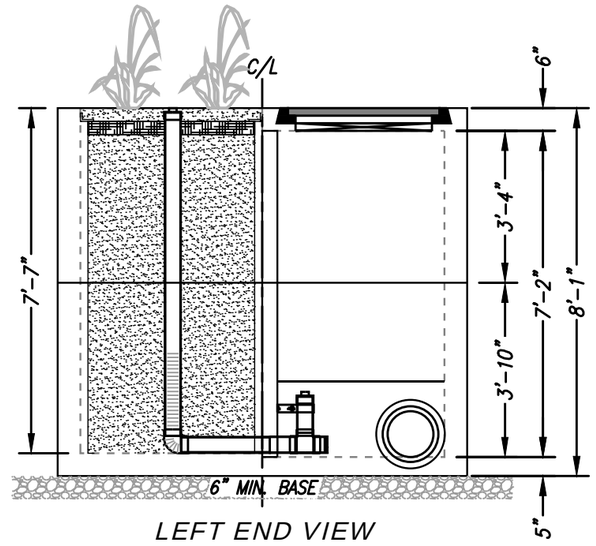


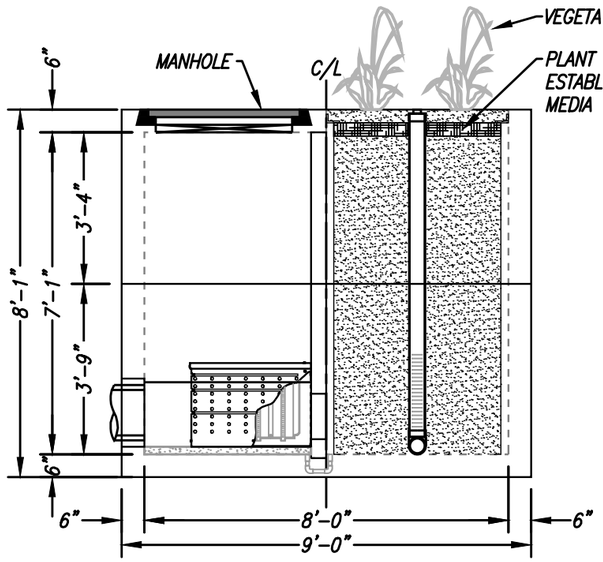
PLAN VIEW



ELEVATION VIEW



LEFT END VIEW



RIGHT END VIEW

REQUIRED TREATMENT VOLUME (CF)	4,216
DRAINDOWN DURATION (HOURS)	68
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	7.70
OPERATING HEAD (FT)	2.0
WETLANDMEDIA INFILTRATION RATE (IN/HR) OR	26
WETLANDMEDIA LOADING RATE (GPM/SF) OR	0.26

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MWS-L-4-8-7'-7"-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

10/14/24 SAMANTHA.KAWL

SITE SPECIFIC DATA			
PROJECT NUMBER		701248-025	
PROJECT NAME		26200 ENTERPRISE WAY	
PROJECT LOCATION		LAKE FOREST, CA	
STRUCTURE ID		DMA 3	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
7016		N/A	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	689.97	HDPE	15"
OUTLET PIPE	689.41	HDPE	15"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	700.74	700.74	700.74
SURFACE LOAD	PEDESTRIAN	N/A	PEDESTRIAN
FRAME & COVER	30"	OPEN PLANTER	24"
WETLANDMEDIA VOLUME (CY)			8.78
ORIFICE SIZE (DIA. INCHES)			ø0.93"
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. EOR TO CONFIRM RIM ELEVATION. WALL THICKNESS TO BE CONFIRMED WITH STRUCTURAL REVIEW.			

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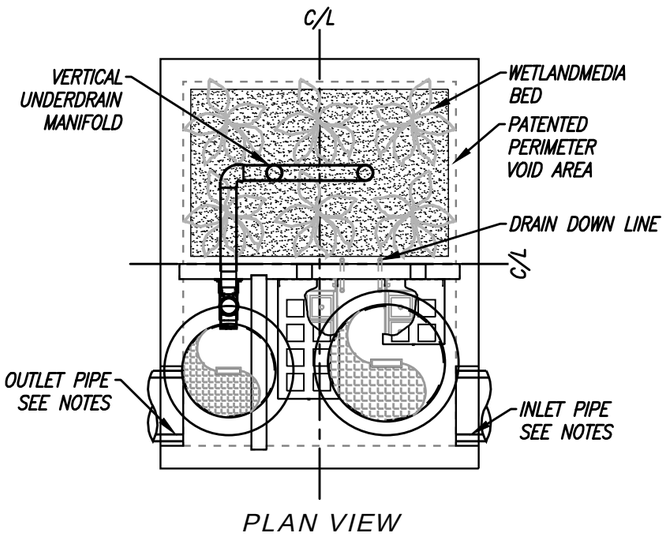
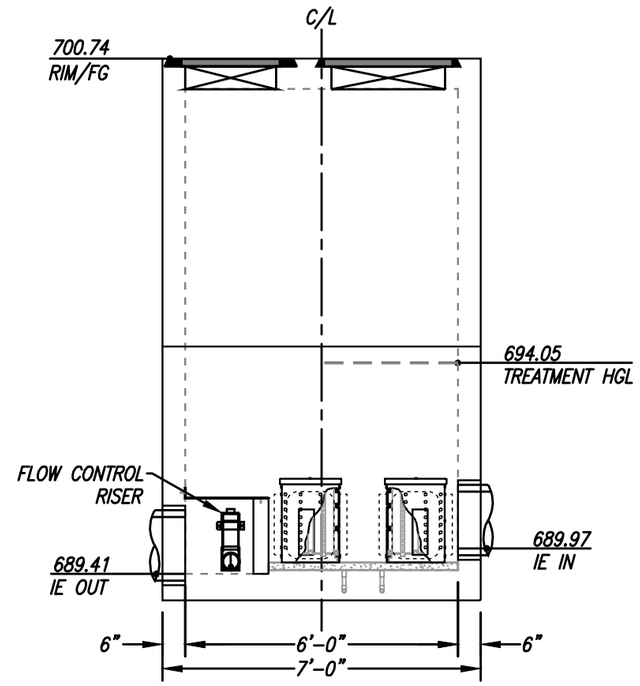
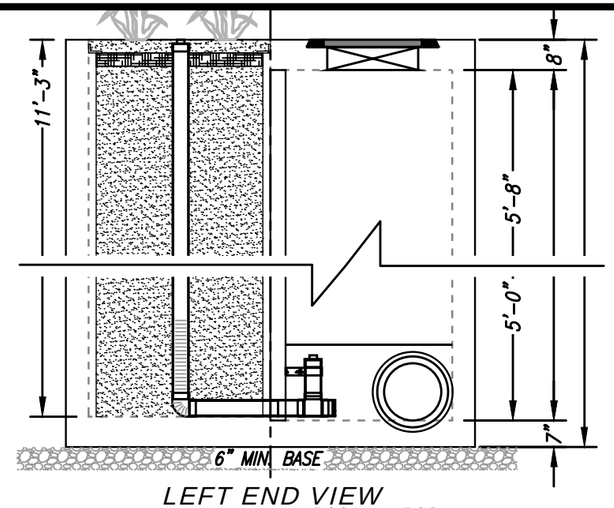


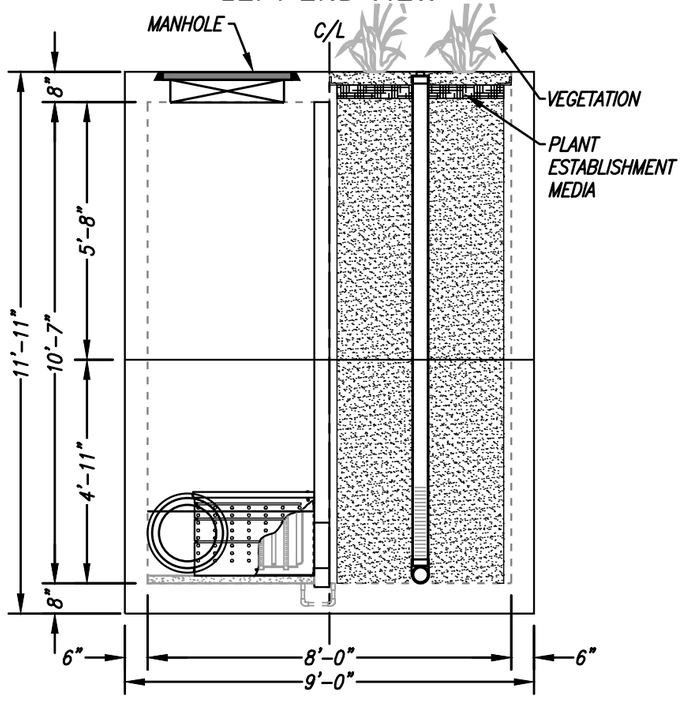
PLAN VIEW



ELEVATION VIEW



LEFT END VIEW



RIGHT END VIEW

REQUIRED TREATMENT VOLUME (CF)	7,016
DRAINDOWN DURATION (HOURS)	40
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	22.00
OPERATING HEAD (FT)	4.5
WETLANDMEDIA INFILTRATION RATE (IN/HR) OR	26
WETLANDMEDIA LOADING RATE (GPM/SF) OR	0.26

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MWS-L-6-8-11'-3"-V-HC
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

10/14/24,SAMANTHA.KAHL

Appendix H

Request of Flow Reduction

Memorandum

To: Jennifer Mansur, Associate Planner

Cc: Dennis Jue, Deputy City Engineer

From: Terry Kelley, Engineering Plan Checker, AndersonPenna

Date: March 12, 2021

Subject: PA 03-21-5408, 26200 Enterprise Way, PC#1 Revised 4-23-21

Engineering has performed a preliminary review of the subject project and has the following comments:

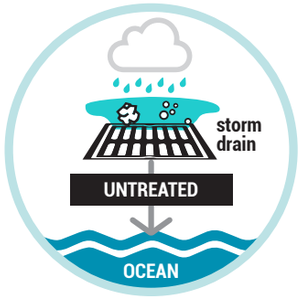
1. To determine the Water Quality Management Plan (WQMP) criteria the final use of the property must be established before submitting a Preliminary WQMP during the planning process. The applicant is to review the City's site at https://www.lakeforestca.gov/294/Water-Quality.
2. Initial determination based on the review this will be a Priority WQMP.
3. Grading plans which may require drainage plans must be completed and submitted to Public Works for review.
4. Erosion control plans must be submitted as part of the grading plans for Public Works review.
5. Haul route plans for demolition and grading operations must be completed and submitted to Public Works for review.
6. All existing private drainage facilities must be identified.
7. All existing public drainage facilities must be identified.
8. All access to the property and buildings from and to private and public areas must meet current ADA requirements.
9. The applicant will be required to provide a Preliminary Hydrology report during the planning phase addressing the requirement for a reduction of 38 to 40% in the 100-year flows contributing to Serrano Creek. The Serrano Summit mixed use site (Civic Center and Lennar residential development); the Meadows residential development and other developments have reduced their flows to Serrano Creek by these percentage amounts.

