Low Impact Development (LID) Plan

For:

Santa Fe Springs Industrial

NWC Telegraph Road & Santa Fe Springs Road
Santa Fe Springs, CA 90670

Prepared for:

Bridgeland Resources, LLC
109 North Post Oak Lane, Suite 230
Houston, TX 77024

Prepared by:

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John Vlassis, P.E.
HZ Job No. 310094

07/17/2024
Date

Contents

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

The following is a list of the Discretionary Permit (s) related to this project:

The City of Santa Fe Springs requires the preparation and implement of a Low Impact Development (LID) Plan.

Master Covenant and Agreement Regarding On-site Stormwater Treatment Devices Maintenance (See Attachment E for copy of this agreement)

Section II: Project Description

Location:

Bridgeland Resources proposes to construct two warehouse and office facilities on the north west corner of Telegraph Road and Santa Fe Springs intersection. The 26.77-acre property is located on the northwest section of the existing oil field bounded to the south by Telegraph Road and to the east by Santa Fe Springs Road. Commercial and industrial developments bound the site to the north and east. Figures 1 and 2 show the location and vicinity maps of the project.

Project Components:

The proposed development's primary function is two warehouses and accompanying primary and secondary offices within each. The project site will consist of two (2) buildings (north and south), surrounding parking lots, and a shared truck loading dock area bisected by trailer stalls with a total area of 1,166,198 SF and 1,091,392 SF of impervious area. Building north will consist of a 298,373 SF warehouse area with 40 dock-hi doors, a 5,000 SF office and a 5,000 SF secondary office. Building south will consist of a 286,305 SF warehouse area with 36 dock-hi doors, a 5,000 SF primary office and a 5,000 SF secondary office. Each building will receive their own trailer stall area comprising of 46 trailer stalls for the building north and 46 trailer stalls for building south.

Per the County of Los Angeles Department of Public Works Low Impact Development Standards Manual, dated February 2014, this project is a Designated Project because it meets the following requirements:

- All development projects equal to one acre or greater of disturbed area and adding more than 10,000 square feet of impervious surface area;
- Parking lots with 5,000 square feet or more of surface area, or with 25 or more parking spaces;
- Redevelopment projects, which are developments that result in creation or addition or replacement of 5,000 square feet or more of impervious surface on a site that was previously developed as described on the above bullets.

Site Activities:

The primary activities that will be taking place on site are the transporting of goods via semi-trailer trucks, along with the storage of goods in the warehouse. The type of goods that will be transported and stored on-site are unknown at this time. Table 1 lists the potential pollutants of concern for this project and any associated activities.

Table 1 – Activity and Associated Pollutants of Concern

Anticipated Activity	Associated Pollutants	Location on Site Map
Import and Export of Goods	Oil, Grease, Metals, Trash	Loading Docks on north and south building
Employee Arrival and Departures from site	Oil, Grease, Metals, Trash	Entrances and parking lot surrounding the building
Landscape and Irrigation Maintenance	Fertilizers, Pesticides and Herbicides	Surrounding the building and the site
Trash Enclosure	Trash	TBD

Table 1 above describes the pollutants of concern that might be associated with the various industrial activities anticipated to occur on this site. This project is subject to the provisions in Los Angeles Regional Water Quality Control Board (LARWQCB) Order R4-2012-0175, Attachment P for the San Gabriel River Watershed Metals and Selenium TMDLs for Lead and Selenium. Order R4-2012-0175 and associated reference documents can be found at the following website:
https://www.waterboards.ca.gov/rwqcb4/water_issues/programs/stormwater/municipal/index.html

The drainage from the project site ultimately drains to the San Gabriel River Reach 2, then to San Gabriel River Reach 1 where it joins San Pedro Bay. Per Los Angeles Regional Water Quality Control Board (LARWQCB) Order R4-2012-0175, Attachment K and P for the San Gabriel River Watershed Metals and Selenium, listed pollutants of San Gabriel River Reach 2 are Copper, Lead, Cyanide, and Water Temperature. Listed pollutants of San Gabriel River Reach 1 are Warm Water Temperature.

Section III: Site Description

Proposed Site Characteristics:

The proposed site is located on the north west section of Telegraph Road and Santa Fe Springs Road. This section makes up 26.77 of the 44.67-acre existing oil field bounded to the south by Telegraph Road and to the east by Santa Fe Springs Road. The proposed development is bounded to the south and east by the remaining 17.90 acres of the oil field, which will encompass four (4) future developments not part of this report. Commercial and industrial developments bound the site to the north and east. The proposed development is currently 26.77 acres but will be split into two parcels, with the northern parcel having 13.45 acres and the southern parcel having 13.32 acres. The project also proposes a cul-de-sac to be constructed on the end of Hawkins Street in order to provide driveways into the proposed separate properties. Figures 1 and 2 show the location and vicinity maps of the project. The property is currently zoned ‘Heavy Manufacturing’ M2 and has a land use designation of ‘Heavy Industrial’.

Not including the cul-de-sac area, the proposed project site will consist of building, paved and landscaped areas with a total area of 1,141,546 SF comprised of 93% impervious area and 7% pervious area or landscaped area. The landscaped area is mainly around the perimeter of the buildings and along the property line. Table 2 describes the breakdown of impervious area per Tributary Drainage Area.

Table 2 – Impervious Area Hardscape Materials

Tributary Drainage Areas	Total Area (Acres)	Percent Impervious	Type/Material of Hardscape
A-1	0.42	91%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-2	0.90	94%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-3	0.95	93%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-4	0.96	94%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-5	0.55	88%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-6	0.20	74%	Curbs, Gutters, AC Pavement, and Landscape
A-7	0.32	82%	Curbs, Gutters, AC Pavement, and Landscape
A-8	0.78	88%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-9	0.28	83%	Curbs, Gutters, AC Pavement, and Landscape
A-10	0.16	89%	Curbs, Gutters, AC Pavement, and Landscape
A-11	0.27	70%	Curbs, Gutters, AC Pavement, and Landscape
A-12	6.34	98%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-13	0.29	79%	Curbs, Gutters, AC Pavement, and Landscape
A-14	0.28	83%	Curbs, Gutters, AC Pavement, and Landscape
A-15	0.30	78%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-16	1.26	92%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-17	0.21	80%	Curbs, Gutters, AC Pavement, and Landscape
A-18	0.39	83%	Curbs, Gutters, AC Pavement, and Landscape
A-19	0.83	94%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape

A-20	1.08	96%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-21	1.14	95%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-22	0.13	33%	Curbs, Gutters, AC Pavement, and Landscape
A-23	0.11	39%	Curbs, Gutters, AC Pavement, and Landscape
A-24	1.01	83%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-25	1.36	83%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape
A-26	5.69	100%	Building Roof, Curbs, Gutters, AC Pavement, and Landscape

Existing & Proposed Drainage Characteristics:

Currently, the site generally drains from northeast to southwest. It is unknown, yet doubtful storm runoff is carried offsite by sub-surface drainage facilities. The existing site can be considered 98% pervious, though graded roads travelled by vehicles and heavy machinery most likely have heavily compacted a small percentage of the total area. There are two existing buildings onsite as well as concrete slabs, utilities, and miscellaneous structures throughout the site.

An existing 51" RCP storm drain runs parallel to and within a few feet inside the projects east property line that and connects to a 54" beneath Telegraph Road. This 54" storm drain runs west until it connects to a Los Angeles County Flood Control District owned drain, eventually draining into the San Gabriel River.

The proposed drainage will have 100% of the site draining to two (2) underground infiltration systems. Water will sheet flow to ribbon gutters directed to onsite curb inlet drains that connect to the infiltration trench systems. Roof drains that also surface flow to gutters and will be conveyed to the infiltration systems. Overflow for both infiltration trenches will be conveyed to Hawkins Street. Figure No.4 shows the proposed drainage patterns. Table 3 shows the proposed BMP's in relation to the Tributary Drainage Areas.

