Appendix K-c Low Impact Development Plan - Lot 3 Valley Boulevard and Paseo Tesoro

Appendices

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Low Impact Development Plan
(LID Plan)

Project Name:

Walnut Business Park – Lot 3
Valley Boulevard and Paseo Tesoro
Walnut, CA 91789

Prepared for:

IDS Real Estate Group
515 South Figueroa Street, 16th Floor
Los Angeles, CA 90071
TEL: (213) 362-9300

Prepared by:

Atlas Civil Design
872 Higuera Street
San Luis Obispo, California
(213) 810-8470

PE Stamp & Sign Here

Date Prepared: June 2023

Date Revised:

Project Owner's Certification

I certify under penalty of law that this document and all attachments were prepared under my jurisdiction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Owner's Name:	Matt Katz		
Owner's Title:	Representative		
Company:	IDS Real Estate Group		
Address:	515 South Figueroa Street, 16th Floor Los Angeles, CA 90071		
Email:	mkatz@idsrealestate.com		
Telephone No:	(213) 362-9300		
Signature:		Date:	

Preparer (Engineer) Certification

Engineer's Name:	Tyler H. Johnson, PE		
Engineer's Title:	Project Manager		
Company:	Atlas Civil Design		
Address:	872 Higuera Street, San Luis Obispo, California		
Email:	thjohnson@atlascivildesign.com		
Telephone No:	(213) 810-8470		
I hereby certify that this Low Impact Development Plan is in compliance with, and meets the requirements set forth in, Order No. R4-2012-0175, of the Los Angeles Regional Water Quality Control Board.			
Engineer's Signature		Date	
Place Stamp Here			

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1. PROJECT DESCRIPTION

1.1. PROJECT CATEGORY

Category	YES	NO
1. Development [a] of a new project equal to 1 acre or greater of disturbed area and adding more than 10,000 square feet of impervious area [b]	☐	☐
2. Development [a] of a new industrial park with 10,000 square feet or more of surface area [c]	☐	☐
3. Development [a] of a new commercial mall with 10,000 square feet or more surface area [c]	☐	☐
4. Development [a] of a new retail gasoline outlet with 5,000 square feet or more of surface area [c]	☐	☐
5. Development [a] of a new restaurant (SIC 5812) with 5,000 square feet or more of surface area [c]	☐	☐
6. Development [a] of a new parking lot with either 5,000 ft^2 or more of impervious area [b] or with 25 or more parking spaces	☐	☐
7. Development [a] of a new automotive service facility (SIC 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) with 5,000 square feet or more of surface area [c]	☐	☐
8. Projects located in or directly adjacent to, or discharging directly to a Significant Ecological Area (SEA),[d] where the development will: a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and b. Create 2,500 square feet or more of impervious area [b]	☐	☐
9. Redevelopment [e] of 5,000 square feet or more in one of the categories listed above If yes, list redevelopment category here: 2	☒	☐
10. Redevelopment [e] of 10,000 square feet or more to a Single Family Home, without a change in landuse.	☐	☐

a Development includes any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that results in land disturbance.

b Surfaces that do not allow stormwater runoff to percolate into the ground. Typical impervious surfaces include: concrete, asphalt, roofing materials, etc.

c The surface area is the total footprint of an area. Not to include the cumulative area above or below the ground surface.

d An area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and would be disturbed or degraded by human activities and developments. Also, an area designated by the City as approved by the Regional Water Quality Control Board.

e Land-disturbing activities that result in the creation, addition, or replacement of a certain amount of impervious surface area on an already developed site. Redevelopment does not include routine maintenance activities that are conducted to maintain the original line and grade, hydraulic capacity, or original purpose of facility, nor does it include modifications to existing single family structures, or emergency construction activities required to immediately protect public health and safety.

1.2. STORMWATER MANAGEMENT REQUIREMENTS FOR DESIGNATED PROJECTS

All Designated Projects must retain 100 percent of the SWQDv on-site through infiltration, evapotranspiration, stormwater runoff harvest and use, or a combination thereof unless it is demonstrated that it is technically infeasible to do so. To meet these requirements, Designated Projects must:

- Conduct site assessment and identify design considerations, including determining the feasibility of on-site infiltration (see Section 4 and Section 7.3);
- Apply site-specific source control measures (see Section 5);
- Calculate the Stormwater Quality Design Volume (see Section 6);
- Implement stormwater quality control measures (see Section 7);
- Implement alternative compliance measures, if necessary (see Section 7);
- Implement hydromodification requirements, if necessary (see Section 8); and
- Develop a Maintenance Plan, if necessary (see Section 9).

A flow chart outlining the design process for Designated Projects is presented in Figure 2-1.

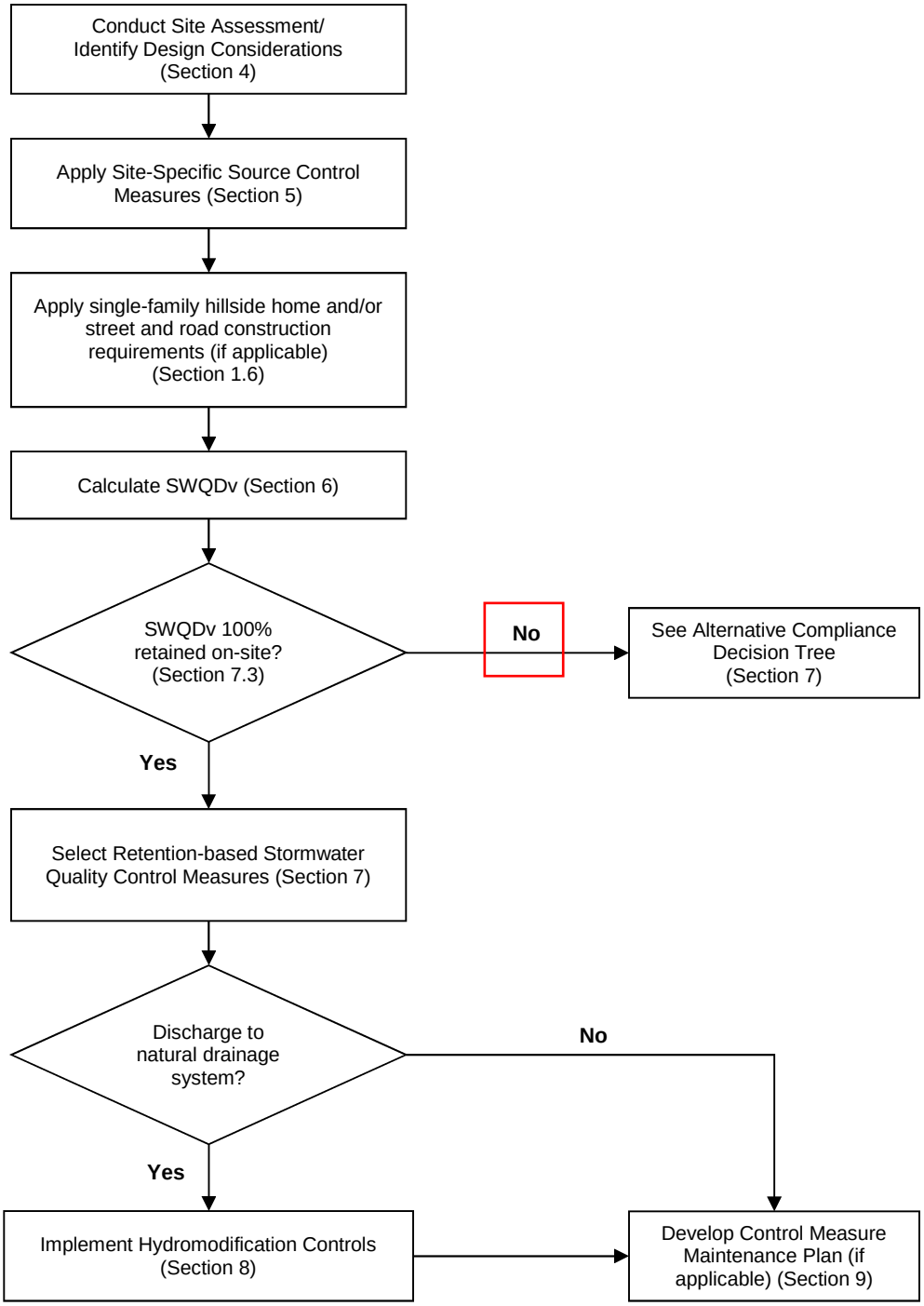


Figure 2-1. Design Process for Meeting Stormwater Requirements for Designated Projects

1.3. PROJECT DESCRIPTION

Total Project Area (ft^2): 229,230.6

Total Project Area (Ac): 5.262

EXISTING CONDITIONS

Condition	Area (ft^2)	Percentage (%)
Pervious Area:	33,325	14.5
Impervious Area:	196,020	85.5

PROPOSED CONDITIONS

Condition	Area (ft^2)	Percentage (%)
Pervious Area:	23,433	10.2
Impervious Area:	205,797.6	89.8

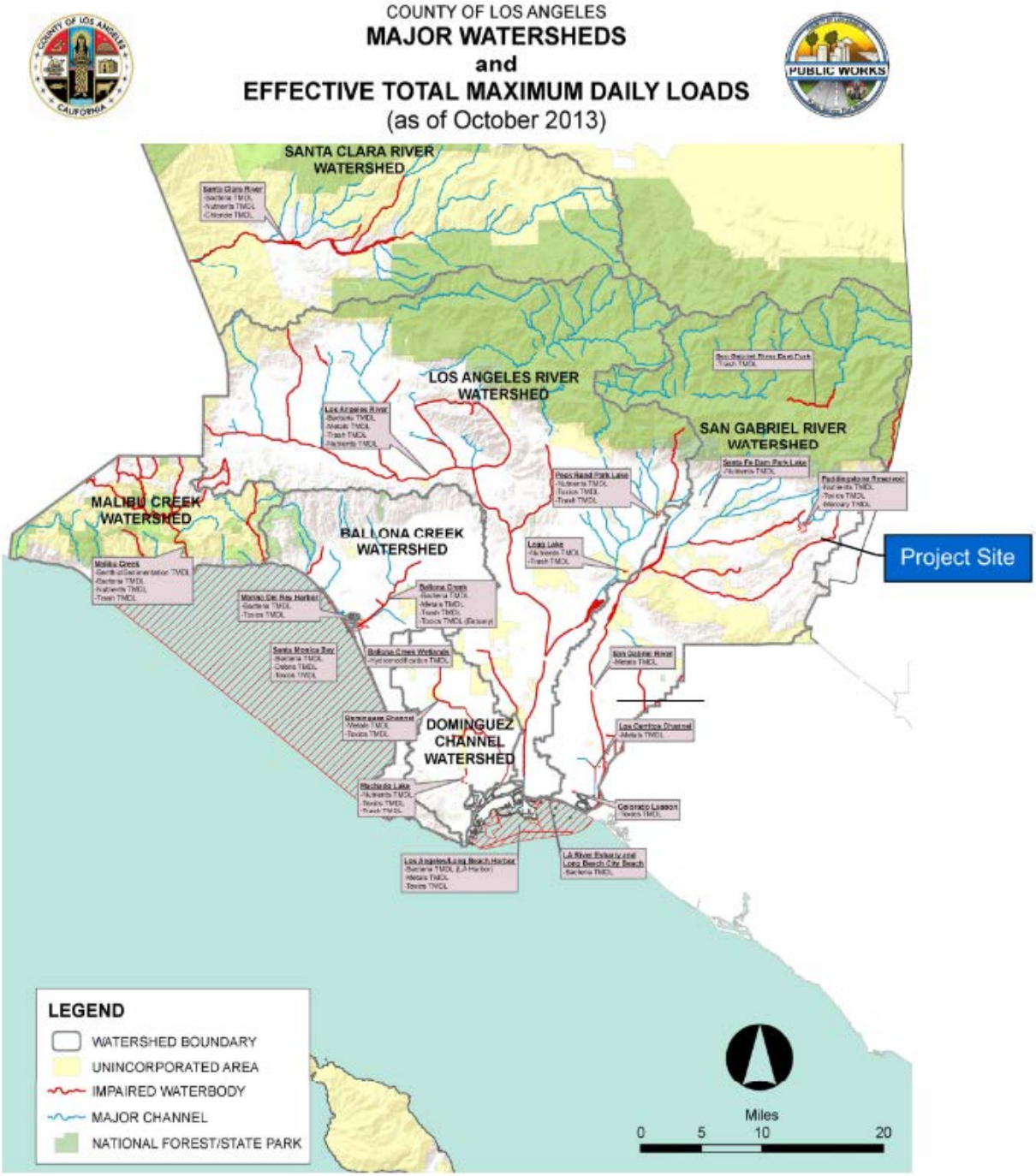
SITE CHARACTERISTICS

DRAINAGE PATTERNS/CONNECTIONS	Existing: The existing site is an industrial manufacturing park with associated landscaping, paving and parking lots. The site drains to the southwest and sheet flows towards the two existing driveways along the southwest corner of the site and into Paseo Sonrisa. Runoff flows north in the curb and gutter and is captured in a curb inlet which then connects to an existing 90" RCP storm drain maintained by the Los Angeles County Flood Control District. This LACFCD storm drain flows south across the site to the intersection of South Lemon Avenue and Valley Boulevard. The Storm drain becomes a 96" RCP and flows southeast into San Jose Creek. San Jose Creek flows west until it merges with the San Gabriel River which flows south until it reaches the Pacific Ocean near Seal Beach.
	Proposed: The proposed project will construct a 91,520 sf warehouse with associated landscaping, paving and parking lots. The site drains to the south and sheet flows to multiple ribbon gutters which direct runoff to catch basins near the south property corner. This runoff is directed to an underground detention system. The underground detention system has been sized to accommodate 150% of the 85th percentile storm event. After detention the runoff will enter a Modular Wetland BMP for Treatment. After treatment the runoff will flow to a sump pump and be pumped to the curb and gutter in Paseo Sonrisa. Runoff will flow north to the existing curb inlet which is connected to the existing 90" RCP storm

	drain. Larger storm events shall be directed around the BMP and detention system through an overflow bypass pipe and connected to the sump pump for discharge to Paseo Sonrisa. The existing 90" RCP storm drain is maintained by the Los Angeles County Flood Control District. This storm drain flows south across the site to the intersection of South Lemon Avenue and Valley Boulevard. The Storm drain becomes a 96" RCP and flows southeast into San Jose Creek. San Jose Creek flows west until it merges with the San Gabriel River which flows south until it reaches the Pacific Ocean near Seal Beach.
NARRATIVE PROJECT DESCRIPTION:	The project will construct a new 91,520 sf warehouse with associated landscaping, paving and parking lots. The proposed drainage within DMA-3 (5.26 acre) of the development includes surface gutters, storm drain inlets/lines, and an underground detention system, a modular wetland near the south corner of the property.

OFFSITE RUNON	No offsite runon will be anticipated.
UTILITY AND INFRASTRUCTURE INFORMATION	All existing buildings, paving, curbs, landscaping and driveways will be demolished. The existing on-site utilities will be relocated or demolished. The existing 90"storm drain and the 12" sewer main that bisect the site will remain in place. New water and sewer utility connections will be made for the proposed warehouse.
SIGNIFICANT ECOLOGICAL AREAS (SEAS)	No known Significant Ecological Area (SEA) are adjacent or located within the project discharge path.
EFFECTIVE TMDL'S AND POLLUTANTS	Based on the County of Los Angeles Major Watersheds and Effective Total Maximum Daily Loads (as of 2013), San Jose Creek and San Gabriel River are an impaired waterbody as shown in Figure-5. Based on the 303(d) list of Water Quality Limited Segments Table the following are the main pollutant/Stressor of San Jose Creek (reach 2): Coliform Bacteria Based on the 303(d) list of Water Quality Limited Segments Table the following are the main pollutant/Stressor of San Gabriel River: Coliform Bacteria , Metals, pH, Cyanide, Pathogens, Nutrients The following is a list of materials to be used in the daily construction activities at the project site and the normal operation of the building, which will potentially contribute to pollutants, other than sediment, to stormwater runoff. Control Practices for each activity are identified below: ▪ Vehicle fluids, including oil, grease, petroleum, and coolants from personal vehicles ▪ Landscaping materials and wastes (topsoil, plant materials, herbicides, fertilizers, mulch, pesticides) ▪ General trash debris and liter ▪ The list of expected pollutants from the proposed Project was compared with the pollutants of concern for the San Jose Creek. The Best Management Practices (BMPs) that have been selected for implementation on this project are detailed in the following sections.

Figure-5:
Impaired Waters



1.4. HYDROMODIFICATION ANALYSIS

DOES THE PROPOSED PROJECT FALL INTO ONE OF THE FOLLOWING CATEGORIES? CHECK YES/NO.	YES	NO
1. *Project is a redevelopment that decreases the effective impervious area compared to the pre-project conditions.*	☐	☒
Describe: The project will increase the impervious areas by adding more paved areas.		
2. *Project is a redevelopment that increases the infiltration capacity of pervious areas compared to the pre-project conditions.*	☐	☒
Describe: Native soils infiltration rates will be used.		
3. *Project discharges directly or via a storm drain to a sump, lake, area under tidal influence, into a waterway that has a 100-year peak flow (Q_{100}) of 25,000 cfs or more.*	☐	☒
Describe: Project discharges to the LACFCD storm drain system.		
4. *Project discharges directly or via a storm drain into concrete or otherwise engineered (not natural) channels (e.g., channelized or armored with rip rap, shotcrete, etc.), which, in turn, discharge into receiving water that is not susceptible to hydromodification impacts.*	☒	☐
Describe: Project discharges to the LACFCD storm drain system.		

[Check "Yes" or "No," as applicable.

If one or more of the above criteria are checked "Yes," the project is exempt from Hydromodification Control Measures. State as such.

If none of the above criteria are checked "Yes," the project will require Hydromodification control measures. Include detailed description of control measures to be implemented and a reference to calculations following the criteria outlined in MS4 Permit (Order R4-2012-0175) §VI.D.7.c.iv]

HYDROMODIFICATION ANALYSIS

The project runoff discharges to the LACFCD storm drain system so is exempt from hydromodification.

1.5. PROPERTY OWNERSHIP/MANAGEMENT

The project is owned by IDS Real Estate Group.

2. BEST MANAGEMENT PRACTICES (BMPS)

2.1. SITE DESIGN

85TH PERCENTILE, 24-HOUR STORM DEPTH [Determined from the Los Angeles County 85th percentile precipitation isohyetal map. If less than 0.75 inch, state as such and use 0.75 inch throughout.]	1.0 in See Attachment A
SITE DESIGN [Describe site design and drainage plan including; site design practices utilized and how BMPs are incorporated using the appropriate hierarchy.]	Roof drainage is routed through downspouts to the sidewalk around the warehouse. 36" wide ribbon gutters collect parking lot runoff and direct it to catch basins. Numerous 24" catch basins collect site runoff and direct it to an underground detention system that has been sized to accommodate 150% of the 85th percentile storm event. After detention the runoff will enter a Modular Wetland BMP for Treatment. After treatment the runoff will flow to a sump pump and be pumped to an existing off-site catch basin which is connected to the existing 90" RCP storm drain. Larger storm events shall be directed around the BMP and detention system through an overflow bypass pipe and connected to the sump pump system.

BMP LIST

DMA DESIGNATION	SQUARE FOOTAGE (SF)	ACREAGE (AC)	STORM WATER QUALITY DESIGN VOLUME (SWQDV, CF)	STORM WATER QUALITY DESIGN FLOWRATE (SWQDQ, CFS)	BMP TYPE [Include make & model if proprietary]	MINIMUM BMP SIZE [Include units]	BMP SIZE PROVIDED [Include units]	GPS COORDINATES
DMA-3	229,230.6	5.262	15,482	1.1822	Modular Wetland MWS-L-8-12-V-UG	8'x12'	8'x12'	34 00.4126 117 51.2604

See Attachment A for calculations.

2.2. BMP SELECTION

2.2.1. INFILTRATION BMPS

NAME	INCLUDED [Check all that apply.]
Bioretention without underdrains	☐
Infiltration Trench	☐
Infiltration Basin	☐
Drywell	☐
Proprietary Subsurface Infiltration Gallery	☐
Permeable Pavement (concrete, asphalt, pavers)	☐
Other: Catch Basin Filter Inserts	☐
Other:	☐

DESCRIPTION	NA
CALCULATIONS	NA

INFILTRATION TEST REPORT:

See Attachment F

2.2.2. RAINWATER HARVEST AND USE BMPS

NAME	INCLUDED [Check all that apply.]
Above-ground cisterns and basins	☐
Underground detention	☐
Other:	☐
Other:	☐
Other:	☐

DESCRIPTION	NA
CALCULATIONS	NA

2.2.3. ALTERNATIVE COMPLIANCE BMPS

BIOFILTRATION BMPS

(If Infiltration BMPs and Rainwater Harvest and Use BMPs are Infeasible)

NAME	INCLUDED [Check all that apply.]
Bioretention with underdrains (i.e. planter box, rain garden, etc.)	☐
Constructed Wetland	☐
Vegetated Swale	☐
Vegetated Filter Strip	☐
Tree-Well Filter	☐
Other: Underground Detention System	☒
Other: Modular Wetland System	☒

DESCRIPTION	The proposed underground detention system is a Stormtech MC-3500 chamber system by ADS. Each chamber is 45" tall and 90" long utilizing 125 chambers. The detention system will be laid on impermeable geotextile fabric and then on a 9" layer of washed aggregate stone. The subgrade is native soil with an infiltration rate of 0.0 in/hr.
CALCULATIONS	Underground Detention System: BMP storage per the manufacturer's specifications: Single chamber storage: 184.1 cf End cap storage: 43.7 cf (125x184.1) + (14x43.7) =10,569 cf Total Storage = 23,627 cf (SWQDv =23,223) Modular Wetland: 23,223 cf / 24hrs / 60 min / 60 sec = 0.269 CFS Wetland capacity: 0.346 cfs

See Attachment C for BMP details.

OFFSITE BMPS

(If Infiltration BMPs, Rainwater Harvest and Use BMPs, and Biofiltration BMPs are Infeasible)

NAME	INCLUDED [Check all that apply.]
Offsite Infiltration	☐
Ground Water Replenishment Projects	☐
Offsite Project - Retrofit Existing Development	☐
Regional Storm Water Mitigation Program	☐
Other:	☐
Other:	☐

DESCRIPTION	NA
CALCULATIONS	NA

2.2.4. TREATMENT CONTROL BMPS

Treatment control BMPs can only be used as pre-treatment to LID BMPs.

NAME	INCLUDED [Check all that apply.]
Media Filter	☐
Filter Insert	☐
CDS Unit	☐
Other:	☐
Other:	☐

DESCRIPTION	NA

2.2.5. HYDROMODIFICATION CONTROL BMPS

NAME	INCLUDED [Check all that apply.]
Infiltration System	☐
Above-ground Cistern	☐
Above-ground Basin	☐
Underground Detention	☐
Other:	☐
Other:	☐

DESCRIPTION	NA
CALCULATIONS	NA

2.2.6. NON-STRUCTURAL SOURCE CONTROL BMPS

NAME	CHECK ONE	
	Included	**Not Applicable**
Education for Property Owners, Tenants and Occupants	☒	☐
Activity Restrictions	☒	☐
Common Area Landscape Management	☒	☐
Common Area Litter Control	☒	☐
Housekeeping of Loading Docks	☒	☐
Common Area Catch Basin Inspection	☒	☐
Street Sweeping Private Streets and Parking Lots	☒	☐

Education for Property Owners, Tenants and Occupants

Practical informational materials will be provided to the employees of the Science Building and/or IDS Real Estate Group to ensure general good housekeeping practices that contribute to the protection of storm water quality. Among other things, these materials will describe the use of chemicals (including household type) that should be limited to the property, with no discharge of specified wastes via hosing or other direct discharge to gutters, catch basins and storm drains.

Initially, IDS Real Estate Group will provide these materials. Thereafter, such materials will be available through the employee education program. This program must be maintained, enforced, and updated periodically by IDS Real Estate Group. Educational materials including, but not limited to the materials included in the Appendix E of this plan will be made available to the employees and contractors of IDS Real Estate Group.

Activity Restrictions

Activities on this site will be limited to activities related to residential living. The project's Conditions, Covenants, and Restrictions (CC&Rs) will outline the activities that are restricted on the property. Such activities related to the LID include car washing, car maintenance and disposal of used motor fluids, pet waste cleanup, and trash container areas.

Common Area Landscape Management

Management programs will be designed and established by IDS Real Estate Group, who will maintain the common areas within the project site. These programs will include how to mitigate the potential dangers of fertilizer and pesticide usage (refer to the Maintenance and Frequency Table).

Ongoing maintenance will be consistent with the State of California Model-Water Efficient Landscape Ordinance.

Fertilizer and pesticide usage shall be consistent with County Management Guidelines for use of Fertilizers and Pesticides.

BMP Maintenance

IDS Real Estate Group will be responsible for implementing each of the BMPs detailed in this plan. IDS Real Estate Group will also be responsible for cleaning and maintaining the BMPs on a regular basis. Maintenance operations should be logged in Appendix F.

Title 22 CCR Compliance

IDS Real Estate Group will comply with this Regulation.

Uniform Fire Code Implementation

IDS Real Estate Group will comply with this Code.

Common Area Litter Control

IDS Real Estate Group will be required to implement trash management and litter control procedures in the common areas aimed at reducing pollution of drainage water. IDS Real Estate Group may also contract with their landscape maintenance firm to provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations and reporting the violations to IDS Real Estate Group for remediation.

Employee Training

A training program will be established as it would apply to future employees of the Medical Facility, and contractors of IDS Real Estate Group to inform and train in maintenance activities regarding the impact of dumping oil, paints, solvents, or other potentially harmful chemicals into storm drains; the proper use of fertilizers and pesticides in landscaping maintenance practices; and the impacts of littering and improper water disposal.

IDS Real Estate Group will conduct the training program which will include targeted training sessions with specific construction disciplines (landscaping, concrete finishers, painters, etc.). See Appendix E for examples of educational materials that will be provided to the Employees. The project's CC&Rs will include provisions for future employee training programs conducted on a yearly based prior to the rainy season.

Catch Basin Inspection

IDS Real Estate Group will maintain the drainage systems, including catch basins and storm drain pipes. IDS Real Estate Group is required to have catch basins inspected and, if necessary, cleaned prior to the storm season, no later than October 15th each year prior to the "first flush" storm. These duties may be contracted out to the landscape maintenance firm hired by IDS Real Estate Group. Please see Appendix F for the maintenance program. Maintenance operations should be logged in Appendix F.

Street Sweeping Private Streets and Parking Lots

IDS Real Estate Group shall have all streets and parking lots swept on a weekly basis. This procedure will be intensified around October 15th of each year prior to the "first flush" storm.