If you have any questions regarding the above comments please contact me.

Teresa (Terry) Kelley, P.E.
Consultant Plan Check Engineer
Ardurra
City Office: (949) 461-3483
Mobile: (949) 371-3223 (Best Contact)
tkelley@lakeforestca.gov

Appendix I

Educational Materials



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

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

← Learn more inside

Who is H_2OC?

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

Join Us

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

Contact

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

24-hour Reporting Website:
myOCeServices.ocgov.com

For emergencies, dial 911

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

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

BEST MANAGEMENT PRACTICES FOR BUSINESSES

WATER POLLUTION AND COMMERCIAL & INDUSTRIAL FACILITIES

YOU ARE THE SOLUTION TO RUNOFF POLLUTION

H_2OC STORMWATER PROGRAM

How is Water Quality Affected By Your Business?

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

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

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

Best Management Practices for Commercial & Industrial Sites

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

Inspect

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

Locate

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

Contain

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

Collect

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

Dispose

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

What Pollutants Are Generated By Commercial & Industrial Sites?

Landscape Maintenance

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

Building Maintenance

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

Parking Lots & Outdoor Areas

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

Waste & Storage Area Management

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

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

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

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

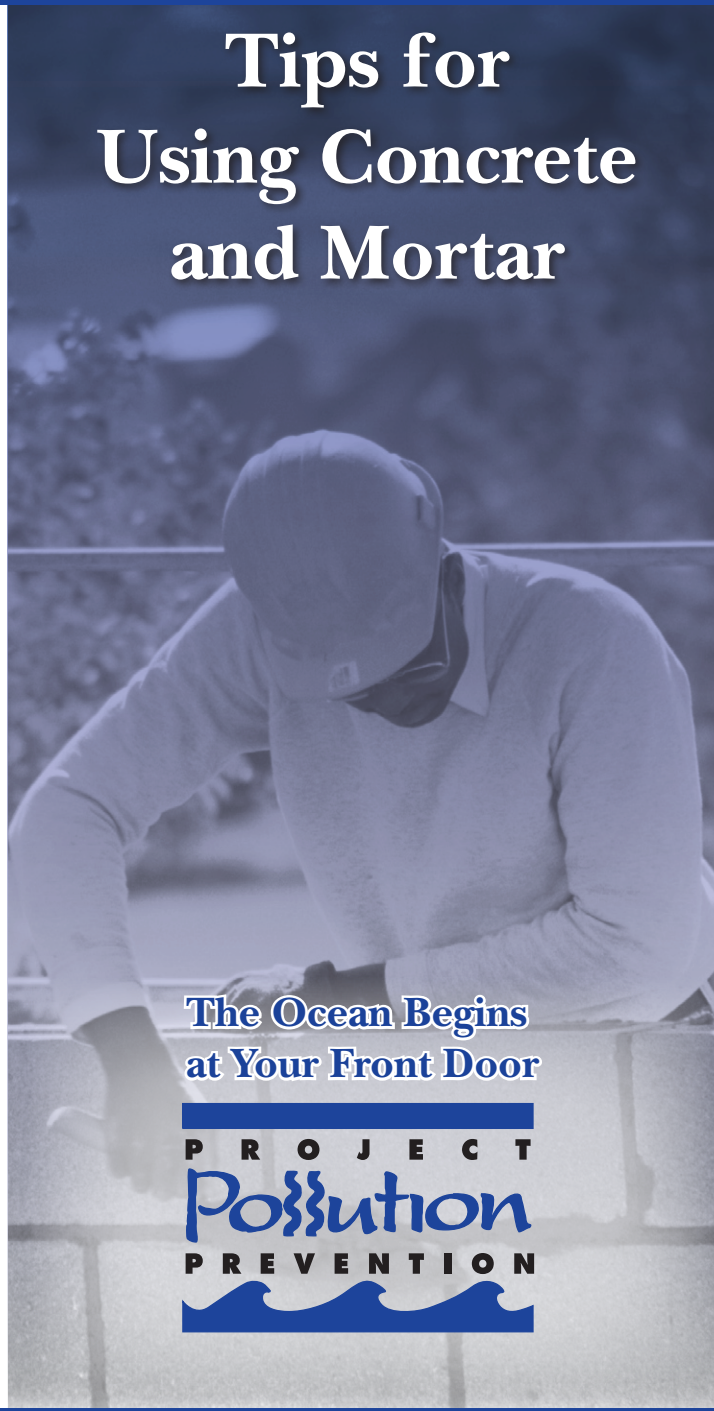
For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com.**

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

For emergencies, dial 911.

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

Tips for Using Concrete and Mortar



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Tips for Using Concrete and Mortar

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

Before the Project

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

During the Project

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

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

Clean-Up

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

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

Spills

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

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

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

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

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

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

UCCE Master Gardener Hotline:
(714) 708-1646

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

For emergencies, dial 911.

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

Printed on Recycled Paper

Help Prevent Ocean Pollution:

Tips for Landscape & Gardening

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Tips for Landscape & Gardening

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

General Landscaping Tips

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

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

Garden & Lawn Maintenance

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

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

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

Household Hazardous Waste Collection Centers

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

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

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Preliminary Hydrologic & Hydraulic Drainage Report

For

26200 Enterprise Way
Lake Forest, California, 92630

April 19, 2023

Prepared For:

BLACK CREEK GROUP

4675 MacArthur Court, Suite 625
Newport Beach, California, 92660

Prepared By:

KIER & WRIGHT
CIVIL ENGINEERS & SURVEYORS, INC.

8955 Research Dr.
Irvine, CA, 92618
Phone 949.508.0202

Preliminary Hydrologic & Hydraulic Report

for

26200 Enterprise Way
Irvine, California

Date: May 28, 2021

Project Manager: D. Garrett Readler, P.E.
RCE No. 76867

Job Number: A21532

Prepared By: _____ 05/28/21

D. Garrett Readler, P.E. Date
Kier & Wright

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   1.2 Report Objectives 4
   1.3 Criteria, Procedure, and Methodology 4
2. Discussion/Calculations 5
   2.1 Hydrology 5
   2.2 Hydraulics 6
   2.3 Stormwater Quality 6
3. Conclusion 6
4. Attachments 7

1. Introduction

1.1 PROJECT DESCRIPTION

This report has been prepared to provide an analysis of drainage patterns and improvements related to the 26200 Enterprise Way development, which is located within the City of Lake Forest, CA. The proposed project is a redevelopment of an existing office space. Once completed, this site will contain one new warehouse with truck docks, surrounded by site parking, landscape, and hardscape, with modular wetland systems for treatment and an underground pipe storage system for outflow control.

The site consists currently of one two-story building and parking lot. The property is bounded more commercial and industrial buildings on the north, south, and west. The northeastern property is currently undeveloped. All existing onsite drainage facilities drain to the storm drain in the public right of way, which drains to nearby Serrano Creek.

The project proposes to surface drain all runoff to curb inlets where it will be treated prior to discharging into the public system. Treated runoff from the largest drainage area will be routed to the underground storage system where the discharge will be controlled to the public storm drain. The purpose of this is to reduce the overall discharge from the site by 40% as requested by the city of Lake Forest.

1.2 REPORT OBJECTIVES

The objective of this report is to outline an orderly drainage system for the site in accordance with the Orange County Hydrology and Hydraulics Manual. Objectives of this report are as follows:

- Determine the developed, or proposed, site hydrologic conditions, including overland runoff rates expected from the 100-year storm event.
- Validate the design of the proposed underground storm drain conveyance systems and provide hydraulic calculations.
- Storm water quality treatment in accordance with MRP NPDES Permit dated November 19, 2015 will be provided. See separate project WQMP.

1.3 CRITERIA, PROCEDURE, AND METHODOLOGY

Calculations and design criteria contained within this report are consistent with the Orange County Hydrology requirements. The hydrology and storage calculations are per SCS runoff equations and are in accordance with County design criteria as performed in the Hydro Cad software. It should be noted that Hydro Cad was utilized to calculate the storage and ponding capacity in the proposed pipes.

2. Discussion/Calculations

2.1 HYDROLOGY

In order to determine expected peak runoff rates from the site, the overall project watershed was divided into ten tributary areas, or Drainage Management Areas (DMA's), based on area draining to proposed treatment devices. A table of the DMA's and their corresponding detention system and area can be found in the table below.

DETENTION SYSTEM	DMA AREA	AREA (AC)
DENTENTION SYSTEM A	1	1.36
	2	1.12
	3	3.24
	4	0.18
DETENTION SYSTEM B	5	0.49
	6	0.33
	7	0.23
DETENTION SYSTEM C	8	0.19
	9	0.71
	10	0.56

Site hydrology was determined using CivilD software utilizing a 100 year storm event.

Using the inputs as described above, the expected 100-year, 24-hour peak runoff rate for listed in the table below:

100-year	TOTAL
Pre-Development (cfs)	40.5
Post-Development (Pre-Mitigation) (cfs)	38.1
Post-Development (Post-Mitigation) (cfs)	19.0

The existing peak flow leaving the site was 40.5 cfs. The proposed peak flow leaving the site before outlet control is 38.1 cfs. With outlet control, the total flow leaving the site is 19.0 cfs, a reduction of 53%. In the hydrology report, the final link contains a flow of 19.0 cfs. The lower value is due to the peak flow of DMA 3 occurring at a different time than the others due to having to flow through the chambers, thus the software

will account for the sub-areas having different peak flow times. To be conservative in our approach, we designed the reduction with the individual peak flows of each DMA to maximize flow.

See Attachment 1 of this report for the proposed Hydrology Map and DMA areas and see Attachment 2 of this report for hydrologic calculations as contained within the CivlD and HydroCAD results.