Table 3 – BMP Designation Table

BMP Designation No.	BMP Description	Tributary Drainage Management Areas (DMAs)
1	Infiltration Trench #1	A-1, A-2, A-3, A-4, A-5, A-6, A-7, A-8, A-9, A-10, A-11, A-12, A-22, A-24

2	Infiltration Trench #2	A-13, A-14, A-15, A-16, A-17, A-18, A-19, A-20, A-21, A-23, A-25, A-26

The BMPs described in the table above are to be designed to capture and retain the Stormwater Quality Design Volume (SWQDv). The SWQDv is defined as:

- The 0.75-inch, 24-hour rain event or
- The 85th percentile, 24-hour rain event, as determined from the Los Angeles County 85th percentile precipitation isohyetal map, whichever is greater.

See Attachment A for the calculation associated with each of the BMPs listed above.

SWQDv values were calculated using the County of Los Angeles Department of Public Works HydroCalc software, see Attachment A for the Analysis. The values generated by HydroCalc are for infiltration.

Section IV: Best Management Practices (BMPs)

A. Source Control BMPs

The following table shows source control BMPs (routine non-structural and routine structural) included in this project and those that were not included.

Routine Non-Structural BMPs

Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
N1	Education for Property Owners, Tenants and Occupants	X		
N2	Activity Restrictions	X		
N3	Common Area Landscape Management	X		
N4	BMP Maintenance	X		
N5	Title 22 CCR Compliance (How development will comply)		X	It is not anticipated that hazardous materials will be maintained on-site
N6	Local Industrial Permit Compliance		X	Warehouse does not require an industrial permit.
N7	Spill Contingency Plan	X		
N8	Underground Storage Tank Compliance		X	No underground storage tanks are part of this project.
N9	Hazardous Materials Disclosure Compliance		X	It is not anticipated that hazardous materials will be maintained on-site
N10	Uniform Fire Code Implementation		X	It is not anticipated that hazardous materials will be maintained on-site
N11	Common Area Litter Control	X		

N12	Employee Training	X		
N13	Housekeeping of Loading Docks	X		
N14	Common Area Catch Basin Inspection	X		
N15	Street Sweeping Private Streets and Parking Lots	X		
N16	Commercial Vehicle Washing		X	No vehicle washing facilities will be included.
N17	Commercial Vehicle Fueling		X	No vehicle fueling facilities will be included.
N18	Commercial Vehicle Maintenance		X	No vehicle maintenance facilities will be included.

Best Management Practices (BMPs) are construction and post-construction devices and procedures which implemented and followed, should reduce or eliminate the infiltration of the pollutant into the storm water system.

Non-Structural BMPs:

N1 - Education for Property Owners, Tenants and Occupants
N2 - Activity Restrictions
N3 - Common Area Landscape Management
N4 - BMP Maintenance
N5 - Title 22 CCR Compliance
N6 - Local Industrial Permit Compliance
N7 - Spill Contingency Plan
N8 - Underground Storage Tank Compliance
N9 - Hazardous Materials Disclosure Compliance
N10 - Uniform Fire Code Implementation
N11 - Common Area Litter Control
N12 - Employee Training
N13 - Housekeeping of Loading Docks
N14 - Common Area Catch Basin Inspection
N15 - Street Sweeping Private Streets and Parking Lots
N16 - Commercial Vehicle Washing
N17 - Commercial Vehicle Fueling
N18 - Commercial Vehicle Maintenance

Structural BMPs:

S1 - Filtration
S2 - Common Area Efficient Irrigation
S3 - Common Area Runoff-Minimizing Landscape Design
S4 - Community Car Wash Racks
S5 - Wash Water Controls for Food Preparation
S6 - Waste Management (Trash Dumpster) Areas
S7 - Self Contained Washing
S8 - Outdoor Storage
S9 - Motor Fuel Concrete Dispensing Areas
S10 - Motor Fuel Dispensing Area Canopy
S11 - Motor Fuel Dispensing Area Interruptible Drainage
S12 - Energy Dissipaters
S13 - Catch Basin Stenciling
S14 - Diversion of Loading Dock Drainage
S15 - Inlet Trash Racks
S16 - Water Quality Inlets
S17 - Stormwater Filters
S18 - Vegetated Swale
S19 - Planter Boxes
S20 - Biofiltration Basin
S21 – Porous/Permeable Pavement
S22 – Infiltration Trench

__ BMPs not applicable to this project

All BMPs selected should be implemented properly and maintained in good working condition for the duration of the life of the BMP (during construction or post-construction).

Non-structural Measures

N1 – Education for Property Owners, Members and Employees
Informational materials will be provided to employees on general housekeeping practices that contribute to protection of storm water quality. These materials will also 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. Bridgeland Resources will provide these materials through an education program, which will be maintained, enforced, and updated periodically.

N2 - Activity Restrictions
Activities on this site will be limited to activities to the transfer of solid waste.

N3 - Common Area Landscape Management
Management programs will be designed and established by Bridgeland Resources Industrial, 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.

N4 - BMP Maintenance
Bridgeland Resources will be responsible for implementing each of the BMPs detailed in this plan. Bridgeland Resources will also be responsible for cleaning and maintaining the BMPs on a regular basis.

N7 - Spill Contingency Plan
Bridgeland Resources will prepare and maintain onsite a spill contingency plan to be implemented in the event of a spill of hazardous materials onsite.

N11 - Common Area Litter Control
Bridgeland Resources will be required to implement waste management and litter control procedures in the common areas aimed at reducing pollution of surface runoff. Bridgeland Resources may also contract with their landscape maintenance firm to provide this service during regularly scheduled maintenance, which should consist of litter patrol, to prevent emptying of waste receptacles in common areas, and noting waste disposal violations and reporting the violations to Bridgeland Resources for investigation.

N12 - Employee Training
An employee training program will be established as it would apply to future employees and contractors of Bridgeland Resources to inform and train all engaged in maintenance activities. These activities include 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 waste disposal.

N13 - Housekeeping of Loading Docks
Runoff from the loading dock area will be directed toward the vegetated swale near the SE corner of the property.

N14 - Common Area Catch Basin Inspection
Bridgeland Resources will be required to have at least 80 percent of the catch basins and inlets inspected, cleaned and maintained on an annual basis and 100 percent of the basins and inlets included in a two-year period. Cleaning should take place in the late summer/early fall prior to the start of the rainy season.

N15 - Street Sweeping Private Streets and Parking Lots
Bridgeland Resources shall have parking lots swept in late summer and early fall, prior to the start of the rainy season, as defined by the city of Industry.

Structural Measures

Structural BMPs shall be installed through the construction and development of the project. The structural BMPs used for this project are summarized below:

S2 - Common Area Efficient Irrigation (SD-12)
Landscape irrigation in common areas should implement water sensors, programmable irrigation times (for short cycles), etc. These common areas will be maintained by Bridgeland Resources. For additional BMP description, see Attachment B, *SD-12: Effective Irrigation.*

S3 - Common Area Runoff-Minimizing Landscape Design
Common area landscaped area should use similar planting material with similar water requirements, in order to reduce excess irrigation runoff and promote surface filtration. These common areas will be maintained by Bridgeland Resources. For additional BMP description, see Attachment B, *SD-10: Site Design and Landscape Planning.*

S6 – Waste Management (Trash Dumpster) Areas (SD-32)
The proposed Waste Management Area will have a screen wall surrounding three (3) sides and an access gate along the front. The waste collection containers will be kept covered. The floor slab of the enclosure will slope, at a minimum of 1%, so no water will collect within the enclosure. See architectural plans for details of Waste Management Area enclosure. For additional BMP description, see Attachment B, *SD-32: Trash Enclosures*.

S13 - Catch Basin Stenciling
All proposed catch basins and inlets will have either a stencil and/or placard with verbiage conforming to city of Los Angeles requirements, as shown in Section IV.B. Bridgeland Resources will maintain the stenciling and labels. For additional BMP description, see Attachment B, *SD-13: Storm Drain System Signs*.

S15 - Inlet trash racks
All proposed catch basins will have catch basin inserts installed in addition to protection bars to collect debris and litter prior to entering the on-site storm drain system.

S22 (T-10) – Infiltration Trench

Two (2) underground proprietary infiltration trenches will be constructed to allow runoff of the whole site including roof and surrounding paved areas to be collected in a perforated pipe and gravel system that will infiltrate into the soil. As part of the design, a riser pipe will be constructed to allow for overflow into Hawkins Street.

B. Addition Source Control BMPs Information

SD - 13: Storm Drain System Signs
The use of stencil's and signs to alert the public to the destination of pollutants allowed to flow into the storm drain system.