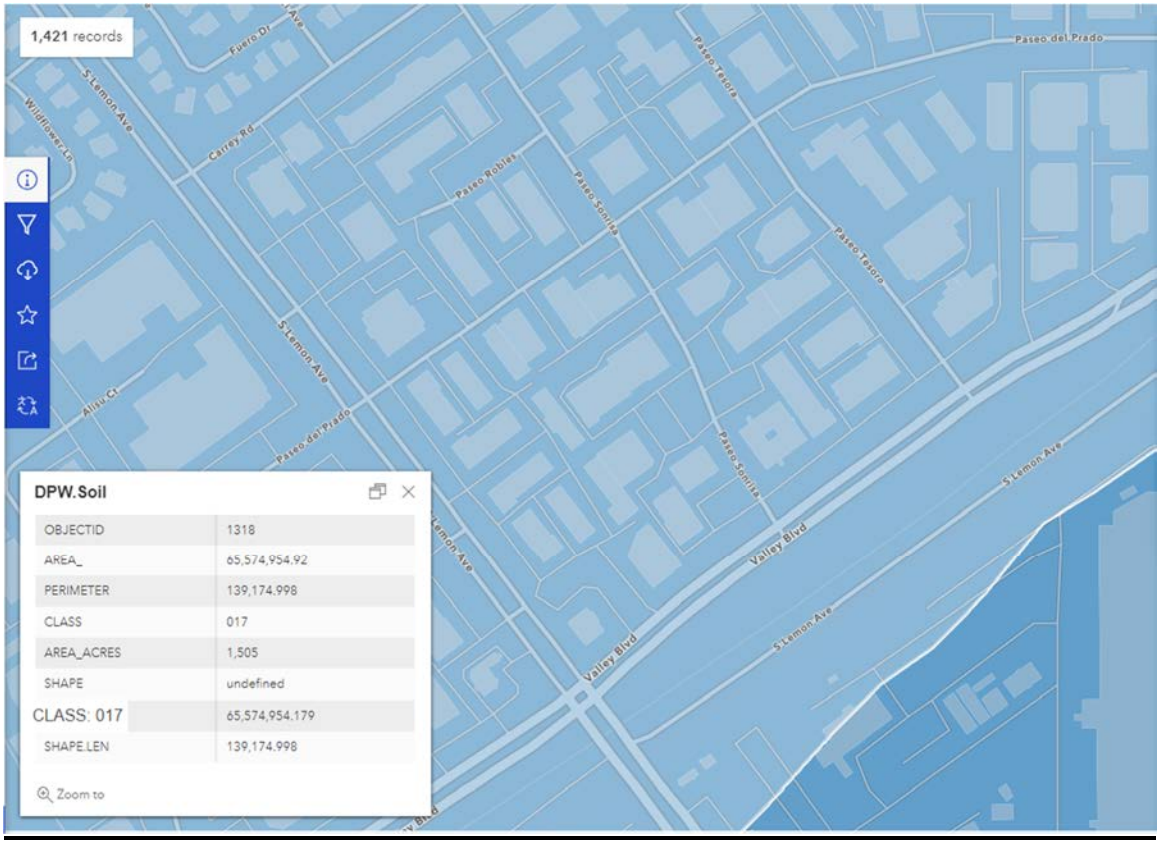
2.2.7. STRUCTURAL SOURCE CONTROL BMPS

NAME	CHECK ONE	
	Included	**Not Applicable**
Provide storm drain system stenciling and signage	☒	☐
Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒
Design and construct trash and waste storage areas to reduce pollution introduction	☒	☐
Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐
Protect slopes and channels and provide energy dissipation	☒	☐
Loading docks	☒	☐
Maintenance bays	☐	☒
Vehicle wash areas	☐	☒
Outdoor processing areas	☐	☒
Equipment wash areas/racks	☐	☒
Fueling areas	☐	☒
Hillside landscaping	☐	☒

Attachment A

Calculations/Maps

Soil Type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DPW.Soil
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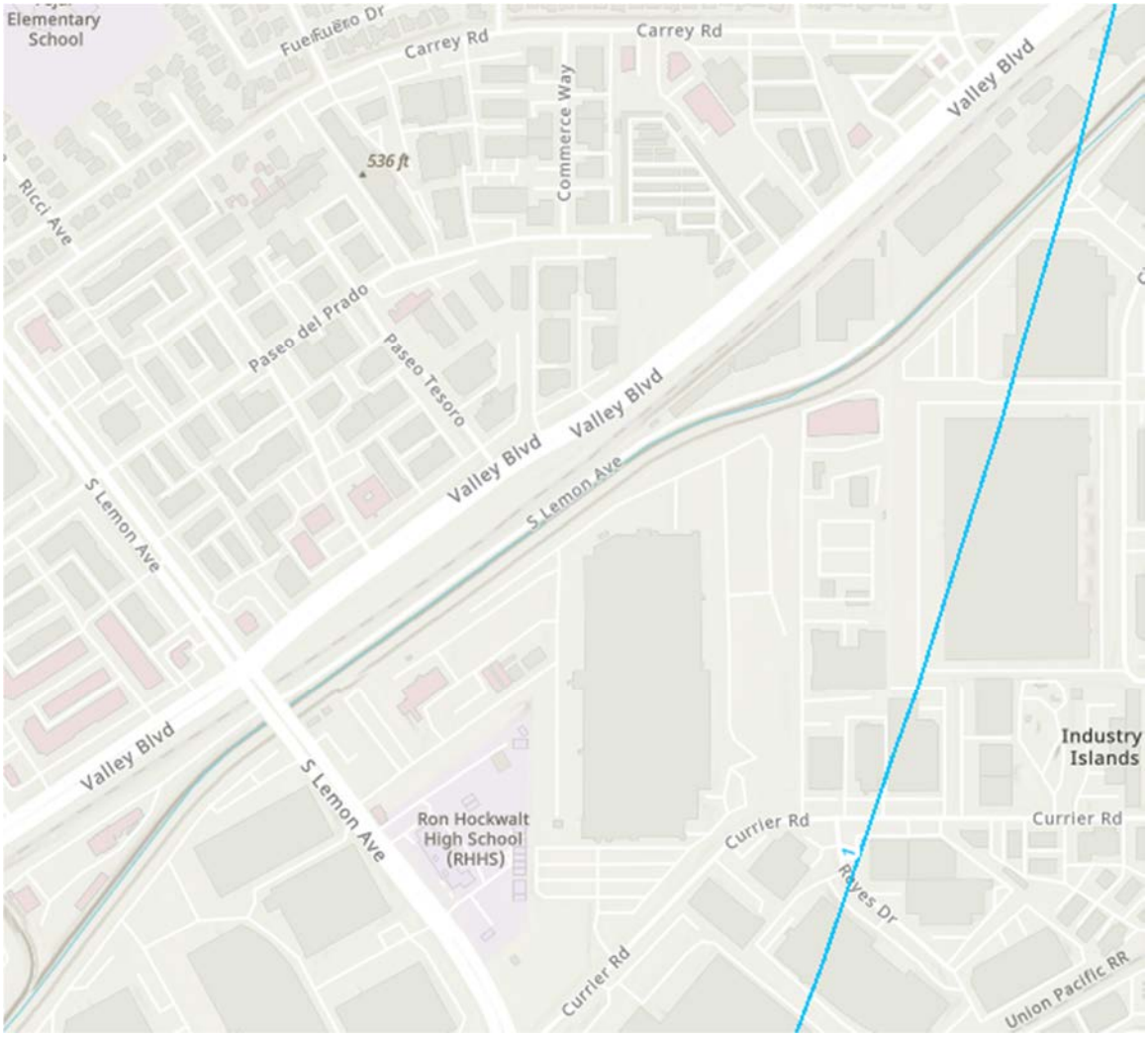
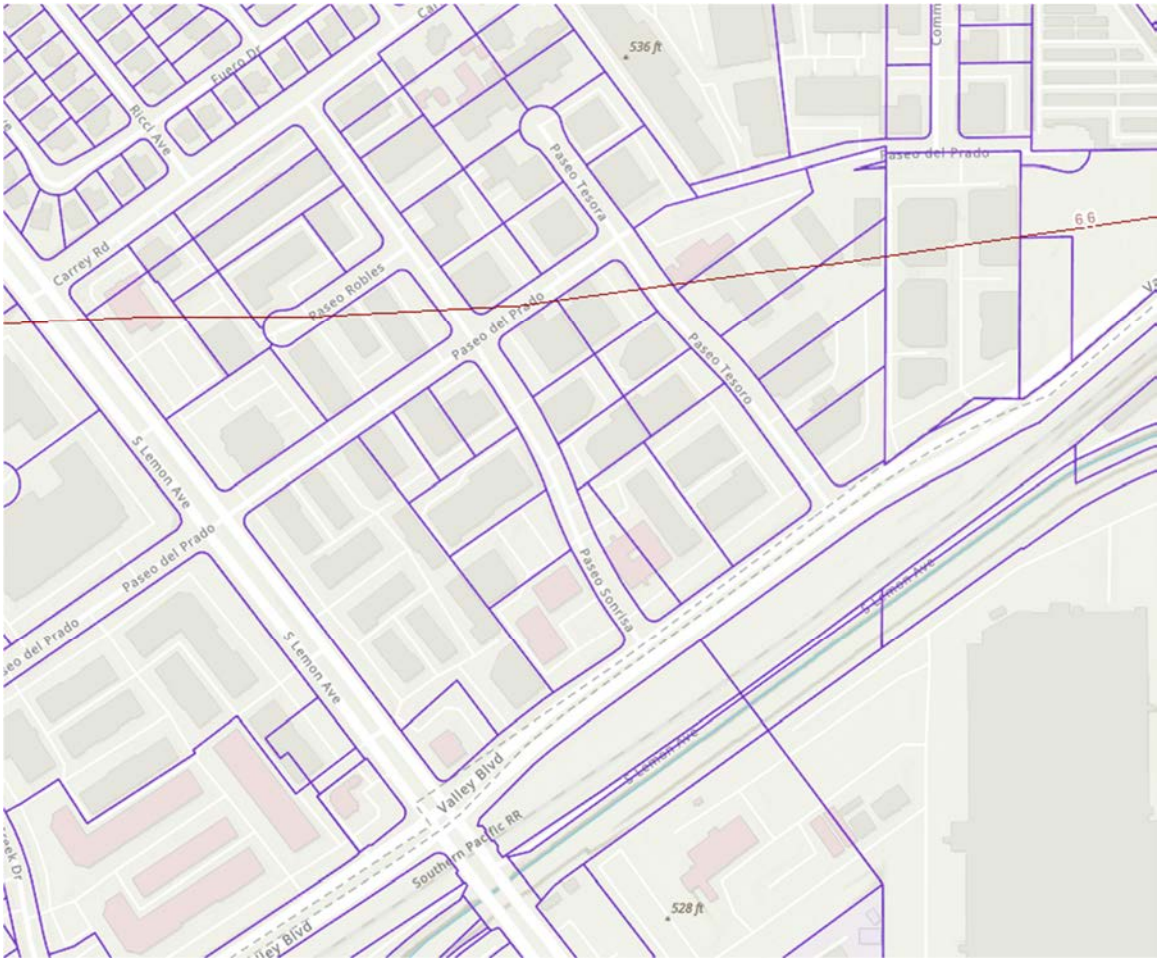
PERIMETER 139,174.998
CLASS 017
AREA_ACRES 1,505
SHAPE undefined
CLASS: 017 65,574,954.179
SHAPE.LEN 139,174.998
Zoom to
Paseo del Prado
Paseo Tesoro
Paseo Robles
Paseo Sonrisa
S Lemon Ave
Valley Blvd
Carrey Rd
Allisu Ct

85th Percentile, 24-Hr Rainfall Isohyetal Map



50-year, 24-Hr Rainfall Isohyetal Map



Volume and Flow Rate Calculations

The Underground Detention System shall be sized to capture 100% of the design capture volume (SWQDv) based on the runoff produced from the 85th percentile storm event (1.0”).

Peak Flow Hydrologic Analysis

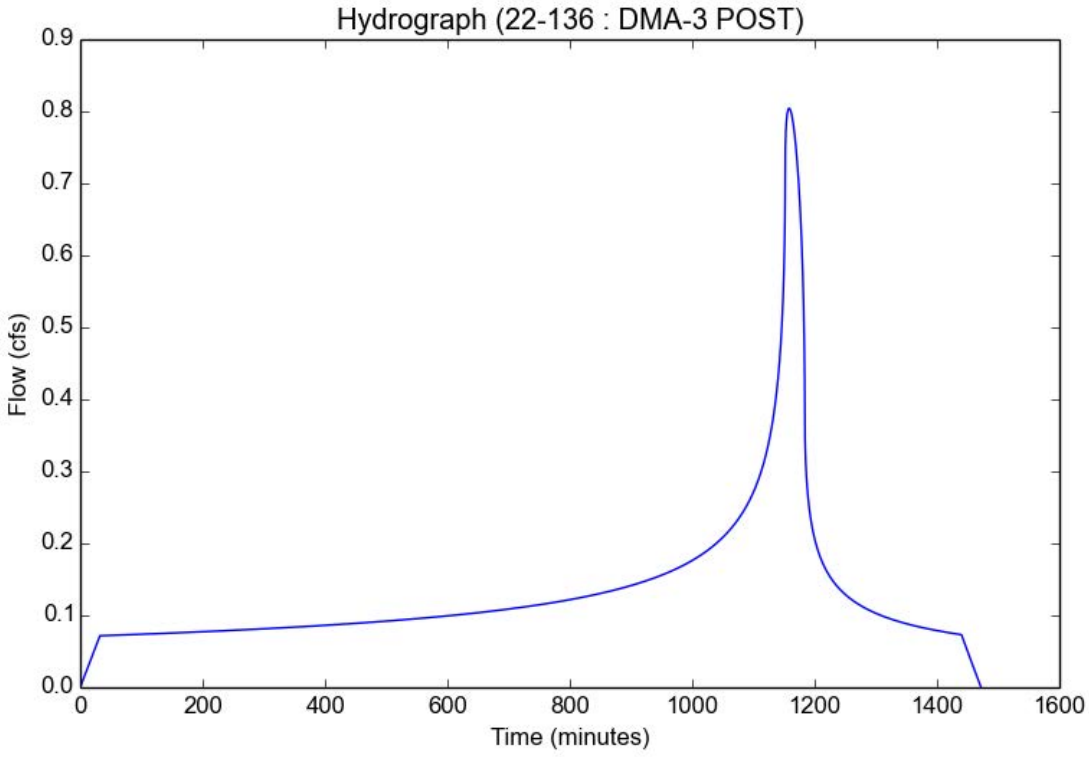
File location: P:/2022/22-136 Walnut Business Park/Civil/reports/Hydrology/Working/22-136 - DMA-3 POST 0.75.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	22-136
Subarea ID	DMA-3 POST
Area (ac)	5.26
Flow Path Length (ft)	421.0
Flow Path Slope (vft/hft)	0.004
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.897
Soil Type	17
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.187
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.8176
Time of Concentration (min)	32.0
Clear Peak Flow Rate (cfs)	0.8042
Burned Peak Flow Rate (cfs)	0.8042
24-Hr Clear Runoff Volume (ac-ft)	0.2666
24-Hr Clear Runoff Volume (cu-ft)	11611.7071



Peak Flow Hydrologic Analysis

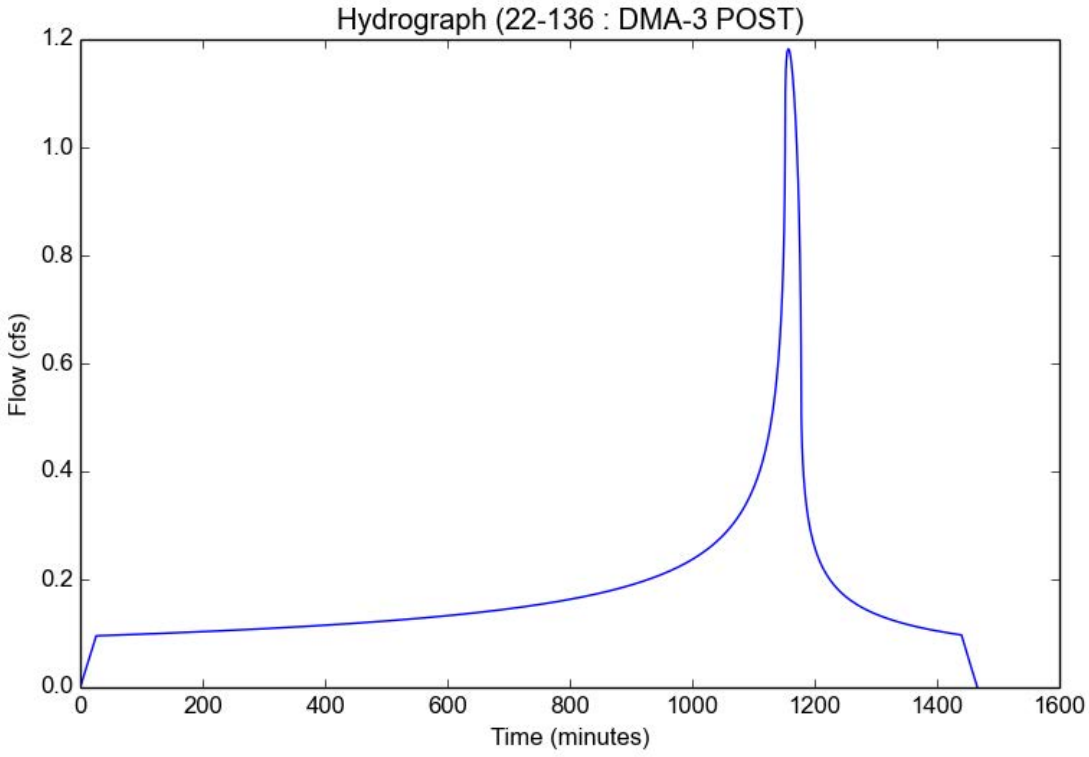
File location: P:/2022/22-136 Walnut Business Park/Civil/reports/Hydrology/Working/22-136 - DMA-3 POST 85th.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	22-136
Subarea ID	DMA-3 POST
Area (ac)	5.26
Flow Path Length (ft)	421.0
Flow Path Slope (vft/hft)	0.004
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.897
Soil Type	17
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2749
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.8176
Time of Concentration (min)	26.0
Clear Peak Flow Rate (cfs)	1.1822
Burned Peak Flow Rate (cfs)	1.1822
24-Hr Clear Runoff Volume (ac-ft)	0.3554
24-Hr Clear Runoff Volume (cu-ft)	15482.2068



Peak Flow Hydrologic Analysis

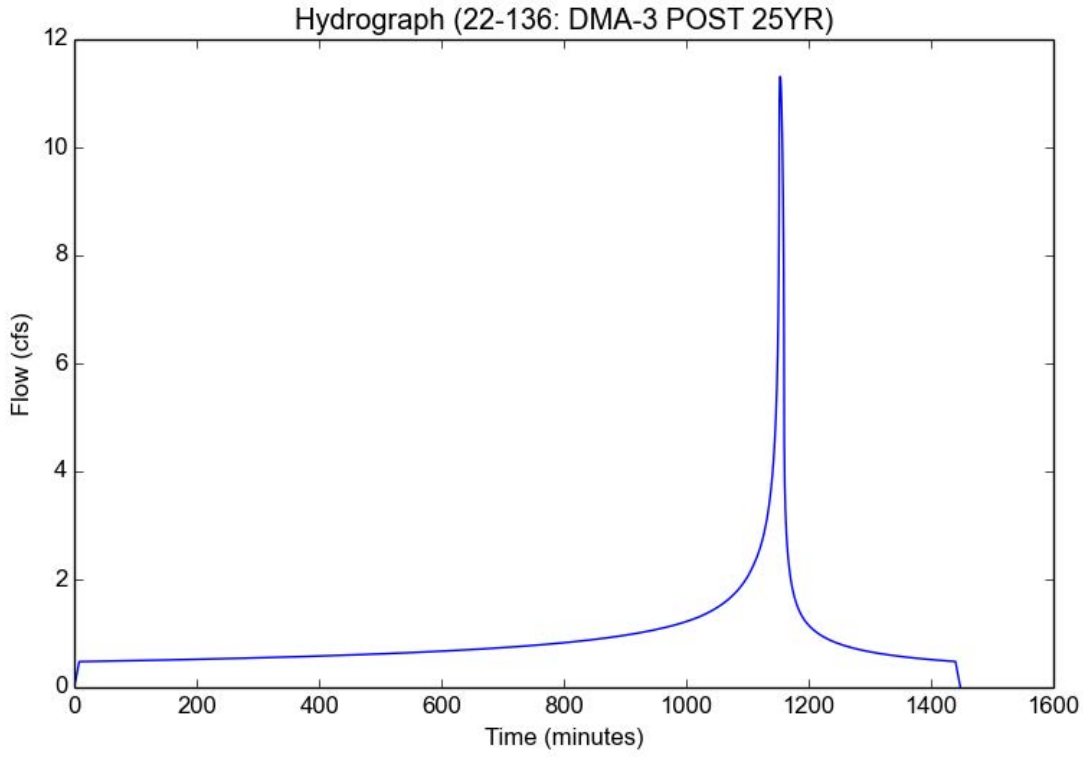
File location: C:/Local Cloud/Shared/2022/22-136 Walnut Business Park/Civil/reports/Hydrology/Working/22-136 - DMA-3 POST 25YR.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	22-136
Subarea ID	DMA-3 POST 25YR
Area (ac)	5.26
Flow Path Length (ft)	421.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	5.71
Percent Impervious	0.897
Soil Type	17
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.0134
Peak Intensity (in/hr)	2.3983
Undeveloped Runoff Coefficient (Cu)	0.8669
Developed Runoff Coefficient (Cd)	0.8966
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	11.3104
Burned Peak Flow Rate (cfs)	11.3104
24-Hr Clear Runoff Volume (ac-ft)	1.8108
24-Hr Clear Runoff Volume (cu-ft)	78877.1234



Peak Flow Hydrologic Analysis

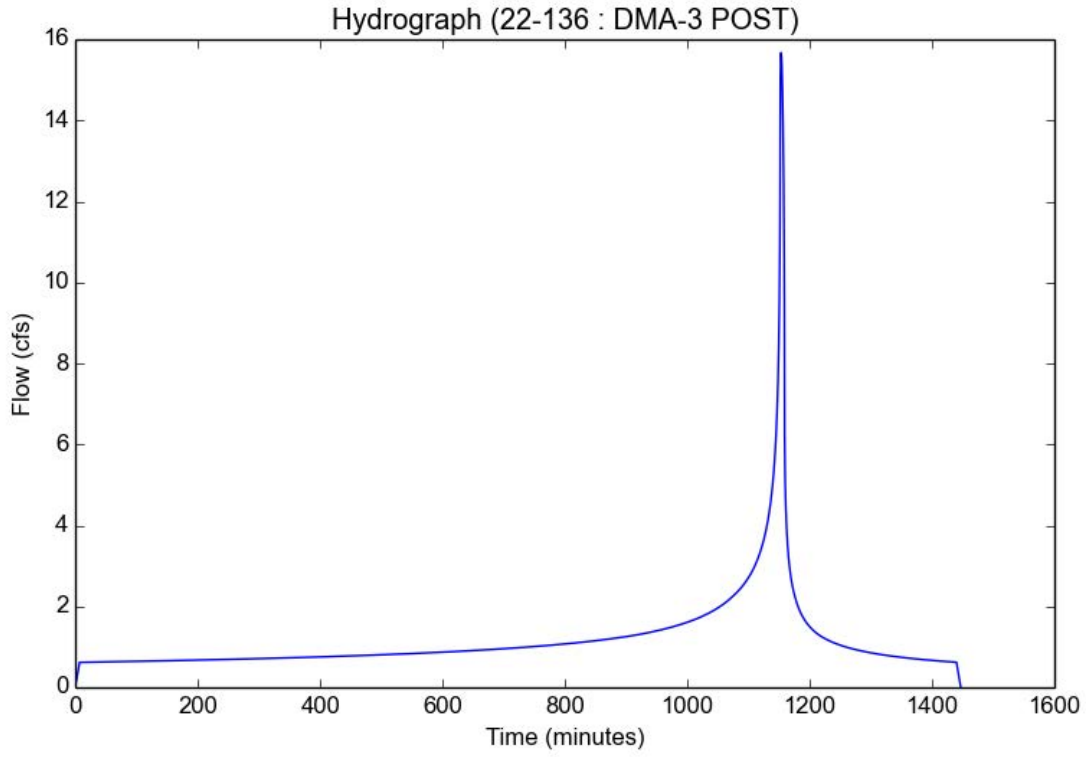
File location: P:/2022/22-136 Walnut Business Park/Civil/reports/Hydrology/Working/22-136 - DMA-3 POST 50yr.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	22-136
Subarea ID	DMA-3 POST
Area (ac)	5.26
Flow Path Length (ft)	421.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	6.5
Percent Impervious	0.897
Soil Type	17
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

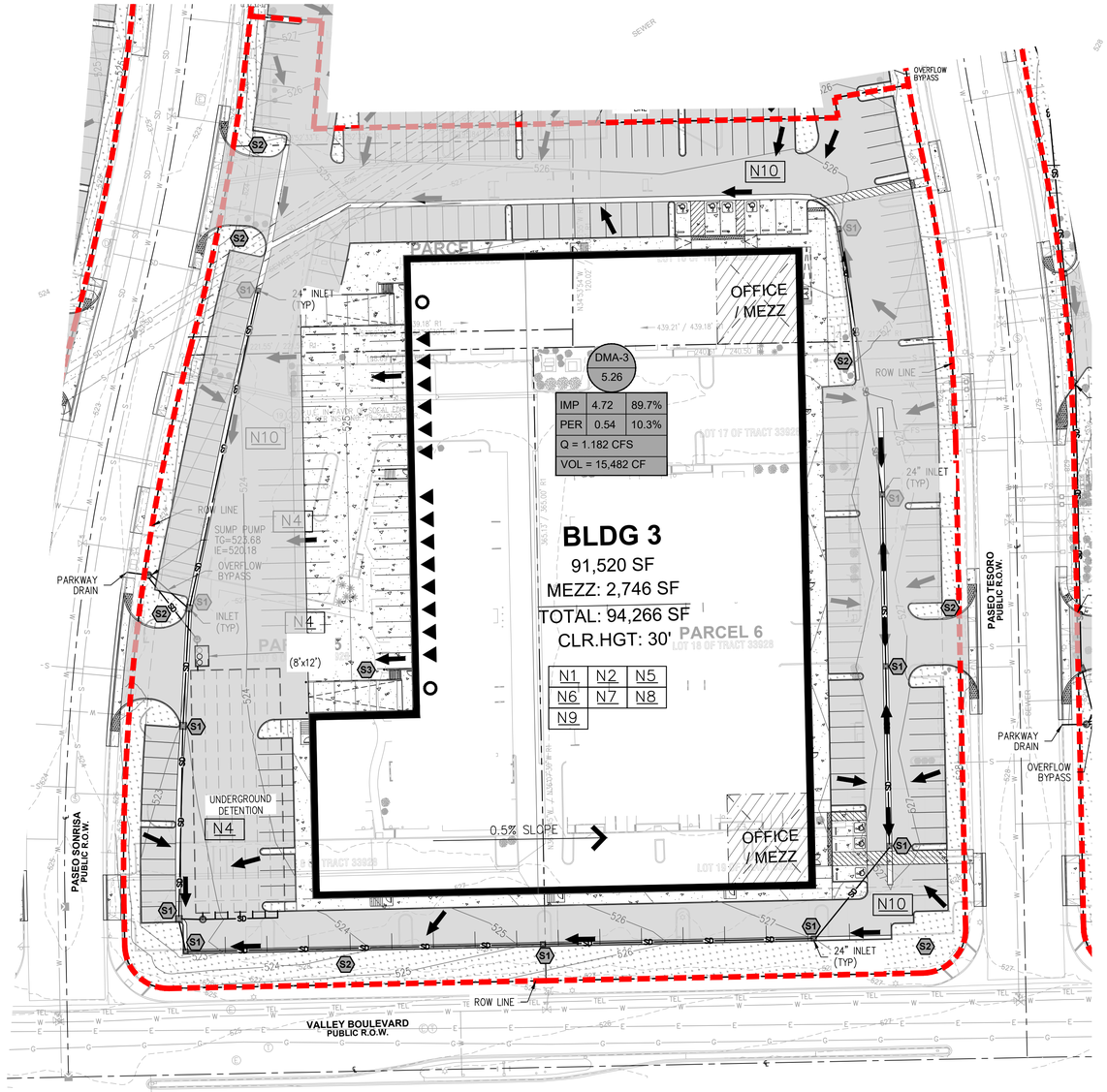
Output Results

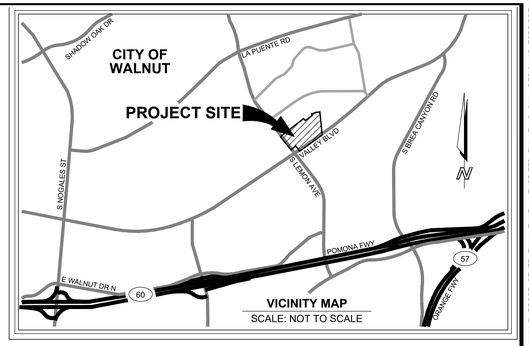
Modeled (50-yr) Rainfall Depth (in)	6.5
Peak Intensity (in/hr)	3.3108
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	15.6735
Burned Peak Flow Rate (cfs)	15.6735
24-Hr Clear Runoff Volume (ac-ft)	2.3605
24-Hr Clear Runoff Volume (cu-ft)	102824.7187



Attachment B

Construction Plans





LEGEND

- PROPERTY BOUNDARY LINE
- CENTERLINE
- 335 EXISTING CONTOURS
- 335 PROPOSED CONTOURS
- SD STORM DRAIN
- PROPOSED CONCRETE
- LIGHT DUTY AC PAVEMENT
- PROPOSED LANDSCAPE
- STORM DRAIN CATCH BASIN
- STORM DRAIN MANHOLE
- DMA# / 0.52 — DRAINAGE MANAGEMENT AREA / AREA IN ACRE
- IMP 0.52 100% — IMPERVIOUS AREA
- PERVIOUS AREA
- QTREAT = 0.13CFS — Q TREATMENT
- SWQDV = 1,444CF — VOLUME TREATMENT
- FLOW DIRECTION
- DRAINAGE BASIN BOUNDARY

CODE

THIS SITE WILL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD ORDER NO. R8-2009-0030 DISCHARGE REQUIREMENTS (MS4 PERMIT).

SUMP PUMP NOTE

SEE THE GRADING AND DRAINAGE PLANS FOR THE SUMP PUMP DETAILS.

LAND USE:

M1 (LIGHT MANUFACTURING)

LID REQUIREMENT (PRIORITY AND NON-PRIORITY PROJECTS)

DATE OF MAINTENANCE AGREEMENT:			
PROPOSED IMPERVIOUS AREA:	205,603.2 SQ.FT.		
DESIGN STORM:	☒ 85TH PERCENTILE	☐ 0.7-INCH	
SWQDv:	15,482 CU.FT.	100	% TO RETAIN ONSITE
LID SOLUTION:	☐ INFILTRATION	☒ BIOFILTRATION	

HYDROLOGIC DATA:

DMA-3	DETAILS
AREA (ACRES)	5.26
SOIL GROUP	017
DESIGN FREQUENCY	25-YEAR
50-YEAR RAINFALL DEPTH (IN)	6.5
PERCENT IMPERVIOUS	89.7%
Q_{25} (CFS)	11.31
SWQDv	VOLUME (CU-FT)
0.75-INCH STORM	11,612
85TH PERCENTILE STORM	15,482 x 1.5 = 23,223
BMP	TOTAL VOLUME CAPACITY (CU-FT)
MODULAR WETLAND	29,894
24 HR DRAW DOWN	0
TOTAL VOLUME CAPACITY	29,894

NOTE: 85TH PERCENTILE STORM GOVERNS

LID DETAILS:

ID	NON-STRUCTURAL SOURCE CONTROL BMPs DESCRIPTION
N1	EDUCATION FOR PROPERTY OWNERS, TENANTS AND OCCUPANTS
N2	ACTIVITY RESTRICTIONS
N3	LANDSCAPE MANAGEMENT
N4	BMP MAINTENANCE
N5	TITLE 22 CCR COMPLIANCE
N6	UNIFORM FIRE CODE IMPLEMENTATION
N7	LITTER / DEBRIS CONTROL PROGRAM
N8	EMPLOYEE TRAINING
N9	CATCH BASIN INSPECTION PROGRAM
N10	SWEEPING OF PRIVATE STREETS AND PARKING LOTS
	STRUCTURAL SOURCE CONTROL BMPs
S1	PROVIDE STORM DRAIN STENCILING AND SIGNAGE (CASQA NEW DEVELOPMENT BMP HANDBOOK SD-13)
S2	USE EFFICIENT IRRIGATION SYSTEMS & LANDSCAPE DESIGN, WATER CONSERVATION, SMART CONTROLLERS, AND SOURCE CONTROL (CASQA NEW DEVELOPMENT BMP HANDBOOK SD-12)
S3	DESIGN AND CONSTRUCT TRASH AND WASTE STORAGE AREAS TO REDUCE POLLUTION INTRODUCTION (CASQA NEW DEVELOPMENT BMP HANDBOOK SD-32)

Civil Engineering • Site Optimization
www.AtlasCivilDesign.com
Tel: 1-213-810-8470
ATLAS Civil Design
San Diego • Orange County • Los Angeles • San Luis Obispo • Monterey

REGISTERED PROFESSIONAL ENGINEER TYLER HILDING STANTON No. 85839 CIVIL STATE OF CALIFORNIA

NOT FOR CONSTRUCTION

DATE	REVISIONS	BY

WALNUT BUSINESS PARK
CITY OF WALNUT
COUNTY OF LOS ANGELES
PRELIMINARY LID PLAN - LOT 3

PROJECT NUMBER:	22-136
PREPARED ON:	
REVISED ON:	6/15/23
PREPARED BY:	GMH
CHECKED BY:	THJ

SHEET 1 OF 1

C:\LOCAL CLOUD\SHARED\2022\22-136 WALNUT BUSINESS PARK\CIVIL\REPORTS\WATER QUALITY\WORKING\22-136_LID_PLAN.DWG - PLOT DATE: June 15, 2023

Attachment C

BMP Details

User Inputs

Chamber Model:	MC-3500
Outlet Control Structure:	Yes
Project Name:	
Engineer:	GREG HOWELL
Project Location:	
Measurement Type:	Imperial
Required Storage Volume:	23223 cubic ft.
Stone Porosity:	40%
Stone Foundation Depth:	9 in.
Stone Above Chambers:	12 in.
Average Cover Over Chambers:	18 in.
Design Constraint Dimensions:	(55 ft. x 150 ft.)