2.2 HYDRAULICS

The storm drain system compliments the watershed area drainage pattern with an underground storm drain collecting each bio-retention planter. The storm drainage ultimately exits the site at two locations, an existing manhole at the northwest of the site to the main in Enterprise Way and to an existing manhole at the northeast of the building that carries flow to the public system.

Results from the HydroCAD analysis support the sizing and functionality of the proposed onsite underground storm drain system. See Attachment 2 of this report for detailed analysis.

2.3 STORMWATER QUALITY

The storm water quality treatment was designed in accordance with the MRP NPDES Permit dated November 19, 2015. Three onsite modular wetland systems are proposed to meet treatment requirements. For more information, see the separate Water Quality Management Plan (WQMP).

3. Conclusion

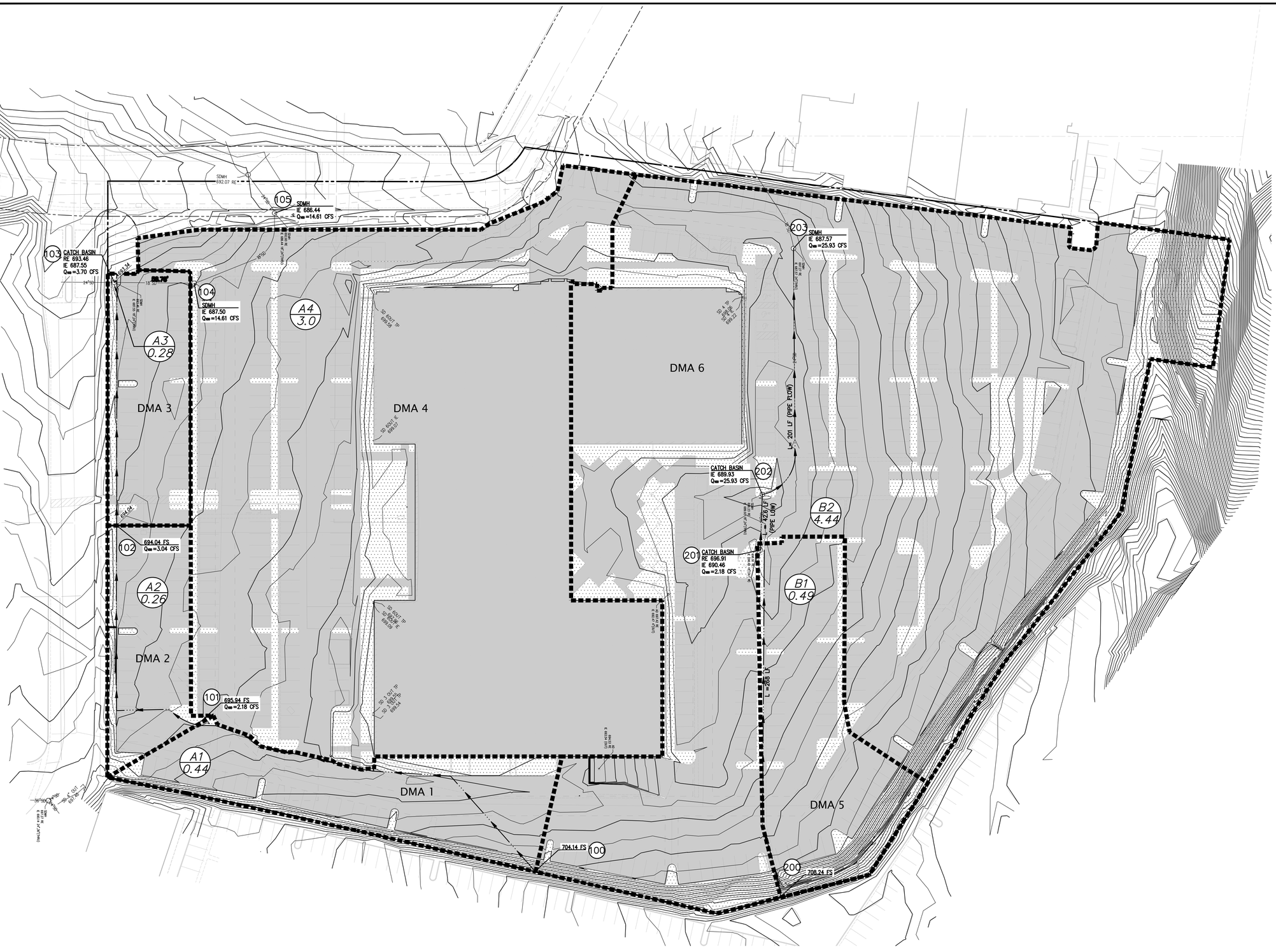
The overall hydrology and hydraulics are consistent with City of Lake Forest and County of Orange guidelines for the 100-year, 24-hour storm event. Treatment criteria is being met by the inclusion of three modular wetland systems onsite. All calculations supporting the design of proposed storm drain conveyance are contained within the Attachments of this report.

4. Attachments

Attachment 1 Hydrology Map
Attachment 2 CIVILD & HydroCAD Analysis

Attachment 1

Hydrology Map



DMA No.	Area (SF)	Area (AC)	Landscape (SF)	Landscape (AC)	Imperv. (SF)	Imper. (AC)
1	19,217	0.441	5,253	0.121	13,963	0.321
2	11,262	0.259	2,109	0.048	9,153	0.210
3	12,363	0.284	319	0.007	12,045	0.277
4	131,156	3.011	17,193	0.395	113,963	2.616
5	21,463	0.493	5,994	0.138	15,469	0.355
6	193,240	4.436	73,178	1.680	120,062	2.756

NO.	REVISION	BY

NO.	REVISION	BY

KIER+WRIGHT
163 Technology Drive
Irvine, CA 92620
Phone: (949) 598-0202
www.kierwright.com

EXISTING HYDROLOGY MAP
OF
26200 ENTERPRISE WAY
FOR
BLACK CREEK GROUP

LAKE FOREST, CALIFORNIA

DATE	APRIL, 2021
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C4.0
OF	6 SHEETS

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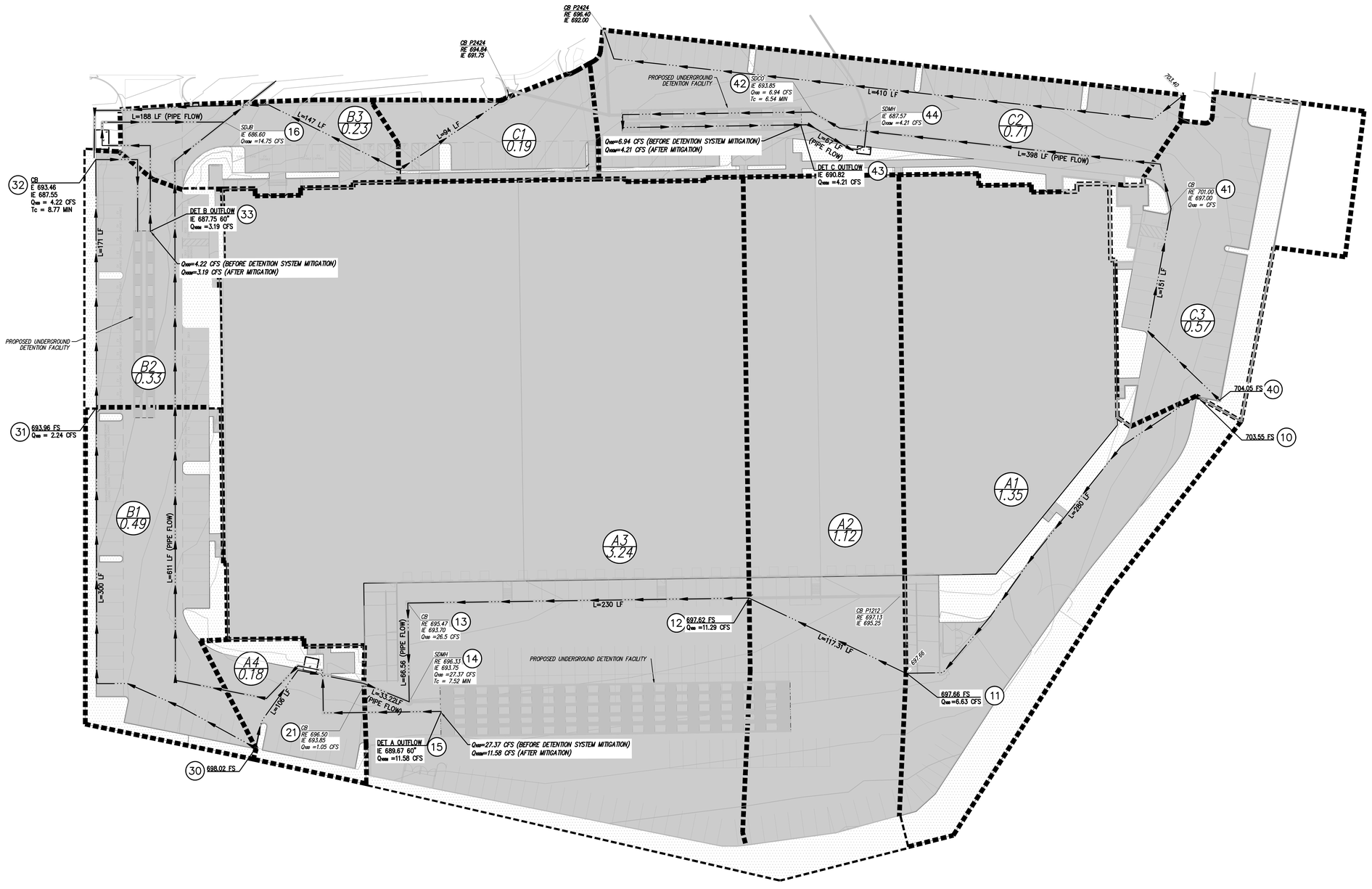

NORTH

0 15 30 60 90

Scale 1" = 30'

LEGEND

- HYDROLOGY AREA
- 1 / 1.0 — AREA NODE / AREA (ACRES)
- DIRECTION OF FLOW
- X — NODE NUMBER
- Q"X"M — MITIGATED FLOW
- LANDSCAPE AREA
- IMPERVIOUS PAVEMENT DRAINING TO BIO-SWALE
- BIO-RETENTION TREATMENT AREA