This project will use catch basins and grate inlets to collect surface runoff from the parking lot areas and direct it in pipes to the existing storm drain system. At each of these grate inlets, a placard will be placed with the message "NO DUMPING – DRAINS TO OCEANS" on it, see Attachment B for sample.

C. Site Design BMPs

The following table shows site design BMPs that are included in this project and a description of each BMP:

Site Design BMPs

Technique	Included?		Brief Description of Method
	Yes	No	
Minimize Impervious Area/Maximize Permeability (C-Factor Reduction)	X		The proposed infiltration trenches will be used to treat all of the surface runoff.
Minimize Directly Connected Impervious Areas (DCIAs) (C-Factor Reduction)		X	
Create Reduced or "Zero Discharge" Areas (Runoff Volume Reduction)		X	
Conserve Natural Areas (C-Factor Reduction)		X	

SD-10: Site Design and Landscape Planning
The purpose of this BMP is to integrate and incorporate landscaping elements in an effective manner to reduce the amount of surface runoff of storm water to underground storm drain facilities. For additional BMP description, see Attachment B, *SD-10: Site Design and Landscape Planning*.

D. Additional Site Design Objectives

The following guidelines address specific concerns highlighted by the Regional Water Quality Control Boards and should be implements if applicable to the proposed project:

- Run-off from the roof will be collected in either planter boxes, biofiltration basins or vegetated swales to be treated prior to discharge into an on-site underground storm drain system.

E. Treatment Control BMPs

The following table shows treatment BMPs that are included in this project. A description of each BMP follows:

Treatment Control BMPs

Name	Included?		If not applicable, state brief reason
	Yes	No	
Vegetated (Grass) Strips		X	Project site not large enough to justify BMP.
Vegetated (Grass) Swales		X	Project site cannot accommodate length of swale.
Proprietary Control Measures	X		
Dry Detention Basin		X	Project site not large enough to justify BMP.
Wet Detention Basin		X	Could not be sustained.
Constructed Wetland		X	Could not be sustained.
Detention Basin/Sand Filter		X	Project site not large enough to justify BMP.
Porous Pavement Detention		X	Could not be sustained.
Porous Landscape Detention		X	Could not be sustained.
Infiltration Basin		X	Existing soils condition does not allow for infiltration.
Infiltration Trench	X		Existing soils condition allows for infiltration.
Media Filter		X	
Biofiltration Basin		X	

F. Hydromodification

The project is not subject to hydromodification requirements, as defined in Section 8 of the LADPW Low Impact Development Standards Manual (February 2014). A review of the downstream channels on the Los Angeles County Storm Drain System Inventory (https://pw.lacounty.gov/fcd/StormDrain/index.cfm) identified that runoff from the project is successively conveyed into concrete-lined and engineered channels that are not susceptible to hydromodification.

Section V: Inspection/Maintenance Responsibility for BMPs

Bridgeland Resources will be responsible for the inspection, employ/implementation of maintenance of the BMPs detailed herein, this includes:

Non-Structural Measures:

- N1- Education for Property Owners
- N2- Activity Restrictions
- N3- Common Area Landscape Management
- N4- BMP Maintenance
- N7- Spill Contingency Plan
- N11- Common Area Litter Control

N12- Employee Training
N13- Housekeeping of Loading Docks
N14- Catch Basin Inspection
N15- Street Sweeping Private Streets and Parking Lots

Structural Measures:

S2- Common Area Efficient Irrigation
S3- Common Area Runoff-Minimizing Landscape Design
S6- Waste Management (Trash Dumpster) Areas
S13- Catch Basin Stenciling
S15- Inlet Trash Racks
S17- Stormwater Filters
S22- Infiltration Trench

Figures No. 5 and 6 detailing the maintenance and frequency of maintenance are included at the end of this text. Bridgeland Resources will be providing ongoing funding for operation and maintenance of the BMP's described herein.

Section VI: Location Map, Plot Plan & BMP Details

The following is a list of the figures used as part of this SUSMP:
Figure No. 1: Location Map
Figure No. 2: Project Site and Vicinity Map
Figure No. 3: Site Plan
Figure No. 4: LID Layout Plans (2 Sheets)
Figure No. 5: Grading Plan (2 Sheets)
Figure No. 5: Non-structural BMP Maintenance Responsibility/Frequency Matrix
Figure No. 6: Structural BMP Maintenance Responsibility/Frequency Matrix

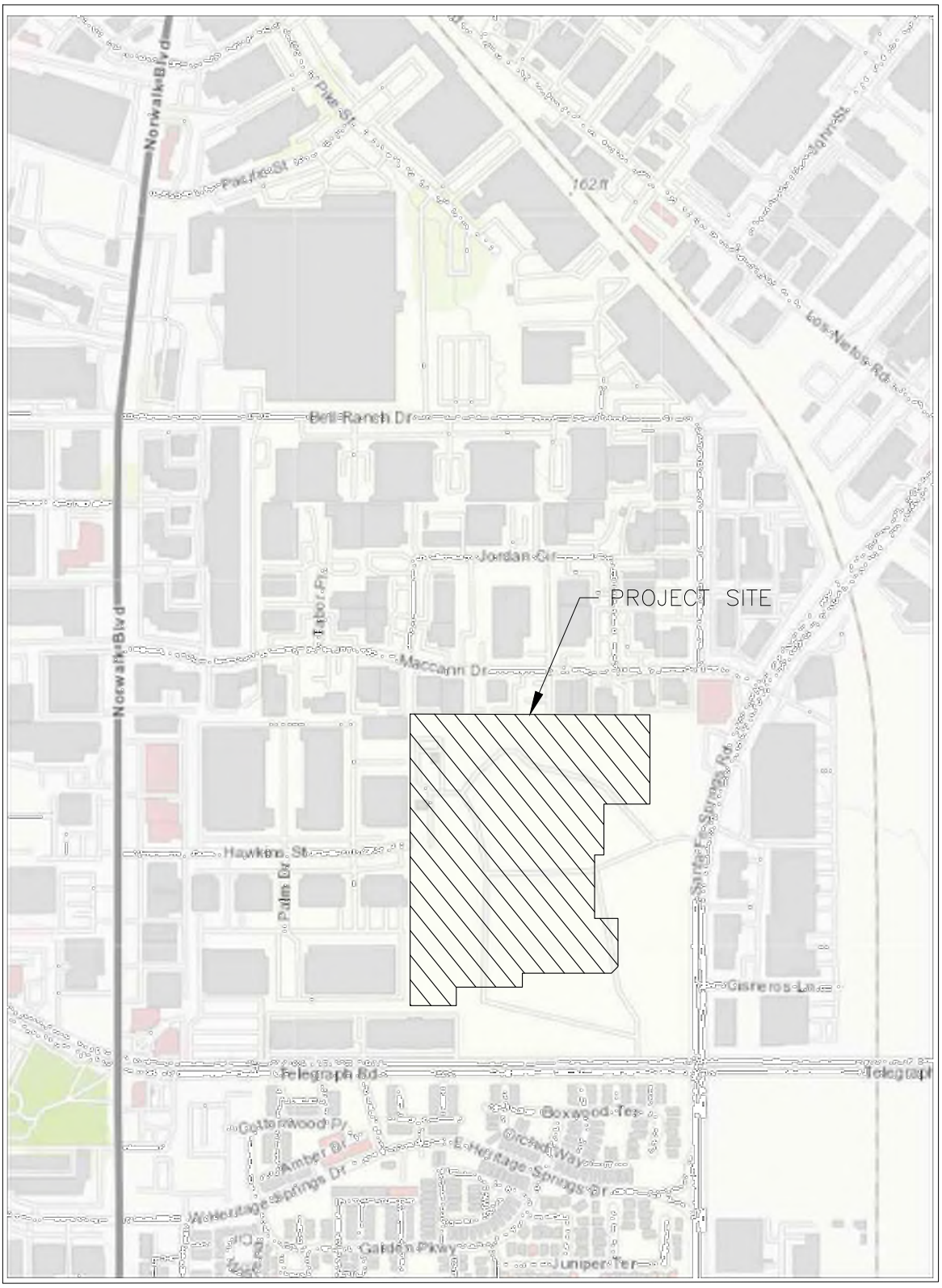
Section VII: Educational Materials Included

The following is a list of educational materials included:

- The Ocean begins at your front door
- A Guide to the Disposal of Water-Based Cleaners
- Additional Educational Material can be found at the following City of Los Angeles website: https://www.lacitysan.org/san/faces/home/portal/s-lsh-wwd/s-lsh-wwd-wp/s-lsh-wwd-wp-lid/s-lsh-wwd-wp-lid-ld;jsessionid=1k40hz_cWBhaVEdXqCllWFe3Bz9DXcHhw9HKotjszOR5PyE8wyNE!-277050723!-804415133?_afrLoop=13070262166560090&_afrWindowMode=0&_afrWindowId=null&_adf.ctrl-state=743c0ut8w_1#!%40%40%3F_afrWindowId%3Dnull%26_afrLoop%3D13070262166560090%26_afrWindowMode%3D0%26_adf.ctrl-state%3D743c0ut8w_5

Section VIII: Attachments

Figure No. 1: Location Map



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LOCATION MAP

SANTA FE SPRINGS

10025 BLOOMFIELD AVENUE
SANTA FE SPRINGS, CA 92612

FIG NO. 1

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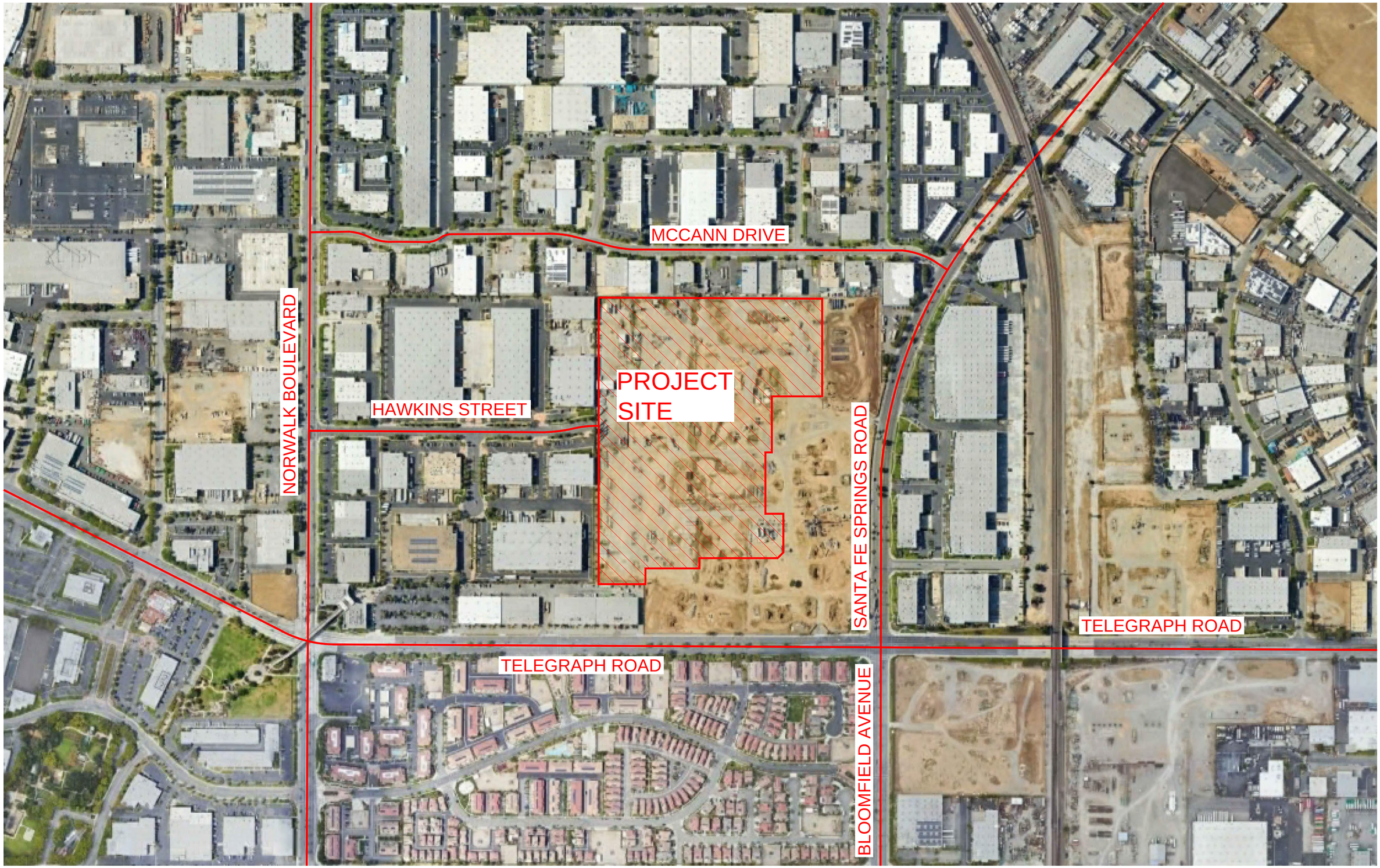
Figure No. 2: Project Site and Vicinity Map



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BENCHMARK:
LOS ANGELES COUNTY B.M. NO. 0Y11864 ELEVATION=154.538'

DESCRIPTION:
A LEAD & TACK IN THE NORTH CATCH BASIN, 1 FOOT WEST OF THE EOR OF THE NW CORNER OF TELEGRAPH ROAD & SANTA FE SPRINGS ROAD.

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

IMPORTANT NOTICE
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIGALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. FOR YOUR DIGALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT
TOLL FREE: 811
TWO WORKING DAYS BEFORE YOU DIG

REGISTERED PROFESSIONAL ENGINEER JOHN J. VICASSIS No. 49830 CIVIL STATE OF CALIFORNIA

NO	REVISION	PREP.	APPVD.	DATE

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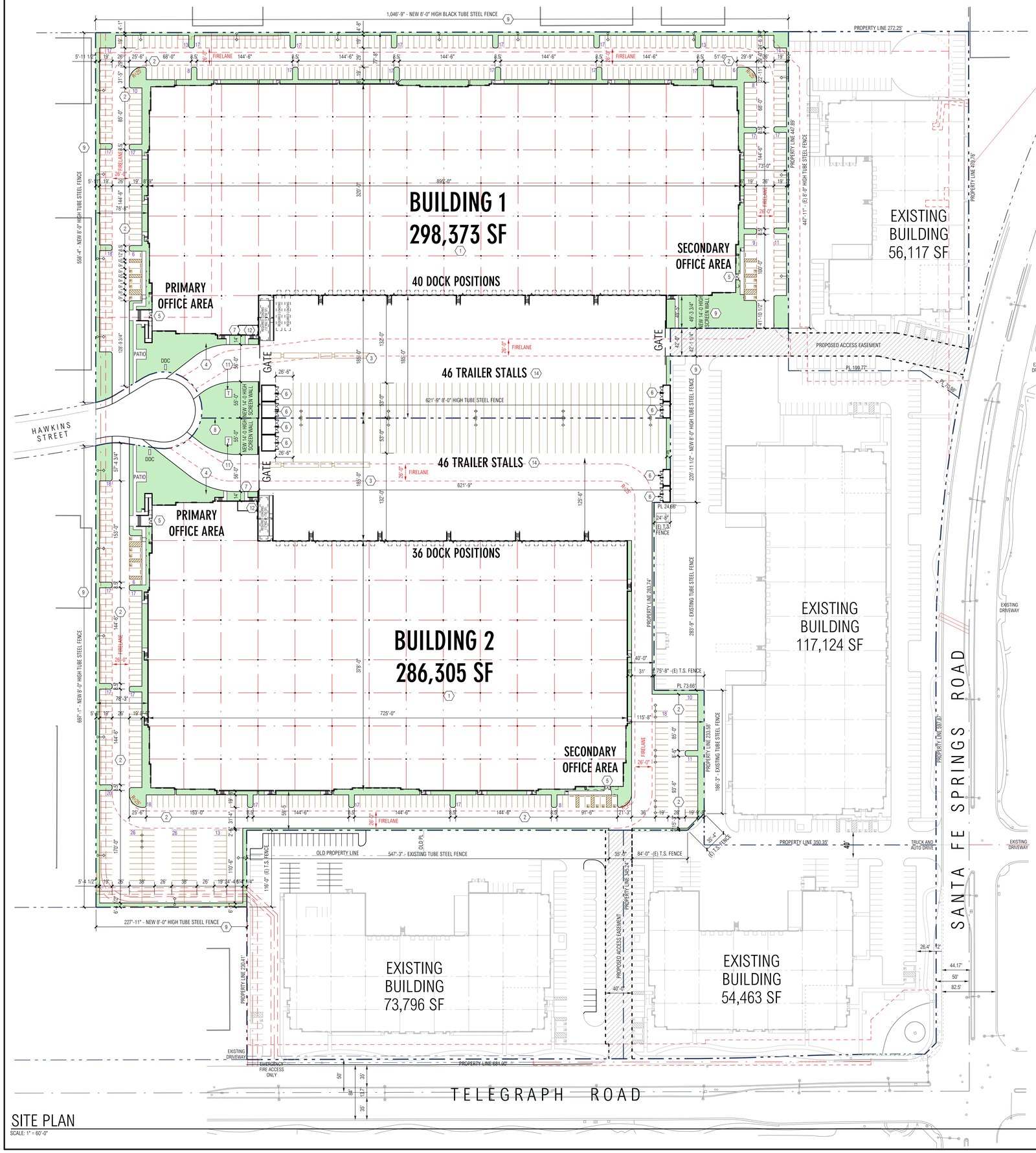
VICINITY MAP
10025 BLOOMFIELD AVE
SANTA FE SPRINGS, CA