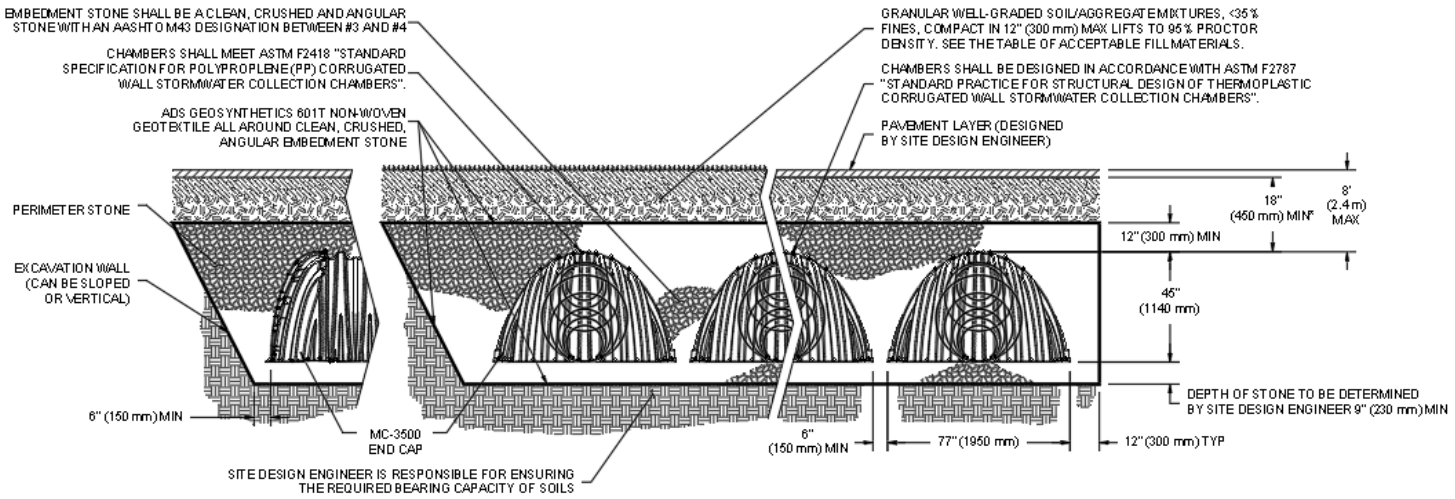
Results

System Volume and Bed Size

Installed Storage Volume:	23627.34 cubic ft.
Storage Volume Per Chamber:	109.90 cubic ft.
Number Of Chambers Required:	125
Number Of End Caps Required:	14
Chamber Rows:	7
Maximum Length:	139.24 ft.
Maximum Width:	50.52 ft.
Approx. Bed Size Required:	6936.22 square ft.

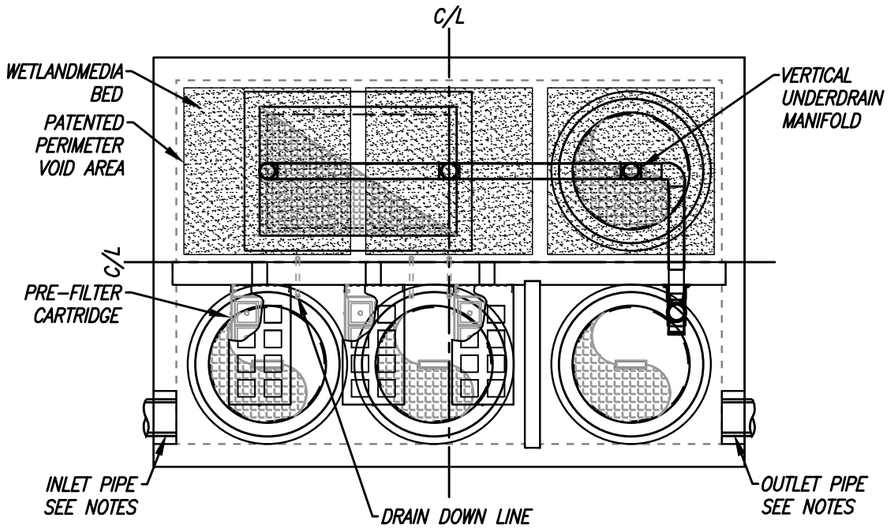
System Components

Amount Of Stone Required:	897 cubic yards
Volume Of Excavation (Not Including Fill):	1413 cubic yards
Total Non-woven Geotextile Required:	2128 square yards
Woven Geotextile Required (excluding Isolator Row):	84 square yards
Woven Geotextile Required (Isolator Row):	155 square yards
Total Woven Geotextile Required:	239 square yards
Impervious Liner Required:	0 square yards

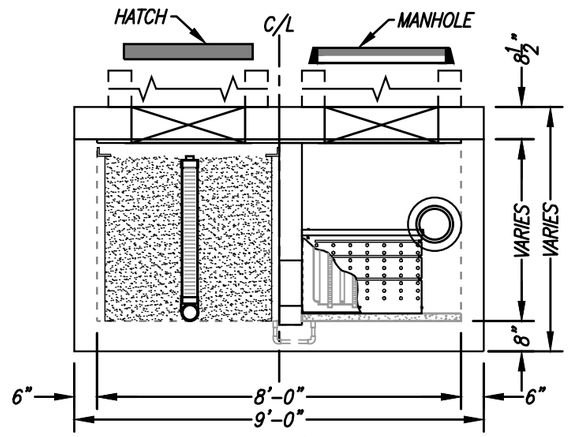


SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
FLOW BASED (CFS)			
0.346			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	DIRECT TRAFFIC		
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



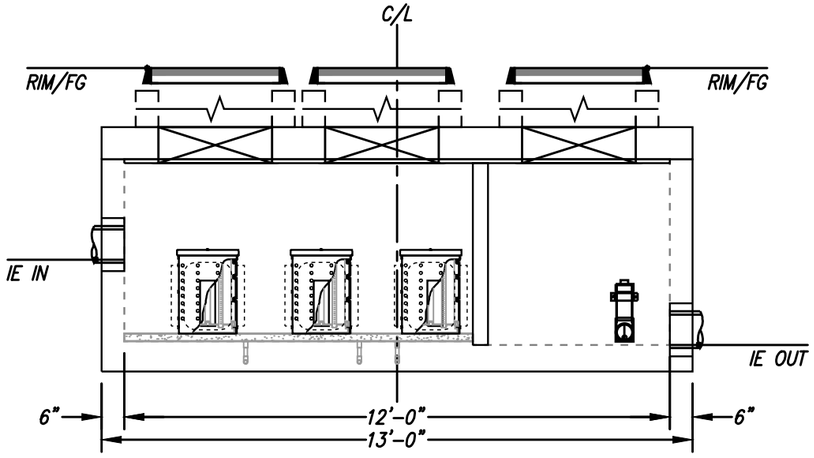
LEFT END VIEW

INSTALLATION NOTES

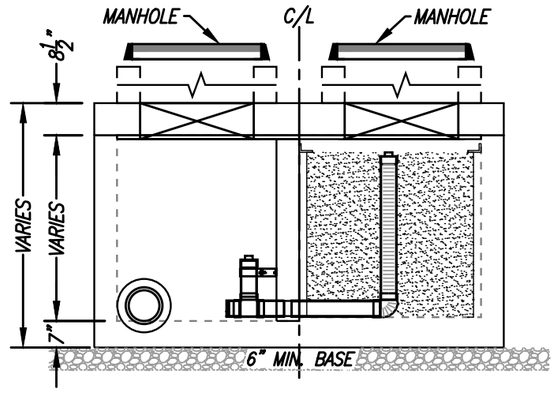
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER 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.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
FOR PATENT INFORMATION, GO TO www.ContechES.com/IP

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com

MWS-L-8-12-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

Attachment D

Operations and Maintenance (O&M) Plan

Operations and Maintenance (O&M) Guidelines

Property:

Walnut Business Park – Lot 3
Valley Boulevard and Paseo Tesoro
Walnut, CA 91789

Prepared for:

IDS Real Estate Group
515 South Figueroa Street, 16th Floor
Los Angeles, CA 90071
TEL: (213) 362-9300

Prepared by:

Atlas Civil Design
872 Higuera Street
San Luis Obispo, California
(213) 810-8470

Operations and Maintenance Plan Funding:

The owner, IDS Real Estate Group, is aware of the maintenance responsibilities of the proposed BMPs. A funding mechanism is in place to maintain the BMPs at the frequency stated in the LID Plan.

Exhibit A, Operations and Maintenance Plan

BMP Applicable? Yes/ No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation and Maintenance Responsibility
Non-Structural Source Control BMPs			
Yes	**Education for Property Owners, Employees, and Occupants** This will be addressed through educational materials. All included materials provide ways of mitigating stormwater pollution in everyday activities associated with residents as well as employees of the property management company and their sub-contractors. Practical informational materials are provided to employees, occupants, or tenants to increase the public's understanding of stormwater quality, sources of pollutants, and what they can do to reduce pollutants in stormwater.	The distribution of these materials will be the responsibility of IDS Real Estate Group or at the initial hiring on an employee.	IDS Real Estate Group
Yes	**Activity Restriction (CC&Rs)** Covenant, Conditions & Restrictions for the development are to be established within the appropriate documents which prohibit activities that can result in discharges of pollutants.	The distribution of these materials will be the responsibility of IDS Real Estate Group or at the initial hiring on an employee.	IDS Real Estate Group
Yes	**Common Area Landscaped Management** Specific practices are followed and ongoing maintenance is conducted to minimize erosion and over-irrigation, conserve water, and reduce pesticide and fertilizer applications.	Landscape maintenance should be practiced at least once per week or to the desire of the Medical Office staff. Overall landscape care should be inspected monthly.	IDS Real Estate Group will maintain or hire professionals to manage the upkeep of the project's landscaped areas.
Yes	**BMP Maintenance** In order to ensure adequate and comprehensive BMP implementation, all responsible parties are identified for implementing all non-structural and structural BMPs, cleaning, inspection, and other maintenance activities are specified including responsible parties for conducting such activities.	2 Inspections/ Cleanings per year per manufacturer's specifications starting on or near October 1st (before the rainy season)	IDS Real Estate Group will maintain or hire professionals to manage the upkeep of the project's BMPs
Yes	**Title 22 CCR Compliance** Hazardous waste is managed properly through compliance with applicable Title 22 regulations. Hazardous materials or wastes will be generated,	The distribution of these materials will be the responsibility of IDS Real	IDS Real Estate Group

	handled, transported, or disposed of in association with the project, measures are taken to comply with applicable local, state, and federal regulation to avoid harm to humans and the environment.	Estate Group or at the initial hiring on an employee.	
Yes	**Common Area Litter Control** The proposed project will have various trash receptacles located near the common areas. Trash management and litter control procedures are specified within this report, including responsible parties, and implemented to reduce pollution of drainage water.	It will be the responsibility of the IDS Real Estate Group to empty and maintain the upkeep of these areas on a weekly basis.	IDS Real Estate Group
Yes	**Employee/ Tenant Training** Practical informational materials and/or training are provided to employees at the initial time of hiring by the HOA to increase their understanding of stormwater quality, sources of pollutants, and their responsibility for reducing pollutants in stormwater.	The distribution of these materials will be the responsibility of IDS Real Estate Group or at the initial hiring on an employee.	IDS Real Estate Group
Yes	**Housekeeping of Loading Docks**	Common inspection should occur weekly or prior to any significant storm events by method of clearing any trash and oil.	IDS Real Estate Group
Yes	**Common Area Catch Basin Inspection** In order to ensure adequate and comprehensive BMP implementation, all responsible parties are identified for implementing all non-structural and structural BMPs, cleaning, inspection, and other maintenance activities are specified including responsible parties for conducting such activities.	Common inspection should occur weekly or prior to any significant storm events by method of clearing any trash/ debris from the catch basin.	IDS Real Estate Group
Yes	**Street Sweeping Private Streets and Parking Lots** Regular sweeping is conducted to reduce pollution of drainage water.	City's Street Sweeping Services or approved Private Company on a weekly basis	IDS Real Estate Group
No	**Retail Gasoline Outlets**		
Structural Source Control BMPs			
Yes	**Provide Storm Drain System Stenciling and Signage** Catch Basin Stenciling and Signage will be placed on all on-site catch basins to the satisfaction of the City Engineer.	Stenciling and Signage should be implemented prior to construction completion by the Contractor. Any defacement of the signage should be addressed immediately by IDS Real Estate Group	IDS Real Estate Group

No	**Design and Construct Outdoor Material Storage Areas to Reduce Pollutant Introduction**		
Yes	**Design and Construct Trash and Waste Storage Areas to Reduce Pollutant Introduction**	It will be the responsibility of IDS Real Estate Group to empty on a daily basis and maintain the upkeep of these areas on a weekly basis.	IDS Real Estate Group
Yes	**Use Efficient Irrigation Systems and Landscape Design** Site efficient irrigation and landscaping has been implemented by the project's landscape architect to the satisfaction of the City Engineer and Planning Department.	Efficient irrigation and landscaping should be implemented prior to construction completion by the Contractor. IDS Real Estate Group will be responsible for the upkeep. Irrigation piping, timers, and landscaped areas should be inspected at least 4 times per year by IDS Real Estate Group or a professional landscaper.	IDS Real Estate Group will maintain or hire professionals to manage the upkeep of the project's landscaping.
Yes	**Protect Slopes and Channels and Provide Energy Dissipation**		IDS Real Estate Group will maintain or hire professionals to manage the upkeep of the project's landscaping and slopes.
Yes	**Loading Docks**		IDS Real Estate Group will maintain or hire professionals to manage the upkeep of the project's Loading Docks.
No	**Maintenance Bays**		
No	**Vehicle Wash Areas**		
No	**Outdoor Processing Areas**		
No	**Equipment Wash Areas**		
No	**Fueling Areas**		
No	**Hillside Landscaping**		
No	**Wash Water Controls for Food Preparation Areas**		

Treatment Control BMPs			
Yes	**BMP #1 – Underground detention system**	See Stormtech manufacturer recommendations attached herein for the implementation, maintenance, and inspection information.	IDS Real Estate Group will maintain or hire professionals to manage the upkeep of the project's BMP's.
Yes	**Modular Wetland**	See Contech's manufacturer recommendations attached herein for the implementation, maintenance, and inspection information.	IDS Real Estate Group will maintain or hire professionals to manage the upkeep of the project's Modular Wetland systems.

Required Permits

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

- No required permits are needed for the implementation, operation, and maintenance of the previously listed BMPs.

Forms to Record the BMP Implementation, Maintenance, and Inspection

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

Recordkeeping

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

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity: _____
(Printed)

Signature: _____

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

Attachment E

Master Covenant Agreement (MCA)

RECORDING REQUESTED BY
AND MAIL TO:

Space above this line is for Recorder's use

COVENANT AND AGREEMENT
REGARDING THE MAINTENANCE OF LOW IMPACT DEVELOPMENT (LID) & NATIONAL POLLUTANTS DISCHARGE ELIMINATION SYSTEM (NPDES) BMPs

The undersigned, _____ ("Owner"), hereby certifies that it owns the real property described as follows ("Subject Property"), located in the County of Los Angeles, State of California:

LEGAL DESCRIPTION

ASSESSOR'S ID #_____TRACT NO._____LOT NO._____

ADDRESS: _____

Owner is aware of the requirements of County of Los Angeles' Green Building Standards Code, Title 31 Section 4.106.5 (LID), and Title 12, Chapter 12.84 – Low Impact Development Standards. The following post-construction BMP features have been installed on the Subject Property:

- □ Porous pavement
- □ Cistern/rain barrel
- □ Infiltration trench/pit
- □ Bioretention or biofiltration
- □ Rain garden/planter box
- □ Disconnect impervious surfaces
- □ Dry Well
- □ Storage containers
- □ Landscape and landscape irrigation
- □ Green roof
- □ Other _____
  _____

The location, including GPS x-y coordinates, and type of each post-construction BMP feature installed on the Subject Property is identified on the site diagram attached hereto as Exhibit 1.

Owner hereby covenants and agrees to maintain the above-described post-construction BMP features in a good and operable condition at all times, and in accordance with the LID/NPDES Maintenance Guidelines, attached hereto as Exhibit 2.

Owner further covenants and agrees that the above-described post-construction BMP features shall not be removed from the Subject Property unless and until they have been replaced with other post-construction BMP features in accordance with County of Los Angeles' Title 12, Chapter 12.84 – Low Impact Development Standards.

Owner further covenants and agrees to maintain all drainage devices located within his/her property in good condition and operable condition at all times.

Owner further covenants and agrees that if Owner hereafter sells the Subject Property, Owner shall provide printed educational materials to the buyer regarding the post-construction BMP features that are located on the Subject Property, including the type(s) and location(s) of all such features, and instructions for properly maintaining all such features.

Owner makes this Covenant and Agreement on behalf of itself and its successors and assigns. This Covenant and Agreement shall run with the Subject Property and shall inure to the benefit of the County of Los Angeles and be binding upon Owner, future owners, and their heirs, successors and assignees, and shall continue in effect until the release of this Covenant and Agreement by the County of Los Angeles, in its sole discretion.

Owner(s):

By:_____ Date:_____

By:_____ Date:_____

A notary public or other officer completing the attached certificate verifies only the identity of the individual who signed the document to which the certificate is attached, and not the truthfulness, accuracy, or validity of that document.

(PLEASE ATTACH NOTARY)

FOR DEPARTMENT USE ONLY:

MUST BE APPROVED BY COUNTY OF LOS ANGELES BUILDING AND SAFETY DIVISION PRIOR TO RECORDING.

APPROVED BY:_____ _____ Date _____ Permit No._____
(Print Name) (Signature)

Attachment F

Infiltration Test Report

March 13, 2023

Matt Katz
IDS Real Estate Group
515 South Figueroa Street, 16th Floor
Los Angeles, CA 90071

Re: Addendum 1 - Field Percolation Testing
Proposed Walnut Business Center
Valley Boulevard and South Lemon Avenue
Walnut, California 91789
Langan Project No. 700108301

Dear Matt:

Langan Engineering and Environemental Services, Inc. (LANGAN) previously performed a geotechnical investigation for the proposed Walnut Business Center to be constructed at the north corner of Valley Boulevard and South Lemon Avenue in Walnut, California. The results of our geotechnical investigation were summarized in a draft geotechnical report dated December 15, 2021.

Our services were performed in accordance with our proposal dated January 6, 2023 and the Professional Services Agreement, executed January 12, 2023.

This letter (Addendum 1) summarizes field percolation testing performed in a subsequent mobilization as part of our overall investigation.

Field Percolation Testing

Field Percolation Test Well Installation

To supplement the data from our geotechnical investigation, five borings , P-1 through P-5, were drilled at the approximate locations shown on Figure 1. The locations of the borings were selected based on our discussions with the project civil engineer. The borings were drilled between approximately 5 to 10 feet below the existing ground surface (bgs) using a truck-mounted drill rig equipped with an eight-inch, outside diameter hollow-stem auger.

We performed standard penetration test (SPT) sampling within the borings and maintained a log of the subsurface conditions encountered.

Upon the completion of drilling, the boreholes were converted to percolation test wells by installing perforated PVC pipe and gravel to fill the annular space between the PVC pipe and the borehole sidewalls.

The test well was installed in general accordance with the *Boring Percolation Test Procedure* outlined in the *County of Los Angeles, Department of Public Works, Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration Manual (LA County Guidelines, GS200.2),* dated June 30, 2021.

Subsurface Conditions

General subsurface conditions encountered at the site are summarized in our Section 2.2 of our draft geotechnical investigation report dated December 15, 2021.

Asphalt concrete pavement (AC) 2.5- to 3.5-inches in thickness, underlain by aggregate base (AB) 3- to 4-inches in thickness, was encountered in the borings.

The pavement section in the borings was underlain by artificial fill soils. Fill soils were encountered to depths of approximately 4 to 7 feet bgs. The fill soils consisted of very moist, firm to stiff clay to clay with silt.

Native soil, consisting of Quartenary-age young alluvial fan deposits were encountered beneath the fill in each boring. The native soils consisted predominantly of moist to very moist, medium stiff to hard sandy silt, silt, clay, and clay with silt.

Groundwater was not encountered in borings P-1 through P-5.

As summarized in our geotechnical investigation report, the depth to groundwater was measured between depths of 16 and 24½ feet below ground surface (bgs). Additionally, the historical high groundwater level (HHGWL) is on the order of approximately 20 feet bgs.

Logs of our supplemental borings are presented in Attachment A.

Field Percolation Testing and Results

After completion of the well construction, the wells were pre-soaked in advance of field percolation testing. Pre-soaking and subsequent field percolation testing was performed in general conformance with Los Angeles County guidelines.

The testing was repeated in the test wells until the measured rate of percolation stabilized and county testing requirements were achieved. Twelve trials were performed within each test well.

The results of the field percolation testing are summarized in Table 1 and presented in Attachment B.

Table 1 - Summary of Percolation Testing

Field Percolation Test #	Depth (Feet)	Ground Surface Elevation (Feet, NAVD88)	Test Elevation (Feet, NAVD88)	USCS Soil Type	Design Infiltration Rate (in/hr)
P-1	10	526	516	ML	0.01
P-2	5	525	520	CL	0.01
P-3	10	524	514	CL	0.00
P-4	5	526	521	ML	0.07
P-5	5	529	524	CL	0.00

The procedure outlined in the LA County Guidelines requires the use of reduction factors to account for the test method used, the variability of subsurface conditions across the site, and the long-term serviceability of the infiltration system. Please note the above test results include the minimum reduction factor of 3 as outlined in the LA County Guidelines.

Conclusions

Based on the results of the percolation testing, we have calculated design infiltration rates of 0.00 to 0.07 inches per hour for the site.

These design infiltration rates are below the minimum allowable design infiltration rate of 0.3 inches per hour; therefore, infiltration at the site is not feasible and an alternative WQMP system will be necessary.

Closing

We appreciate the opportunity to have provided these services for this project. Should you have any questions regarding this letter, please feel free to contact us.

Sincerely,

Langan Engineering and Environmental Services, Inc.

Claudia Rangel
Staff Engineer

Shaun Wilkins
Senior Project Geologist

signed 3/13/23

signed 3/13/23

Christopher J. Zadoorian
Senior Associate

Enclosures: Figure 1 – Site Plan
Attachment A – Boring Logs
Attachment B – Percolation Test Results

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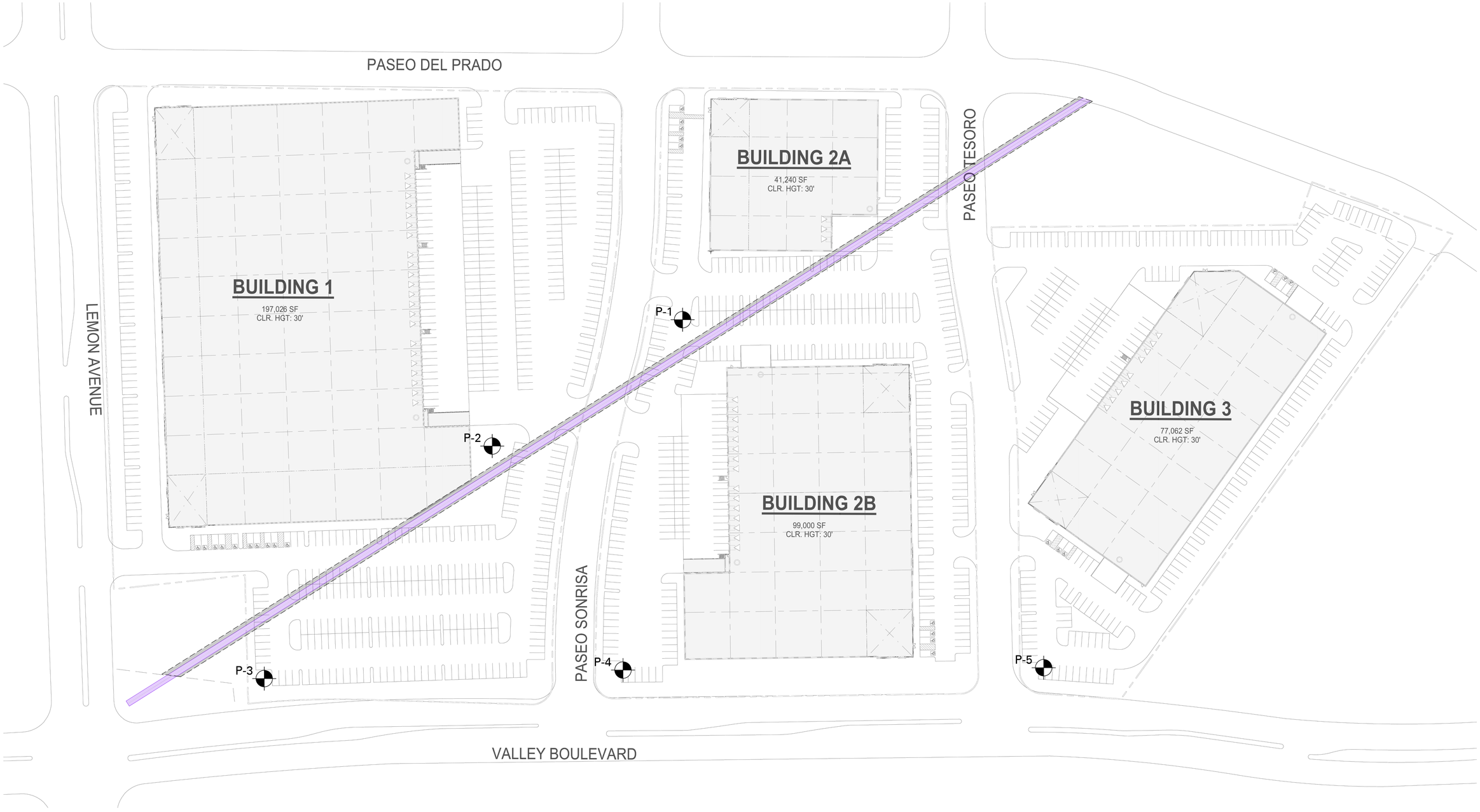
FIGURE



LEGEND:

P-1 INFILTRATION BORING

APPROXIMATE LOCATION OF EXISTING STORM DRAIN

APPROXIMATE LOCATION OF EXISTING 15-FOOT STORM DRAIN EASEMENT

NOTES:

1. BACKGROUND IMAGE REFERENCED FROM "IDS WALNUT BUSINESS CENTER VALLEY BOULEVEARD & LEMON AVENUE WALNUT, CALIFORNIA 91789", SHT A100, PREPARED BY WARE MALCOMB, DATED DECEMBER 07, 2022.

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SCALE IN FEET

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Project
WALNUT BUSINESS PARK
20401 VALLEY BOULEVARD
WALNUT
LOS ANGELES COUNTY CALIFORNIA

Plate Title
SITE PLAN

Project No.	Figure No.
700108301	1
Date: MARCH 2023	
Scale: AS SHOWN	
Drawn By: CC	

Filename: \\langan.com\data\IRV\data3\700108301\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\GEOTECHNICAL\GEOTECHNICAL FIGURES.dwg Date: 2/28/2023 Time: 10:09 User: mgalvan Style Table: Langan.stb Layout: Ware Malcomb SP

ATTACHMENT A

Boring Logs

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		Symbols	Typical Names
Coarse-Grained Soil (more than half of soil is larger than the no. 200 sieve size)	**Gravels** (more than half of coarse fraction is retained/> no. 4 sieve size)	**GW**	Well-graded GRAVELS with less than 5% fines or gravel-sand mixtures
		GP	Poorly-graded GRAVELS with less than 5% fines or gravel-sand mixtures
		GM	Silty gravels, gravel-sand-silt mixtures;GRAVELS with greater than 12% ML or MH fines
		GC	Clayey gravels, gravel-sand-clay mixtures; GRAVELS with greater than 12% CL or CH
	Sands (more than half of coarse fraction passes/< no. 4 sieve size)	**SW**	Well-graded sands with less than 5% fines or gravelly sands, little or no fines
		SP	Poorly-graded sands with less than 5% fines or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures; SANDS with greater than 12% ML or MH fines
		SC	Clayey sands, sand-clay mixtures; SANDS with greater than 12% CL or CH fines
Fine-Grained Soils (more than half of soil is smaller than the no. 200 sieve size)	**Silts and Clays** LL = < 50	**ML**	Inorganic silts and clayey silts of low plasticity, sandy non-plastic SILT, gravelly SILT
		CL	Inorganic clays of low to medium plasticity, silty CLAY, trace fines, sand
		OL	Organic silts and organic silt-clays of non-plastic to medium plasticity
	Silts and Clays LL = > 50	**MH**	Inorganic medium plastic silts, medium plastic to very plastic clayey silts.
		CH	Inorganic plastic to very plastic CLAYS, sandy plastic CLAY
		OH	Organic medium plastic to plastic silty CLAYS, and very plastic CLAYS
Highly Organic Soils		**PT**	Peat and other highly organic soils

GRAIN SIZE CHART

Classification	Range of Grain Sizes	
	U.S. Standard Sieve Size	Grain Size in Millimeters
Boulders	Above 12"	Above 305
Cobbles	12" to 3"	305 to 76.2
Gravel	3" to No. 4	76.2 to 4.75
coarse	3" to ¾"	76.2 to 19.1
fine	¾" to No.4	19.1 to 4.75
Sand	No. 4 to No. 200	4.76 to 0.075
coarse	No. 4 to No. 10	4.76 to 2.00
medium	No. 10 to No. 40	2.00 to 0.420
fine	No. 40 to No. 200	0.240 to 0.075
Silt and Clay	Below No. 200	Below 0.075

GROUNDWATER READING

- Groundwater encountered during drilling
- Groundwater at completion
- Groundwater at 24 hours

SOIL DESCRIPTIONS/SYMBOLS

- Well-graded GRAVEL (GW)
- Poorly-graded GRAVEL (GP)
- Silty GRAVEL (GM)
- Clayey GRAVEL (GC)
- Well-graded SAND (SW)
- Poorly-graded SAND (SP)
- Silty SAND (SM)
- Clayey SAND (SC)
- AGGREGATE BASE
- Low-Plasticity SILT (ML)
- High-Plasticity SILT (MH)
- Low-Plasticity CLAY (CL)
- High-Plasticity CLAY (CH)
- SANDSTONE
- CLAYSTONE
- SILTSTONE
- FILL
- ASPHALT

SAMPLER TYPE

- CR - Modified California (CR) split-barrel ring sampler with 3.0-inch outside diameter and a 2.5-inch inside diameter.
- SPT - Standard Penetration Test (SPT) split-barrel sampler with a 2.00-inch outside diameter with a 1.5-inch inside diameter
- ST - Shelby Tube (3.0-inch outside diameter, thin-walled tube) advanced with hydraulic pressure
- BAG - Bulk Sample
- C - Core Barrel

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Figure Title

BORING LOG LEGEND

Figure No.

APPENDIX A

Filename: \\Langan.com\data\IRV\other\CAD Library Irvine\Titleblocks (LANGAN)\GEOTECH TITLEBLOCK\Classification Legend\Classification Legend.dwg Date: 6/18/2021 Time: 11:52 User: mgalvan Style Table: Langan.stb Layout: Legend

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Log of Boring **P-1** Sheet 1 of 1

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: 526 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 01/30/2023 / Date Finished: 01/30/2023
Drilling Equipment: CME-75 Truck-mounted drill rig	Completion Depth: 10 ft / Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 2 / Undisturbed - / Core -
Casing Diameter (in): - / Casing Depth (ft): -	Water Level (ft.): First ▽ / Completion ▼ - / 24 HR. ▼ -
Casing Hammer: - / Weight (lbs): - / Drop (in): -	Drilling Foreman: Cody
Sampler: 2-inch O.D. SPT Split-Barrel	Field Engineer: S. Wilkins
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Contact Depth	Well Diagram
	526.0	Asphalt Concrete = 3-inches thick, AB = 4-inches thick **Artificial Fill (af)** CLAY with Silt (CL), dark and light olive gray mottled, firm, very moist. [FILL]	0						0.6	
	522.0	**Young Alluvial Fan Deposits (Qya)** CLAY with Silt (CL), olive gray, very stiff, moist, caliche stringers.	4	S-1	SPT	18	7 8 9	17	4.0	10 feet of 3-inch diameter, perforated PVC pipe with sock around pipe. 3/4-inch gravel in the annular space.
	519.0	Sandy SILT (ML), olive gray, hard, moist, very fine sand.	7	S-2	SPT	18	8 14 18	32	7.0	
	516.0	Total Depth = 10 feet Groundwater not encountered. Boring converted to percolation test well. Boring backfilled with soil cuttings and patched with AC.	10						10.0	3 inches of 3/4-inch gravel with solid end cap on pipe.