DMA No.	Area (SF)	Area (AC)	Landscape (SF)	Landscape (AC)	Imperv. (SF)	Imper. (AC)
A1	58999	1.354	10,723	0.246	48,276	1.108
A2	48903	1.123	2,330	0.053	46,573	1.069
A3	141302	3.244	2,504	0.057	138,798	3.186
A4	7784	0.179	2,178	0.050	5,606	0.129
B1	21200	0.487	4,482	0.103	16,718	0.384
B2	14416	0.331	2,761	0.063	11,655	0.268
B3	10207	0.234	977	0.022	9,230	0.212
C1	8292	0.190	419	0.010	7,873	0.181
C2	30796	0.707	2,789	0.064	28,007	0.643
C3	24708	0.567	6,034	0.139	18,674	0.429

NO.	REVISION	BY

KIER+WRIGHT
163 Technology Drive
Irvine, CA 92620
Phone: (949) 598-0202
www.kierwright.com

PROPOSED HYDROLOGY MAP
OF
26200 ENTERPRISE WAY
FOR
BLACK CREEK GROUP

LAKE FOREST, CALIFORNIA

DATE	APRIL, 2023
SCALE	1" = 30'
DESIGNER	EK
DRAWN BY	MRF
JOB NO.	A21532
SHEET	C4.0
OF	6 SHEETS

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Attachment 2

CIVILD & HydroCAD Analysis

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study, Date: 04/19/23 File Name: A21532EXQ10.roc

---

A21532 EXISTING CONDITION
Q100

Program License Serial Number 6509

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

++

Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2) = 75.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fp)= 0.200(In/Hr)
Max Catchment Loss (Fm) = 0.020(In/Hr)
Initial subarea data:
Initial area flow distance = 299.360(Ft.)
Top (of initial area) elevation = 704.140(Ft.)
Bottom (of initial area) elevation = 695.940(Ft.)
Difference in elevation = 8.200(Ft.)
Slope = 0.02739 s(%)= 2.74
TC = k(0.304)*[(length^3)/(elevation change)]^0.2

```
Initial area time of concentration =    6.107 min.
Rainfall intensity =      5.517(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.897
Subarea runoff =      2.177(CFS)
Total initial stream area =        0.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =   695.940(Ft.)
End of street segment elevation =   694.040(Ft.)
Length of street segment  =   207.470(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  35.000(Ft.)
Distance from crown to crossfall grade break  =  10.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.634(CFS)
Depth of flow =   0.333(Ft.), Average velocity =   2.202(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.341(Ft.)
Flow velocity =   2.20(Ft/s)
Travel time =    1.57 min.     TC =    7.68  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      4.839(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =      0.859(CFS) for    0.260(Ac.)
Total runoff =      3.036(CFS)  Total area =        0.70(Ac.)
Area averaged Fm value =    0.020(In/Hr)
```

```
Street flow at end of street =      3.036(CFS)
Half street flow at end of street =      3.036(CFS)
Depth of flow =   0.346(Ft.), Average velocity =   2.276(Ft/s)
Flow width (from curb towards crown)=  10.989(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =   694.040(Ft.)
End of street segment elevation =   693.460(Ft.)
Length of street segment  =   193.140(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  10.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.402(CFS)
Depth of flow =   0.429(Ft.), Average velocity =   1.523(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.600(Ft.)
Flow velocity =   1.52(Ft/s)
Travel time =    2.11 min.     TC =    9.79  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      4.210(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =      0.659(CFS) for    0.280(Ac.)
Total runoff =      3.695(CFS)  Total area =        0.98(Ac.)
Area averaged Fm value =    0.020(In/Hr)
Street flow at end of street =      3.695(CFS)
```

```
Half street flow at end of street =      3.695(CFS)
Depth of flow =   0.438(Ft.), Average velocity =   1.554(Ft/s)
Flow width (from curb towards crown)=  15.087(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   687.550(Ft.)
Downstream point/station elevation =   687.500(Ft.)
Pipe length  =    58.78(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.695(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     0.125(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      0.073(Ft.)
 Minor friction loss =      0.102(Ft.)  K-factor =   1.50
Pipe flow velocity =      2.09(Ft/s)
Travel time through pipe =    0.47 min.
Time of concentration (TC) =    10.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Time of concentration =    10.26 min.
Rainfall intensity =      4.099(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =     10.914(CFS) for    3.000(Ac.)
Total runoff =     14.609(CFS)  Total area =        3.98(Ac.)
Area averaged Fm value =    0.020(In/Hr)


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Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
```

```
Upstream point/station elevation =   687.500(Ft.)
Downstream point/station elevation =   686.440(Ft.)
Pipe length  =    90.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.609(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     2.272(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      1.740(Ft.)
 Minor friction loss =      1.592(Ft.)  K-factor =   1.50
Pipe flow velocity =      8.27(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    10.44 min.


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Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Initial subarea data:
Initial area flow distance =   268.000(Ft.)
Top (of initial area) elevation =   708.240(Ft.)
Bottom (of initial area) elevation =   696.910(Ft.)
Difference in elevation =    11.330(Ft.)
Slope =    0.04228  s(%)=       4.23
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.357 min.
Rainfall intensity =      5.948(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.897
Subarea runoff =      2.614(CFS)
Total initial stream area =        0.490(Ac.)


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Process from Point/Station      201.000 to Point/Station      202.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   690.460(Ft.)
Downstream point/station elevation =   689.930(Ft.)
```

```
Pipe length  =    42.62(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.614(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     2.614(CFS)
Normal flow depth in pipe =    5.78(In.)
Flow top width inside pipe =   16.81(In.)
Critical Depth =    7.35(In.)
Pipe flow velocity =      5.34(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     5.49 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Time of concentration =     5.49 min.
Rainfall intensity =      5.865(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.897
Subarea runoff =     23.318(CFS) for    4.440(Ac.)
Total runoff =     25.933(CFS)  Total area =        4.93(Ac.)
Area averaged Fm value =    0.020(In/Hr)


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Process from Point/Station      202.000 to Point/Station      203.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =   689.930(Ft.)
Downstream point/station elevation =   687.570(Ft.)
Pipe length  =   201.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.933(CFS)
Given pipe size =     24.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     1.867(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      2.640(Ft.)
 Minor friction loss =      1.587(Ft.)  K-factor =   1.50
Pipe flow velocity =      8.25(Ft/s)
```

Travel time through pipe = 0.41 min.
Time of concentration (TC) = 5.90 min.
End of computations, total study area = 8.91 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number (AMC 2) = 75.0

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study, Date: 04/14/23 File Name: A21532PROP.roc

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A21532 PROPOSED CONDITION
Q100
PRE-MITIGATION

Program License Serial Number 6509

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

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Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2) = 75.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fp)= 0.200(In/Hr)
Max Catchment Loss (Fm) = 0.020(In/Hr)
Initial subarea data:
Initial area flow distance = 280.000(Ft.)
Top (of initial area) elevation = 703.550(Ft.)
Bottom (of initial area) elevation = 697.660(Ft.)
Difference in elevation = 5.890(Ft.)
Slope = 0.02104 s(%)= 2.10
TC = k(0.304)*[(length^3)/(elevation change)]^0.2

```
Initial area time of concentration =    6.268 min.
Rainfall intensity =      5.436(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.897
Subarea runoff =      6.629(CFS)
Total initial stream area =        1.360(Ac.)


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Process from Point/Station       11.000 to Point/Station       12.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =   697.660(Ft.)
End of street segment elevation =   696.620(Ft.)
Length of street segment  =   117.310(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  59.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =  -0.020
Slope from grade break to crown (v/hz)  =  -0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      9.008(CFS)
Depth of flow =   0.271(Ft.), Average velocity =   2.459(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  59.000(Ft.)
Flow velocity =   2.46(Ft/s)
Travel time =    0.80 min.     TC =    7.06  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      5.076(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =      4.656(CFS) for    1.120(Ac.)
Total runoff =     11.285(CFS)  Total area =        2.48(Ac.)
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```
Area averaged Fm value =    0.020(In/Hr)
Street flow at end of street =     11.285(CFS)
Half street flow at end of street =      5.643(CFS)
Depth of flow =   0.295(Ft.), Average velocity =   2.601(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  59.000(Ft.)


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Process from Point/Station       12.000 to Point/Station       13.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------------
Covered channel
Upstream point elevation =   696.620(Ft.)
Downstream point elevation =   695.470(Ft.)
Channel length thru subarea  =   230.000(Ft.)
Channel base width      =    0.670(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =     18.608(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.670(Ft.)
Flow(q) thru subarea =     18.608(CFS)
Pressure flow condition in covered channel:
Wetted perimeter =    2.68(Ft.)  Flow area =    0.45(Sq.Ft)
Hydraulic grade line required at box inlet =    705.390(Ft.)
Friction loss =    706.540(Ft.)
Minor Friction loss =      0.000(Ft.)   K-Factor =  0.000
Flow Velocity =   41.45(Ft/s)
Travel time  =    0.09 min.
Time of concentration =    6.84 min.
 Adding area flow to channel
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      5.170(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.897
Subarea runoff =     15.229(CFS) for    3.240(Ac.)
Total runoff =     26.514(CFS)  Total area =        5.72(Ac.)
Area averaged Fm value =    0.020(In/Hr)
```

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Process from Point/Station       13.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =   693.700(Ft.)
Downstream point/station elevation =   693.500(Ft.)
Pipe length  =    66.56(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    26.514(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     9.282(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      4.239(Ft.)
 Minor friction loss =      5.243(Ft.)  K-factor =   1.50
Pipe flow velocity =     15.00(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     6.91 min.


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Process from Point/Station       14.000 to Point/Station       14.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.720(Ac.)
Runoff from this stream =     26.514(CFS)
Time of concentration =    6.91 min.
Rainfall intensity =     5.139(In/Hr)
Area averaged loss rate (Fm) =    0.0200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Initial subarea data:
Initial area flow distance =   106.000(Ft.)
Top (of initial area) elevation =   698.020(Ft.)
Bottom (of initial area) elevation =   696.500(Ft.)
```

```
Difference in elevation =     1.520(Ft.)
Slope =    0.01434  s(%)=       1.43
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.589 min.
Rainfall intensity =      6.499(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.897
Subarea runoff =      1.050(CFS)
Total initial stream area =        0.180(Ac.)


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Process from Point/Station       21.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   693.850(Ft.)
Downstream point/station elevation =   693.750(Ft.)
Pipe length  =    33.22(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.050(CFS)
Given pipe size =     12.00(In.)
Calculated individual pipe flow  =     1.050(CFS)
Normal flow depth in pipe =    6.26(In.)
Flow top width inside pipe =   11.99(In.)
Critical Depth =    5.17(In.)
Pipe flow velocity =      2.53(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =     4.81 min.