SHEET NUMBER
FIG NO. 2

Figure No. 3: Site Plan



SITE PLAN

SCALE: 1" = 60'-0"

SCALE: 1" = 60'-0" 0' 20' 50' 100' 200'

APPLICANT

RGA, OFFICE OF ARCHITECTURAL DESIGN, INC.
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IRVINE CA, 92618
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FAX (949) 341-0922
CONTACT: MIKE GILL

OWNER

BRIDGELAND RESOURCES, LLC
109 NORTH POST OAK LANE, SUITE 230
HOUSTON, TX 77024
CONTACT: SCOTT WOOD

PROJECT CODE REQUIREMENTS

2023 COUNTY OF LOS ANGELES BUILDING CODE (TITLE 26)
2023 COUNTY OF LOS ANGELES ELECTRICAL CODE (TITLE 27)
2023 COUNTY OF LOS ANGELES PLUMBING CODE (TITLE 28)
2023 COUNTY OF LOS ANGELES MECHANICAL CODE (TITLE 29)
2023 COUNTY OF LOS ANGELES GREEN BUILDING STANDARDS CODE (TITLE 31)

WIND SPEED: 95 MPH
EXPOSURE: C
ASCE7-16

LEGEND

◇—◇ LIGHT POLE AND BASE PER ELECTRICAL DRAWINGS

PROJECT DATA - BUILDING 1:

ZONE:	M-2
SITE AREA:	585,785 SF / 13.45 AC
FOOTPRINT AREA:	288,373 SF
FIRST FLOOR OFFICE:	5,000 SF
SECOND FLOOR AREA	5,000 SF
TOTAL BUILDING AREA:	298,373 SF
COVERAGE:	50.08 %
F.A.R.:	50.94 %
PARKING REQUIRED:	
0 - 20,000 SF (1/500 SF)	40 STALLS
20,001 SF - 100,000 SF (1/750 SF)	107 STALLS
100,001 SF - 200,000 SF (1/1,000 SF)	100 STALLS
200,001 SF AND ABOVE (1/2,000 SF)	49 STALLS
TOTAL STALLS	296 STALLS
PARKING PROVIDED:	
ACCESSIBLE STALLS	8 STALLS
STANDARDS STALLS	268 STALLS
EV STALLS (20% TOTAL STALLS)	69 STALLS
TOTAL STALLS	345 STALLS
BICYCLE PARKING STALLS 5% OF MOTORIZED VEHICLES (CAL GREEN)	18 STALLS
1-BICYCLE STALL SHALL BE DESIGNATED FOR LONG TERM PARKING	1 STALLS
TOTAL BICYCLE STALLS PROVIDE	19 STALLS
LANDSCAPE REQUIRED:	
FRONTAGE: 217' X 25 SF = 5,425 SF	5,425 SF
6% OF PARKING AREA = 245,811 SF X .06	14,749 SF
TOTAL LANDSCAPE REQUIRED:	20,174 SF
LANDSCAPE PROVIDED:	46,601 SF
TRAILER PARKING REQUIRED: 1 TRAILER (12' X 53') PER 4 DOCK LOADING DRS FOR BUILDINGS OVER 100,000 SF (40 DOORS PROVIDED)	10 TRAILERS
TRAILER PARKING PROVIDED:	46 TRAILERS

GENERAL NOTES:
1. NO MORE THAN 15% OFFICE BUILDOUT IS ANTICIPATED.

TRASH AREA CALCULATION

REQUIRED TRASH AREA:	
1 % FOR THE FIRST 20,000 SF	200 SF
1/2% FOR AFTER 20,000 SF	1,392 SF
TOTAL REQUIRED	1,592 SF
PROVIDED TRASH AREA	1,701 SF

PROJECT DATA - BUILDING 2:

ZONE:	M-2
SITE AREA:	580,413 SF / 13.32 AC
FOOTPRINT AREA:	276,305 SF
FIRST FLOOR OFFICE:	5,000 SF
SECOND FLOOR AREA	5,000 SF
TOTAL BUILDING AREA:	286,305 SF
COVERAGE:	48.47 %
F.A.R.:	49.33 %
PARKING REQUIRED:	
0 - 40,000 SF (1/500 SF)	40 STALLS
40,001 SF - 100,000 SF (1/750 SF)	80 STALLS
100,001 SF - 200,000 SF (1/1,000 SF)	100 STALLS
200,001 SF AND ABOVE (1/2,000 SF)	43 STALLS
TOTAL STALLS	263 STALLS
PARKING PROVIDED:	
ACCESSIBLE STALLS	8 STALLS
STANDARDS STALLS	226 STALLS
EV STALLS (20% TOTAL PROVIDED)	59 STALLS
TOTAL STALLS	293 STALLS
BICYCLE PARKING STALLS 5% OF MOTORIZED VEHICLES (CAL GREEN)	14 STALLS
1-BICYCLE STALL SHALL BE DESIGNATED FOR LONG TERM PARKING	1 STALLS
TOTAL BICYCLE STALLS PROVIDE	15 STALLS
LANDSCAPE REQUIRED:	
FRONTAGE: 183' LF X 25' SF = 4,575 SF	4,575 SF
6% OF PARKING AREA) = 280,568 SF X .06	16,834 SF
TOTAL LANDSCAPE REQUIRED:	21,409 SF
LANDSCAPE PROVIDED:	38,540 SF
TRAILER PARKING REQUIRED: 1 TRAILER (12' X 53') PER 4 DOCK LOADING DRS FOR BUILDINGS OVER 100,000 SF (36 DOORS PROVIDED)	9 TRAILERS
TRAILER PARKING PROVIDED:	46 TRAILERS

GENERAL NOTES:
1. NO MORE THAN 15% OFFICE BUILDOUT IS ANTICIPATED.

TRASH AREA CALCULATION

REQUIRED TRASH AREA:	
1 % FOR THE FIRST 20,000 SF	200 SF
1/2% FOR AFTER 20,000 SF	1,332 SF
TOTAL REQUIRED	1,532 SF
PROVIDED TRASH AREA	1,701 SF

KEYNOTES: ⟨00⟩

1. PROPOSED PAINTED CONCRETE TILT-UP INDUSTRIAL BUILDING.
2. TYPICAL PARKING STALL - 8.5' X 19'. STRIPING PER CITY STANDARDS.
3. TRUCK YARD W/ DOCK HIGH AND GRADE LEVEL TRUCK DOORS.
4. LANDSCAPING - SEE CONCEPT LANDSCAPE PLAN.
5. PRIMARY BUILDING ENTRANCE.
6. 6'-0" CONCRETE PAINTED TRASH ENCLOSURE AND ROOF COVER LOCATIONS.
7. CONCRETE 14'-0" HIGH SCREENWALL WITH 10'-0" HIGH TUBE STEEL SLIDING GATE.
8. PROPERTY LINES.
9. PROPOSED 8'-0" HIGH BLACK TUBE STEEL FENCE.
11. ELECTRICAL TRANFORMER TO BE SCREENED BY LANDSCAPE.
12. ELECTRICAL EQUIPMENT TO BE LOCATED IN THE ELECTRICAL ROOM.
13. BIKE RACK LOCATION.
14. TRAILER PARKING POSITIONS PER CITY STANARDS.