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Log of Boring **P-2** Sheet 1 of 1

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: 525 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 01/30/2023 — Date Finished: 01/30/2023
Drilling Equipment: CME-75 Truck-mounted drill rig	Completion Depth: 5 ft — Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 1 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Cody
Sampler: 2-inch O.D. SPT Split-Barrel	Field Engineer: S. Wilkins
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Contact Depth	Well Diagram
	+525.0		0							
	+524.5	Asphalt Concrete = 3-inches thick, AB = 3-inches thick.								
		Artificial Fill (af) CLAY (CL), dark olive brown and olive gray mottled, stiff, very moist, few fine to medium sand. [FILL]	1						0.5	5 feet of 3-inch diameter, perforated PVC pipe with sock around pipe. 3/4-inch gravel in the annular space. 3 inches of 3/4-inch gravel with solid end cap on pipe.
			2							
			3							
	+521.0		4	S-1	SPT	18	2 2 3	5	4.0	
	+520.0	**Young Alluvial Fan Deposits (Qya)** CLAY (CL), dark olive gray, medium stiff, very moist, few fine to medium sand, caliche stringers present.	5						5.0	
		Total Depth = 5 feet Groundwater not encountered. Boring converted to percolation test well. Boring backfilled with soil cuttings and patched with AC.	6							
			7							
			8							
			9							
			10							
			11							
			12							
			13							
			14							
			15							
			16							
			17							
			18							
			19							
			20							

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Log of Boring **P-3** Sheet 1 of 1

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: 524 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 01/30/2023 / Date Finished: 01/30/2023
Drilling Equipment: CME-75 Truck-mounted drill rig	Completion Depth: 10 ft / Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 2 / Undisturbed - / Core -
Casing Diameter (in): - / Casing Depth (ft): -	Water Level (ft.): First ▽ / Completion ▼ - / 24 HR. ▼ -
Casing Hammer: - / Weight (lbs): - / Drop (in): -	Drilling Foreman: Cody
Sampler: 2-inch O.D. SPT Split-Barrel	Field Engineer: S. Wilkins
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Contact Depth	Well Diagram
	+524.0	Asphalt Concrete = 3.5-inches thick, AB = 3.5-inches thick **Artificial Fill (af)** CLAY (CL), light yellowish brown and olive gray mottled, stiff, very moist, few fine to medium sand. [FILL]	0						0.6	
		Dark olive gray mottled.	5	S-1	SPT	18	4 6 8	14		10 feet of 3-inch diameter, perforated PVC pipe with sock around pipe. 3/4-inch gravel in the annular space.
	+517.0	**Young Alluvial Fan Deposits (Qya)** CLAY (CL), olive gray, stiff, very moist, caliche stringers present.	7						7.0	
			9	S-2	SPT	18	4 6 8	14		
	+514.0	Total Depth = 10 feet Groundwater not encountered. Boring converted to percolation test well. Boring backfilled with soil cuttings and patched with AC.	10						10.0	3 inches of 3/4-inch gravel with solid end cap on pipe.

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Log of Boring **P-4** Sheet 1 of 1

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: 526 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 01/30/2023 / Date Finished: 01/30/2023
Drilling Equipment: CME-75 Truck-mounted drill rig	Completion Depth: 5 ft / Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 1 / Undisturbed - / Core -
Casing Diameter (in): - / Casing Depth (ft): -	Water Level (ft.): First ▽ / Completion ▼ - / 24 HR. ▼ -
Casing Hammer: - / Weight (lbs): - / Drop (in): -	Drilling Foreman: Cody
Sampler: 2-inch O.D. SPT Split-Barrel	Field Engineer: S. Wilkins
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Contact Depth	Well Diagram
	+526.0		0							
	+525.5	Asphalt Concrete = 2.5-inches thick, AB = 4-inches thick.							0.5	
		Artificial Fill (af) CLAY (CL), dark olive gray, stiff, very moist. [FILL]	1							
			2							
			3							
			4	S-1	SPT	18	5 7 9	16		
	+521.5								4.5	
	+521.0	**Young Alluvial Fan Deposits (Qya)** SILT (ML), light olive brown, very stiff, moist, caliche stringers present.	5						5.0	
		Total Depth = 5 feet Groundwater not encountered. Boring converted to percolation test well. Boring backfilled with soil cuttings and patched with AC.	6							5 feet of 3-inch diameter, perforated PVC pipe with sock around pipe. 3/4-inch gravel in the annular space. 3 inches of 3/4-inch gravel with solid end cap on pipe.
			7							
			8							
			9							
			10							
			11							
			12							
			13							
			14							
			15							
			16							
			17							
			18							
			19							
			20							

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Log of Boring **P-5** Sheet 1 of 1

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: 529 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 01/30/2023 — Date Finished: 01/30/2023
Drilling Equipment: CME-75 Truck-mounted drill rig	Completion Depth: 5 ft — Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 1 — Undisturbed - — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Cody
Sampler: 2-inch O.D. SPT Split-Barrel	Field Engineer: S. Wilkins
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Contact Depth	Well Diagram
	+529.0	Concrete = 3.5-inches thick, AB = 3-inches thick	0						0.5	
		Artificial Fill (af) CLAY with Silt (CL), olive brown and gray mottled, medium stiff, very moist. [FILL]	1							
			2							
			3							5 feet of 3-inch diameter, perforated PVC pipe with sock around pipe. 3/4-inch gravel in the annular space. 3 inches of 3/4-inch gravel with solid end cap on pipe.
	+525.0		4	S-1	SPT	18	2 3 4	7	4.0	
	+524.0	**Young Alluvial Fan Deposits (Qya)** CLAY with Silt (CL), olive brown, medium stiff, very moist.	5						5.0	
		Total Depth = 5 feet Groundwater not encountered. Boring converted to percolation test well. Boring backfilled with soil cuttings and patched with concrete.	6							
			7							
			8							
			9							
			10							
			11							
			12							
			13							
			14							
			15							
			16							
			17							
			18							
			19							
			20							

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ATTACHMENT B

Percolation Test Results

PERCOLATION TEST DATA SHEET

Project:		Walnut Business Park				Project No.:	700108301	Date:	1/31/2023
Test Hole No.:		P-1				Tested By:	S. Wilkins		
Depth of Test Hole (ft):		10				USCS Soil Classification:		ML	
PVC Pipe Dimension:		3-in I.D. Perforated				Test Hole Diameter (in):		8	
Trial No.	Date	Time of Measurement	Initial Depth to Water (ft)	Time of Measurement	Final Depth to Water (ft)	Volume of Water Infiltrated (cu.in.)	Surface Area (sq.in.)	Time Interval (min)	Inflitration Rate (in/hr)
#1 (Refill)	1/31/2023	7:23 AM	4.93	7:53 AM	4.96	18	1579	30	0.02
#2 (Refill)	1/31/2023	7:53 AM	4.96	8:23 AM	5.00	24	1570	30	0.03
#3 (Refill)	1/31/2023	8:23 AM	5.00	8:53 AM	5.06	36	1558	30	0.05
#4 (Refill)	1/31/2023	8:53 AM	4.85	9:23 AM	4.91	36	1603	30	0.05
#5 (Refill)	1/31/2023	9:23 AM	4.91	9:53 AM	4.95	24	1585	30	0.03
#6 (Refill)	1/31/2023	9:53 AM	4.95	10:23 AM	5.01	36	1573	30	0.05
#7 (Refill)	1/31/2023	10:23 AM	5.01	10:53 AM	5.08	42	1555	30	0.05
#8 (Refill)	1/31/2023	10:53 AM	4.85	11:23 AM	4.91	36	1603	30	0.05
#9 (Refill)	1/31/2023	11:23 AM	4.91	11:53 PM	4.96	30	1585	30	0.04
#10 (Refill)	1/31/2023	11:53 AM	4.95	12:23 PM	5.00	30	1573	30	0.04
#11 (Refill)	1/31/2023	12:23 PM	5.00	12:53 PM	5.06	36	1558	30	0.05
#12 (Refill)	1/31/2023	12:53 PM	5.06	1:23 PM	5.12	36	1540	30	0.05

Comments:	1. Percolation test was performed in accordance with the Boring Percolation Test Procedure provided in the "Guidelines for Design, Investigation, and Reporting - Low Impact Development Stormwater Infiltration," prepared by County of Los Angeles Department of Public Works, dated 30 June 2021. 2. Weather: Sunny and warm.	Average Stabilized Rate	0.04
		Reduction Factors RF_t=1, RF_v=1, RF_s=1	3
		Design Infiltration Rate (in/hr)	0.01

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PERCOLATION TEST DATA SHEET

Project:	Walnut Business Park	Project No.:	700108301	Date:	1/31/2023
Test Hole No.:	P-2	Tested By:	S. Wilkins		
Depth of Test Hole (ft):	5	USCS Soil Classification:		CL	
PVC Pipe Dimension:	3-in I.D. Perforated	Test Hole Diameter (in):		8	

Trial No.	Date	Time of Measurement	Initial Depth to Water (ft)	Time of Measurement	Final Depth to Water (ft)	Volume of Water Infiltrated (cu.in.)	Surface Area (sq.in.)	Time Interval (min)	Inflitration Rate (in/hr)
#1 (Refill)	1/31/2023	7:25 AM	1.75	7:55 AM	1.80	30	1030	30	0.06
#2 (Refill)	1/31/2023	7:55 AM	1.80	8:25 AM	1.84	24	1015	30	0.05
#3 (Refill)	1/31/2023	8:25 AM	1.84	8:55 AM	1.87	18	1003	30	0.04
#4 (Refill)	1/31/2023	8:55 AM	1.87	9:25 AM	1.89	12	994	30	0.02
#5 (Refill)	1/31/2023	9:25 AM	1.89	9:55 AM	1.94	30	988	30	0.06
#6 (Refill)	1/31/2023	9:55 AM	1.94	10:25 AM	1.95	6	973	30	0.01
#7 (Refill)	1/31/2023	10:25 AM	1.95	10:55 AM	1.97	12	970	30	0.02
#8 (Refill)	1/31/2023	10:55 AM	1.97	11:25 AM	2.00	18	964	30	0.04
#9 (Refill)	1/31/2023	11:25 AM	2.00	11:55 AM	2.03	18	955	30	0.04
#10 (Refill)	1/31/2023	11:55 AM	1.83	12:25 PM	1.86	18	1006	30	0.04
#11 (Refill)	1/31/2023	12:25 PM	1.86	12:55 PM	1.88	12	997	30	0.02
#12 (Refill)	1/31/2023	12:55 PM	1.88	1:25 PM	1.91	18	991	30	0.04

Comments:	1. Percolation test was performed in accordance with the Boring Percolation Test Procedure provided in the "Guidelines for Design, Investigation, and Reporting - Low Impact Development Stormwater Infiltration," prepared by County of Los Angeles Department of Public Works, dated 30 June 2021. 2. Weather: Sunny and warm.	Average Stabilized Rate	0.03
		Reduction Factors RF_t=1, RF_v=1, RF_s=1	3
		Design Infiltration Rate (in/hr)	0.01

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PERCOLATION TEST DATA SHEET

Project:	Walnut Business Park					Project No.:	700108301	Date:	1/31/2023
Test Hole No.:	P-3					Tested By:	S. Wilkins		
Depth of Test Hole (ft):	10					USCS Soil Classification:		CL	
PVC Pipe Dimension:	3-in I.D. Perforated					Test Hole Diameter (in):		8	

Trial No.	Date	Time of Measurement	Initial Depth to Water (ft)	Time of Measurement	Final Depth to Water (ft)	Volume of Water Infiltrated (cu.in.)	Surface Area (sq.in.)	Time Interval (min)	Inflitration Rate (in/hr)
#1 (Refill)	1/31/2023	7:28 AM	3.00	7:58 AM	3.00	0	2161	30	0.00
#2 (Refill)	1/31/2023	7:58 AM	3.00	8:28 AM	3.01	6	2161	30	0.01
#3 (Refill)	1/31/2023	8:28 AM	3.01	8:58 AM	3.02	6	2158	30	0.01
#4 (Refill)	1/31/2023	8:58 AM	3.02	9:28 AM	3.08	36	2155	30	0.03
#5 (Refill)	1/31/2023	9:28 AM	3.08	9:58 AM	3.11	18	2137	30	0.02
#6 (Refill)	1/31/2023	9:58 AM	3.11	10:28 AM	3.14	18	2128	30	0.02
#7 (Refill)	1/31/2023	10:28 AM	3.14	10:58 AM	3.18	24	2119	30	0.02
#8 (Refill)	1/31/2023	10:58 AM	3.18	11:28 AM	3.21	18	2107	30	0.02
#9 (Refill)	1/31/2023	11:28 AM	3.21	11:58 AM	3.23	12	2098	30	0.01
#10 (Refill)	1/31/2023	11:58 AM	3.23	12:28 PM	3.24	6	2092	30	0.01
#11 (Refill)	1/31/2023	12:28 PM	3.24	12:58 PM	3.26	12	2089	30	0.01
#12 (Refill)	1/31/2023	12:58 PM	3.26	1:28 PM	3.29	18	2083	30	0.02

Comments:	1. Percolation test was performed in accordance with the Boring Percolation Test Procedure provided in the "Guidelines for Design, Investigation, and Reporting - Low Impact Development Stormwater Infiltration," prepared by County of Los Angeles Department of Public Works, dated 30 June 2021. 2. Weather: Sunny and warm.	Average Stabilized Rate	0.01
		Reduction Factors RF_t=1, RF_v=1, RF_s=1	3
		Design Infiltration Rate (in/hr)	0.00

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PERCOLATION TEST DATA SHEET

Project:		Walnut Business Park				Project No.:	700108301	Date:	1/31/2023
Test Hole No.:		P-4				Tested By:	S. Wilkins		
Depth of Test Hole (ft):		5				USCS Soil Classification:		ML	
PVC Pipe Dimension:		3-in I.D. Perforated				Test Hole Diameter (in):		8	
Trial No.	Date	Time of Measurement	Initial Depth to Water (ft)	Time of Measurement	Final Depth to Water (ft)	Volume of Water Infiltrated (cu.in.)	Surface Area (sq.in.)	Time Interval (min)	Inflitration Rate (in/hr)
#1 (Refill)	1/31/2023	7:31 AM	0.72	8:01 AM	1.01	175	1341	30	0.26
#2 (Refill)	1/31/2023	8:01 AM	1.01	8:31 AM	1.27	157	1254	30	0.25
#3 (Refill)	1/31/2023	8:31 AM	1.27	9:01 AM	1.52	151	1175	30	0.26
#4 (Refill)	1/31/2023	9:01 AM	1.52	9:31 AM	1.75	139	1100	30	0.25
#5 (Refill)	1/31/2023	9:31 AM	1.75	10:01 AM	1.95	121	1030	30	0.23
#6 (Refill)	1/31/2023	10:01 AM	1.95	10:31 AM	2.11	97	970	30	0.20
#7 (Refill)	1/31/2023	10:31 AM	1.73	11:01 AM	1.89	97	1036	30	0.19
#8 (Refill)	1/31/2023	11:01 AM	1.89	11:31 AM	2.07	109	988	30	0.22
#9 (Refill)	1/31/2023	11:31 AM	2.07	12:01 PM	2.24	103	934	30	0.22
#10 (Refill)	1/31/2023	12:01 PM	1.84	12:31 PM	2.01	103	1003	30	0.20
#11 (Refill)	1/31/2023	12:31 PM	2.01	1:01 PM	2.16	90	952	30	0.19
#12 (Refill)	1/31/2023	1:01 PM	2.16	1:31 PM	2.32	97	907	30	0.21

Comments:	1. Percolation test was performed in accordance with the Boring Percolation Test Procedure provided in the "Guidelines for Design, Investigation, and Reporting - Low Impact Development Stormwater Infiltration," prepared by County of Los Angeles Department of Public Works, dated 30 June 2021. 2. Weather: Sunny and warm.	Average Stabilized Rate	0.20
		Reduction Factors RF_t=1, RF_v=1, RF_s=1	3
		Design Infiltration Rate (in/hr)	0.07

LANGAN

PERCOLATION TEST DATA SHEET

Project:	Walnut Business Park	Project No.:	700108301	Date:	1/31/2023
Test Hole No.:	P-5	Tested By:	S. Wilkins		
Depth of Test Hole (ft):	5	USCS Soil Classification:		CL	
PVC Pipe Dimension:	3-in I.D. Perforated	Test Hole Diameter (in):		8	

Trial No.	Date	Time of Measurement	Initial Depth to Water (ft)	Time of Measurement	Final Depth to Water (ft)	Volume of Water Infiltrated (cu.in.)	Surface Area (sq.in.)	Time Interval (min)	Inflitration Rate (in/hr)
#1 (Refill)	1/31/2023	7:34 AM	1.40	8:04 AM	1.40	0	1136	30	0.00
#2 (Refill)	1/31/2023	8:04 AM	1.40	8:34 AM	1.41	6	1136	30	0.01
#3 (Refill)	1/31/2023	8:34 AM	1.41	9:04 AM	1.41	0	1133	30	0.00
#4 (Refill)	1/31/2023	9:04 AM	1.41	9:34 AM	1.42	6	1133	30	0.01
#5 (Refill)	1/31/2023	9:34 AM	1.42	10:04 AM	1.42	0	1130	30	0.00
#6 (Refill)	1/31/2023	10:04 AM	1.42	10:34 AM	1.42	0	1130	30	0.00
#7 (Refill)	1/31/2023	10:34 AM	1.42	11:04 AM	1.42	0	1130	30	0.00
#8 (Refill)	1/31/2023	11:04 AM	1.42	11:34 AM	1.43	6	1130	30	0.01
#9 (Refill)	1/31/2023	11:34 AM	1.43	12:04 PM	1.43	0	1127	30	0.00
#10 (Refill)	1/31/2023	12:04 PM	1.43	12:34 PM	1.44	6	1127	30	0.01
#11 (Refill)	1/31/2023	12:34 PM	1.44	1:04 PM	1.45	6	1124	30	0.01
#12 (Refill)	1/31/2023	1:04 PM	1.45	1:34 PM	1.46	6	1121	30	0.01

Comments:	1. Percolation test was performed in accordance with the Boring Percolation Test Procedure provided in the "Guidelines for Design, Investigation, and Reporting - Low Impact Development Stormwater Infiltration," prepared by County of Los Angeles Department of Public Works, dated 30 June 2021. 2. Weather: Sunny and warm.	Average Stabilized Rate	0.01
		Reduction Factors RF_t=1, RF_v=1, RF_s=1	3
		Design Infiltration Rate (in/hr)	0.00

LANGAN

Attachment G

Geotechnical Investigation

DRAFT

DRAFT GEOTECHNICAL INVESTIGATION REPORT

for

PROPOSED INDUSTRIAL BUILDING DEVELOPMENT
20401 Valley Boulevard
Walnut, California 91789

Prepared For:

IDS Real Estate Group
515 South Figueroa Street, 16th Floor
Los Angeles, CA 90071

Prepared By:

Langan Engineering and Environmental Services, Inc.
18575 Jamboree Road, Suite 150
Irvine, California 92612

December 15, 2021
Langan Project No.: 700108301

LANGAN

DRAFT

December 15, 2021

Matt Katz and Geoff Garland
IDS Real Estate Group
515 South Figueroa Street, 16th Floor
Los Angeles, CA 90071

Draft Geotechnical Investigation Report
Proposed Industrial Building Development
20401 Valley Boulevard
Walnut, California
Langan Project No. 700108301

Dear Matt and Geoff:

Langan Engineering & Environmental Services, Inc. is pleased to submit this Draft geotechnical investigation report for the proposed Industrial Building development to be constructed at 20401 Valley Boulevard in Walnut, California.

This report was prepared in general accordance with our proposal dated November 9, 2021.

♦ ♦ ♦

We sincerely appreciate the opportunity to be of service to you. Please contact us if you have questions regarding this report.

Sincerely,
Langan Engineering & Environmental Services, Inc.

DRAFT

Chris Zadoorian, G.E.
Associate

CC:SHW:CJZ:

Document ID: \\langan.com\data\IRV\data3\700108301\Outbound\Draft Report\700108301-12.15.21-geor-cjz.docx

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A FIELD EXPLORATIONS AND LABORATORY TEST RESULTS

1.0 INTRODUCTION

Langan Engineering and Environmental Services, Inc. (LANGAN) has completed a geotechnical investigation for the proposed industrial building development to be constructed at 20401 Valley Boulevard in Walnut, California at the location shown on Figure 1.

The site is located between Valley Boulevard and Paseo del Prado east of Lemon Avenue as shown on Figure 2.

The site is approximately 26 acres and is currently developed with approximately 36 commercial and/or industrial buildings and associated surface parking lots.

An existing 84- to 90-inch-diameter, reinforced concrete pipe (RCP) storm drain crosses the site roughly from northeast to southwest. The existing storm drain was constructed in the late 1960s and the invert ranges from approximately 15 feet bgs at the northeasterly corner of the site to approximately ten feet bgs at the southwesterly corner of the site.

The ground surface level at the site generally slopes down to the south and ranges from approximately Elevation 525 to Elevation 520.

You furnished us with a conceptual site plan dated November 11, 2021 prepared by Ware Malcomb that depict the current proposed Walnut Business Park development.

Based on our review of the site plan, we understand that the proposed development will include four at-grade high-bay industrial buildings, designated as Buildings 1, 2A, 2B and 3 at the approximate location shown on Figure 1. The buildings will range in size between approximately 41,000 and 177,000 square feet.

Based on our discussions with you, each proposed building will be established approximately four feet above the existing ground surface level at the site to accommodate loading docks. For the purposes of this report, we have assumed that the lowest finish floor levels will range from approximately Elevation 525 to 528 noting that actual lowest finish floor elevations for each building may vary somewhat.

Portland cement concrete (PCC) and/or and asphalt concrete (AC) pavement are also planned for loading docks, drive lanes, and vehicle parking.

Our investigation is summarized herein followed by our conclusions and recommendations for the proposed development.

2.0 SUBSURFACE EXPLORATIONS AND CONDITIONS

2.1 Subsurface Explorations

Prior to drilling, we obtained permits from the Los Angeles (LA) County Environmental Health Department (Permit Number SR 0277564).

We drilled twelve borings, borings B-1 through B-12, at the locations show on Figure 2. Our borings were drilled to depths of approximately 25 to 50 feet below existing ground surface (bgs) using truck-mounted mud rotary drilling equipment. Table 1 summarizes the general locations of our borings with respect to the proposed building locations.

Table 1 – Boring Locations

Building Designation	Associated Borings
Building 1	B-1 through B-4
Buildings 2A and 2B	B-5 through B-9
Building 3	B-10 through B-12

Our field representative maintained a log of the soil conditions encountered during drilling and we collected relatively undisturbed samples and performed standard penetration testing (SPT) at regular intervals. We also collected bulk samples in several of the borings.

The samples collected from the borings were transported to our office for further review and for assignment of geotechnical laboratory testing.

Upon completion of the borings, we backfilled the boreholes with bentonite grout in accordance with the conditions of the LA County permit.

The drill spoils from the borings were placed in 55-gallon drums for temporary storage pending subsequent off-site disposal by a licensed materials hauler.

We also restored the ground surface to the pre-existing condition at each boring location.

2.2 Subsurface Conditions

Asphalt concrete pavement (AC) was encountered in each boring overlying aggregate base. The AC pavement ranged from three to five and one-half inches in thickness overlying aggregate base ranging from as summarized in Table 2.

Table 2 – Summary of AC Pavement and Underlying Base Materials

Building Designation	Associated Borings	AC Pavement (inches)	Aggregate Base (inches)
Building 1	B-1 through B-4	3.0	2.0 to 6.0
Buildings 2A and 2B	B-5 through B-9	3.0 to 5.5	4.0 to 6.0
Building 3	B-10 through B-12	4.0 to 5.0	6.0

Fill soils were encountered in the borings to depths of approximately 4.5 to 9.5 feet bgs. The fill consisted of moist to very moist clayey soils with varying amounts of silt, sand, and gravel and is summarized in Table 3, below.

Native soil, consisting of Quaternary-age young alluvial fan deposits were encountered beneath the fill in each boring. The native soils consisted predominately of very moist to wet medium stiff to very stiff clay with varying amounts of sand, silt, and gravel as well as a layer of medium dense sandy clay.

The upper native soils exhibit medium to high plasticity and in isolated cases are very soft and compressible as encountered in borings B-5 and B-7 at depths of approximately 20 feet bgs.

Interbedded sandstone, claystone, and siltstone bedrock of the Tertiary-aged Puente Formation, Yorba member, was encountered below the alluvial fan deposits in borings B-1, B-2, and B-4 at depths of approximately 10, 20, and 35 feet, respectively, as summarized in Table 3.

The generalized subsurface conditions at the site are depicted in Figures 3 through 10, Cross Sections A-A' through H-H'.

2.3 Groundwater

It's sometimes difficult to positively identify the groundwater level in geotechnical exploration borings in general, and when using mud-rotary drilling methods in clayey soils the difficulty is exacerbated.

The primary reason for the challenges is that the time required for the groundwater level to 'stabilize' is considerably longer than the time allotted to drill and backfill the borings.

Upon completion of each boring, the drilling mud was bailed from the borehole and the borehole was allowed to stand briefly. We measured the depth of groundwater in each case after removal of the drilling mud; however, reliable measurement were obtained only in borings B-2, B-4, B-8, B-9 and B-11. Groundwater was located measured between depths of 16 and 24½ feet bgs in these borings and it's reasonable to assume that the groundwater level in the remaining borings is similar to the levels in the nearby borings.

Table 3 below summarizes the groundwater levels measured at the time of drilling and as Groundwater was not always observed due to the drilling fluids utilized.

Please note also that the groundwater levels shown on Figures 3 through 10 are based extrapolated from the above measurements.

Based on our review of nearby groundwater well data and the historically highest groundwater map, provided by the State of California, the historically highest groundwater level (HHGWL) at the site is on the order of 20 feet bgs, as shown in Figure 11.

2.4 Tabular Summary of Subsurface Conditions

Table 3 summarizes the thickness of fill, depth to groundwater at the time of drilling and depth to bedrock in each exploration boring.

Table 3 – Fill Thickness, Depth to Groundwater and Bedrock

Boring	Building Area	Fill Thickness (feet)	Depth to Groundwater[1] (feet)	Depth to Bedrock (feet)
B-1	Building 1	2.5		10
B-2	Building 1	2.5	20.0	20
B-3	Building 1	2.5		> 26.5
B-4	Building 1	5.0	24.0	35
B-5	Building 2A	2.5		>26.5
B-6	Building 2A	2.5		>26.5
B-7	Building 2B	2.5		>26.5
B-8	Building 2B	2.5	24.5	>51.5
B-9	Building 2B	5.0	24.0	>26.5
B-10	Building 3	5.0		>26.5
B-11	Building 3	7.5	16.0	>51.5
B-12	Building 3	5.0		>26.5

3.0 GEOTECHNICAL LABORATORY TESTING

We performed geotechnical laboratory testing on samples collected from our borings that included the following:

- In-situ Moisture Content and Dry-density
- Atterberg Limits
- Direct Shear
- Consolidation
- Maximum Dry-density and Optimum Moisture Content
- Fines Content
- Expansion Index
- Corrosion Potential
- R-Value

Laboratory testing is in progress as the time this draft report was prepared; we will present the results of the testing when all test data is available. .

4.0 GEOLOGIC AND SEISMIC HAZARDS EVALUATION

4.1 Regional and Local Geologic Setting

The subject site is located in the Los Angeles Basin, a northwest trending, alluvium-filled lowland situated at the north end of the Peninsular Ranges geomorphic province of coastal southern California. This basin, which is the surface expression of a deep structural trough, has been subdivided into four primary structural blocks distinguished from one another by contrasting basement rock types and stratigraphy. These structural blocks are generally separated by zones of faulting along which movement has occurred intermittently since middle Miocene time (Yerkes and others, 1965).

The site is located in the central portion of the Northeastern Block of the Los Angeles Basin, a roughly triangular-shaped area bounded on the south by the Elsinore/Whittier fault, on the east by the Chino fault, and on the north by the Sierra Madre/Cucamonga fault.

The city of Walnut is located between the San Jose and Puente Hills in an alluviated valley. Bedrock of these hills generally consists of the Puente Formation. Drainage through the area is controlled by San Jose Creek, which flows toward the west-southwest.

Locally, Morton and Miller (2003) have mapped the site as being underlain by middle Holocene-aged young alluvial-fan deposits (map unit Qyf_3). This unit is described as "slightly consolidated silt, sand, and coarse-grained sand to boulder alluvial fan deposits having slightly to moderately dissected surfaces."* These alluvial fans are noted to consist primarily of boulder alluvial in the headward portions of the fan, grading southward into dominantly sand and gravel.

Morton and Miller indicate several outcrops of the Yorba member of the Puente Formation bedrock near the site (map unit Tpy). The Yorba member is described as "white to gray, thin bedded, micaceous and siliceous siltstone and sandy siltstone." The Yorba member is Miocene in age.

A regional geologic map of the site vicinity is provided in Figure 12.

4.2 Geologic and Seismic Hazards Evaluation

We evaluated the geologic and seismic hazards at the site in general accordance with California Geological Survey (CGS) Special Publication 117A, "*Guidelines for Evaluating and Mitigating Seismic Hazards in California."* The results of our evaluation is summarized below.

4.3 Regional Faulting

We reviewed the CGS 2010 Fault Activity Map (FAM) of California and the USGS Quaternary Fault and Fold Database (QFFD), to identify mapped faults within 100 kilometers of the site. The FAM and QFFD show that the closest mapped faults to the site are the San Jose fault, approximately 3 kilometers (1.8 miles) to the northwest, the Walnut Creek fault, approximately 6.3 kilometers to the northwest (4 miles) and the Whittier fault, approximately 8 kilometers (5 miles) to the southwest.

Figures 13A and 13B show the site location relative to the nearby seismic sources.

4.4 Regional Seismicity

The site is located in an active seismic area that has historically been affected by generally moderate to occasionally high levels of ground motion. Therefore, the proposed development will probably experience moderate to occasionally high levels of ground motion from nearby faults as well as ground motions from other active seismic areas of the southern California region.

A search of the web-based USGS Advanced National Seismic System (ANSS) Comprehensive Earthquake Catalog (ComCat), accessed on December 9, 2021, found that 62 earthquakes with magnitudes of 5.0 or greater have occurred within a 100-km radius of the site since 1800.

4.5 Ground Surface Rupture Potential

The site is not located within a County of Los Angeles or CGS Alquist-Priolo Earthquake Fault Zone based on a review of their respective websites.

Thus, the potential for ground surface rupture is considered very low.

4.6 Liquefaction Potential

Liquefaction may occur in loose to medium dense granular soils and low-plasticity silts and clays below the groundwater level as a result of strong ground shaking.