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Process from Point/Station       21.000 to Point/Station       14.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.180(Ac.)
Runoff from this stream =      1.050(CFS)
Time of concentration =    4.81 min.
Rainfall intensity =     6.328(In/Hr)
Area averaged loss rate (Fm) =    0.0200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      5.72    26.514      6.91    0.020      5.139
2      0.18     1.050      4.81    0.020      6.328
Qmax(1) =
```

```
           1.000 *    1.000 *    26.514) +
           0.811 *    1.000 *     1.050) + =      27.366
Qmax(2) =
           1.232 *    0.695 *    26.514) +
           1.000 *    1.000 *     1.050) + =      23.769

Total of 2 streams to confluence:
Flow rates before confluence point:
      26.514       1.050
Maximum flow rates at confluence using above data:
       27.366       23.769
Area of streams before confluence:
        5.720        0.180
Effective area values after confluence:
        5.900        4.157
Results of confluence:
Total flow rate =     27.366(CFS)
Time of concentration =     6.914 min.
Effective stream area after confluence =      5.900(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.020(In/Hr)
Study area total (this main stream) =       5.90(Ac.)


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Process from Point/Station       14.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   693.750(Ft.)
Downstream point/station elevation =   686.700(Ft.)
Pipe length  =   560.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    27.366(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
    36.530(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =     37.994(Ft.)
 Minor friction loss =      5.586(Ft.)  K-factor =   1.50
Pipe flow velocity =     15.49(Ft/s)
Travel time through pipe =    0.60 min.
Time of concentration (TC) =     7.52 min.


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Process from Point/Station       15.000 to Point/Station       15.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
```

```
Stream flow area =      5.900(Ac.)
Runoff from this stream =     27.366(CFS)
Time of concentration =    7.52 min.
Rainfall intensity =     4.898(In/Hr)
Area averaged loss rate (Fm) =    0.0200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station       30.000 to Point/Station       31.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Initial subarea data:
Initial area flow distance =   299.600(Ft.)
Top (of initial area) elevation =   698.020(Ft.)
Bottom (of initial area) elevation =   693.960(Ft.)
Difference in elevation =     4.060(Ft.)
Slope =    0.01355  s(%)=       1.36
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.032 min.
Rainfall intensity =      5.089(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.896
Subarea runoff =      2.235(CFS)
Total initial stream area =        0.490(Ac.)


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Process from Point/Station       31.000 to Point/Station       32.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =   693.960(Ft.)
End of street segment elevation =   693.460(Ft.)
Length of street segment  =   170.760(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  56.500(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.035
Slope from grade break to crown (v/hz)  =   0.035
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   7.500(Ft.)
```

```
Slope from curb to property line (v/hz) =   0.050
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.794(CFS)
Depth of flow =   0.451(Ft.), Average velocity =   1.639(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.619(Ft.)
Flow velocity =   1.64(Ft/s)
Travel time =    1.74 min.     TC =    8.77  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      4.484(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =      1.059(CFS) for    0.330(Ac.)
Total runoff =      3.295(CFS)  Total area =        0.82(Ac.)
Area averaged Fm value =    0.020(In/Hr)
Street flow at end of street =      3.295(CFS)
Half street flow at end of street =      3.295(CFS)
Depth of flow =   0.474(Ft.), Average velocity =   1.706(Ft/s)
Flow width (from curb towards crown)=  10.270(Ft.)


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Process from Point/Station       32.000 to Point/Station       32.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Time of concentration =     8.77 min.
Rainfall intensity =      4.484(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
```

```
rational method)(Q=KCIA) is C = 0.896
Subarea runoff =      0.924(CFS) for    0.230(Ac.)
Total runoff =      4.219(CFS)  Total area =        1.05(Ac.)
Area averaged Fm value =    0.020(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   687.550(Ft.)
Downstream point/station elevation =   686.600(Ft.)
Pipe length  =   273.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.219(CFS)
Given pipe size =     12.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     3.549(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      3.827(Ft.)
 Minor friction loss =      0.672(Ft.)  K-factor =   1.50
Pipe flow velocity =      5.37(Ft/s)
Travel time through pipe =    0.85 min.
Time of concentration (TC) =     9.62 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       15.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.050(Ac.)
Runoff from this stream =      4.219(CFS)
Time of concentration =    9.62 min.
Rainfall intensity =     4.254(In/Hr)
Area averaged loss rate (Fm) =    0.0200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      5.90    27.366      7.52    0.020      4.898
2      1.05     4.219      9.62    0.020      4.254
Qmax(1) =
           1.000 *    1.000 *    27.366) +
           1.152 *    0.782 *     4.219) + =      31.166
Qmax(2) =
```

```
           0.868 *    1.000 *    27.366) +
           1.000 *    1.000 *     4.219) + =      27.968

Total of 2 streams to confluence:
Flow rates before confluence point:
      27.366       4.219
Maximum flow rates at confluence using above data:
       31.166       27.968
Area of streams before confluence:
        5.900        1.050
Effective area values after confluence:
        6.721        6.950
Results of confluence:
Total flow rate =     31.166(CFS)
Time of concentration =     7.517 min.
Effective stream area after confluence =      6.721(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.020(In/Hr)
Study area total (this main stream) =       6.95(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =   686.600(Ft.)
Downstream point/station elevation =   686.440(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    31.166(CFS)
Given pipe size =     24.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     2.986(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      0.854(Ft.)
 Minor friction loss =      2.292(Ft.)  K-factor =   1.50
Pipe flow velocity =      9.92(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     7.59 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       41.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
```

```
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Initial subarea data:
Initial area flow distance =   151.100(Ft.)
Top (of initial area) elevation =   704.050(Ft.)
Bottom (of initial area) elevation =   701.000(Ft.)
Difference in elevation =     3.050(Ft.)
Slope =    0.02019  s(%)=       2.02
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.938 min.
Rainfall intensity =      6.232(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.897
Subarea runoff =      3.131(CFS)
Total initial stream area =        0.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   697.000(Ft.)
Downstream point/station elevation =   687.570(Ft.)
Pipe length  =   591.25(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.131(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.131(CFS)
Normal flow depth in pipe =    5.95(In.)
Flow top width inside pipe =   16.94(In.)
Critical Depth =    8.10(In.)
Pipe flow velocity =      6.14(Ft/s)
Travel time through pipe =    1.60 min.
Time of concentration (TC) =     6.54 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       42.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
```

Time of concentration = 6.54 min.
Rainfall intensity = 5.304(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified rational method)(Q=KCIA) is C = 0.897
Subarea runoff = 3.812(CFS) for 0.900(Ac.)
Total runoff = 6.943(CFS) Total area = 1.46(Ac.)
Area averaged Fm value = 0.020(In/Hr)
End of computations, total study area = 8.41 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number (AMC 2) = 75.0

Orange County Rational Hydrology Program

(Hydrology Manual Date(s) October 1986 & November 1996)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study, Date: 04/18/23 File Name: A21532POST.roc

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A21532 PROPOSED CONDITION
Q100
POST MITIGATION/DETENTION

Program License Serial Number 6509

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0

Decimal fraction of study above 2000 ft., 600M = 0.0000
English Units Used for input data

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Process from Point/Station 15.000 to Point/Station 15.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2) = 75.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fp)= 0.200(In/Hr)
Max Catchment Loss (Fm) = 0.020(In/Hr)
Rainfall intensity = 4.897(In/Hr) for a 100.0 year storm
User specified values are as follows:
TC = 7.52 min. Rain intensity = 4.90(In/Hr)
Total area = 5.91(Ac.) Total runoff = 11.58(CFS)

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```
Process from Point/Station       15.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   689.670(Ft.)
Downstream point/station elevation =   686.700(Ft.)
Pipe length  =   610.55(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.580(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =    11.580(CFS)
Normal flow depth in pipe =   15.28(In.)
Flow top width inside pipe =   23.09(In.)
Critical Depth =   14.64(In.)
Pipe flow velocity =      5.49(Ft/s)
Travel time through pipe =    1.85 min.
Time of concentration (TC) =     9.37 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.910(Ac.)
Runoff from this stream =     11.580(CFS)
Time of concentration =    9.37 min.
Rainfall intensity =     4.316(In/Hr)
Area averaged loss rate (Fm) =    0.0200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       33.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      4.484(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =   8.77 min.  Rain intensity =       4.48(In/Hr)
Total area =         1.05(Ac.)  Total runoff =      3.19(CFS)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =   687.750(Ft.)
Downstream point/station elevation =   686.600(Ft.)
Pipe length  =   188.30(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.190(CFS)
Given pipe size =     12.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     0.743(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      1.509(Ft.)
 Minor friction loss =      0.384(Ft.)  K-factor =   1.50
Pipe flow velocity =      4.06(Ft/s)
Travel time through pipe =    0.77 min.
Time of concentration (TC) =     9.54 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       16.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.050(Ac.)
Runoff from this stream =      3.190(CFS)
Time of concentration =    9.54 min.
Rainfall intensity =     4.272(In/Hr)
Area averaged loss rate (Fm) =    0.0200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream  Area  Flow rate      TC     Fm       Rainfall Intensity
 No.    (Ac.)   (CFS)       (min) (In/Hr)     (In/Hr)


1      5.91    11.580      9.37    0.020      4.316
2      1.05     3.190      9.54    0.020      4.272
Qmax(1) =
           1.000 *    1.000 *    11.580) +
           1.010 *    0.982 *     3.190) + =      14.746
Qmax(2) =
           0.990 *    1.000 *    11.580) +
           1.000 *    1.000 *     3.190) + =      14.652

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.580       3.190
```

```
Maximum flow rates at confluence using above data:
       14.746       14.652
Area of streams before confluence:
        5.910        1.050
Effective area values after confluence:
        6.941        6.960
Results of confluence:
Total flow rate =     14.746(CFS)
Time of concentration =     9.374 min.
Effective stream area after confluence =      6.941(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.020(In/Hr)
Study area total (this main stream) =       6.96(Ac.)

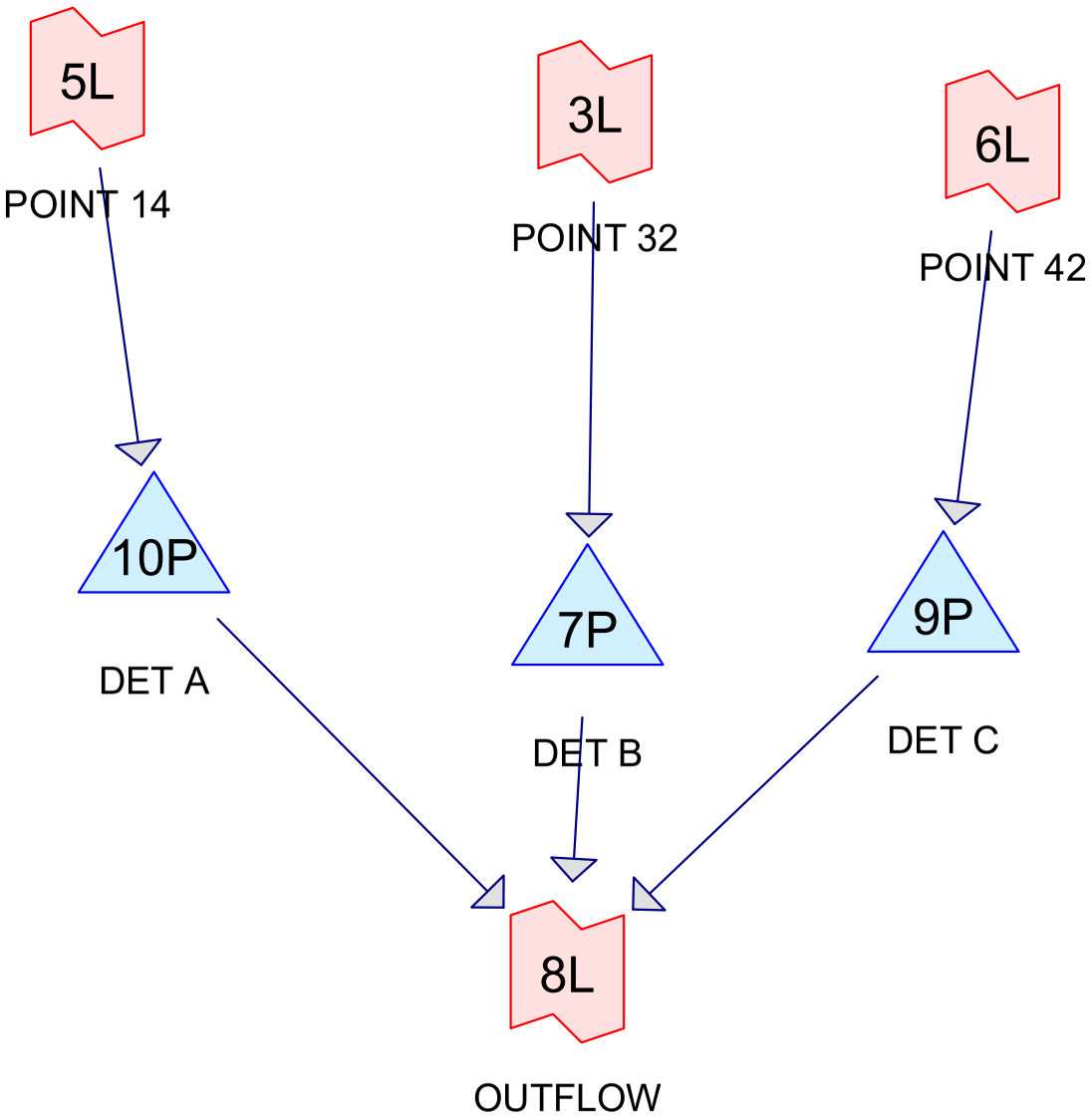

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   686.600(Ft.)
Downstream point/station elevation =   686.440(Ft.)
Pipe length  =    44.60(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.746(CFS)
Given pipe size =     24.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     0.543(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      0.189(Ft.)
 Minor friction loss =      0.513(Ft.)  K-factor =   1.50
Pipe flow velocity =      4.69(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =     9.53 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       43.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.1000  Max loss rate(Fp)=     0.200(In/Hr)
Max Catchment Loss (Fm) =     0.020(In/Hr)
Rainfall intensity =      5.305(In/Hr) for a   100.0 year storm
User specified values are as follows:
```

```
TC =   6.54 min.  Rain intensity =       5.30(In/Hr)
Total area =         1.46(Ac.)  Total runoff =      4.21(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       44.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =   690.820(Ft.)
Downstream point/station elevation =   687.570(Ft.)
Pipe length  =    66.66(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.210(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     4.210(CFS)
Normal flow depth in pipe =    5.19(In.)
Flow top width inside pipe =   16.31(In.)
Critical Depth =    9.44(In.)
Pipe flow velocity =      9.97(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =     6.65 min.
End of computations, total study area =            8.42 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number (AMC 2) =  75.0
```