GENERAL NOTES:

1. EXISTING STRUCTURES ONSITE TO BE REMOVED.
2. CONCEPTUAL MONUMENT SIGN LOCATIONS ARE PROVIDED ONLY. NO SIGNS ARE PROPOSED WITH THIS APPLICATION PACKAGE.
3. ALL PROPOSED NEW ON-SITE UTILITY SERVICES SHALL BE UNDERGROUNDED.
4. DRIVEWAYS SHALL BE CONSTRUCTED PER CITY STANDARD PLAN.
5. DAMAGED SECTIONS OF CURB & GUTTER ALONG PIONEER BLVD. SHALL BE REPAIRED.
6. STATE OF CALIFORNIA "GENERAL CONSTRUCTION NPDES PERMITS AND WDID NUMBERS MUST BE OBTAINED PRIOR TO PERMIT.
7. PROVIDE 1 FOOTCANDLE MIN. THROUGH-OUT THE DEVELOPMENT AND SHALL BE APPROVED BY THE POLICE SERVICES DEPARTMENT.

PROJECT INFORMATION

ASSESSOR PARCEL NUMBER (S):	8005-015-051
GENERAL PLAN DESIGNATION:	INDUSTRIAL
ZONE DESIGNATION:	M-2 (HEAVY MANUFACTURING)
CONSTRUCTION TYPE:	III-B
OCCUPANCY:	B/ S-1

RGA
Office of Architectural Design
210 Progress, Suite 220
Irvine, CA 92618
T 949-341-0920
FX 949-341-0922

CONSULTANT

PROFESSIONAL SEALS

TELEGRAPH ROAD
AND
SANTA FE SPRINGS ROAD
DEVELOPMENT

BRIDGELAND RESOURCES, LLC
109 NORTH POST OAK LANE, SUITE 230
HOUSTON, TX 77024
ATTN: SCOTT WOOD

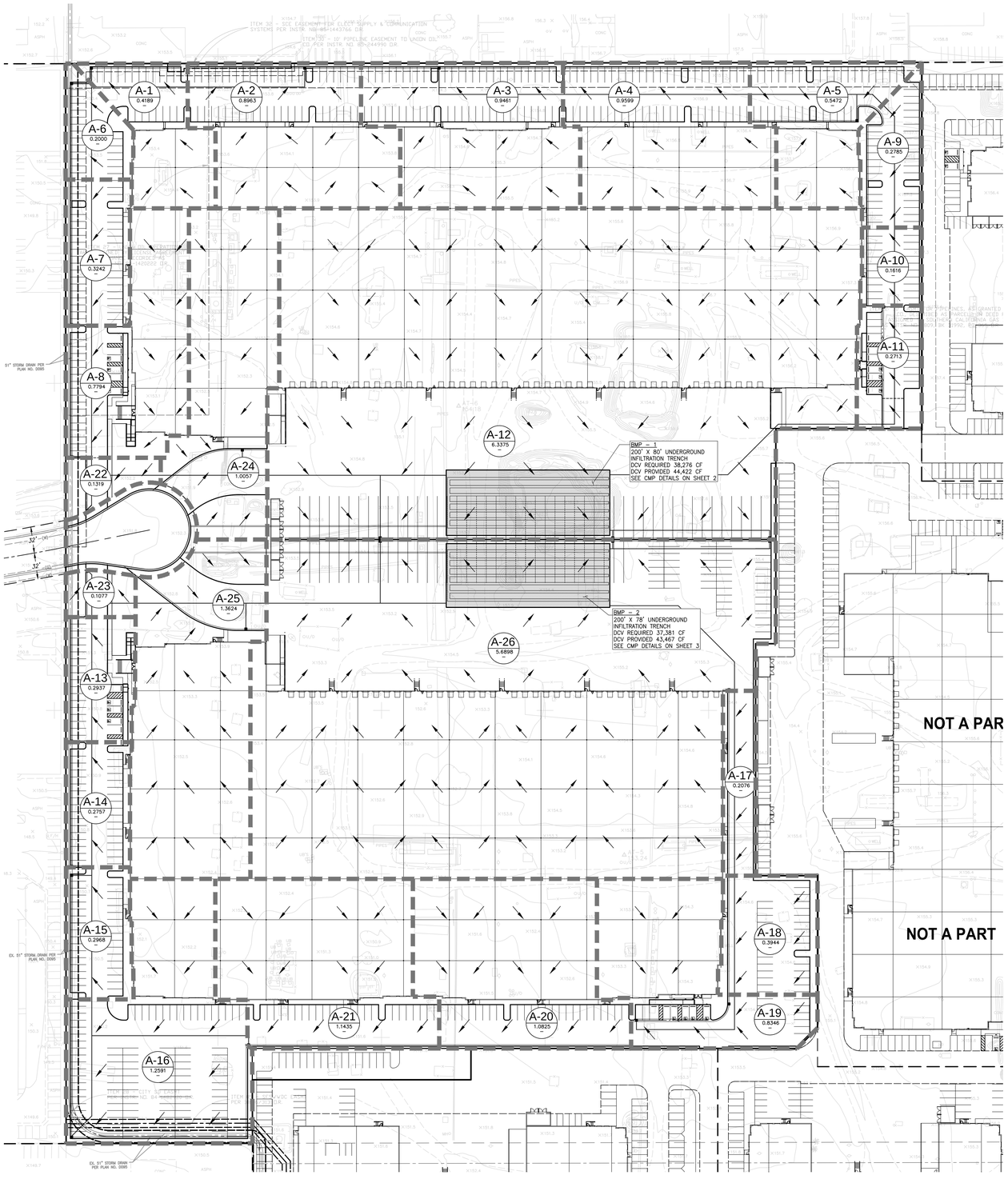
MARK	DATE	DESCRIPTION
CD		
BID		
PC		
DD		
SD	04/19/24	SCHEMATIC DESIGN

RGA PROJECT NO:	22100-00
OWNER PROJECT NO:	00000.00
CAD FILE NAME:	22100-00-A1-01P
DRAWN BY:	JH
CHK'D BY:	JH

SHEET TITLE
OVERALL SITE PLAN

SHEET: A1-01P

Figure No. 4: LID Layout Plans



LEGEND:

A-1 / 2.797 / 4.697 — SUB-AREA; DRAINAGE AREA (ACRES); 25-YR PEAK FLOW RATE (CFS)

TRIBUTARY AREA BOUNDARY

PROPERTY BOUNDARY

FLOW DIRECTION ARROW

SUB-AREA	TOTAL AREA	TOTAL IMPERVIOUS AREA	TOTAL PERVIOUS AREA	% IMPERVIOUS
A-1	18,248 SF 0.42 ACRES	16,561 SF	1,687 SF	0.91
A-2	39,042 SF 0.90 ACRES	36,768 SF	2,274 SF	0.94
A-3	41,212 SF 0.95 ACRES	38,485 SF	2,727 SF	0.93
A-4	41,814 SF 0.96 ACRES	39,282 SF	2,522 SF	0.94
A-5	23,838 SF 0.55 ACRES	21,072 SF	2,766 SF	0.88
A-6	8,709 SF 0.20 ACRES	6,428 SF	2,281 SF	0.74
A-7	14,121 SF 0.32 ACRES	11,603 SF	2,518 SF	0.82
A-8	33,951 SF 0.78 ACRES	29,791 SF	4,160 SF	0.88
A-9	12,133 SF 0.28 ACRES	10,042 SF	2,091 SF	0.83
A-10	7,039 SF 0.16 ACRES	6,253 SF	786 SF	0.89
A-11	11,816 SF 0.27 ACRES	8,281 SF	3,535 SF	0.70
A-12	276,062 SF 6.34 ACRES	270,581 SF	5,481 SF	0.98
A-13	12,794 SF 0.29 ACRES	10,129 SF	2,665 SF	0.79
A-14	12,011 SF 0.28 ACRES	9,922 SF	2,089 SF	0.83
A-15	12,927 SF 0.30 ACRES	10,119 SF	2,808 SF	0.78
A-16	54,845 SF 1.26 ACRES	50,566 SF	4,279 SF	0.92
A-17	9,043 SF 0.21 ACRES	7,238 SF	1,805 SF	0.80
A-18	17,178 SF 0.39 ACRES	14,237 SF	2,941 SF	0.83
A-19	36,353 SF 0.83 ACRES	34,302 SF	2,051 SF	0.94
A-20	47,153 SF 1.08 ACRES	45,195 SF	1,958 SF	0.96
A-21	49,811 SF 1.14 ACRES	47,514 SF	2.297 SF	0.95
A-22	5,744 SF 0.13 ACRES	1,888 SF	3,856 SF	0.33
A-23	4,693 SF 0.11 ACRES	1,841 SF	2,852 SF	0.39
A-24	43,808 SF 1.01 ACRES	36,555 SF	7,253 SF	0.83
A-25	59,348 SF 1.36 ACRES	49,357 SF	9,991 SF	0.83
A-26	247,848 5.69 ACRES	246,884 SF	964 SF	1.00
TOTAL SITE	1,141,546 SF 26.21 ACRES	1,060,899 SF	80,642 SF	0.9294