Liquefaction occurs when the cyclic loading to the soil due to strong ground shaking results in a buildup of excessive pore-water pressure in the pore spaces between the soil grains and the grain-to-grain contact of the soils is temporarily interrupted resulting is settlement as the soil particles reconstitute. Typically, liquefaction occurs within the upper approximately 50 feet bgs.

The site is located within County- and State-designated liquefaction hazard zones as shown on Figure 14.

Noting that the HHGWL is approximately 20 feet bgs and the geologic deposits present below this depth consist of stiff to very stiff clayey soils and/or bedrock, the potential for liquefaction at the site is considered to be very low.

Localized, discontinuous soft clays that would be subject to loss of strength during strong ground sharking are present at the site, however, these deposits are not anticipated to contribute appreciably to the overall performance of foundation elements constructed as part of the proposed development.

4.7 Lateral Spreading Potential

Lateral spreading is seismically-induced slope instability phenomenon wherein slope failure can occur as a result of liquefaction.

The ground surface level at the site is generally flat so that open or unsupported slopes are not present. However, San Jose Creek Diversion Channel is located as close as approximately 300 feet

south of the site. This channel has been improved with vertical concrete channel walls and is approximately 20 feet in depth.

Based on the very low liquefaction potential of the site and depth to HHGWL, the potential for lateral spreading is likewise considered very low.

4.8 Seismic (aka 'Dry') Settlement

Seismically-induced (aka 'dry') settlement may occur in loose granular soils due to strong ground shaking.

The soils encountered in the exploration borings consist mainly of medium stiff to stiff fine-grained deposits and/or medium dense granular deposits. Therefore, the potential for seismically-induced settlement is considered very low.

4.9 Earthquake-Induced Landslides

The site is not located in a zone of required investigation for Earthquake-Induced Landslides per CGS Earthquake Fault Zones and Seismic Hazard Zones, San Dimas Quadrangle map as shown on Figure 14. Additionally, no landslides have been mapped near the site on regional geologic maps of the area. No evidence of deep-seated landsliding was observed during our field exploration and no significant sloped boundary conditions exist. Therefore, the probability of earthquake-induced landsliding at the site is negligible.

4.10 Flood Mapping

Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Number 06071C8600H, the site is located within an area determined to be outside the 0.2 percent annual chance floodplain.

4.11 Tsunamis, Seiche, and Dam Inundation

Based on information and maps available from the CGS and the County of Los Angeles, the site is not located within a Tsunami inundation hazard zone. Based on review of adjacent water bodies, the site is not subject to inundation from seiche. Based on a review of the Dam Breach Inundation Map Web Publisher hosted by the California Division of Safety of Dams (DSOD) the site is not within a dam inundation boundary.

4.12 Subsidence

Land subsidence may be induced from withdrawal of oil, gas, or water from wells. Based on a search of the CalGEM (formerly known as Division of Oil, Gas, and Geothermal Resources [DOGGR]) GIS Well Finder online tool, the site is not located in an oil field. The nearest well is indicated approximately 0.8 miles west of the site. The status of this well is listed as plugged. According to our review of the available information from CalGEM, the likelihood of land subsidence caused by oil or gas withdrawal from oil wells is negligible.

4.13 Expansive Soils and Bedrock

Expansive soils swell and shrink when the moisture content in the soil changes as a result of cyclic wet/dry weather cycles, installation of irrigation systems, change in landscape plantings, or changes in grading.

Swelling and shrinking soils can result in differential movement of structures including floor slabs and foundations, and site work including hardscape, utilities, and sidewalks.

Based on the preliminary laboratory test data, the on-site soils have a moderate to high potential for expansion.

5.0 CONCLUSIONS

5.1 General

The site is generally free from geologic or seismic hazards that would preclude the proposed development and the proposed development is considered feasible from a geotechnical perspective.

The site is subject to strong ground shaking that would result from an earthquake occurring on a nearby or distant fault source; however, this hazard is common in Southern California and can be mitigated by following the seismic design requirements of the 2019 California Building Code (CBC).

Undocumented fill was encountered in each boring; and the undocumented fill, native soils and underlying bedrock typically contain high to very high moisture contents, are moderately to highly plastic and subject to swelling or shrinking due to changes in moisture content.

These conditions impact each of the primary geotechnical considerations for the proposed development including (1) foundation support, (2) floor slab and flat work support and (3) general grading.

Mitigation measures to reduce the moisture content will be required to allow the re-use of the on-site soils and also to address potential for expansion and compression due to changes in moisture content.

The planned grading, that will include placement of approximately four feet of new fill, will help to mitigate these existing conditions.

5.2 Foundations

The current planned development concept includes raising the existing ground surface level by approximately four feet across the site so that the proposed building foundations will be established at near the existing ground surface level or slightly above.

The soils present at the existing ground surface level generally consist of undocumented fill materials, likely placed as part of the existing commercial building development. The soils are not considered suitable for foundation support and should be removed and replaced as properly compacted fill as recommended herein.

The proposed buildings may be supported on spread and continuous footings established in properly compacted fill soils provided the recommendations presented herein are followed.

The existing fill soils may require some degree of drying or conditioning in order to re-use as properly compacted fill.

The bottom of footings for Buildings 1, 2A and 2B should be established at a suitable depth so that surcharge loading is not imposed to the existing RCP storm drains.

5.3 Earthwork Considerations

Based on the current planned development concept and the recommendations presented herein for remedial grading, we anticipate that mass excavation typically on the order of two to three feet and up to approximately eight feet will be required to remove existing undocumented fill.

The existing fill soils generally contain relatively high moisture contents and are subject to shrinkage and swelling due to changes in moisture content and these soils are not suitable for reuse in required fills.

Additionally, these soils are subject to shrinkage and swelling with subsequent changes in moisture content.

The on-site soils may be re-used on-site provided mitigation measures are performed to address the moisture and plasticity (shrink and swell potential) of these soil. Mitigation measures are presented herein.

Alternatively, the on-site soils could be exported and suitable import materials could be utilized.

We anticipate that the exposed excavation bottoms will be relatively wet and compressible and that mitigation measures will be required to establish a firm working surface to receive new compacted select fill.

Recommendations for bottom stabilization are presented herein.

5.4 Floor Slab Support

Again noting that the proposed finish floor levels will be established approximately four feet above the existing ground surface level, the proposed building floor slab may be established on non-expansive properly compacted fill as recommended herein.

5.5 Pavement Design and Construction

Existing undocumented fill soils are not suitable for pavement support due the previously described expansive potential and high moisture contents.

PCC and AC pavement may be supported on properly compacted fill as recommended herein.

5.6 Groundwater

The current groundwater level at the site is on the order of 15 feet or more bgs; these depths correspond roughly with the HHGWL is on the order of five to ten feet BGS.

As noted above, we estimate the maximum depth of on-site excavation to be on the order of eight feet bgs to remove existing undocumented fill soils.

Thus, it's unlikely that groundwater will be encountered during mass excavation.

5.7 Stormwater Infiltration

The Los Angeles County Public Works Guidelines for *Geotechnical Investigation and Development – Low Impact Development Stormwater Infiltration (LA County Stormwater Guidelines)* dated June 30, 2021 lists the conditions at a site that allow for stormwater infiltration.

We did not perform field percolation testing as part of our investigation, as the soils present at the site consist primarily of clayey soils with relatively high moisture contents. The soils, by observation, do not appear to have a design infiltration rate greater than 0.3 inches per hour as required by the LA County Stormwater Guidelines.

Additionally, introduction of stormwater within the soils above the groundwater level will likely result in expansion and swelling of the upper soils and therefore is not considered feasible.

5.8 Corrosion Considerations

The results of the corrosion testing are summarized in Table 4.

Table 4 - Corrosion Test Results

Boring (Depth)	Soil Type	Resistivity (ohm-cm)	pH	Sulfate (% by Mass)	Chloride (% by Mass)
B-1 (0-5 feet)	Clay (CL)	820	7.4	0.0687	0.0106
B-9 (0-5 feet)	Clay (CL)	770	7.5	0.0448	0.0098

The results of the sulfate testing indicates that the on-site soils be classified as exposure category S_0 for sulfates and exposure category C_1 for chlorides in accordance with American Concrete Institute (ACI) Table 19.3.1.1).

The sulfate concentrations indicate a low potential for sulfate attack on PCC and that the on-site soils are extremely corrosive to ferrous metals.

It would be prudent to engage a corrosion consultant to evaluate the need for mitigation measures for buried metallic piping.

6.0 RECOMMENDATIONS

6.1 Foundations

The proposed industrial building may be supported on spread and continuous footings established in properly compacted fill soils.

Spread and continuous footings a minimum of two feet wide and established at least two feet below the lowest finish floor level and/or adjacent grade may be designed using an allowable bearing pressure of 5,000 pounds per square foot (psf). The recommended bearing pressure may be increased by one-third when considering short term wind and seismic loading conditions.

We anticipate static settlement due to the dead-plus-live loading to be on the order of 1 inch or less.

Differential settlement between adjacent footings is expected to be on the order of ¼ inch or less.

Lateral loading may be resisted by passive pressure of the soils acting against the sides of the footings and friction along the bottom of the footing.

To resist lateral loading, an ultimate passive resistance equal to 600 psf per foot of embedment up to a maximum value of 6,000 psf and an ultimate coefficient of friction equal to 0.6 may be used.

The ultimate passive pressure and the ultimate coefficient of friction may be combined noting that the ultimate passive resistance should be reduced in this case by 50 percent in consideration of the deformation required to mobilize the full passive resistance.

6.2 Seismic Design

Based on the data from our investigation and our review of available shear wave velocity mapping, the site may be classified as Site Class D in accordance with Chapter 20 of ASCE-7-16. We anticipate that exception 2 of Section 11.4.8 of ASCE 7-16 will be applicable for the proposed building and therefore, a site specific response spectra is not required per CBC.

CBC-prescribed seismic design parameters are presented in Table 5.

Table 5 – CBC Prescriptive Seismic Design Parameters

Criteria	Value
MCE_R Ground Motion at Short Periods, S_s	1.778
MCE_R Ground Motion at 1 Second Period, S_1	0.628
Site Class	D
Site-Modified Spectral Acceleration Value at Short Periods, S_{MS}	1.778
Site-Modified Spectral Acceleration Value at 1 Second Period, S_{M1}	1.068
Design Spectral Response Acceleration at short periods, S_{DS}	1.185
Design Spectral Response Acceleration at 1 second period, S_{D1}	0.712
MCE_G Peak Ground Acceleration, PGA_M	0.833

6.3 Floor Slab Support

The proposed building floor slab may be supported on non-expansive properly compacted fill soil.

To minimize the potential of moisture transfer from the soil through the building floor slab that could damage finish flooring, a capillary break section should be installed beneath the building floor slab.

The capillary break section should consist of six inches of gravel underlying a 15-mil HDPE membrane and is required only where finish flooring is planned.

6.4 Pavement Design Recommendations

The required pavement and base thicknesses will depend on the expected wheel loads, traffic index (TI), and the R-value of the subgrade materials.

Pavement sections should be supported on 12 inches of properly compacted fill soils. Noting that geotechnical laboratory testing is in progress at the time we issued this draft report, we assumed an R-value of 20 in our analysis.

Our pavement design recommendations for asphalt concrete (AC) and Portland cement concrete (PCC) are provided below.

6.4.1 Asphalt-Concrete Pavement Design

AC pavement for surface parking shall be designed in accordance with the CATRANS method. Table 6 summarizes our AC pavement recommendations for assumed TIs of 4.5, 5, 6, and 7.

Table 6 – AC Pavement Design Recommendations

Traffic Use	TI	AC (inches)	AB (inches)
Parking Areas	4.5	3.0	7.0
Automobile Drive Lanes	5.0	3.5	8.0
Truck and Trailer Drive Lanes	6.0	4.0	10.0
Delivery Access and Loading Docks	7.0	5.0	12.0

We can determine the recommended pavement and aggregate base thickness for other TIs if required. Careful inspection is recommended to confirm that the recommended thickness or greater is achieved and there proper construction procedures are followed.

The aggregate base should conform to California Department of Transportation (CALTRANS) Class 2 aggregate base or equivalent. The base should be compacted to at least 95 percent relative compaction.

6.4.2 Portland Cement Concrete Pavement Design

Table 7 summarizes our Portland cement concrete (PCC) pavement recommendations for assumed TIs of 6 and 7 based on minimum compressive strength of 3,000 psi for the PCC.

Table 7 – PCC Pavement Design Recommendations

Traffic Use	TI	PCC (inches)	AB (inches)
Truck and Trailer Drive Lanes	6.0	7.0	6.0
Delivery Access and Loading Docks	7.0	8.0	6.0

Dowels are recommended at joints to reduce any possible offsets. Careful inspection is recommended to check that the recommended thickness or greater is achieved and that proper construction procedures are followed.

The aggregate base should conform to CALTRANS Class 2 aggregate base or equivalent. The base should be compacted to at least 95 percent relative compaction.

6.5 Site Flatwork / Sidewalks

The design section for site flatwork, including sidewalks, should consist of four inches of reinforced PCC over four inches of CALTRANS Class II aggregate base. The PCC thickness should be increased to six inches for the outer six horizontal inches of the flatwork or sidewalk.

Steel reinforcement should consist of #3 bars placed at 24-inch center-to-center spacing in each direction.

The PCC and CMB, or AB section should be underlain by a minimum of 12 inches of properly compacted fill soils; however we anticipate that site flatwork will be established within the minimum 3 foot properly compacted fill zone required for the building foundations. New fill soils may be placed on existing undocumented fill soils provided the recommendations presented in Section 6.7.2 are followed.

6.6 Earthwork Considerations

6.6.1 Temporary Vertical Cuts and Construction Slopes

Temporary vertical cuts are feasible in the native material and should not exceed 4 feet in height.

Temporary, unsurcharged slopes may be excavated into the on-site soils and fill materials and these slopes should not exceed a 1.5H:1V gradient and should not exceed 15 feet in height.

Temporary vertical cuts and temporary construction slopes should be protected from erosion by directing surface water away from the top of the slope, by placing sand-bags at the top of the slopes and vertical cuts, and/or covering the slopes with plastic sheeting during rain events.

6.6.2 Subgrade Preparation

Demolition of the existing buildings and site flatwork will be performed along with subsequent removal and recompaction of the existing undocumented fill soils.

We anticipate that very moist to wet, medium to high plasticity, potentially expansive soils are present at the bottom of the mass excavation.

It will be necessary to stabilize the exposed bottom to allow subsequent placement and compaction of new, select fill. One method to stabilize the bottom of the mass excavation is to place a one-foot thick layer of 1½-minus crushed rock directly on the exposed bottom to establish a firm working surface.

Depending on the condition of the exposed bottom, additional stabilization could be require and could include the use of a geotextile fabric and/or a geosynthetic cellular confinement material.

Other methods are also suitable, provided we review the procedure with the contractor, again, to assure the required degree of stabilization is achieved.

There is not any benefit in performing mechanical preparation on the exposed mass excavation bottom, rather scarification and compaction effort on the moist to wet clayey soils will likely result in significant disturbance accompanied by little if any improvement.

Prior to the placement of one or more of the above-referenced stabilization methods, the exposed excavation bottom should be proof rolled with light-weight steel drum equipment and the crushed rock and/or geotextile material(s) may be placed directly on the proof-rolled alluvial clay bottom materials.

The crushed rock should be densified using vibratory compaction equipment, noting again however that it's not advisable to utilized heavy duty equipment such as vibrating vibratory rollers; rather it'd be prudent to utilized vibratory equipment that delivers its energy with an eight to 12-inch thick lift. Heavy duty equipment may result in disturbance to the wet clayey bottom, even with 12 inches of crushed rock overlying.

The suitability of the crushed rock and geotextile fabric, if utilized, to support new fill can be evaluated in the field by observing the deformation of the surface materials under loaded construction equipment (scrapers, front-end loaders with a fully loaded bucket, etc.).

The crushed rock materials may be considered to be part of the select fill beneath the footings.

Prior to the placement of new select fill on the stabilized bottom, all deleterious materials should be removed from the areas to be graded prior to initiation of grading operations and disposed of off-site.

6.6.3 Materials for Fill

The existing on-site soils, including existing undocumented fill soils consist primarily of very moist clayey soils. These soils are generally suitable for re-use in compacted fills, however, it's likely that these soils will require drying or blending with drier granular materials to achieve the required degree of compaction.

One method that would allow re-use of on-site clayey soils in compacted fills would be to blend these soils with dry coarse materials including crushed miscellaneous base (CMB), aggregate base, crushed rock and/or coarse sand.

Blending of on-site soils will result in three primary benefits that will facilitate grading and assure performance of the fill: (1) reduction in the moisture content to facilitate placement and compaction, (2) stiffening to reduce compressibility and strength increase to increase allowable bearing pressure and (3) reduced potential for expansion.

It will be necessary to perform strength and compressibility testing on proposed blends to confirm the mixture sufficient improves the stiffness and compressibility; however, as a preliminary estimate, it may be assumed that one part CMB blended with two parts of on-site clayey soil, will achieve the necessary improvements.

Imported fill materials, if utilized, should consist of non-expansive materials with adequate strength and stiffness to support foundation, floor slab, and pavement loading. We should be provided with samples of proposed import materials prior import to the site to evaluate the suitability of those materials for the intended on-site use.

In general, all fill soils should be free of organic and other deleterious materials and have a maximum particle size no greater than three inches.

6.6.4 Fill Placement and Compaction

Fill soils shall be moisture conditioned as recommended herein, placed in loose lifts not exceeding 8-inches in thickness and mechanically compacted.

For the purposes of this report, the above-recommended granular and on-site clayey soil blend may be considered to be a fine-grained soil.

Fine-grained fill soils should be moisture conditioned to 2 to 4 percent above the optimum moisture content and compacted to at least 90 percent of the maximum dry density obtainable per ASTM D-1557. We recommend that relatively light-weight compaction equipment be utilized when working in fine-grained soils.

Granular soils should be moisture conditioned to 0 to 2 percent above the optimum moisture content and compacted to at least 95 percent of the maximum dry density obtained per ASTM D-1557.

6.6.5 Site Drainage

Proper drainage should be maintained at all times. Ponding or trapping of water in localized areas can cause differing moisture levels in the subsurface soil. Drainage should be directed away from the tops of slopes. Erosion protection and drainage control measures should be implemented during periods of inclement weather. During rainfall events, backfill operations may need to be restricted to allow for proper moisture control during fill placement.

7.0 LIMITATIONS

The conclusions and recommendations provided in this report are based on subsurface conditions inferred from available boring and test pit data, as well as project information provided to date.

This report was prepared for IDS Reality Group, their design consultants and subcontractors for use in the proposed development.

If changes to the proposed development are made, we should be notified to review our conclusions and recommendations.

We should be retained during the construction phase to perform necessary geotechnical observations and testing in accordance with good geotechnical engineering practice.

Information on subsurface strata and groundwater levels shown on the logs represent conditions encountered only at the locations indicated and at the time of investigation.

8.0 CLOSING

We sincerely appreciate the opportunity to provide professional services for this project and look forward to working with you on this project. Please contact us at your convenience to discuss any questions you may have regarding this report.

Sincerely,

Langan Engineering and Environmental Services, Inc.

DRAFT

Claudia Rangel
Staff Engineer

DRAFT

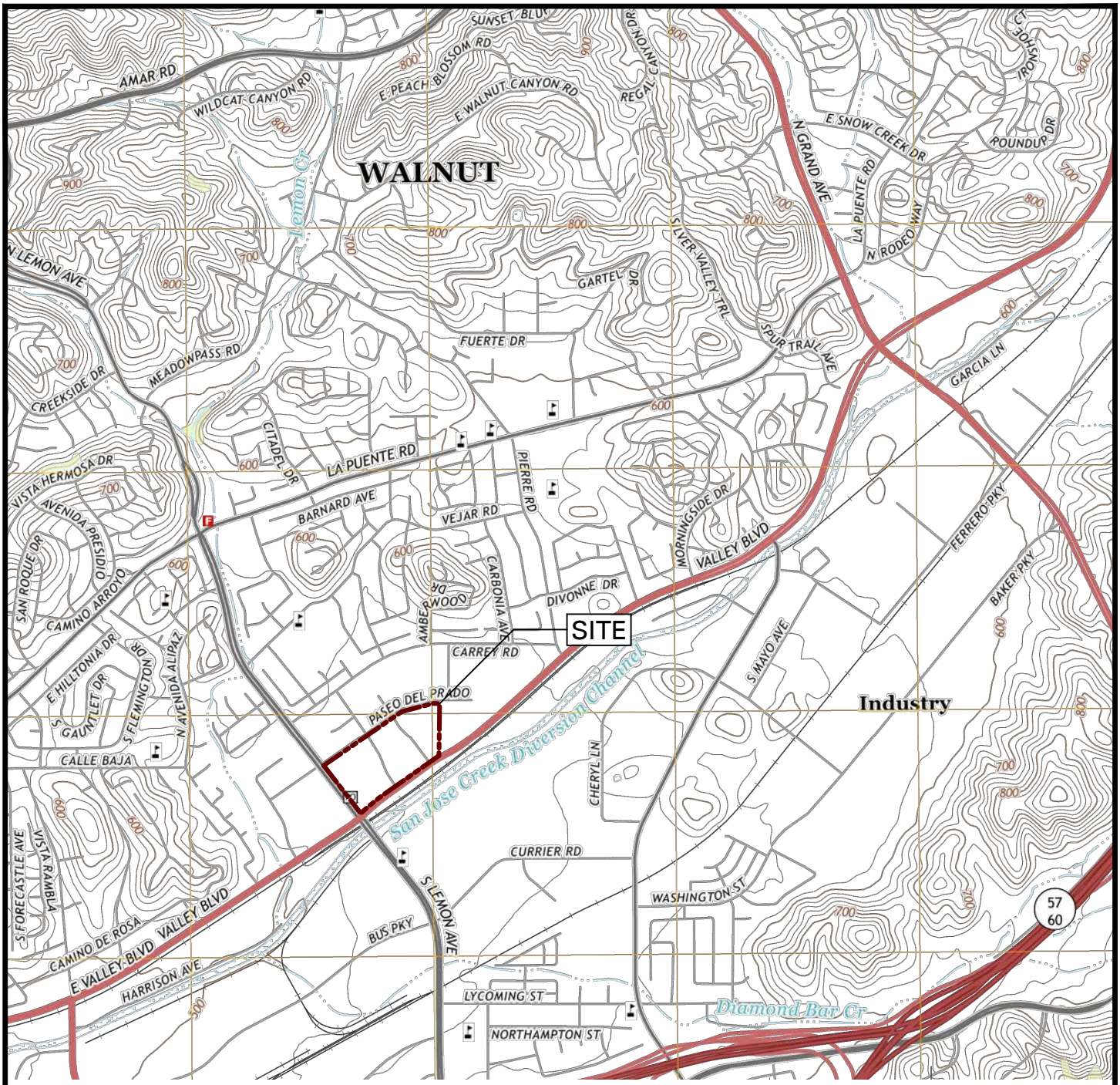
Shaun Wilkins
Senior Project Geologist

DRAFT

Chris Zadoorian
Associate

FIGURES

DRAFT



LEGEND:

SITE LIMITS

2000 1000 0 2000

SCALE IN FEET

REFERENCE: 7.5-MINUTE USGS SAN DIMAS TOPOGRAPHIC QUADRANGLE (2015).

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Project	Figure Title	Project No.	Figure No.
WALNUT BUSINESS PARK 20401 VALLEY BOULEVARD WALNUT LOS ANGELES COUNTY CALIFORNIA	**SITE LOCATION MAP**	700108301	**1**
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		Scale: AS SHOWN	
		Drawn By: CC	

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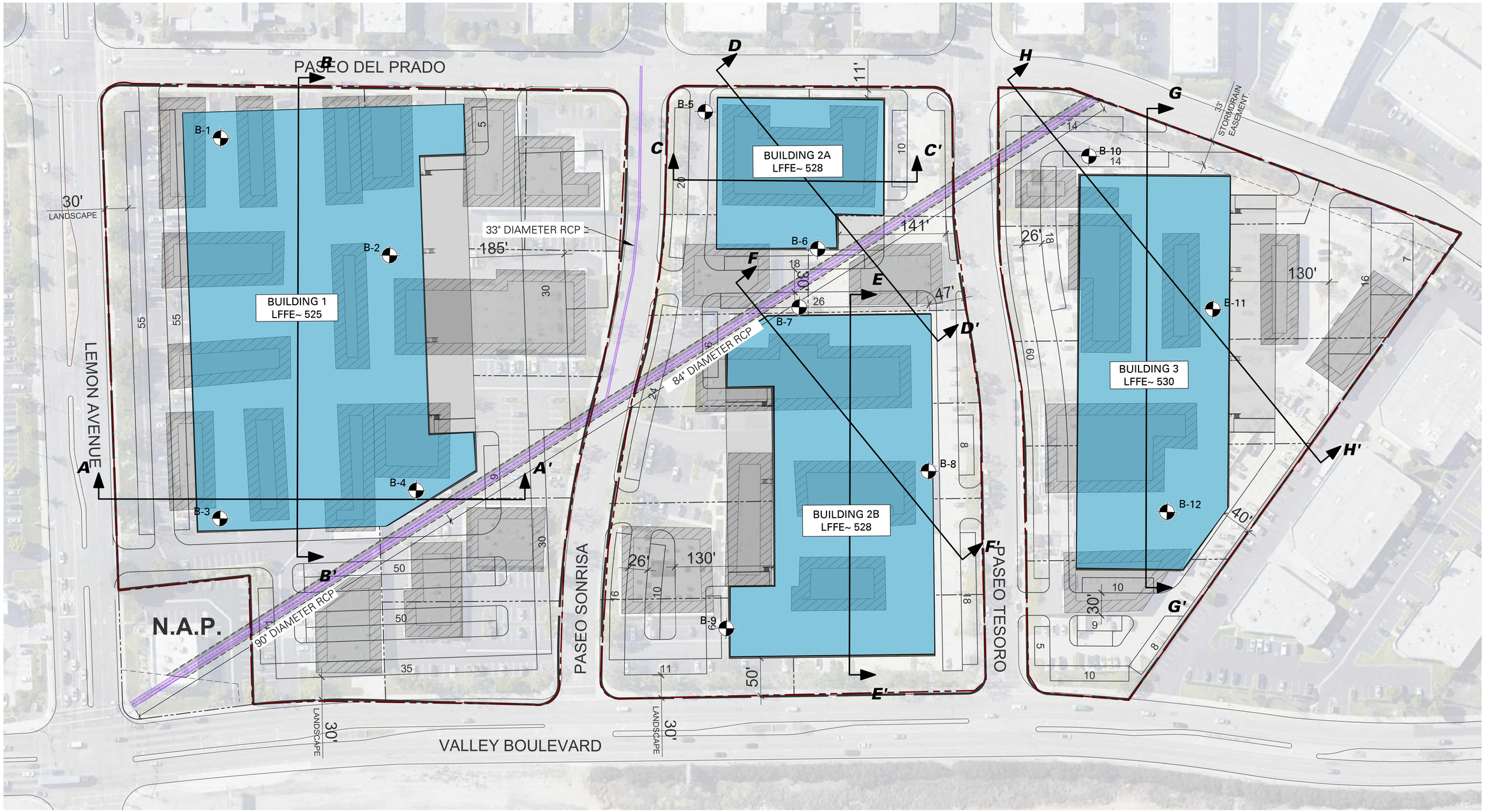

LEGEND:

- SITE LIMITS
- B-1 BORING LOCATION
- PROPOSED INDUSTRIAL BUILDINGS
- LFFE~ 525 LOWEST FINISHED FLOOR ELEVATION (FEET)
- APPROXIMATE LOCATION OF EXISTING STORM DRAIN
- APPROXIMATE LOCATION OF EXISTING 15-FOOT STORM DRAIN EASEMENT

NOTES:

1. BACKGROUND IMAGE REFERENCED FROM "CONCEPTUAL SITE PLAN - SHEET 1", PREPARED BY WARE MALCOMB, DATED NOVEMBER 14, 2021.
2. STORM DRAIN LOCATION REFERENCED FROM "PROJECT NO. 8301, WALNUT LINE B", PREPARED BY NATIONAL ENGINEERING CO., DATED JULY 18, 1967.
3. STORM DRAIN LOCATION REFERENCED FROM "STORM DRAIN PLANS IN TRACT NO. 33488", PREPARED BY JENNINGS-HALDERMAN-HOOD, DATED APRIL 10, 1978.

60 30 0 60
SCALE IN FEET

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Project: **WALNUT BUSINESS PARK**

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WALNUT
LOS ANGELES COUNTY CALIFORNIA

Plate Title: **SITE PLAN**

Project No.	Figure No.
700108301	2
Date: DECEMBER 2021	
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CROSS SECTION A-A'

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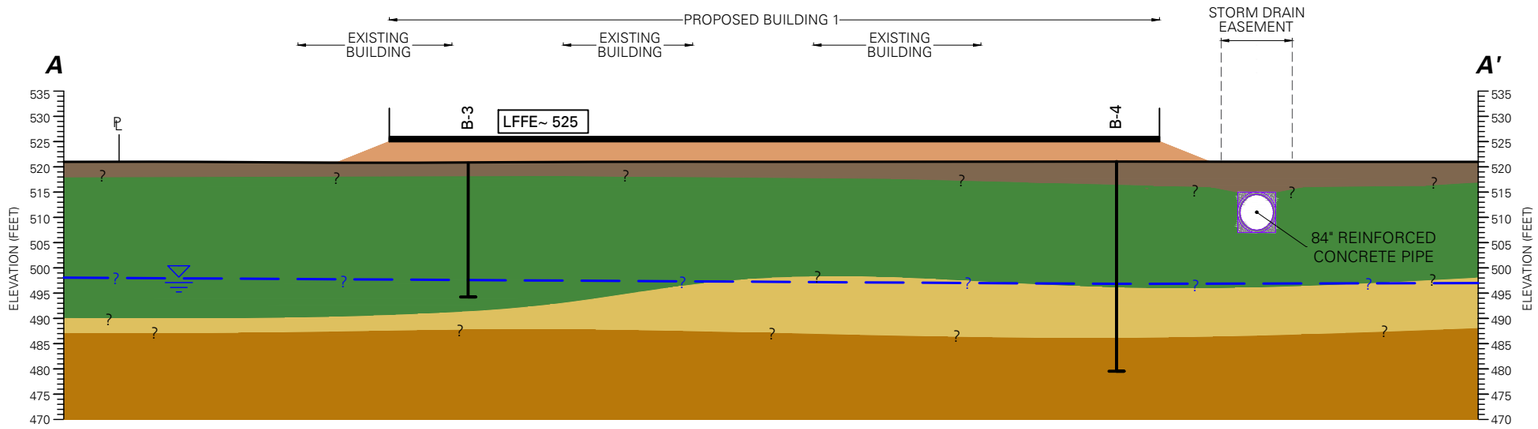

LEGEND:

- APPROXIMATE GROUND SURFACE LEVEL
- PROPOSED FILL
- ARTIFICIAL FILL (af)
- PREDOMINATELY SANDY SOILS
- PREDOMINATELY CLAYEY SOILS
- SANDSTONE/SILTSTONE/CLAYSTONE
- APPROXIMATE GROUNDWATER LEVEL AT TIME OF EXPLORATION
- LFFE~ 525 — LOWEST FINISHED FLOOR ELEVATION (FEET)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING LOGS.
2. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTIONS.
3. GROUND SURFACE PROFILE INFERRED FROM GOOGLE EARTH PRO ON DECEMBER 3, 2021.