Subcat Reach Pond Link

Routing Diagram for A21532 HYDROCAD
Prepared by {enter your company name here}, Printed 4/19/2023
HydroCAD® 10.10-5a s/n 02379 © 2020 HydroCAD Software Solutions LLC

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 7P: DET B Peak Elev=688.96' Storage=0.017 af Inflow=3.75 cfs 0.392 af
Outflow=3.19 cfs 0.391 af

Pond 9P: DET C Peak Elev=691.81' Storage=0.014 af Inflow=4.49 cfs 0.545 af
Outflow=4.21 cfs 0.544 af

Pond 10P: DET A Peak Elev=692.27' Storage=0.263 af Inflow=23.19 cfs 2.247 af
Outflow=11.58 cfs 2.235 af

Link 3L: POINT 32 CFS Imported from DETB.csv Inflow=3.75 cfs 0.392 af
Primary=3.75 cfs 0.392 af

Link 5L: POINT 14 CFS Imported from DETA.csv Inflow=23.19 cfs 2.247 af
Primary=23.19 cfs 2.247 af

Link 6L: POINT 42 CFS Imported from DETC.csv Inflow=4.49 cfs 0.545 af
Primary=4.49 cfs 0.545 af

Link 8L: OUTFLOW Inflow=18.13 cfs 3.170 af
Primary=18.13 cfs 3.170 af

Summary for Pond 10P: DET A

[82] Warning: Early inflow requires earlier time span

Inflow	=	23.19 cfs @	16.17 hrs, Volume=	2.247 af
Outflow	=	11.58 cfs @	16.29 hrs, Volume=	2.235 af, Atten= 50%, Lag= 7.6 min
Primary	=	11.58 cfs @	16.29 hrs, Volume=	2.235 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 692.27' @ 16.29 hrs Surf.Area= 0.135 ac Storage= 0.263 af

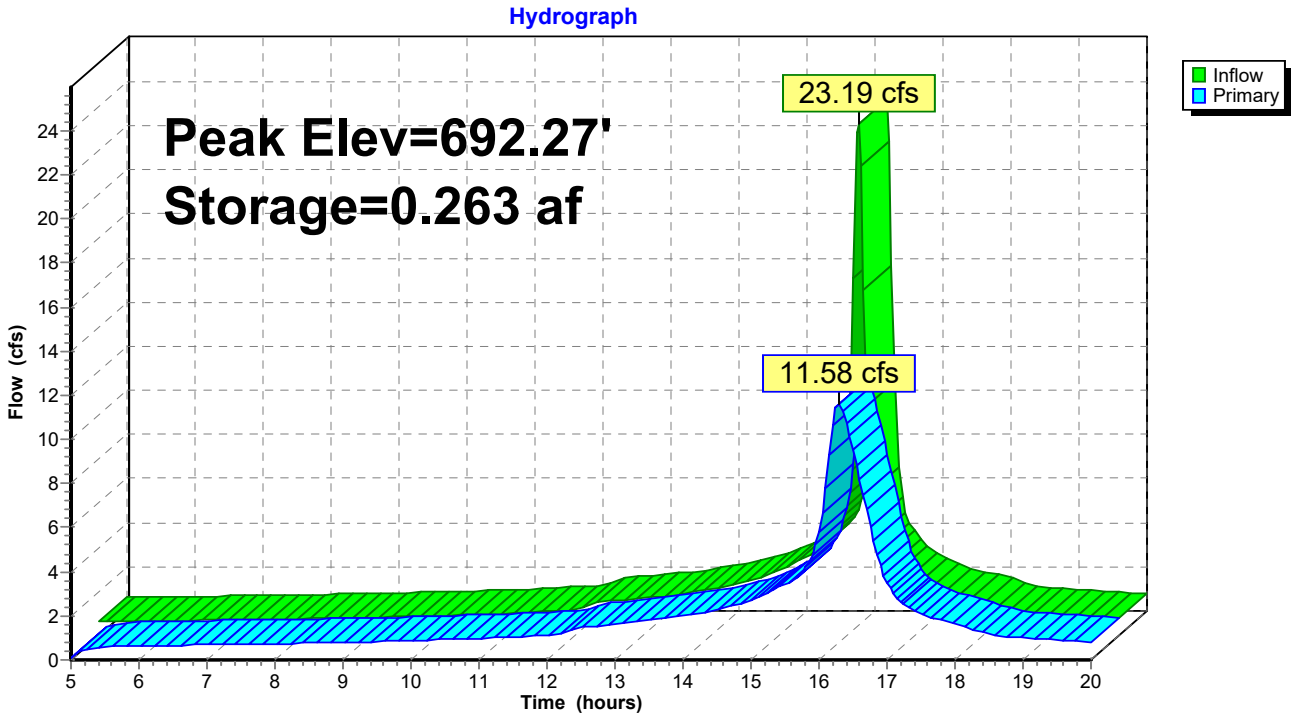
Plug-Flow detention time= 12.0 min calculated for 2.226 af (99% of inflow)
Center-of-Mass det. time= 9.8 min (870.2 - 860.4)

Volume	Invert	Avail.Storage	Storage Description
#1	689.67'	0.530 af	**60.0" Round Pipe Storage** x 5 L= 235.0' S= 0.0010 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	689.67'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=11.55 cfs @ 16.29 hrs HW=692.26' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 11.55 cfs @ 6.54 fps)

Pond 10P: DET A



Summary for Pond 7P: DET B

[82] Warning: Early inflow requires earlier time span

Inflow	=	3.75 cfs @	16.18 hrs,	Volume=	0.392 af
Outflow	=	3.19 cfs @	16.25 hrs,	Volume=	0.391 af, Atten= 15%, Lag= 4.2 min
Primary	=	3.19 cfs @	16.25 hrs,	Volume=	0.391 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 688.96' @ 16.25 hrs Surf.Area= 0.021 ac Storage= 0.017 af