30 15 0 30
SCALE IN FEET (VERTICAL)

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SCALE IN FEET (HORIZONTAL)

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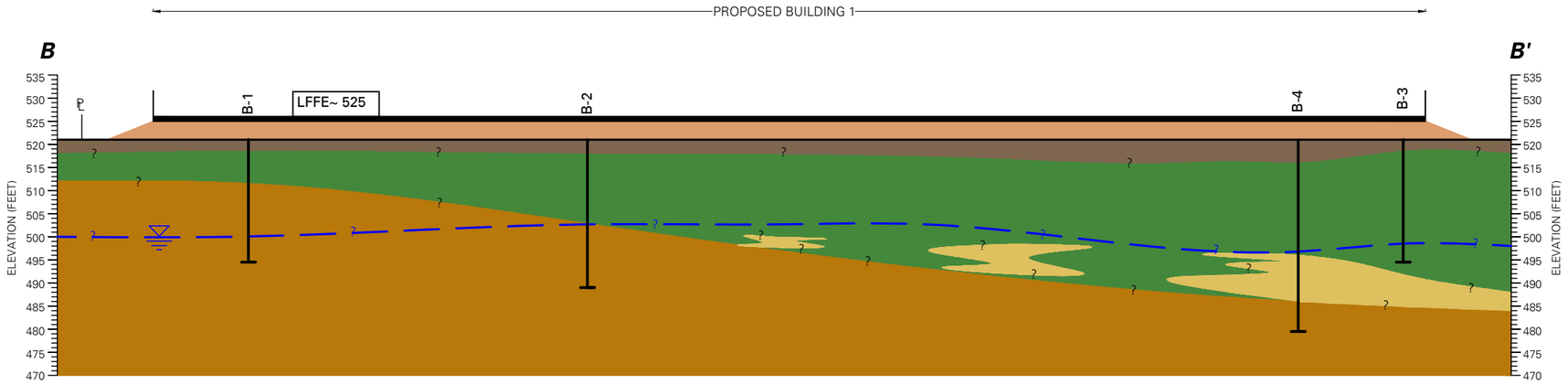
Project	WALNUT BUSINESS PARK 20401 VALLEY BOULEVARD WALNUT LOS ANGELES COUNTY CALIFORNIA
Figure Title	CROSS SECTION A-A'
Project No.	700108301
Date	DECEMBER 2021
Scale	AS SHOWN
Drawn By	CC
Figure No.	3

CROSS SECTION B-B'

N36W



LEGEND:

- APPROXIMATE GROUND SURFACE LEVEL
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SCALE IN FEET (VERTICAL)

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SCALE IN FEET (HORIZONTAL)

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Figure Title
CROSS SECTION C-C'

Project No.	Figure No.
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Date: DECEMBER 2021	
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CROSS SECTION C-C'

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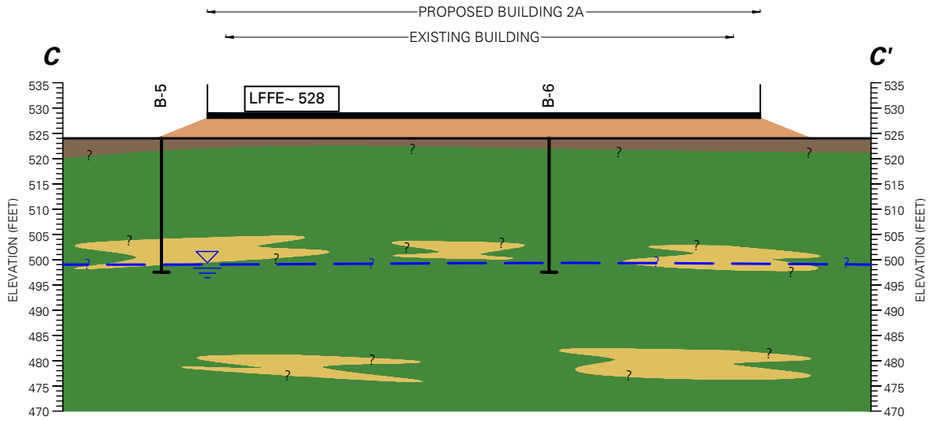

LEGEND:

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- ARTIFICIAL FILL (af)
- PREDOMINATELY SANDY SOILS
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Figure Title	CROSS SECTION B-B'
Project No.	700108301
Date	DECEMBER 2021
Scale	AS SHOWN
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Figure No.	4

CROSS SECTION D-D'

N75W

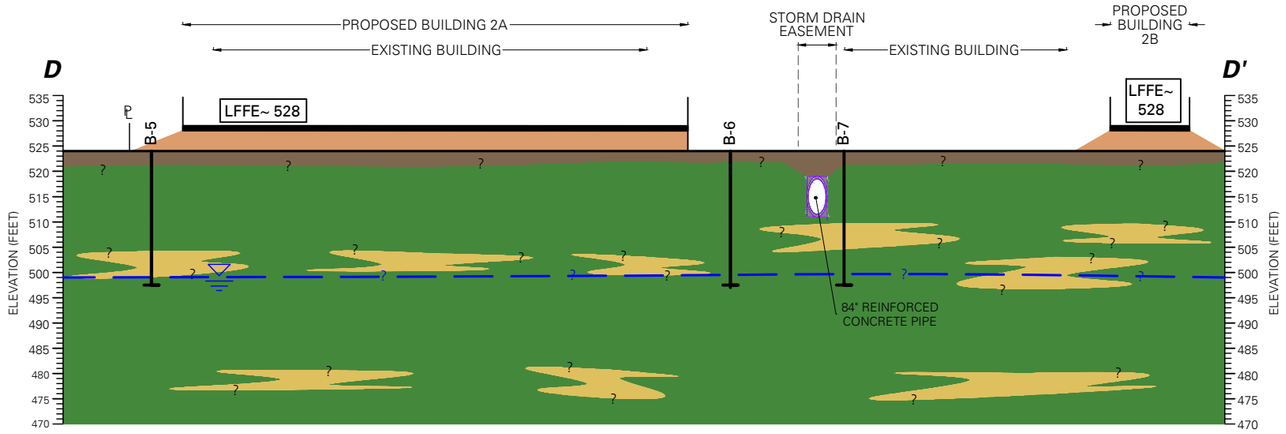

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Figure Title	CROSS SECTION G-G'
Project No.	700108301
Date	DECEMBER 2021
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Figure No.	9

CROSS SECTION E-E'

N36W

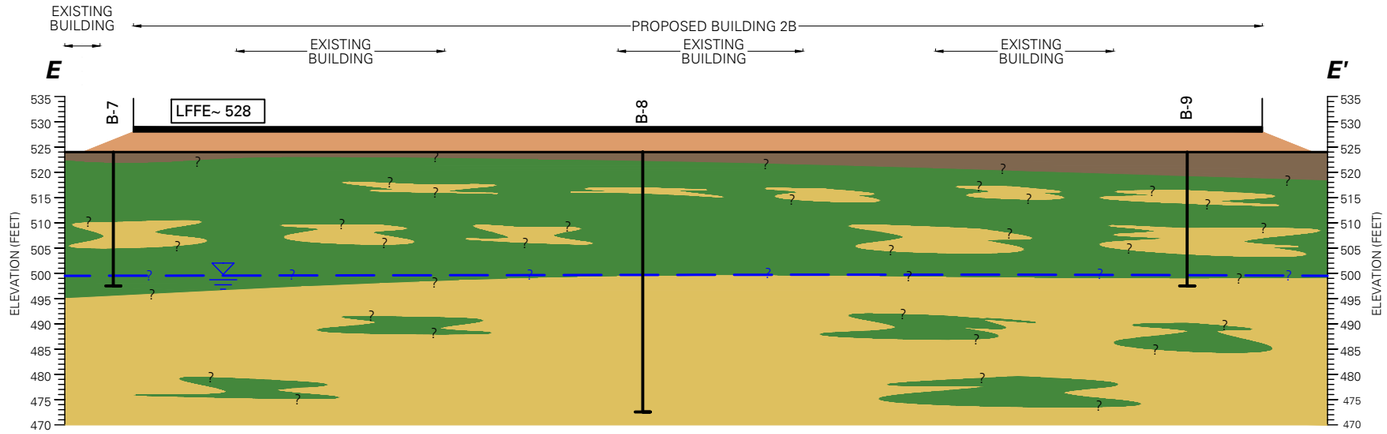

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Figure Title
CROSS SECTION D-D'

Project No.	Figure No.
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CROSS SECTION F-F'

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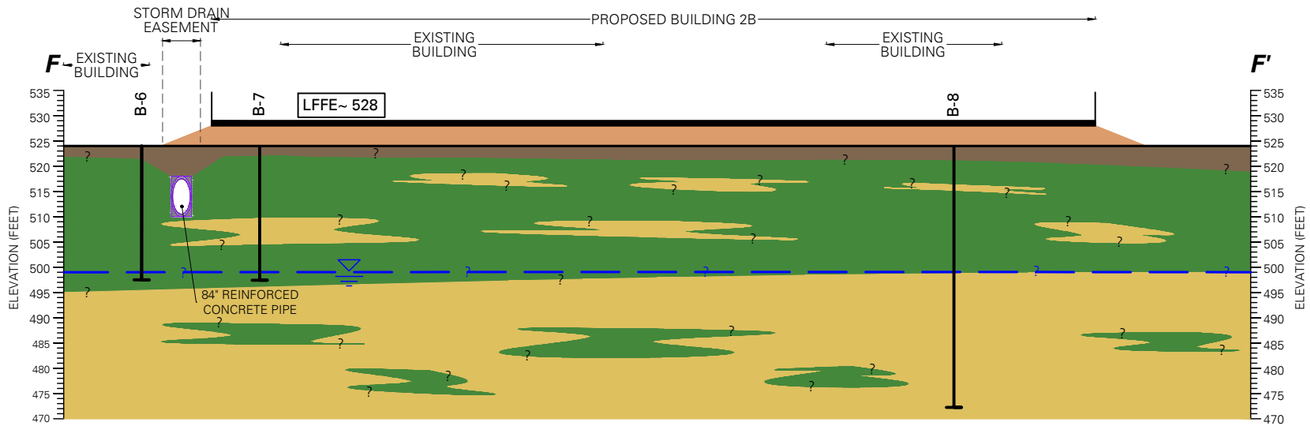

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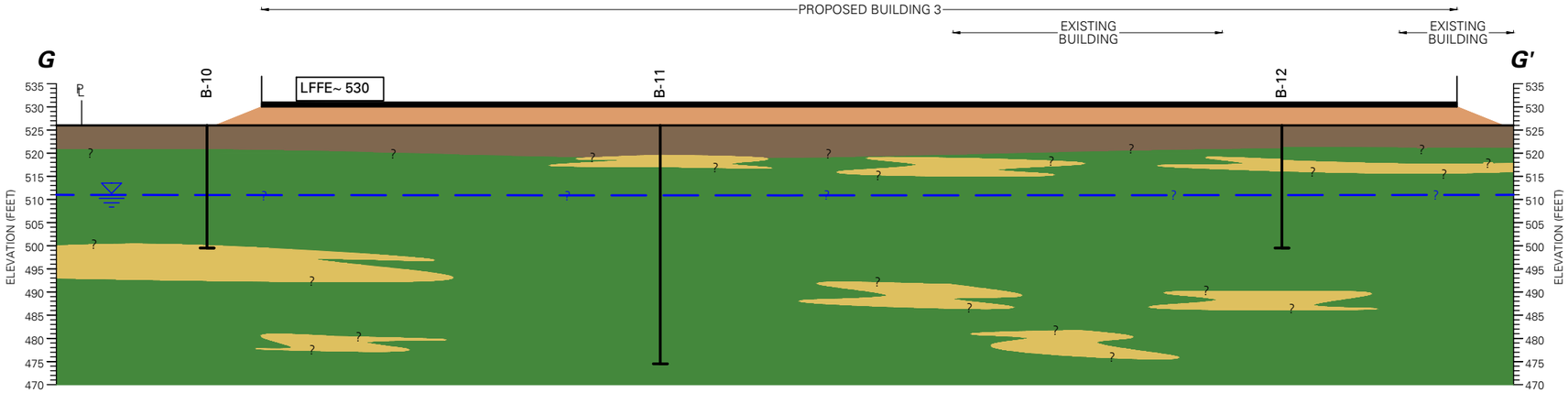
Figure Title	CROSS SECTION F-F'
Project No.	700108301
Date	DECEMBER 2021
Scale	AS SHOWN
Drawn By	CC
Figure No.	8

CROSS SECTION G-G'

N36W



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- APPROXIMATE GROUND SURFACE LEVEL
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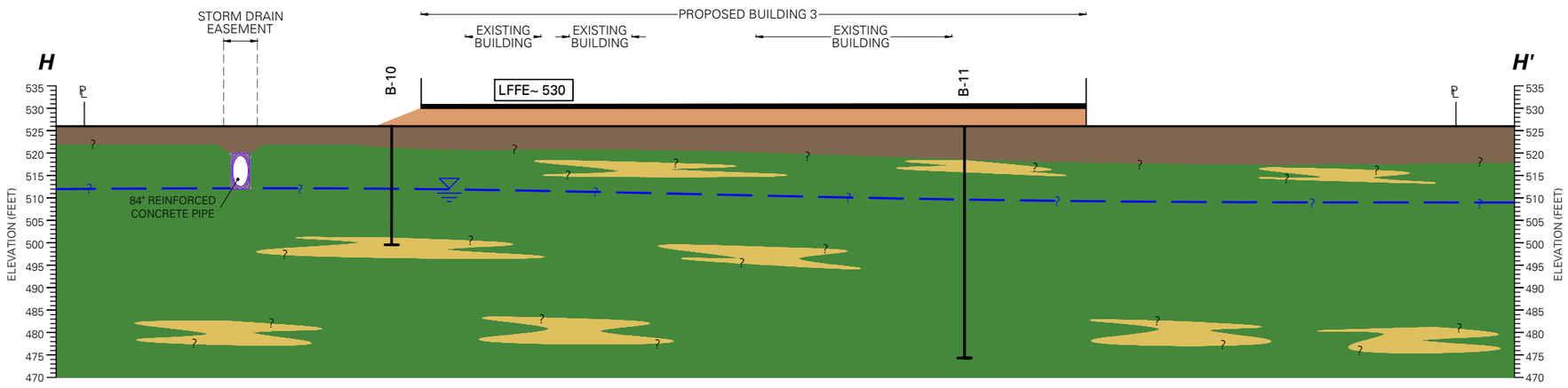
Project	WALNUT BUSINESS PARK 20401 VALLEY BOULEVARD WALNUT LOS ANGELES COUNTY CALIFORNIA
Figure Title	CROSS SECTION E-E'
Project No.	700108301
Date	DECEMBER 2021
Scale	AS SHOWN
Drawn By	CC
Figure No.	7

CROSS SECTION H-H'

N75W



LEGEND:

- APPROXIMATE GROUND SURFACE LEVEL
- PROPOSED FILL
- ARTIFICIAL FILL (af)
- PREDOMINATELY SANDY SOILS
- PREDOMINATELY CLAYEY SOILS
- SANDSTONE/SILTSTONE/CLAYSTONE
- APPROXIMATE GROUNDWATER LEVEL AT TIME OF EXPLORATION
- LFFE~ 525 — LOWEST FINISHED FLOOR ELEVATION (FEET)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING LOGS.
2. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTIONS.
3. GROUND SURFACE PROFILE INFERRED FROM GOOGLE EARTH PRO ON DECEMBER 3, 2021.

30 15 0 30
SCALE IN FEET (VERTICAL)

60 30 0 60
SCALE IN FEET (HORIZONTAL)

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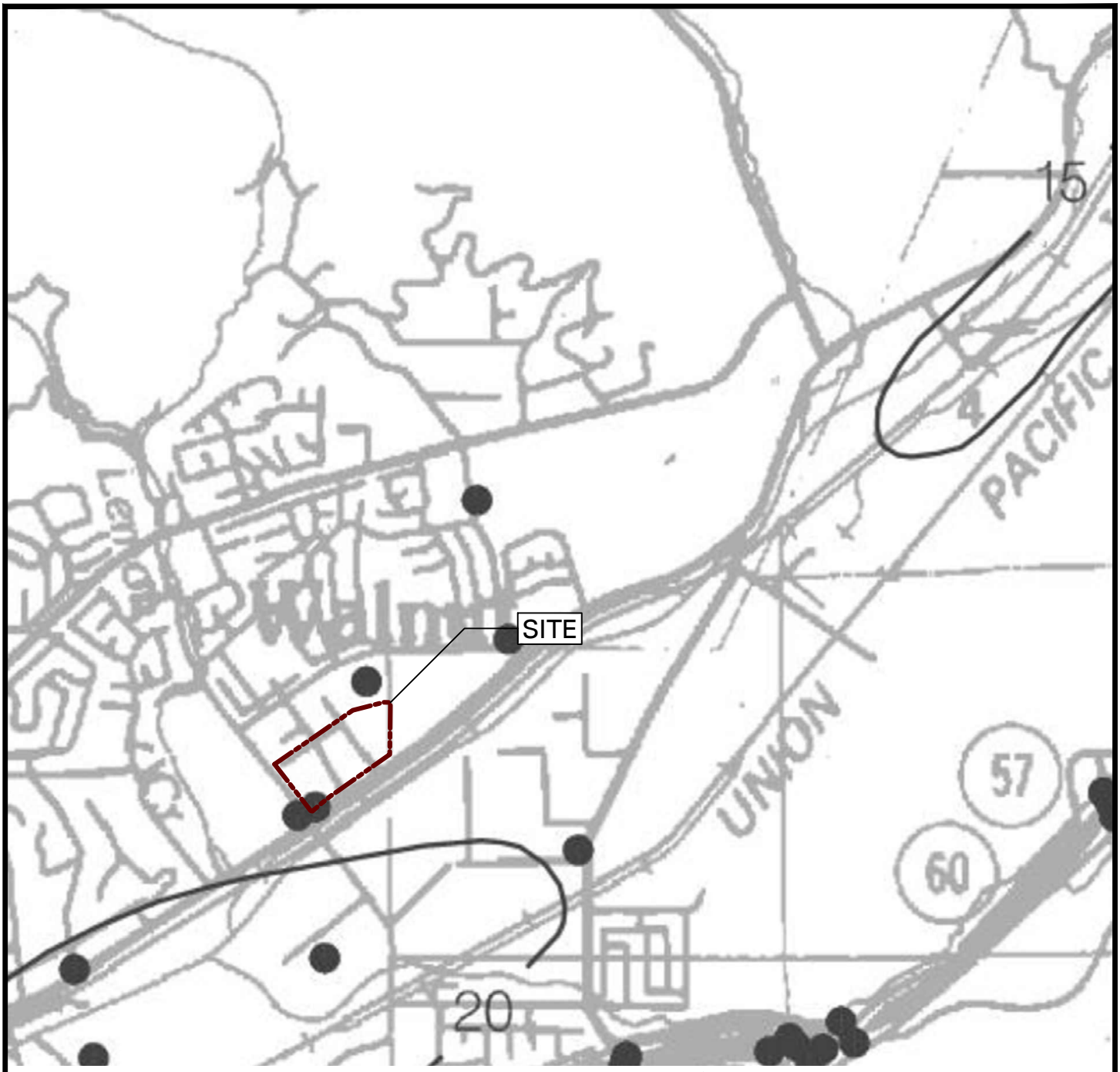
Project	WALNUT BUSINESS PARK 20401 VALLEY BOULEVARD WALNUT LOS ANGELES COUNTY CALIFORNIA
Figure Title	CROSS SECTION H-H'
Project No.	700108301
Date	DECEMBER 2021
Scale	AS SHOWN
Drawn By	CC
Figure No.	10



LEGEND:

SITE LIMITS

30 DEPTH TO GROUNDWATER IN FEET

BOREHOLE SITE

2000 1000 0 2000

SCALE IN FEET

REFERENCE: SEISMIC HAZARD ZONE REPORT OF THE SAN DIMAS QUADRANGLE, LOS ANGELES COUNTY, CALIFORNIA, PLATE 1.2 (CALIFORNIA DEPARTMENT OF CONSERVATION, 1998)

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WALNUT BUSINESS PARK

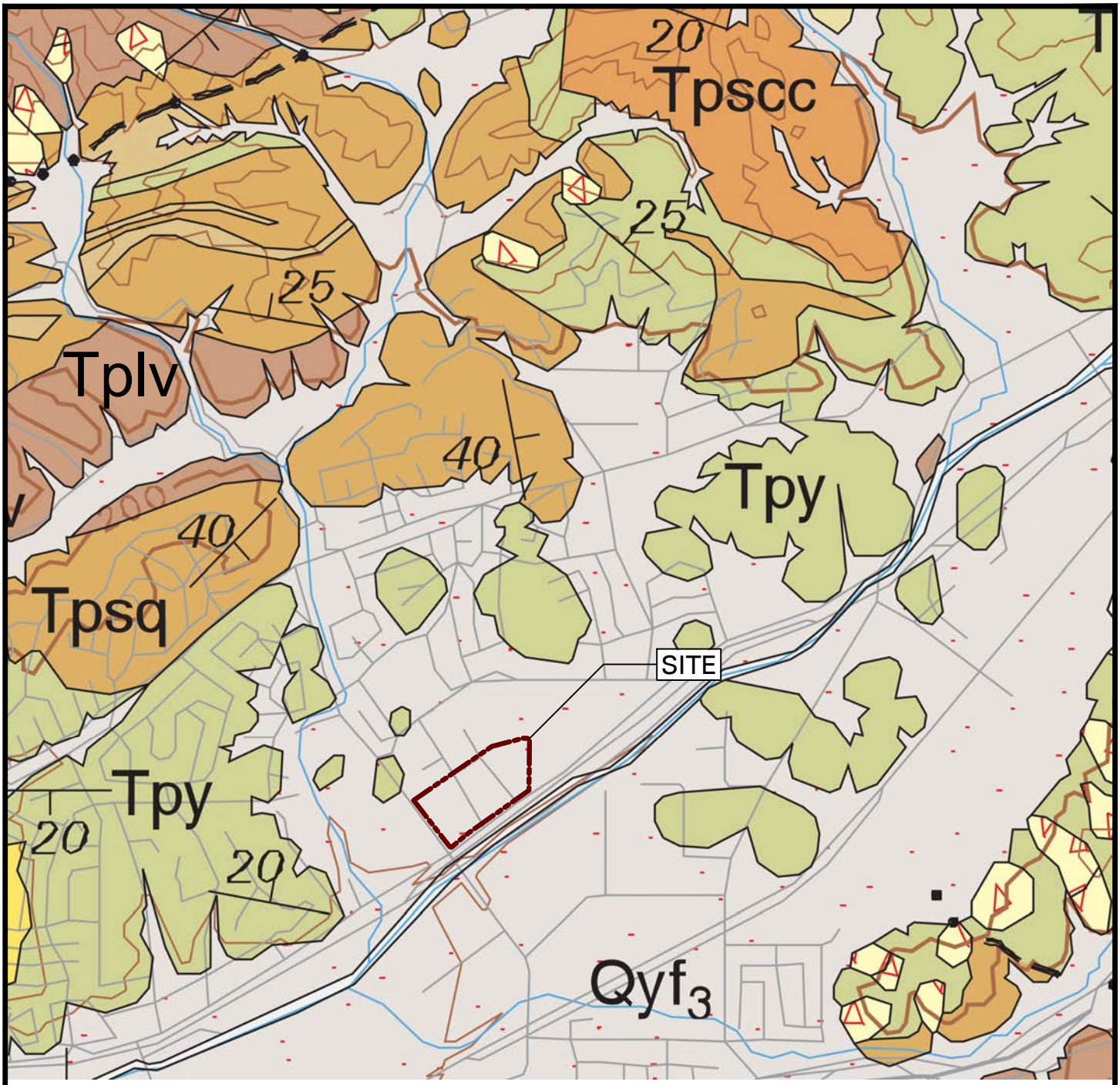
20401 VALLEY BOULEVARD
WALNUT
LOS ANGELES COUNTY CALIFORNIA

Figure Title

HISTORICAL HIGH GROUNDWATER MAP

Project No.	Figure No.
700108301	**11**
Date: DECEMBER 2021	
Scale: AS SHOWN	
Drawn By: CC	

Filename: \\langan.com\data\IRV\data3\700108301\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\GEOTECHNICAL\GEOTECHNICAL FIGURES.dwg Date: 12/13/2021 Time: 10:25 User: cconstantino Style Table: Langan.stb Layout: HHGWL



LEGEND:

Qyf	YOUNG ALLUVIAL-FAN DEPOSITS
	PUENTE FORMATION
Tpy	YORBA MEMBER
Tpscc	SYCAMORE CANYON MEMBER
Tpsq	SOQUEL MEMBER
Tplv	LA VIDA MEMBER

2000 1000 0 2000

SCALE IN FEET

REFERENCE: PRELIMINARY GEOLOGIC MAP OF THE SAN BERNARDINO 30' X 60' QUADRANGLE, CALIFORNIA (MORTON & MILLER, 2003)

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20401 VALLEY BOULEVARD
WALNUT
LOS ANGELES COUNTY CALIFORNIA

Figure Title
REGIONAL GEOLOGIC MAP

Project No.
700108301

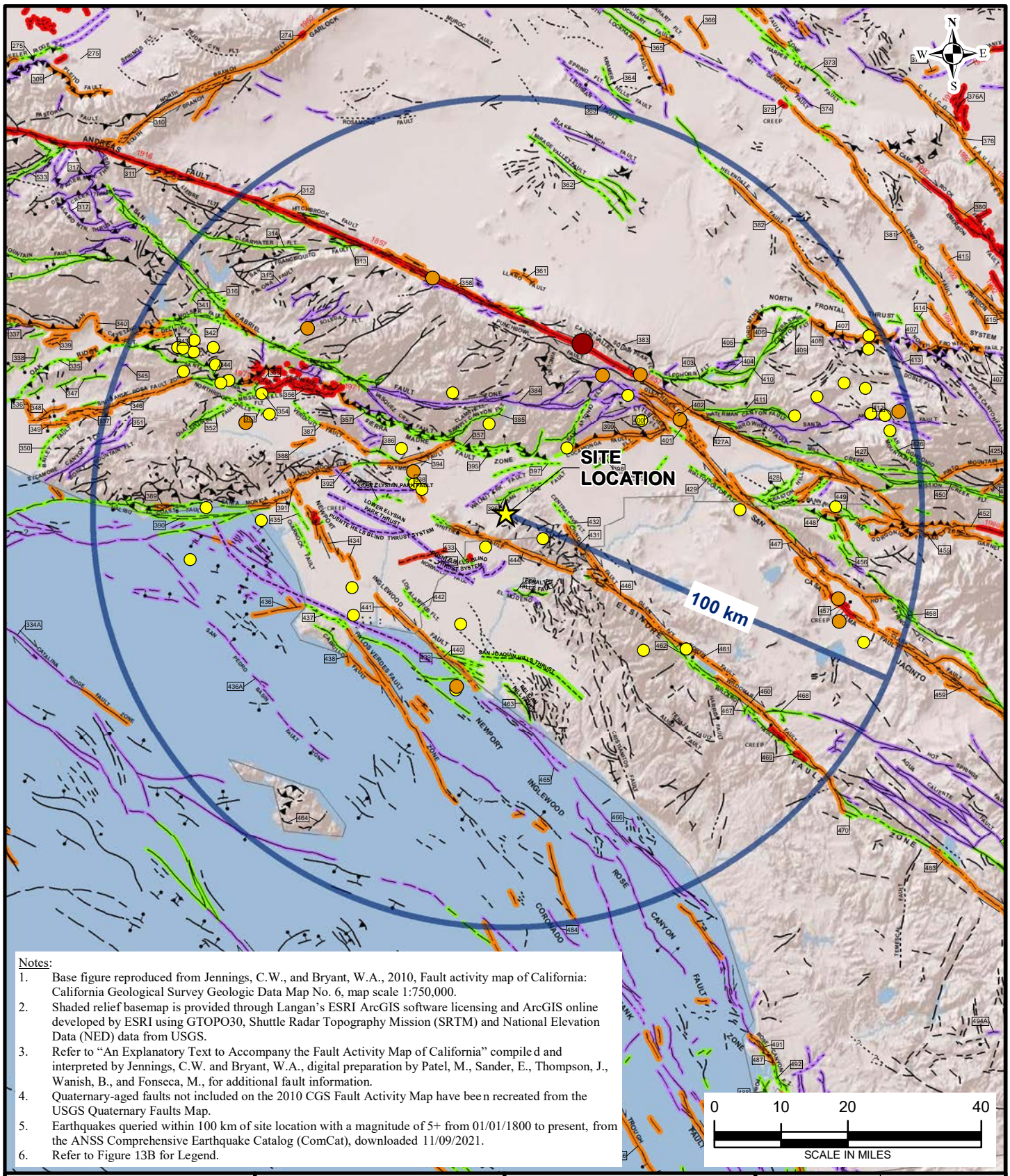
Date
DECEMBER 2021

Scale
AS SHOWN

Drawn By
CC

Figure No.
12

Filename: \\langan.com\data\IRV\data3\700108301\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\GEOTECHNICAL\GEOTECHNICAL FIGURES.dwg Date: 12/13/2021 Time: 10:25 User: cconstantino Style Table: Langan.stb Layout: RGM



Notes:

1. Base figure reproduced from Jennings, C.W., and Bryant, W.A., 2010, Fault activity map of California: California Geological Survey Geologic Data Map No. 6, map scale 1:750,000.
2. Shaded relief basemap is provided through Langan's ESRI ArcGIS software licensing and ArcGIS online developed by ESRI using GTOPO30, Shuttle Radar Topography Mission (SRTM) and National Elevation Data (NED) data from USGS.
3. Refer to "An Explanatory Text to Accompany the Fault Activity Map of California" compiled and interpreted by Jennings, C.W. and Bryant, W.A., digital preparation by Patel, M., Sander, E., Thompson, J., Wanish, B., and Fonseca, M., for additional fault information.
4. Quaternary-aged faults not included on the 2010 CGS Fault Activity Map have been recreated from the USGS Quaternary Faults Map.
5. Earthquakes queried within 100 km of site location with a magnitude of 5+ from 01/01/1800 to present, from the ANSS Comprehensive Earthquake Catalog (ComCat), downloaded 11/09/2021.
6. Refer to Figure 13B for Legend.