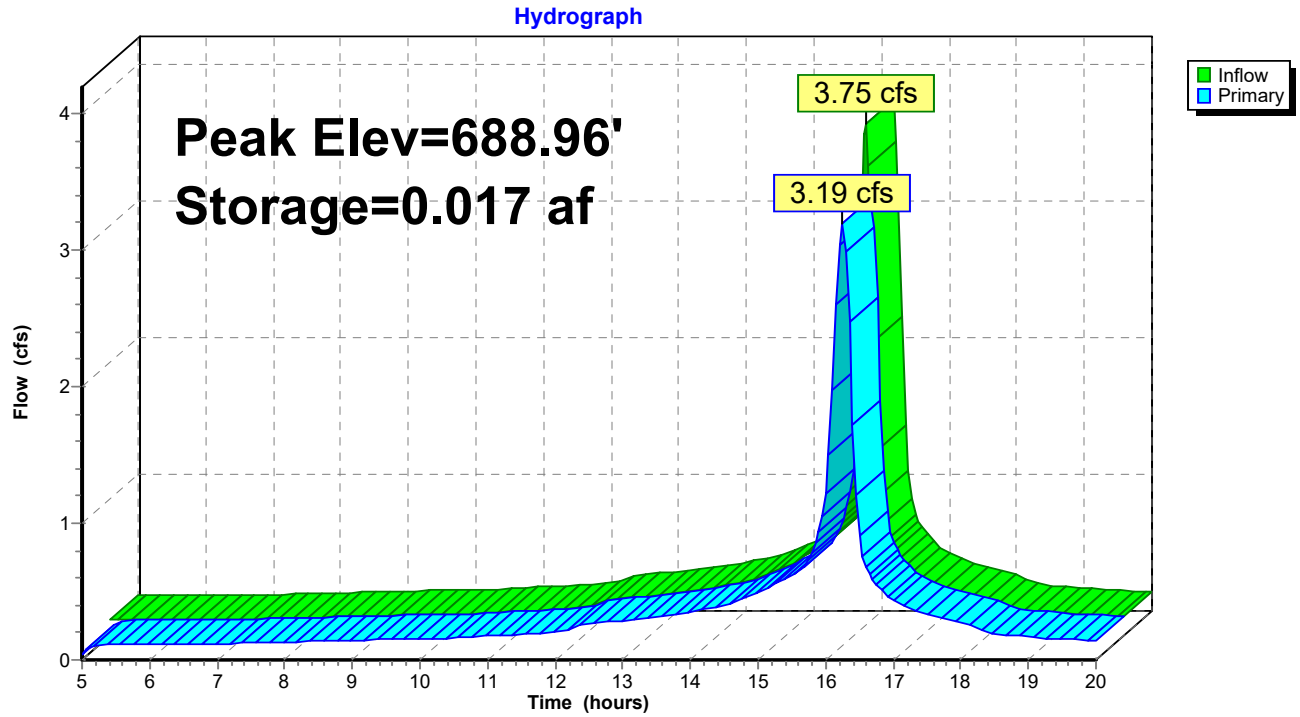
Plug-Flow detention time= 3.7 min calculated for 0.391 af (100% of inflow)
Center-of-Mass det. time= 2.9 min (863.7 - 860.8)

Volume	Invert	Avail.Storage	Storage Description
#1	687.75'	0.072 af	**48.0" Round Pipe Storage** x 2 L= 125.0' S= 0.0010 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	687.75'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.18 cfs @ 16.25 hrs HW=688.96' (Free Discharge)
1=Orifice/Grate (Orifice Controls 3.18 cfs @ 4.05 fps)

Pond 7P: DET B



Summary for Pond 9P: DET C

[82] Warning: Early inflow requires earlier time span

Inflow	=	4.49 cfs @	16.15 hrs,	Volume=	0.545 af
Outflow	=	4.21 cfs @	16.18 hrs,	Volume=	0.544 af, Atten= 6%, Lag= 2.0 min
Primary	=	4.21 cfs @	16.18 hrs,	Volume=	0.544 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 691.81' @ 16.18 hrs Surf.Area= 0.021 ac Storage= 0.014 af

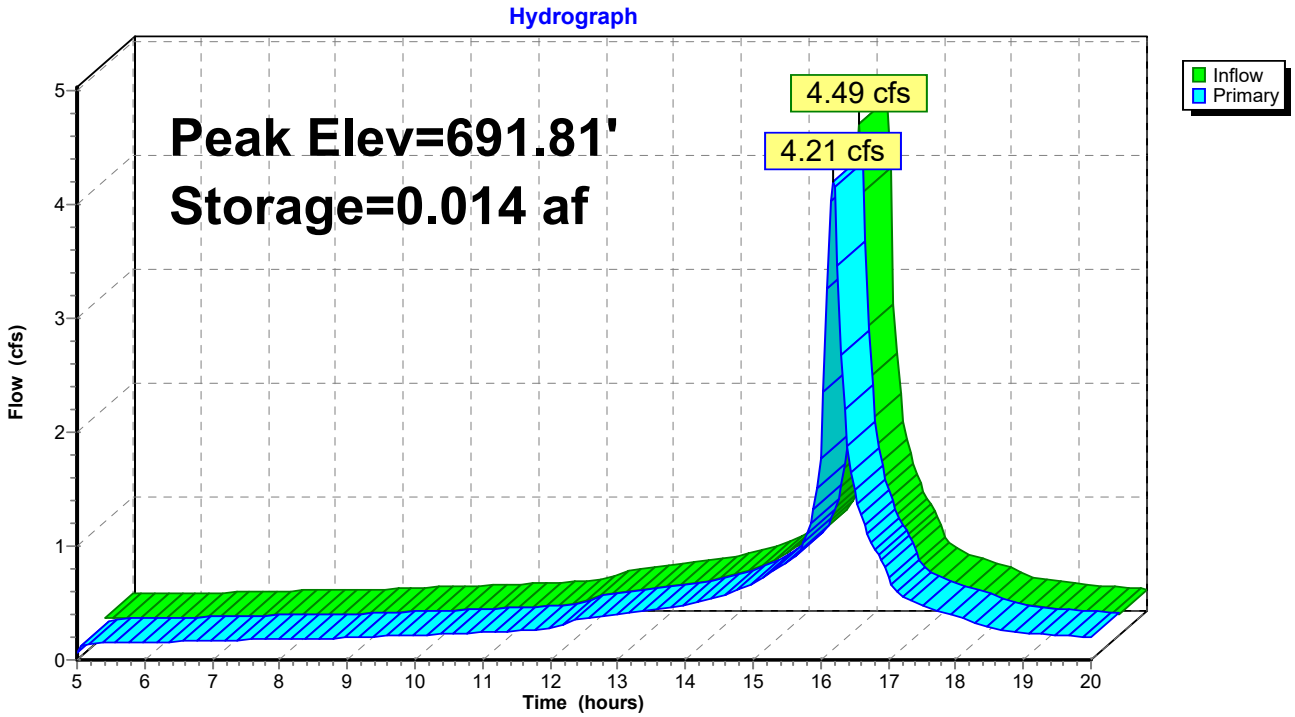
Plug-Flow detention time= 3.1 min calculated for 0.544 af (100% of inflow)
Center-of-Mass det. time= 2.3 min (864.8 - 862.5)

Volume	Invert	Avail.Storage	Storage Description
#1	690.82'	0.108 af	**60.0" Round Pipe Storage** x 2 L= 120.0' S= 0.0010 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	690.82'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.11 cfs @ 16.18 hrs HW=691.80' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 4.11 cfs @ 3.37 fps)

Pond 9P: DET C



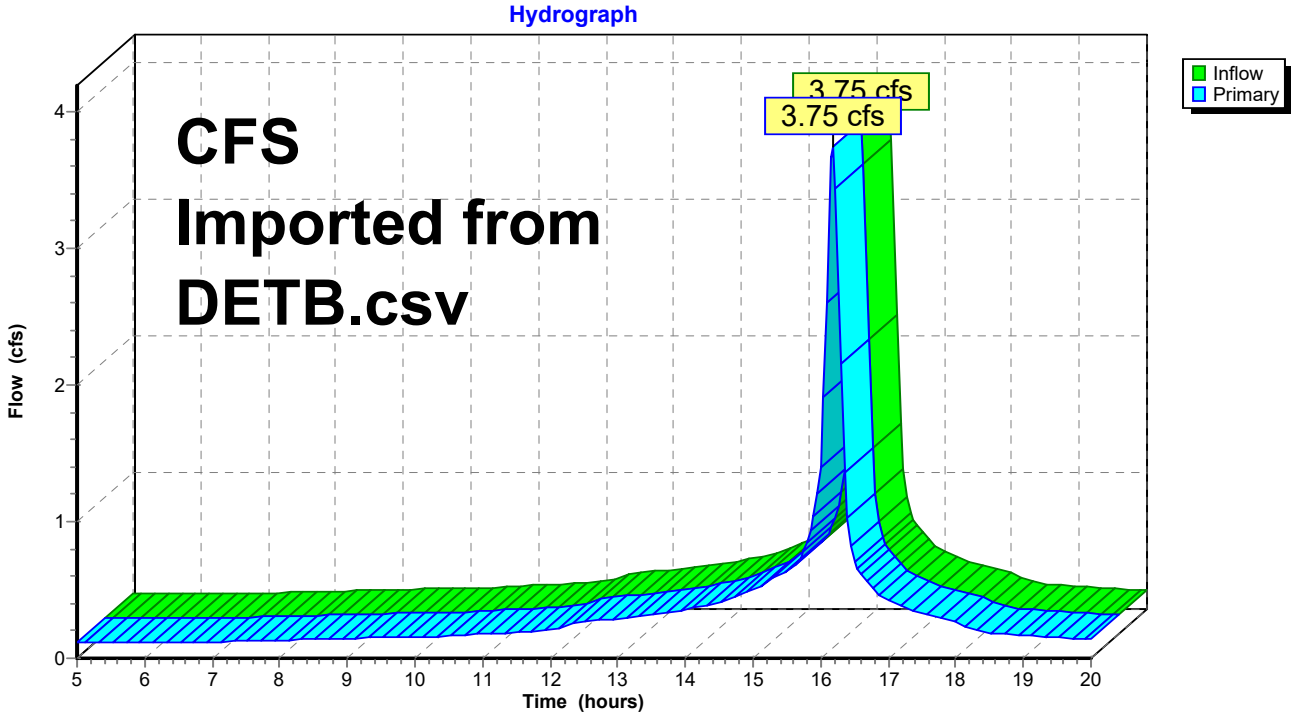
Summary for Link 3L: POINT 32

Inflow = 3.75 cfs @ 16.18 hrs, Volume= 0.392 af
Primary = 3.75 cfs @ 16.18 hrs, Volume= 0.392 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

CFS Imported from DETB.csv

Link 3L: POINT 32



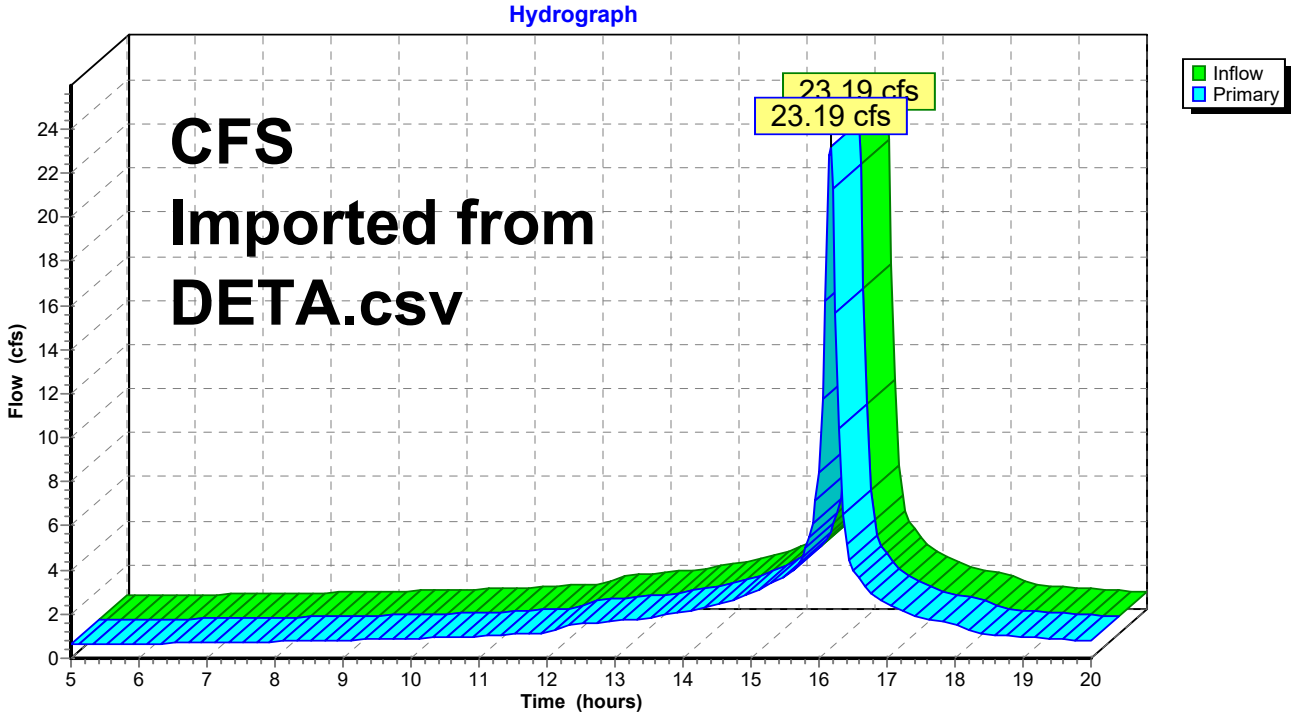
Summary for Link 5L: POINT 14

Inflow = 23.19 cfs @ 16.17 hrs, Volume= 2.247 af
Primary = 23.19 cfs @ 16.17 hrs, Volume= 2.247 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

CFS Imported from DETA.csv

Link 5L: POINT 14



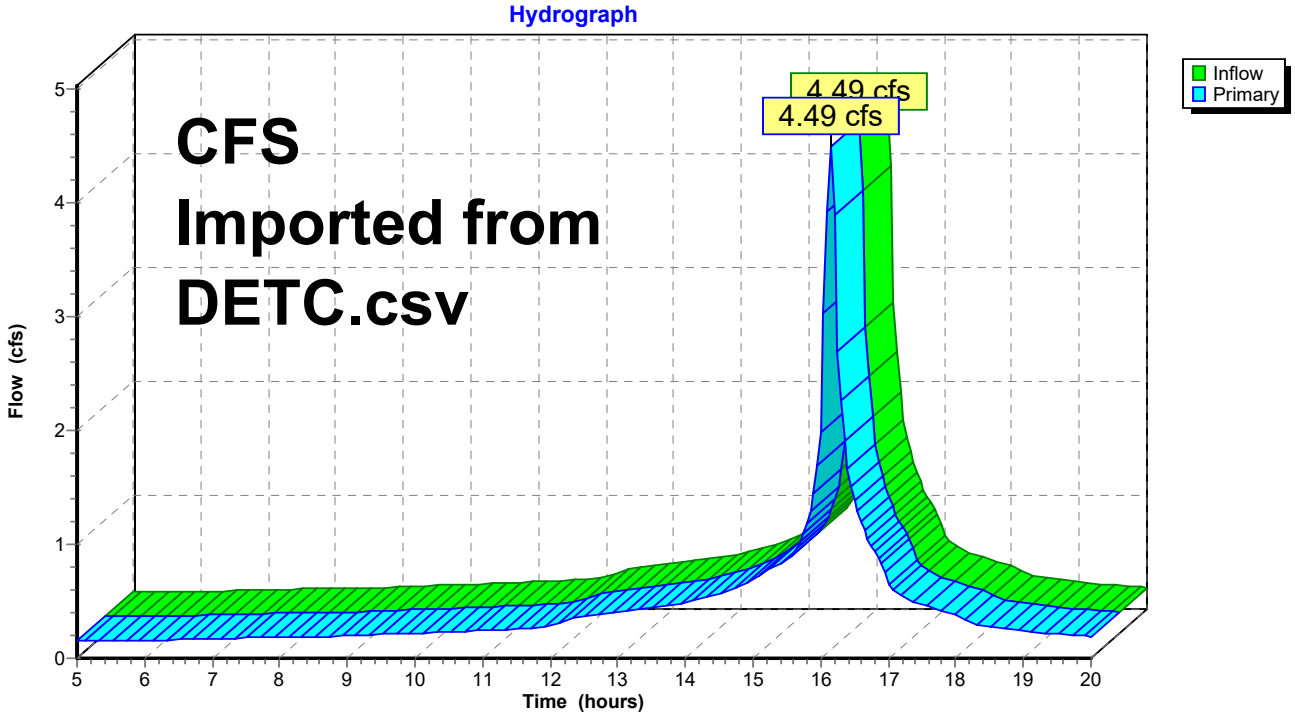
Summary for Link 6L: POINT 42

Inflow = 4.49 cfs @ 16.15 hrs, Volume= 0.545 af
Primary = 4.49 cfs @ 16.15 hrs, Volume= 0.545 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

CFS Imported from DETC.csv

Link 6L: POINT 42



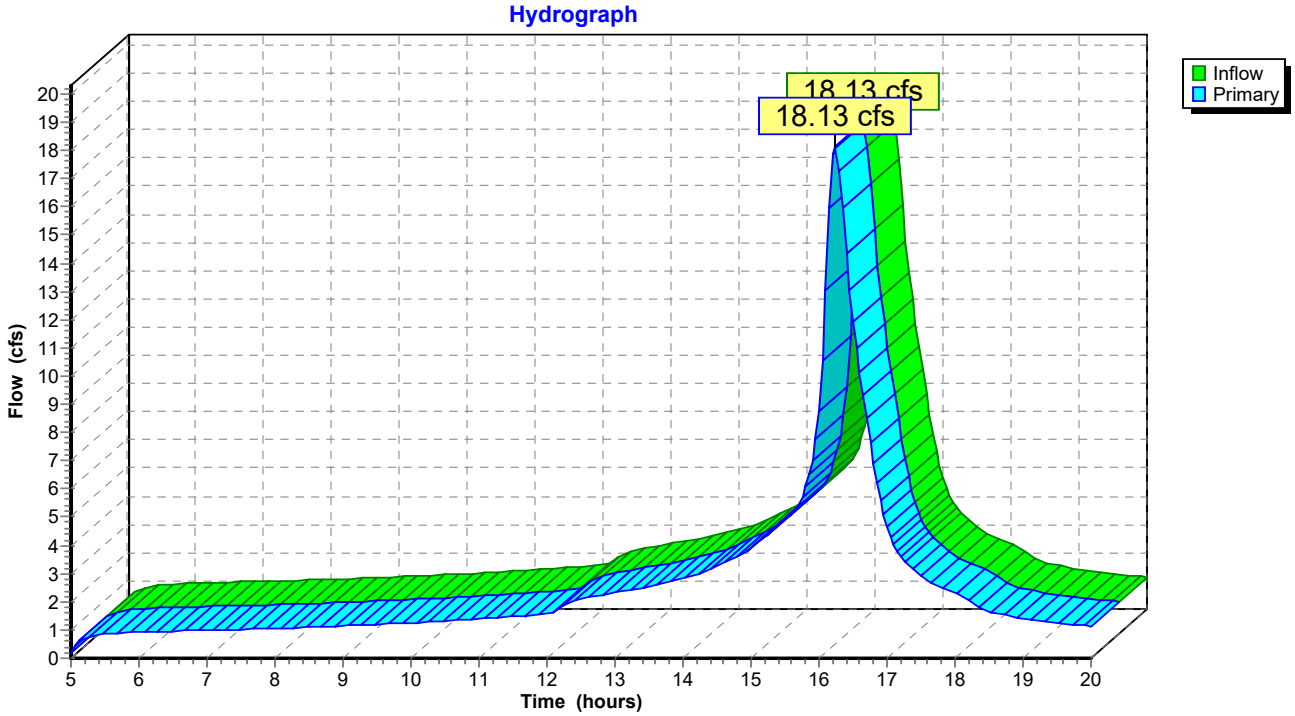
Summary for Link 8L: OUTFLOW

Inflow = 18.13 cfs @ 16.23 hrs, Volume= 3.170 af
Primary = 18.13 cfs @ 16.23 hrs, Volume= 3.170 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Fixed water surface Elevation= 686.44'

Link 8L: OUTFLOW



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