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Project
WALNUT BUSINESS PARK
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LOS ANGELES COUNTY CALIFORNIA

Figure Title
QUATERNARY FAULT ACTIVITY AND EARTHQUAKE EPICENTER MAP

Project No.
700108301

Date
DECEMBER 2021

Scale
1 inch = 20 miles

Drawn By
TO

Figure
13A

Path: \\langan.com\data\IRV\data3\700108301\Project Data\ArcGIS\MXD\Geotech_Figures\Fault 7A - Fault Map.mxd Date: 11/15/2021 User: Toulie Time: 11:08:11 AM

LEGEND:

Fault Age

The age classifications are based on geologic evidence to determine the youngest faulted unit and the oldest unfaulted unit along each fault or fault section

- Historic
- Holocene
- Late Quaternary
- Quaternary

Earthquake Epicenter

- Magnitude 5.0 to 5.9
- Magnitude 6.0 to 6.9
- Magnitude 7.0 to 7.4
- Magnitude 7.5 to 8.0

Pre-Quaternary Faults

- fault, certain
- fault, approx. located
- fault, concealed
- thrust fault, certain
- thrust fault, approx. located
- thrust fault, approx. located, queried
- fault, certain
- fault, concealed
- fault, approx. located

Quaternary Faults

- fault, certain
- fault, approx. located
- fault, approx. located, queried
- fault, inferred, queried
- fault, concealed
- fault, concealed, queried
- thrust fault, certain
- thrust fault, approx. located
- thrust fault, concealed
- dextral fault, certain
- dextral fault, approx. located
- dextral fault, concealed
- sinistral fault, certain
- sinistral fault, approx. located
- sinistral fault, concealed
- thrust fault, certain (2)
- thrust fault, approx. located (2)
- thrust fault, concealed (2)
- fault, solid
- fault, dashed
- fault, dotted
- dextral fault, solid
- fault, dotted, queried
- fault, dotted, queried (2)
- fault, solid, dip
- fault, dashed, dip
- fault, dotted, dip
- reverse fault, solid
- reverse fault, dashed
- reverse fault, dotted

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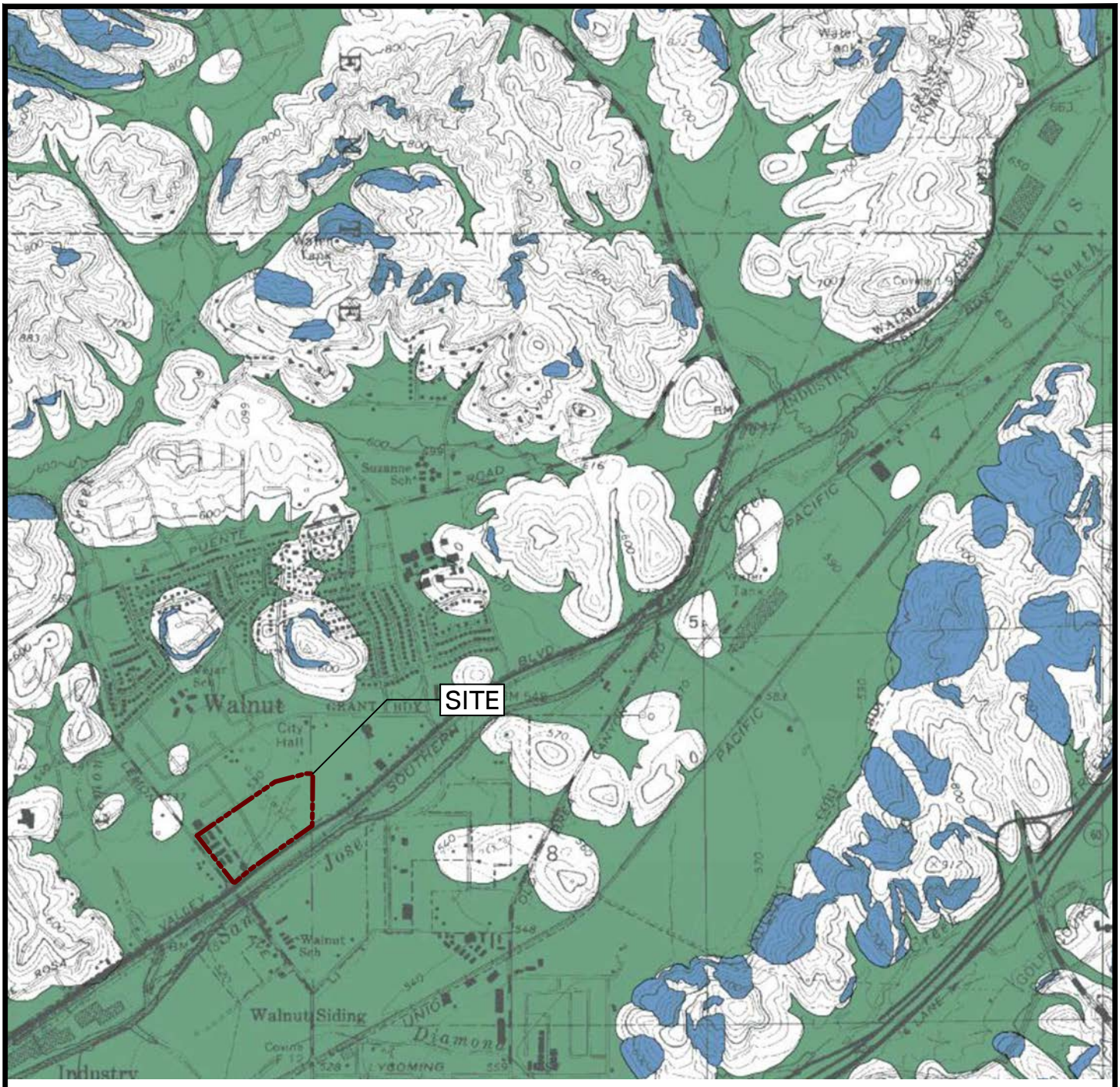
Project: WALNUT BUSINESS PARK
WALNUT
LOS ANGELES COUNTY CALIFORNIA

Figure Title: QUATERNARY FAULT ACTIVITY AND EARTHQUAKE EPICENTER MAP

Project No.: 700108301
Date: DECEMBER 2021
Scale: NOT TO SCALE
Drawn By: TO

Figure: 13B



LEGEND:

Liquefaction
Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides
Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

REFERENCE: CGS EARTHQUAKE ZONES OF REQUIRED INVESTIGATION FOR THE SAN DIMAS, CALIFORNIA 7.5-MINUTE QUADRANGLE (1999)

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Project
WALNUT BUSINESS PARK
20401 VALLEY BOULEVARD
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Figure Title
SEISMIC HAZARD ZONES MAP

Project No.	Figure No.
700108301	14
Date: DECEMBER 2021	
Scale: AS SHOWN	
Drawn By: CC	

Filename: \\langan.com\data\IRV\data3\700108301\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\GEOTECHNICAL\GEOTECHNICAL FIGURES.dwg Date: 12/13/2021 Time: 10:25 User: cconstantino Style Table: Langan.stb Layout: SHZM

APPENDIX A
Field Explorations and Laboratory Testing

APPENDIX A

SUBSURFACE EXPLORATIONS

We explored the subsurface conditions at the site by drilling twelve borings (B-1 through B-12) to depths ranging between 26.5 and 51.5 feet BGS at the locations shown on Figure 2. The borings were drilled in November 2021 by SoCal Drilling Co. using a Mayhew 1,000 Mud-Rotary drill.

The locations of the explorations were determined in the field by observing nearby landmarks. This information should be considered accurate only to the degree implied by the methods used.

A member of our geotechnical staff observed and logged the explorations. We obtained representative samples of the various soil encountered in the explorations. Classifications and sampling intervals are presented on the exploration logs included in this appendix.

SOIL SAMPLING

Samples were collected from the borings using modified California split-spoon samplers in general accordance with ASTM D3550 and we performed Standard Penetration Tests (SPTs) in general accordance with ASTM D1586.

The modified California samplers and SPTs were driven using a 140-pound hammer free falling 30 inches. The samplers were driven a total distance of 18 inches or to refusal. The number of blow counts required to drive the sampler for each 6 inch (California sampler) and 12-inch (SPT) segment was recorded (or less if refusal is met) on the exploration logs. Sampling methods and intervals are shown on the exploration logs.

The samples collected from the borings were transported to our office for further review and for assignment of geotechnical laboratory testing.

SOIL CLASSIFICATION

The soil samples were described in accordance with the classification legend that is included in this appendix prior to the exploration logs. The exploration logs indicate the depths at which the soils or their characteristics change, although the change actually may be gradual. If the change was observed directly in a sample then the contact is indicated with a solid line on the logs. If the change occurred between sample locations, the depth was interpreted and the change is indicated on the logs with a dashed line. Classifications are shown on the exploration logs.

LABORATORY TESTING

Moisture Content and In-place Dry Density

The natural moisture content of select soil samples were performed in general accordance with ASTM D2216. The natural moisture content is a ratio of the weight of the water to soil in a test sample and is expressed as a percentage.

Select soil samples were tested to determine the in situ dry density. The tests were performed in general accordance with ASTM D2937. The dry density is defined as the ratio of the dry weight of the soil sample to the volume of that sample. The dry density typically is expressed in units of pounds per cubic foot (pcf).

The test results are presented in this appendix.

Maximum Dry-Density and Optimum Moisture Content

Maximum dry-density and optimum moisture content testing was performed in general accordance with ASTM D 1557 on one bulk samples obtained from the explorations. The tests determines the optimal moisture content at which sample achieves its maximum dry density. The test results are presented in this appendix.

Grain size Analysis

Grain Size analysis was completed on select samples obtained from the explorations. The tests were conducted in general accordance with ASTM D 1140. The test measures the liquid limit, plastic limit, and plasticity index of soils. The test results are presented in this appendix.

Atterberg Limits

Atterberg Limit tests were completed on select samples obtained from the explorations. The tests were conducted in general accordance with ASTM D 4318. The test measures the amount of material finer than 75-µm (No. 200) sieve in soils. The test results are presented in this appendix.

Expansion Index

Expansion index tests were performed on selected bulk samples of the on-site soils in accordance with the latest version of Test Method ASTM D4829.

The test results are presented in this appendix.

Corrosion Testing

Chemical and electrical analyses were performed on selected bulk samples of onsite soils to determine their soluble sulfate content, chloride content, pH (acidity) and minimum electrical resistivity. These tests were performed in accordance with the latest versions of California Test Method Nos. CTM 417 (sulfate), CTM 422 (chloride), and CTM 643 (pH and resistivity) respectively. The results of these tests are included in this appendix.

Consolidation Testing

One-dimensional consolidation testing was performed in general accordance with ASTM D2435 on relatively undisturbed soil samples. The test measures the volume change of a soil sample under predetermined loads.

The test results are presented in this appendix.

Strength Testing

Direct shear tests were completed on select samples obtained from the explorations. The tests were performed in general accordance with ASTM D3080. The test determines the effects upon shear resistance and displacement, and strength properties such as Mohr strength envelopes.

The test results are presented in this appendix.

R-Value

A representative sample of the near-surface soil was tested for resistance value (R-Value) in accordance with California Test Method 301. This test is designed to provide a relative measure of soil strength for use in pavement design.

The test result is presented in this appendix.

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UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		Symbols	Typical Names
Coarse-Grained Soil (more than half of soil is larger than the no. 200 sieve size)	**Gravels** (more than half of coarse fraction is retained/> no. 4 sieve size)	**GW**	Well-graded GRAVELS with less than 5% fines or gravel-sand mixtures
		GP	Poorly-graded GRAVELS with less than 5% fines or gravel-sand mixtures
		GM	Silty gravels, gravel-sand-silt mixtures;GRAVELS with greater than 12% ML or MH fines
		GC	Clayey gravels, gravel-sand-clay mixtures; GRAVELS with greater than 12% CL or CH
	Sands (more than half of coarse fraction passes/< no. 4 sieve size)	**SW**	Well-graded sands with less than 5% fines or gravelly sands, little or no fines
		SP	Poorly-graded sands with less than 5% fines or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures; SANDS with greater than 12% ML or MH fines
		SC	Clayey sands, sand-clay mixtures; SANDS with greater than 12% CL or CH fines
Fine-Grained Soils (more than half of soil is smaller than the no. 200 sieve size)	**Silts and Clays** LL = < 50	**ML**	Inorganic silts and clayey silts of low plasticity, sandy non-plastic SILT, gravelly SILT
		CL	Inorganic clays of low to medium plasticity, silty CLAY, trace fines, sand
		OL	Organic silts and organic silt-clays of non-plastic to medium plasticity
	Silts and Clays LL = > 50	**MH**	Inorganic medium plastic silts, medium plastic to very plastic clayey silts.
		CH	Inorganic plastic to very plastic CLAYS, sandy plastic CLAY
		OH	Organic medium plastic to plastic silty CLAYS, and very plastic CLAYS
Highly Organic Soils		**PT**	Peat and other highly organic soils

GRAIN SIZE CHART

Classification	Range of Grain Sizes	
	U.S. Standard Sieve Size	Grain Size in Millimeters
Boulders	Above 12"	Above 305
Cobbles	12" to 3"	305 to 76.2
Gravel coarse fine	3" to No. 4 3" to ¾" ¾" to No.4	76.2 to 4.75 76.2 to 19.1 19.1 to 4.75
Sand coarse medium fine	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.76 to 0.075 4.76 to 2.00 2.00 to 0.420 0.240 to 0.075
Silt and Clay	Below No. 200	Below 0.075

GROUNDWATER READING

- Groundwater encountered during drilling
- Groundwater at completion
- Groundwater at 24 hours

SOIL DESCRIPTIONS/SYMBOLS

- Well-graded GRAVEL (GW)
- Poorly-graded GRAVEL (GP)
- Silty GRAVEL (GM)
- Clayey GRAVEL (GC)
- Well-graded SAND (SW)
- Poorly-graded SAND (SP)
- Silty SAND (SM)
- Clayey SAND (SC)
- AGGREGATE BASE
- Low-Plasticity SILT (ML)
- High-Plasticity SILT (MH)
- Low-Plasticity CLAY (CL)
- High-Plasticity CLAY (CH)
- SANDSTONE
- CLAYSTONE
- SILTSTONE
- FILL
- ASPHALT

SAMPLER TYPE

- CR - Modified California (CR) split-barrel ring sampler with 3.0-inch outside diameter and a 2.5-inch inside diameter.
- SPT - Standard Penetration Test (SPT) split-barrel sampler with a 2.00-inch outside diameter with a 1.5-inch inside diameter
- ST - Shelby Tube (3.0-inch outside diameter, thin-walled tube) advanced with hydraulic pressure
- BAG - Bulk Sample
- C - Core Barrel

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Figure Title

BORING LOG LEGEND

Figure No.

APPENDIX A

Filename: \\Langan.com\data\IRV\other\CAD Library Irvine\Titleblocks (LANGAN)\GEOTECH TITLEBLOCK\Classification Legend\Classification Legend.dwg Date: 6/18/2021 Time: 11:52 User: mgalvan Style Table: Langan.stb Layout: Legend

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Log of Boring **B-1** Sheet 1 of 2

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: Google Earth = 521 (feet, MSL)
Drilling Company: SoCal Drilling	Date Started: 11/22/21 — Date Finished: 11/22/21
Drilling Equipment: Mayhew 1000	Completion Depth: 26.5 ft — Rock Depth: -
Size and Type of Bit: 4.75" Mud Rotary	Number of Samples: Disturbed 4 — Undisturbed 4 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Randy
Sampler: Bulk; 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+521.0	AC = 3-inches thick, AB = 6-inches thick.	0						Bulk sample collected from 0-10 feet. Corrosivity test
	+520.3	**Artificial Fill (af)** CLAY (CL), olive brown with dark brown mottled, stiff, moist [FILL].	1						
	+518.5	**Quaternary Young Alluvial Fan Deposits (Qyf)** CLAY with Sand (CL), dark brown, stiff, very moist, some sand.	2						
			3	S-1	CR	18	4 8 12		
		Olive brown, medium stiff to stiff.	4						
			5	S-2	SPT	12	2 4 4		
	+513.5	CLAY (CL), olive gray and brown mottled, stiff, very moist, abundant caliche, few iron oxide and limonite staining.	6						
			7						
			8	S-3	CR	18	4 8 9		DD = 94.0 pcf, MC = 28.9%
			9						
	+511.0	**BEDROCK - Tertiary Puente Formation Yorba Member (Tpy)** Clayey SANDSTONE, olive brown with iron oxide and limonite mottled, medium dense, moist, fine sand, distinct shallow dipping planar beds, thinly bedded.	10	S-4	SPT	12	4 6 10		
			11						
			12						
			13						
			14						
	+506.0	SANDSTONE/SILTSTONE/CLAYSTONE, olive brown/gray/orangish brown, hard to dense, moist, iron oxide and some limonite staining, moderately dipping, thinly bedded, planar.	15						
			16	S-5	CR	18	9 22 29		
			17						
			18						
			19						
	+501.0		20						

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Log of Boring **B-1** Sheet 2 of 2

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 521 (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist. BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+501.0	SANDSTONE with Clay and SILTSTONE, olive brown with gray and orangish brown interbeds, medium dense to very stiff, moist, fine sand, well to moderate bedding.	20	S-6	SPT	10	5 9 9		
	+496.0	SILTSTONE/SANDSTONE, olive brown with gray and orangish brown interbeds, very dense to hard, moist, fine sand, moderately shallow dipping planar beds, thinly bedded.	25	S-7	CR	18	20 38 49		
	+494.5	Total Depth = 26.5 feet Boring bailed after completion. Depth to groundwater not apparent. Boring backfilled with bentonite grout and AC patched.	27						

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Log of Boring **B-2** Sheet 1 of 2

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: Google Earth = 521 (feet, MSL)
Drilling Company: SoCal Drilling	Date Started: 11/22/21 — Date Finished: 11/22/21
Drilling Equipment: Mayhew 1000	Completion Depth: 32 ft — Rock Depth: -
Size and Type of Bit: 4.75" Mud Rotary	Number of Samples: Disturbed 4 — Undisturbed 4 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ 20 — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Randy
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+521.0	AC = 3-inches thick, AB = 6-inches thick.	0						
	+520.3	**Artificial Fill (af)** CLAY (CL), olive brown with dark brown mottled, stiff, moist [FILL].	1						
	+518.5	**Quaternary Young Alluvial Fan Deposits (Qyf)** CLAY (CL), dark brown, stiff, very moist, moderate plasticity.	2						
			3	S-1	SPT	6	4 4 5		
	+516.0	Sandy CLAY (CL), olive brown with yellow and orangish brown mottled, stiff, moist, fine to medium sand, trace caliche.	4						
	+515.0	Sandy CLAY (CL), olive brown, stiff, moist to very moist, fine sand, abundant caliche.	5	S-2	CR	18	5 9 12		DD = 104.2 pcf, MC = 19.8%
			6						
			7						
			8	S-3	SPT	12	3 5 5		
	+511.0	CLAY with Sand (CL), olive gray and brown, stiff, very moist, some fine sand, caliche stringers.	9						
			10	S-4	CR	18	3 6 8		DD = 97.8 pcf, MC = 27.2%
			11						
			12						
			13						
			14						
	+506.0	Sandy CLAY (CL), orangish dusk brown, stiff, moist, fine sand, fine to coarse gravel.	15						
			16	S-5	SPT	18	4 7 7		
			17						
			18						
			19						
	+501.0		20						

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Log of Boring **B-2** Sheet 2 of 2

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 521 (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+501.0	**BEDROCK - Tertiary Puente Formation Yorba Member (Tpy)** SANDSTONE/SILTSTONE, olive brown and orangish brown, very dense to hard, moist, fine sand, planar, shallow dipping beds.	20	S-6	CR	18	12 34 42		
	+496.0	Clayey to Silty SANDSTONE, orangish brown to olive brown, very dense, moist, fine sand, iron oxide staining.	25	S-7	SPT	12	15 27 36		
		Very hard, concretionary bed.	30	S-8	CR	0	50/3.5"		No sample recovery.
	+489.0	Total Depth = 32 feet Boring bailed after completion. Groundwater observed at 20 feet bgs. Boring backfilled with bentonite grout and AC patched.	32						
			45						

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Log of Boring **B-3** Sheet 1 of 2

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: Google Earth = 521 (feet, MSL)
Drilling Company: SoCal Drilling	Date Started: 11/22/21 — Date Finished: 11/22/21
Drilling Equipment: Mayhew 1000	Completion Depth: 26.5 ft — Rock Depth: -
Size and Type of Bit: 4.75" Mud Rotary	Number of Samples: Disturbed 4 — Undisturbed 3 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Randy
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+521.0		0						
	+520.6	AC = 3-inches thick, AB = 2-inches thick.							
		Artificial Fill (af) CLAY (CL), olive brown with dark brown mottled, stiff, moist [FILL].	1						
			2						
	+518.5	**Quaternary Young Alluvial Fan Deposits (Qyf)** Silty CLAY (CL), olive brown, stiff, very moist.	3	S-1	SPT	5	2 5 4		
	+517.0	CLAY with Silt (CL), olive gray, very stiff, very moist.	4						
			5	S-2	CR	15	5 9 11		DD = 87.4 pcf, MC = 29.6%
			6						
	+513.5	CLAY with Silt and Sand (CL), olive gray, stiff, very moist, abundant caliche stringers.	7						
			8	S-3	SPT	6	2 4 4		
			9						
		Very stiff, fine gravel, decreased sand.	10	S-4	CR	18	6 10 14		DD = 95.1 pcf, MC = 28.2%
			11						
			12						
			13						
			14						
		Olive brown, increased clay.	15	S-5	SPT	10	6 12 8		
			16						
			17						
			18						
	+502.0		19						
		CLAY (CL), gray brown, very stiff, very moist, few caliche and rootlets.	20						

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Log of Boring **B-3** Sheet 2 of 2

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 521 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+501.0		20						DD = 96.8 pcf, MC = 26.6%
			21	S-6	CR	18	10 18 22		
			22						
	+498.0	Sandy CLAY (CL), olive brown, very stiff, very moist, iron oxide and limonite staining.	23						
			24						
			25						
			26	S-7	SPT	18	6 8 10		
	+494.5	Total Depth = 26.5 feet Boring bailed after completion. Depth to groundwater not apparent. Boring backfilled with bentonite grout and AC patched.	27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						
			37						
			38						
			39						
			40						
			41						
			42						
			43						
			44						
			45						

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Log of Boring **B-4** Sheet 1 of 2

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: Google Earth = 521 (feet, MSL)
Drilling Company: SoCal Drilling	Date Started: 11/22/21 — Date Finished: 11/22/21
Drilling Equipment: Mayhew 1000	Completion Depth: 41.5 ft — Rock Depth: -
Size and Type of Bit: 4.75" Mud Rotary	Number of Samples: Disturbed 5 — Undisturbed 5 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ 24 — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Randy
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+521.0		0						
	+520.4	AC = 3-inches thick, AB = 4-inches thick.	1						
		Artificial Fill (af) SILT with Sand (ML), dark olive gray, medium stiff, fine sand, high plasticity, few rootlets [FILL].	2						
			3	S-1	CR	18	3 3 5		
			4						
	+516.0		5						
		Quaternary Young Alluvial Fan Deposits (Qyf) CLAY (CL), olive brown and gray, soft to medium stiff, very moist, abundant caliche.	6	S-2	SPT	6	1 2 2		
			7						
		Olive gray, medium stiff, fine sand, caliche stringers.	8	S-3	CR	15	2 4 6		DD = 90.8 pcf, MC = 26.0%
			9						
		Olive brown, abundant caliche stringers.	10	S-4	SPT	12	2 3 4		
			11						
			12						
			13						
			14						
	+506.0		15						
		Sandy CLAY (CL), reddish dusk brown, stiff, moist to very moist, fine to very coarse sand.	16	S-5	CR	18	4 8 9		DD = 104.6 pcf, MC = 21.9%
			17						
			18						
			19						
			20						

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Log of Boring **B-4** Sheet 2 of 2

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 521 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+501.0	Reddish brown with some brown mottled, medium dense to stiff, moist, very fine sand, increase sand.	20–24	S-6	SPT	12	6 8 7		
	+496.0	Clayey SAND (SC), olive brown, dense, moist to very moist, medium to coarse sand, fine gravel.	25–26	S-7	CR	18	26 29 22		DD = 114.4 pcf, MC = 19.5%
	+491.0	Gravelly SAND with Clay (SW), olive brown, very dense, very moist, fine to coarse sand and gravel.	27–31	S-8	SPT	6	14 37 50/5"		Heavy auger chatter from 28-33 feet.
	+486.0	**BEDROCK - Tertiary Puente Formation Yorba Member (Tpy)** SILTSTONE/SANDSTONE, gray and olive brown interbeds, very dense to hard, moist to very moist, fine sandstone with some silt, well to moderate plannar bedding with shallow dip, thinly bedded.	32–36	S-9	CR	17	30 45 50/5"		
	+481.0	SANDY SILTSTONE/SILTY SANDSTONE, olive brown and gray, hard to very dense, moist, thinly bedded, planar.	37–41	S-10	SPT	10	28 32 36		
	+479.5	Total Depth = 41.5 feet Boring bailed after completion. Groundwater observed at 24 feet bgs. Boring backfilled with bentonite grout and AC patched.	42–45						

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Log of Boring **B-5** Sheet 1 of 2

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: Google Earth = 524 (feet, MSL)
Drilling Company: SoCal Drilling	Date Started: 11/24/21 — Date Finished: 11/24/21
Drilling Equipment: Mayhew 1000	Completion Depth: 26.5 ft — Rock Depth: -
Size and Type of Bit: 4.75" Mud Rotary	Number of Samples: Disturbed 5 — Undisturbed 3 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Randy
Sampler: Bulk; 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+524.0	AC = 3-inches thick, AB = 6-inches thick.	0						Bulk sample collected from 0-10 feet.
	+523.3	**Artificial Fill (af)** CLAY (CL), olive brown with dark brown mottled, stiff, moist [FILL].	1						
	+521.5	**Quaternary Young Alluvial Fan Deposits (Qyf)** CLAY with Gravel (CL), medium brown with some dark brown mottled, stiff, moist, fine gravel.	2						
			3	S-1	SPT	3	3 6 6		
			4						
			5	S-2	CR	18	5 8 8		DD = 108.3 pcf, MC = 26.1%
			6						
		Medium stiff to stiff.	7						
			8	S-3	SPT	9	2 4 4		
			9						
	+514.0	CLAY with Gravel (CL), olive brown with orangish brown mottled, medium stiff, moist to very moist, caliche.	10	S-4	CR	18	2 4 6		DD = 100.8 pcf, MC = 26.3%
			11						
			12						
			13						
			14						
	+509.0	Sandy CLAY (CL), reddish dusk brown, medium stiff, moist, fine gravel.	15	S-5	SPT	12	2 3 3		
			16						
			17						
			18						
			19						
	+504.0		20						

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Log of Boring **B-5** Sheet 2 of 2

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 524 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+504.0	SILT (ML), dusky brown, stiff, wet, grades into Silty SAND with Gravel (SM) with depth	20	S-6	CR	18	3 4 16		Soil saturated. DD = 79.8 pcf, MC = 40.5%
	+499.0	Sandy CLAY (CL), reddish dusk brown, very stiff, very moist, very fine to fine sand.	25	S-7	SPT	10	6 9 14		
	+497.5	Total Depth = 26.5 feet Boring bailed after completion. Depth to groundwater not apparent. Boring backfilled with bentonite grout and AC patched.	27						

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Log of Boring **B-6** Sheet 1 of 2

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: Google Earth = 524 (feet, MSL)
Drilling Company: SoCal Drilling	Date Started: 11/23/21 — Date Finished: 11/23/21
Drilling Equipment: Mayhew 1000	Completion Depth: 26.5 ft — Rock Depth: -
Size and Type of Bit: 4.75" Mud Rotary	Number of Samples: Disturbed 4 — Undisturbed 3 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Randy
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+524.0	AC = 4-inches thick, AB = 4-inches thick.	0						
	+523.3	**Artificial Fill (af)** CLAY (CL), olive brown with dark brown mottled, stiff, moist [FILL].	1						
	+521.5	**Quaternary Young Alluvial Fan Deposits (Qyf)** Sandy CLAY (CL), olive gray, medium stiff to stiff, moist, fine to coarse sand, moderately plastic clay.	2						
			3	S-1	SPT	9	2 3 5		
			4						
	+519.0	CLAY with Sand (CL), olive gray, stiff, very moist, some fine sand, caliche.	5	S-2	CR	18	4 10 14		DD =115.0 pcf, MC = 29.3%
			6						
		Olive brown and gray, medium stiff, moist, fine to coarse sand, iron oxide.	7						
			8	S-3	SPT	9	2 3 4		
			9						
	+514.0	CLAY (CL), olive brown with orange and light brown mottled, stiff, very moist, fine to coarse sand, abundant caliche, iron oxide staining.	10	S-4	CR	18	4 6 9		DD = 104.6 pcf, MC = 30.7%
			11						
			12						
			13						
			14						
		Olive brown with brown mottled, medium stiff, no caliche.	15						
			16	S-5	SPT	18	2 3 4		
			17						
			18						
			19						
			20						

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Log of Boring **B-6** Sheet 2 of 2

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 524 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+504.0	Dusk brown, medium stiff to stiff, coarse sand.	20	S-6	CR	18	2 4 8		DD = 98.8 pcf, MC = 30.1%
			21						
			22						
			23						
			24						
		Olive and dusky brown, stiff, fine to coarse sand.	25	S-7	SPT	12	3 4 8		
	+497.5		26						
		Total Depth = 26.5 feet Boring bailed after completion. Depth to groundwater not apparent. Boring backfilled with bentonite grout and concrete patched.	27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						
			37						
			38						
			39						
			40						
			41						
			42						
			43						
			44						
			45						

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Log of Boring **B-7** Sheet 1 of 2

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: Google Earth = 524 (feet, MSL)
Drilling Company: SoCal Drilling	Date Started: 11/23/21 — Date Finished: 11/23/21
Drilling Equipment: Mayhew 1000	Completion Depth: 26.5 ft — Rock Depth: -
Size and Type of Bit: 4.75" Mud Rotary	Number of Samples: Disturbed 3 — Undisturbed 4 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Randy
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+524.0	AC = 5.5-inches thick, AB = 6-inches thick.	0						
	+523.0	**Artificial Fill (af)** CLAY (CL), olive brown with dark brown mottled, stiff, moist [FILL].	1						
	+521.5	**Quaternary Young Alluvial Fan Deposits (Qyf)** CLAY (CL), dark brown, stiff, moist, fine to coarse sand, some caliche.	2						
			3	S-1	CR	18	4 9 12		
	+519.0	CLAY (CL), olive gray, medium stiff, very moist, fine sand, some caliche.	4						
			5	S-2	SPT	12	2 3 4		
		Olive brown, stiff, moist to very moist, iron oxide and abundant caliche mottled.	6						
			7	S-3	CR	18	3 5 8		DD = 98.9 pcf, MC = 32.9%
		Olive gray, medium stiff, very moist, some iron oxide and abundant caliche staining.	8						
			9	S-4	SPT	12	2 3 5		
	+509.0	SAND and Clayey SAND (SP-SC), brown to orangish brown, medium dense, slightly moist, fine gravel.	10						
			11						
			12						
			13						
			14						
			15	S-5	CR	18	8 11 5		Poor sample recovery. DD = 96.8 pcf, MC = 17.1%
			16						
			17						
			18						
			19						
	+504.0		20						

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Log of Boring **B-7** Sheet 2 of 2

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 524 (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+504.0	CLAY (CL), dusky reddish brown, very soft, very moist.	20	S-6	SPT	10	0 1 0		
	+499.0	Sandy SILT (ML), medium olive brown, medium stiff, wet, very fine to fine sand, low plasticity.	25	S-7	CR	18	2 2 6		DD = 99.3 pcf, MC = 24.4%
	+497.5	Total Depth = 26.5 feet Boring bailed after completion. Depth to groundwater not apparent. Boring backfilled with bentonite grout and concrete patched.	27						

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Log of Boring **B-8** Sheet 1 of 3

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: Google Earth = 524 (feet, MSL)
Drilling Company: SoCal Drilling	Date Started: 11/23/21 — Date Finished: 11/23/21
Drilling Equipment: Mayhew 1000	Completion Depth: 51.5 ft — Rock Depth: -
Size and Type of Bit: 4.75" Mud Rotary	Number of Samples: Disturbed 6 — Undisturbed 6 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ 24.5 — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Randy
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	524.0	AC = 4-inches thick, AB = 6-inches thick.	0						
	523.2	**Artificial Fill (af)** CLAY (CL), dark brown with light brown mottled, very stiff, moist [FILL].	1						
	521.5	**Quaternary Young Alluvial Fan Deposits (Qyf)** CLAY (CL), olive gray, stiff, very moist, caliche, few old rootlets.	2						
			3	S-1	CR	18	6 11 14		
			4						
			5	S-2	SPT	8	2 4 5		
			6						
	516.5	Silty SAND (SM), olive gray and brown, loose, moist to very moist.	7						DD = 92.8 pcf, MC = 22.9%
	515.5	CLAY (CL), olive gray and brown, medium stiff, moist to very moist.	8	S-3	CR	12	3 4 6		
		Dark brown with some light brown mottled, very moist, coarse sand.	9						
			10						
			11	S-4	SPT	12	2 3 3		
			12						
			13						
			14						
	509.0	CLAY with Sand (CL), olive brown, very stiff, very moist, abundant caliche, few very old rootlets.	15						DD = 107.7 pcf, MC = 20.3%
			16	S-5	CR	18	7 16 17		
			17						
			18						
			19						
	504.0		20						

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Log of Boring **B-8** Sheet 2 of 3

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 524 (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+504.0	CLAY (CL), reddish dusk brown, very stiff, very moist, coarse sand.	20	S-6	SPT	12	5 7 9		
	+499.0	Clayey SAND with Gravel (SC), reddish dusky brown, dense, moist, fine gravel.	25	S-7	CR	12	10 26 34		DD = 119.3 pcf, MC = 14.7% Auger chatter from 26-45 feet.
		Olive brown, very dense, very moist, fine gravel.	30	S-8	SPT	10	36 50/4"		
	+489.0	Sandy to Clayey GRAVEL (GC), olive brown, very dense, wet, fine to coarse gravel.	35	S-9	CR	2	50/5"		Poor sample recovery.
	+484.0	SAND with Gravel and Clay (SW), olive brown, very dense, wet, fine to coarse gravel.	40	S-10	SPT	10	35 37 38		
	+479.0		45						

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Log of Boring **B-8** Sheet 3 of 3

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 524 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+479.0	Silty to Clayey SAND (SC), olive brown, medium dense, wet, some caliche, few lenses of Sandy Silt/Clay.	45	S-11	CR	12	11 9 9		
			46						
			47						
			48						
			49						
		Fine to very fine sand, no caliche.	50	S-12	SPT	10	8 10 11		
	+472.5		51						
		Total Depth = 51.5 feet Boring bailed after completion. Groundwater observed at 24.5 feet bgs. Boring backfilled with bentonite grout and AC patched.	52						
			53						
			54						
			55						
			56						
			57						
			58						
			59						
			60						
			61						
			62						
			63						
			64						
			65						
			66						
			67						
			68						
			69						
			70						

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Log of Boring **B-9** Sheet 1 of 2

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: Google Earth = 524 (feet, MSL)
Drilling Company: SoCal Drilling	Date Started: 11/23/21 — Date Finished: 11/23/21
Drilling Equipment: Mayhew 1000	Completion Depth: 26.5 ft — Rock Depth: -
Size and Type of Bit: 4.75" Mud Rotary	Number of Samples: Disturbed 5 — Undisturbed 3 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ 24 — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Randy
Sampler: Bulk; 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+524.0	AC = 4-inches thick, AB = 6-inches thick.	0						Bulk sample collected from 0-10 feet. Corrosivity test
	+523.2	**Artificial Fill (af)** CLAY (CL), dark brown and light brown mottled, stiff, very moist, fine sand [FILL].	1						
			2						
			3	S-1	SPT	9	3, 5, 6		
			4						
	+519.0	**Quaternary Young Alluvial Fan Deposits (Qyf)** CLAY (CL), olive gray and brown mottled, stiff, very moist, trace caliche.	5						DD = 96.5 pcf, MC = 27.3%
			6	S-2	CR	15	4, 7, 9		
			7						
	+516.5	Silty SAND (SM), medium brown, loose, moist.	8	S-3	SPT	6	2, 2, 2		
			9						
	+514.0	CLAY (CL), dark brown, stiff, very moist.	10	S-4	CR	18	3, 4, 6		DD = 87.4 pcf, MC = 33.4% Direct Shear Test
			11						
			12						Auger chatter from 12-14 feet.
			13						
			14						
	+509.0	Clayey SAND with Gravel (SC), brown and light brown mottled, medium dense, slightly moist to moist, fine to coarse sand, fine gravel, iron oxide staining.	15	S-5	SPT	4	4, 8, 8		
			16						
			17						
			18						
			19						
	+504.0		20						

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Log of Boring **B-9** Sheet 2 of 2

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 524 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+504.0	CLAY (CL), medium to dark brown, medium stiff, very moist.	20	S-6	CR	18	1 3 5		DD = 96.7 pcf, MC = 27.9%
	+499.0	Silty SAND (SM), medium brown, medium dense, moist, very fine sand.	25	S-7	SPT	18	4 11 10		
	+497.5	Total Depth = 26.5 feet Boring bailed after completion. Groundwater observed at 24 feet bgs. Boring backfilled with bentonite grout and AC patched.	27						

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Log of Boring **B-10** Sheet 1 of 2

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: Google Earth = 526 (feet, MSL)
Drilling Company: SoCal Drilling	Date Started: 11/24/21 — Date Finished: 11/24/21
Drilling Equipment: Mayhew 1000	Completion Depth: 26.5 ft — Rock Depth: -
Size and Type of Bit: 4.75" Mud Rotary	Number of Samples: Disturbed 3 — Undisturbed 4 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Randy
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+526.0	AC = 4-inches thick, AB = 6-inches thick.	0						
	+525.2	**Artificial Fill (af)** CLAY with Sand (CL), dark gray and light gray mottled, stiff, moist [FILL].	1						
			2						
			3	S-1	CR	18	5, 9, 11		
			4						
	+521.0	**Quaternary Young Alluvial Fan Deposits (Qyf)** CLAY with Silt (CL), light olive gray, stiff moist, abundant caliche.	5						
			6	S-2	SPT	5	3, 6, 7		
			7						
	+518.5	CLAY with Sand (CL), olive gray, stiff, moist, fine to very fine sand.	8	S-3	CR	18	5, 8, 12		DD = 95.3 pcf, MC = 27.8% Direct Shear Test
			9						
		Olive brown and gray, medium stiff, some iron oxide and caliche.	10	S-4	SPT	10	2, 3, 4		
			11						
			12						
			13						
			14						
	+511.0	SILT with Sand (ML), medium brown, very stiff, moist, fine to very fine sand.	15	S-5	CR	18	4, 11, 14		DD = 105.0 pcf, MC = 21.5% Consolidation Test
			16						
			17						
			18						
			19						
			20						

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Log of Boring **B-10** Sheet 2 of 2

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 526 (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+506.0	Dusk brown, stiff, moist to very moist.	20	S-6	SPT	10	5 6 7		
	+501.0	Clayey SAND (SC), medium brown, medium dense, very moist to wet.	25	S-7	CR	18	7 16 18		
	+499.5	Total Depth = 26.5 feet Boring bailed after completion. Depth to groundwater not apparent. Boring backfilled with bentonite grout and AC patched.	27						

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Log of Boring **B-11** Sheet 1 of 3

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: Google Earth = 526 (feet, MSL)
Drilling Company: SoCal Drilling	Date Started: 11/24/21 — Date Finished: 11/24/21
Drilling Equipment: Mayhew 1000	Completion Depth: 51.5 ft — Rock Depth: -
Size and Type of Bit: 4.75" Mud Rotary	Number of Samples: Disturbed 7 — Undisturbed 6 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ 16 — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Randy
Sampler: Bulk; 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+526.0	AC = 4-inches thick, AB = 6-inches thick.	0						Bulk sample collected from 0-10 feet.
	+525.2	**Artificial Fill (af)** Sandy CLAY (CL), brown and dark brown, very stiff, moist [FILL].	1						
			2						
			3	S-1	SPT	9	3 8 9		
			4						
		Light and dark brown, medium stiff to stiff.	5						DD = 94.6 pcf, MC = 25.6%
			6	S-2	CR	18	3 5 7		
			7						
	+518.5	**Quaternary Young Alluvial Fan Deposits (Qyf)** Clayey SAND (SC), olive brown, medium dense, wet, fine gravel.	8	S-3	SPT	4	4 8 6		
			9						
	+516.0	CLAY (CL), olive gray, medium stiff, very moist, fine gravel, medium plasticity.	10	S-4	CR	18	1 3 4		DD = 100.5 pcf, MC = 35.9%
			11						
			12						
			13						
			14						
	+511.0	CLAY with Sand (CL), medium brown, soft, very moist, fine sand.	15						
			16	S-5	SPT	10	2 2 2		
			17						
			18						
			19						
	+506.0		20						

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Log of Boring **B-11** Sheet 2 of 3

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 526 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+506.0	Sandy CLAY (CL), medium brown, soft, very moist.	20	S-6	CR	18	2 2 2		DD = 107.6 pcf, MC = 26.9%
			21						
			22						
			23						
			24						
		Brown, very stiff, very moist, iron oxide staining.	25	S-7	SPT	15	5 8 9		
			26						
			27						
			28						
			29						
		Orangish brown, moist, very fine to fine sand, some iron oxide staining.	30	S-8	CR	18	7 12 14		DD = 103.8 pcf, MC = 22.6%
			31						
			32						
			33						
			34						
		Light brown and dark brown mottled, stiff, very moist.	35	S-9	SPT	15	4 5 6		
			36						
			37						
			38						
			39						
		Brown, very stiff, very moist, abundant caliche, some iron oxide.	40	S-10	CR	18	14 18 21		
			41						
			42						
			43						
			44						
			45						

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Log of Boring **B-11** Sheet 3 of 3

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 526 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+481.0	Medium brown, stiff, moist.	45	S-11	SPT	9	6 7 7		
	+476.0	Sandy SILT (ML), olive brown, very stiff, moist.	50	S-12	CR	18	6 17 21		
	+474.5	Total Depth = 51.5 feet Boring bailed after completion. Groundwater observed at 16 feet bgs. Boring backfilled with bentonite grout and concrete patched.	51						

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Log of Boring **B-12** Sheet 1 of 2

Project: Walnut Business Park	Project No.: 700108301
Location: 20401 Valley Boulevard	Elevation and Datum: Google Earth = 526 (feet, MSL)
Drilling Company: SoCal Drilling	Date Started: 11/24/21 — Date Finished: 11/24/21
Drilling Equipment: Mayhew 1000	Completion Depth: 26.5 ft — Rock Depth: -
Size and Type of Bit: 4.75" Mud Rotary	Number of Samples: Disturbed 3 — Undisturbed 4 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First ▽ — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Randy
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+526.0	AC = 5-inches thick, AB = 6-inches thick.	0						
	+525.1	**Artificial Fill (af)** CLAY with Sand (CL), dusky brown to dark brown, stiff, very moist, few gravel [FILL].	1						
			2						
			3	S-1	CR	18	2 7 8		
			4						
	+521.0	**Quaternary Young Alluvial Fan Deposits (Qyf)** CLAY with Silt (CL), olive brown, medium stiff, very moist, fine gravel.	5						
			6	S-2	SPT	9	1 2 3		
	+518.5	SAND (SP), light brown, medium dense, moist, coarse sand, fine to medium gravel.	7						
			8	S-3	CR	18	9 20 15		DD = 106.8 pcf, MC = 5.0%
			9						
	+516.0	CLAY (CL), olive brown, soft, very moist, caliche.	10						
			11	S-4	SPT	9	1 2 1		
			12						
			13						
			14						
		Olive gray.	15						DD = 115.3 pcf, MC = 29.0%
			16	S-5	CR	18	5 9 14		
			17						
			18						
			19						
	+506.0		20						

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Log of Boring **B-12** Sheet 2 of 2

Project	Project No.
Walnut Business Park	700108301
Location	**Elevation and Datum**
20401 Valley Boulevard	Google Earth = 526 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	Water Content	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+506.0	CLAY with Silt (CL), olive to medium brown, stiff to very stiff, caliche.	20	S-6	SPT	12	4 7 8		
	+501.0	Sandy CLAY (CL), medium brown, hard, very moist, with gravel.	25	S-7	CR	18	11 22 30		
	+499.5	Total Depth = 26.5 feet Boring bailed after completion. Depth to groundwater not apparent. Boring backfilled with bentonite grout and concrete patched.	27						

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MOISTURE DENSITY TESTS

PROJECT Langan # 70018301 **JOB NO.** 2012-0057 **BY** LD **DATE** 12/13/21

Sample No.	B-1 / S-3	B-2 / S-2	B-2 / S-4	B-3 / S-2	B-3 / S-4	B-3 / S-6	B-4 / S-3	B-4 / S-5
Depth (ft)	7.5	5.0	10.0	5.0	10.0	20.0	7.5	15.0
Testing								
Soil Type	Brown, Silty Clay	Brown, Silty Clay	Brown, Silty Clay	Brown, Silty Clay	Brown, Silty Clay	Brown, Silty Clay	Brown, Silty Clay	Brown, Silty Clay
Wet+Tare	952.0	1169.6	971.8	905.1	957.2	960.6	729.6	990.1
No. Ring	5	6	5	5	5	5	4	5
Wet Weight	110.3	139.3	132.4	150.1	128.8	112.9	131.4	144.3
Dry Weight	85.6	116.3	104.1	115.8	100.5	89.2	104.3	118.4
Wet density	121.1	124.9	124.4	113.2	121.9	122.5	114.4	127.4
% Water	28.9	19.8	27.2	29.6	28.2	26.6	26.0	21.9
Dry Density	94.0	104.2	97.8	87.4	95.1	96.8	90.8	104.6
O.B.Press(psf)								

Sample No.	B-4 / S-7	B-5 / S-2	B-5 / S-3	B-5 / S-4	B-6 / S-2	B-6 / S-4	B-6 / S-6	B-7 / S-3
Depth (ft)	2.5	5.0	10.0	20.0	5.0	10.0	20.0	7.5
Testing								
Soil Type	Brown, Silty Clay w. Sand	Brown, Silty Clay w. Gravel	Brown, Silty Clay	Brown, Silty Clay w. Gravel	Brown, Silty Clay	Brown, Silty Clay	Brown, Silty Clay	Brown, Silty Clay
Wet+Tare	1180.9	951.5	1131.5	945.5	949.6	936.4	950.1	1124.3
No. Ring	6	5	6	5	5	5	5	6
Wet Weight	169.5	136.6	127.3	112.1	148.7	136.7	128.5	131.4
Dry Weight	141.9	108.3	100.8	79.8	115.0	104.6	98.8	98.9
Wet density	136.6	136.6	127.3	112.1	148.7	136.7	128.5	131.4
% Water	19.5	26.1	26.3	40.5	29.3	30.7	30.1	32.9
Dry Density	114.4	108.3	100.8	79.8	115.0	104.6	98.8	98.9
O.B.Press(psf)								

Geo-Logic ASSOCIATES

MOISTURE DENSITY TESTS

PROJECT Langan # 70018301 **JOB NO.** 2012-0057 **BY** LD **DATE** 12/13/21

Sample No.	B-7 / S-5	B-7 / S-7	B-8 / S-3	B-8 / S-5	B-8 / S-7	B-9 / S-2	B-9 / S-6	B-11 / S-2
Depth (ft)	15.0	25.0	7.5	15.0	25.0	5.0	20.0	5.0
Testing								
Soil Type	Brown, Silty Sand w. Gravel &Silty Clay	Brown, Clayey Sand	Brown, Clayey Sand	Brown, Silty Clay	Brown, Silty Clay w. Silty Sand	Brown, Silty Clay	Brown, Silty Clay	Brown, Silty Clay
Wet+Tare	725.0	773.6	909.9	1002.6	1045.9	962.8	1161.3	938.3
No. Ring	4	4	5	5	5	5	6	5
Wet Weight	155.1	187.7	124.5	132.9	157.1	123.9	135.6	86.9
Dry Weight	132.4	150.9	101.3	110.5	137.0	97.3	106.0	69.2
Wet density	113.4	123.6	114.0	129.5	136.8	122.9	123.7	118.8
% Water	17.1	24.4	22.9	20.3	14.7	27.3	27.9	25.6
Dry Density	96.8	99.3	92.8	107.7	119.3	96.5	96.7	94.6
O.B.Press(psf)								

Sample No.	B-11 / S-4	B-11 / S-6	B-11 / S-8	B-12 / S-5	B-12 / S-4			
Depth (ft)	10.0	20.0	30.0	7.5	15.0			
Testing								
Soil Type	Brown, Silty Clay	Brown, Silty Clay	Brown, Silty Clay	Brown, Silty Sand	Brown, Silty Clay			
Wet+Tare	908.0	1175.5	1193.7	929.4	956.8			
No. Ring	5	6	6	5	5			
Wet Weight	118.5	168.3	133.9	166.8	121.6			
Dry Weight	87.2	132.6	109.2	158.9	94.3			
Wet density	136.6	136.6	127.3	112.1	148.7			
% Water	35.9	26.9	22.6	5.0	29.0			
Dry Density	100.5	107.6	103.8	106.8	115.3			
O.B.Press(psf)								

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SAMPLE NO.:	B-1	B-9			
Depth:	0 - 5'	0 - 5'			
DIRECT SHEAR TEST (type)					
Initial Moisture Content %					
Dry Density (pcf)					
Normal Stress (psf)					
Peak Shear Stress (psf)					
Ultimate Shear Stress (psf)					
Cohesion (psf)					
Internal Friction Angle (degrees)					
EXPANSION TEST UBC STD 18-2					
Initial Dry Density (pcf)					
Initial Moisture Content %					
Final Moisture Content %					
Pressure (psf)					
Expansion Index / Swell %					
CORROSIVITY TEST					
Resistivity (CTM 643) (ohm-cm)	820	770			
pH (ASTM D1293)	7.4	7.5			
CHEMICAL TESTS					
Soluble Sulfate (CTM 417) (%)	0.0687	0.0448			
Chloride Content (CTM 422) (%)	0.0106	0.0098			
Wash #200 Sieve (ASTM-1140) %					
Sand Equivalent (ASTM D2419)					

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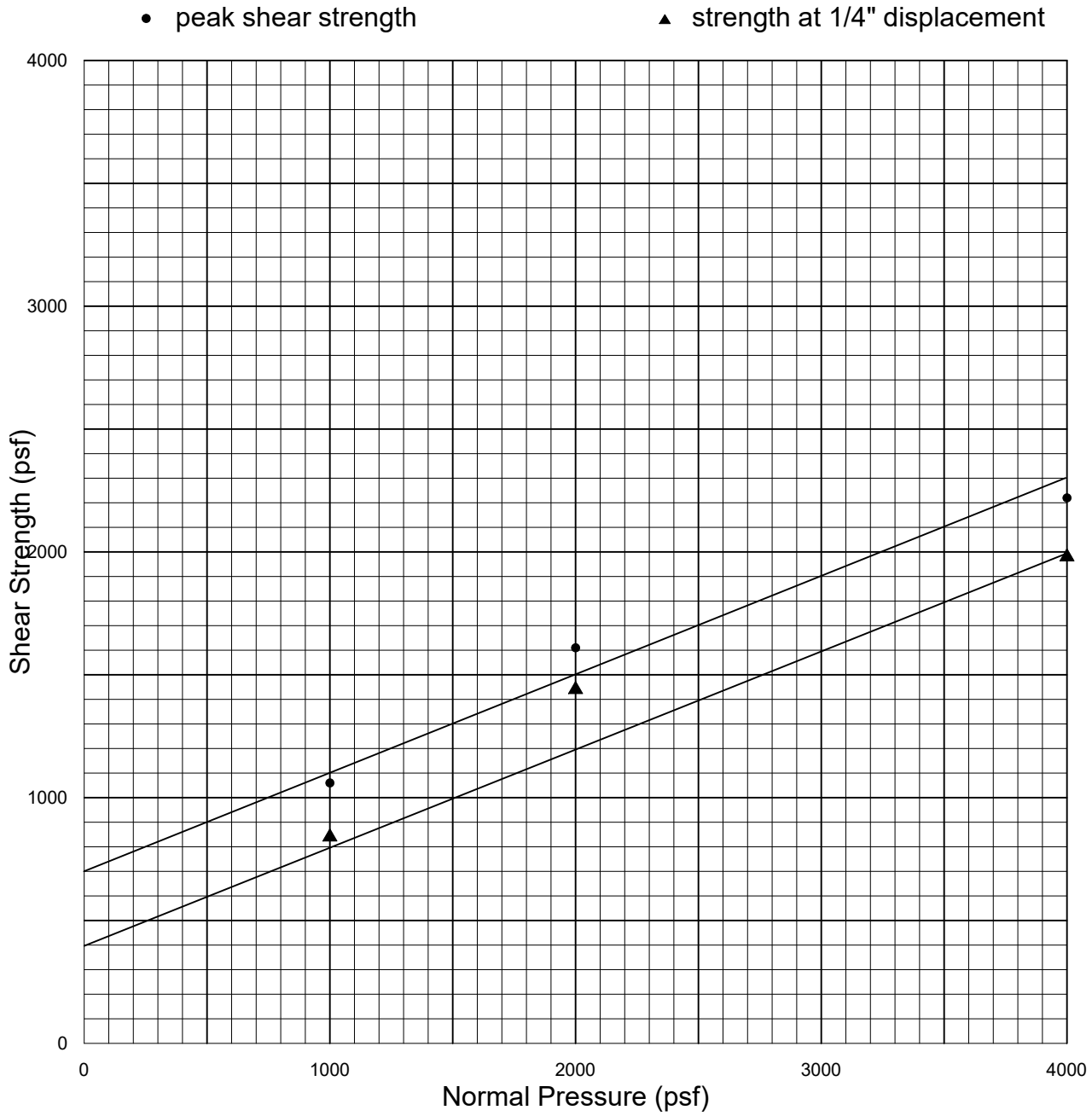
DIRECT SHEAR TEST - ASTM D-3080



Strain Rate: 0.0084 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial W.C. (%)	Final W.C. (%)
B-9/S-4	Undisturbed & Saturated	Silty Clay	87.4	33.4	37.4

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
1000	1060 @ 0.1050"	840
2000	1610 @ 0.1100"	1440
4000	2220 @ 0.1055"	1980
	C = 700 psf	C = 400 psf
	ϕ = 22 deg.	ϕ = 22 deg.

Date: 12-13-2021

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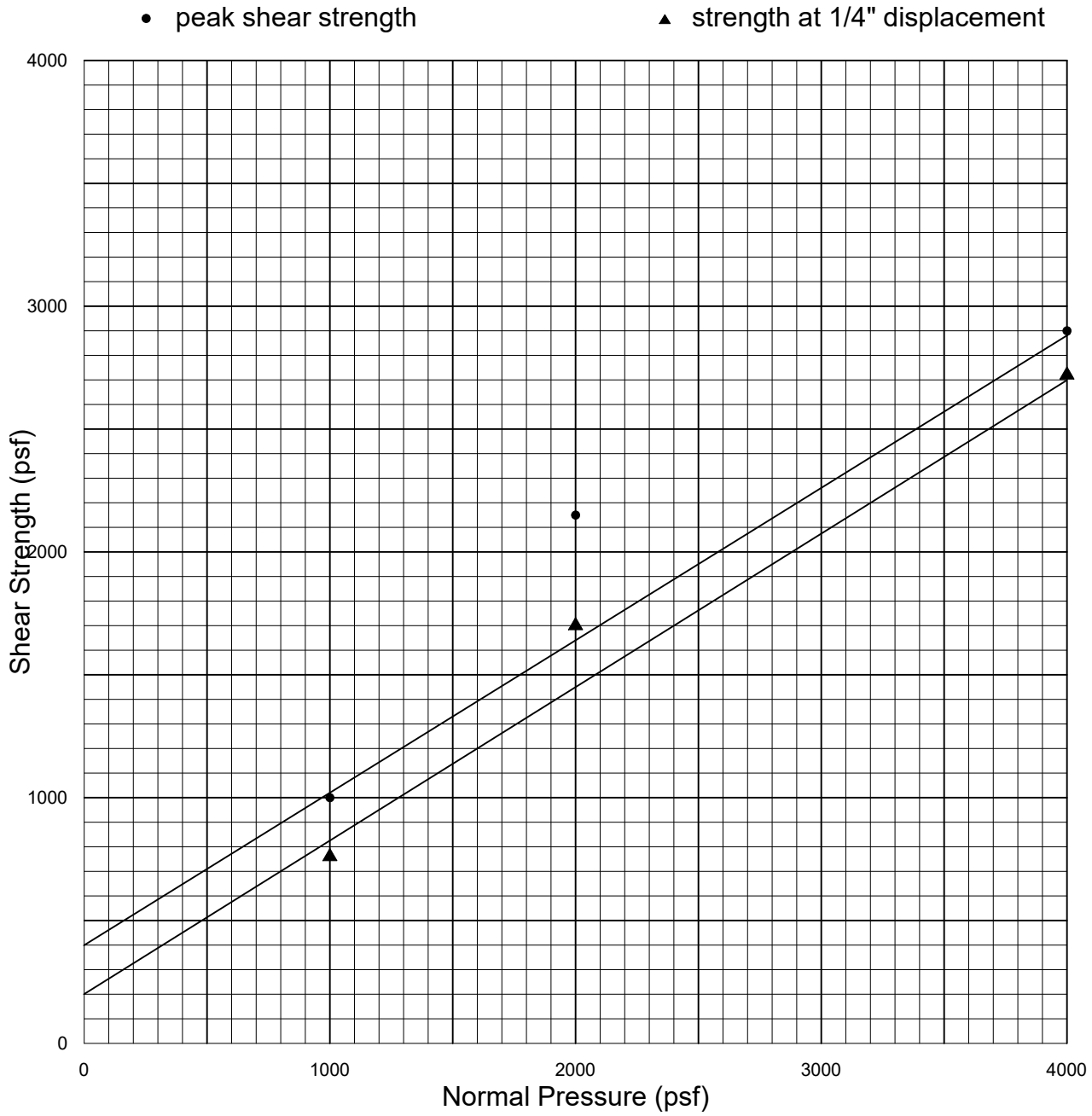
DIRECT SHEAR TEST - ASTM D-3080



Strain Rate: 0.0084 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial W.C. (%)	Final W.C. (%)
B-10/S-3	Undisturbed & Saturated	Silty Clay	95.3	27.8	27.9

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
1000	1000 @ 0.0405"	760
2000	2150 @ 0.1200"	1700
4000	2900 @ 0.1455"	2720
	C = 400 psf	C = 200 psf
	ϕ = 32 deg.	ϕ = 32 deg.

Date: 12-13-2021

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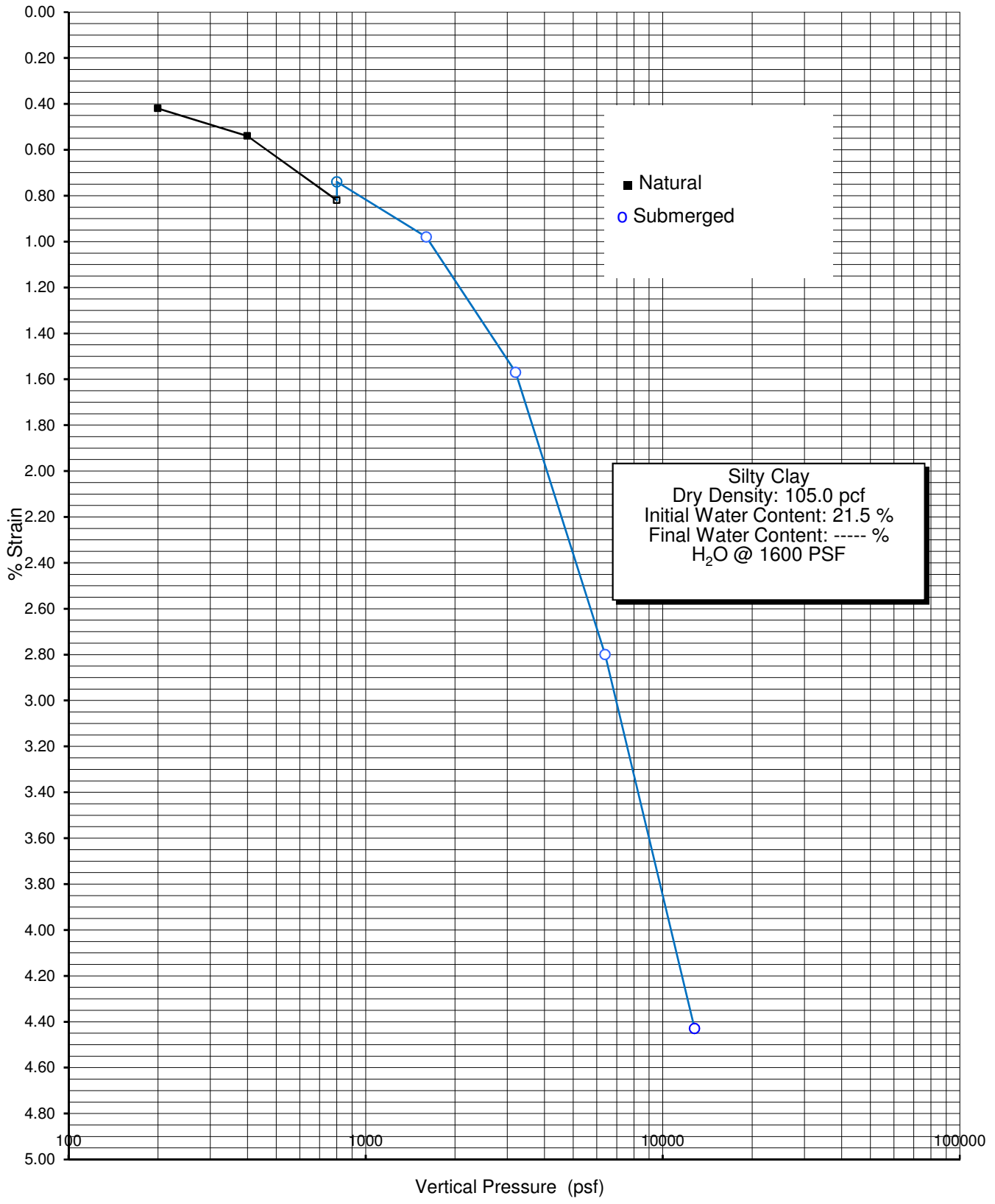
CONSOLIDATION TEST - ASTM D2435

Boring / Sample No.	B-10 / S-5	Depth:	15'	Date	12-08-21



Geo-Logic ASSOCIATES

CONSOLIDATION TEST - ASTM D2435

Boring / Sample No.	B-4 / S-3	Depth:	15'	Date	12-08-21