N

30 60 120 180

SCALE 1" = 60'

BENCHMARK:
LOS ANGELES COUNTY B.M. NO. 0Y11864 ELEVATION=154.538'

DESCRIPTION:
A LEAD & TACK IN THE NORTH CATCH BASIN, 1 FOOT WEST OF THE EOR OF THE NW CORNER OF TELEGRAPH ROAD & SANTA FE SPRINGS ROAD.

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

IMPORTANT NOTICE
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIGALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. FOR YOUR DIGALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT
TOLL FREE: 811
TWO WORKING DAYS BEFORE YOU DIG

REGISTERED PROFESSIONAL ENGINEER JOHN J. VLASSIS No. 49830 CIVIL STATE OF CALIFORNIA

NO	REVISION	PREP.	APPVD.	DATE

PREPARED BY:
HUITT ZOLLARS
90 E. Thousand Oaks Boulevard, Suite 201
Thousand Oaks, California 91360
Phone (805) 418-1902 Fax (805) 418-1819

PREPARED FOR:
BRIDGELAND RESOURCES
BRIDGELAND RESOURCES, INC.
109 NORTH POST OAK LANE, SUITE 230
HOUSTON,TX 77024

LID LAYOUT PLAN
10025 BLOOMFIELD AVE
SANTA FE SPRINGS, CA

SHEET NUMBER
1 OF 3

FILENAME: R:\R316710.01 – EPD – Telegraph Road Industrial\10 CADD & BIM\10.1 AutoCAD\10.1.1 Civil\Sheets\316710.01LID01.dwg Feb 26 2024 5:06pm

PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 1,420 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 44,348 CF
- PIPE STORAGE VOLUME = 10,037 CF
- BACKFILL STORAGE VOLUME = 34,385 CF
- TOTAL STORAGE PROVIDED = 44,422 CF

PIPE DETAILS
- DIAMETER = 36"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = PERFORATED
- BARREL SPACING = 82"

BACKFILL DETAILS
- WIDTH AT ENDS = 18"
- ABOVE PIPE = 18"
- WIDTH AT SIDES = 108"
- BELOW PIPE = 18"

ASSEMBLY
SCALE: 1" = 20'

NOTES
- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE 2⅔" x ½" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

C:\EXPORTS\TEMPLATES\NEW\CMP_V8.DWG 10/18/2019 10:02 AM

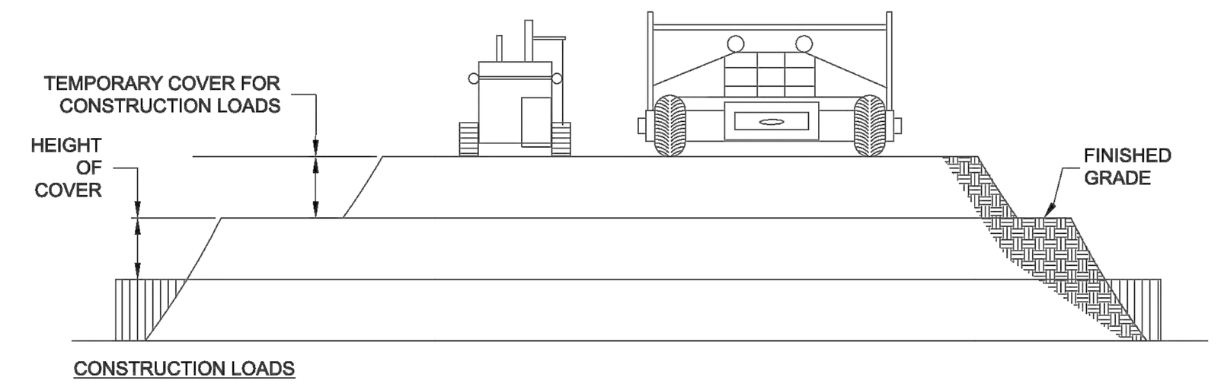
DATE	REVISION DESCRIPTION	BY

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

CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO46190 EPD -Telegraph RD
Infiltration Trench #1
Santa Fe Springs, CA
DETENTION SYSTEM

PROJECT No.: 31858	SEQ. No.: 46190	DATE: 2/26/2024
DESIGNED: DYO		DRAWN: DYO
CHECKED: DYO		APPROVED: DYO
SHEET NO.: 1		



CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

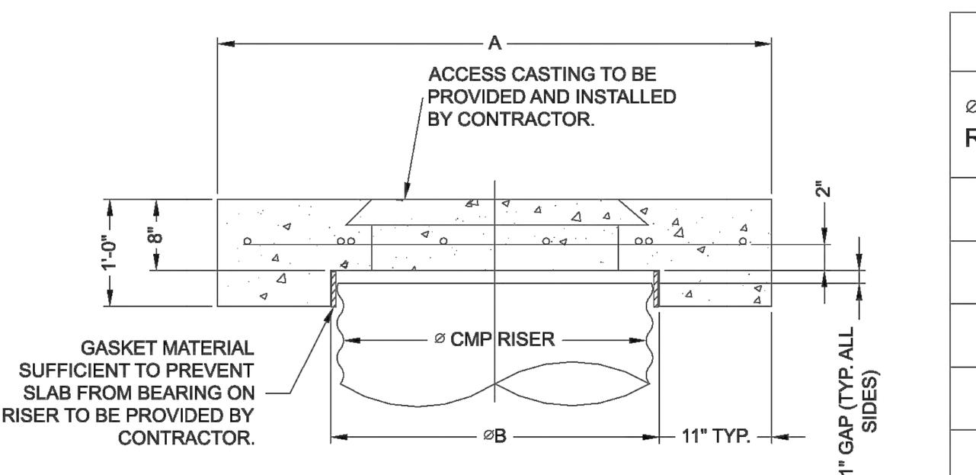
ALUMINUM: AASHTO M-196 OR ASTM B-745
APPLICABLE

HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.
REQUIREMENTS

INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

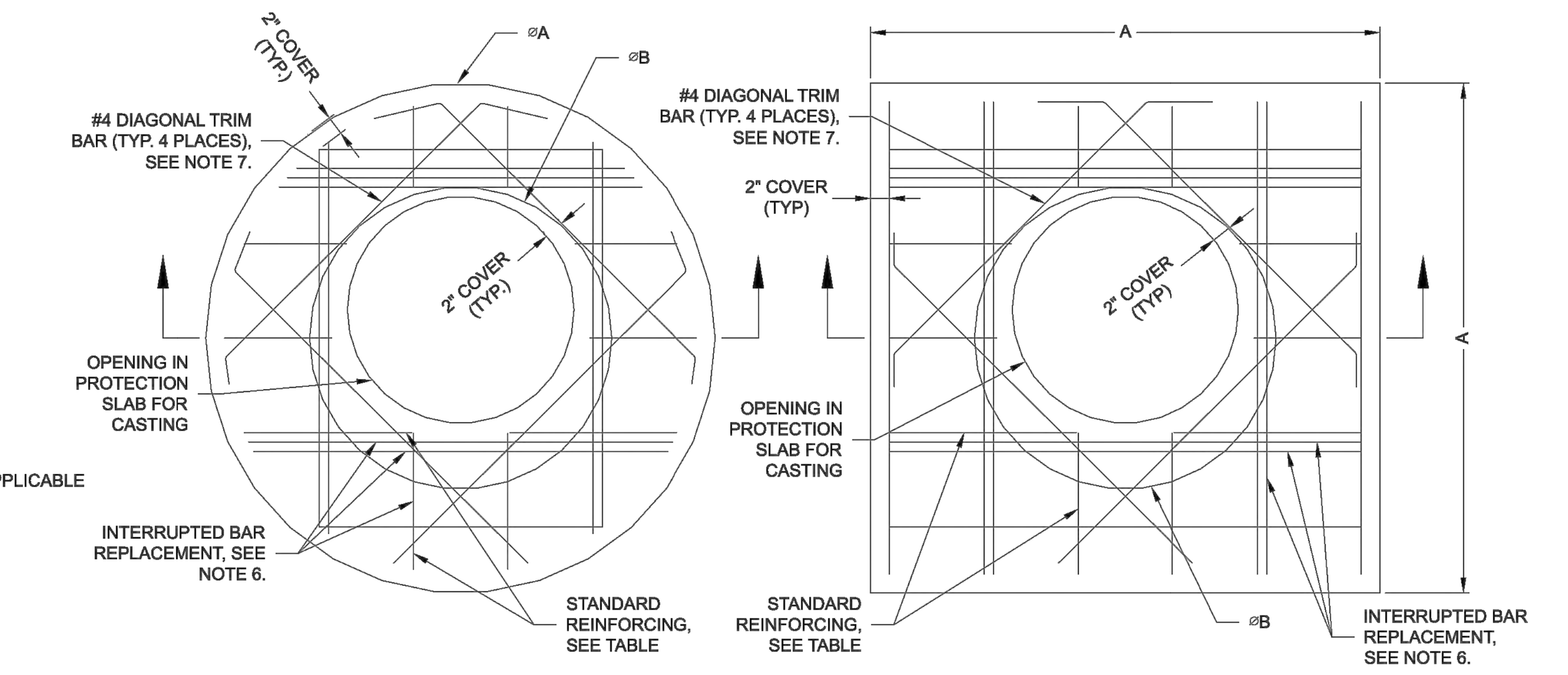


SECTION VIEW

⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

REINFORCING TABLE

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW

SQUARE OPTION PLAN VIEW

NOTES:
1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

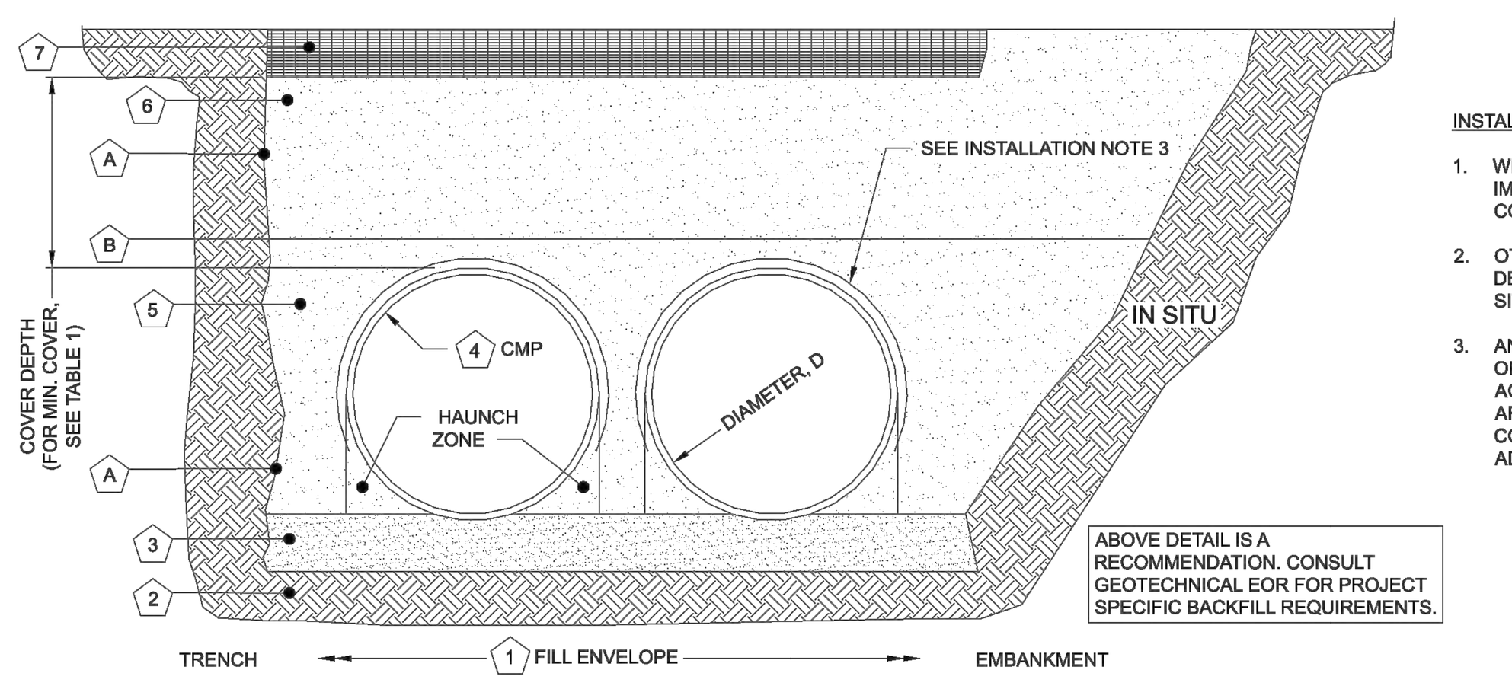
SCALE: N.T.S.

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX
CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING
DYO46190 EPD -Telegraph RD
Infiltration Trench #1
Santa Fe Springs, CA
DETENTION SYSTEM

TABLE 1:

DIAMETER, D	MIN. COVER	CORR. PROFILE
6"-10"	12"	1 1/2" x 1/4"
12"-48"	12"	2 2/3" x 1/2"
>48"-96"	12"	3" x 1", 5" x 1"
>96"	D/8	3" x 1", 5" x 1"

- STRUCTURAL BACKFILL MUST EXTEND TO LIMITS OF THE TABLE
- TOTAL HEIGHT OF COMPACTED COVER FOR CONVENTIONAL HIGHWAY LOADS IS MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TOP OF RIGID PAVEMENT.



ABOVE DETAIL IS A RECOMMENDATION. CONSULT GEOTECHNICAL EOR FOR PROJECT SPECIFIC BACKFILL REQUIREMENTS.

INSTALLATION NOTES
1. WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES.
2. OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.
3. AN HDPE MEMBRANE LINER WILL BE PLACED ON THE CROWN OF EACH PIPE TO PROVIDE AN IMPERMEABLE BARRIER AGAINST ENVIRONMENTAL CHANGES THAT MAY ADVERSELY AFFECT THE SYSTEM OVER TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL TECHNICAL DETAILS.

TABLE 2: PERFORATED STANDARD

CMP RETENTION STANDARD BACKFILL SPECIFICATIONS

	MATERIAL LOCATION	MATERIAL SPECIFICATION	DESCRIPTION	
1	FILL ENVELOPE WIDTH	PER ENGINEER OF RECORD	MINIMUM TRENCH WIDTH MUST ALLOW ROOM FOR PROPER COMPACTION OF HAUNCH MATERIALS UNDER THE PIPE. THE SUGGESTED MINIMUM TRENCH WIDTH, OR EOR RECOMMENDATION: PIPE ≤ 12": D + 16" PIPE > 12": 1.5D + 12"	MINIMUM EMBANKMENT WIDTH (IN FEET) FOR INITIAL FILL ENVELOPE: PIPE < 24": 3.0D PIPE 24" - 144": D + 4'0" PIPE > 144": D + 10'0"
2	FOUNDATION	**AASHTO 26.5.2** - PER ENGINEER OF RECORD	PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND FOUNDATION BROUGHT BACK TO GRADE WITH A FILL MATERIAL APPROVED BY THE ENGINEER OF RECORD.	
3	BEDDING	**AASHTO M 43: 3, 357, 4, 467, 5, 56, 57**	ENGINEER OF RECORD TO DETERMINE IF BEDDING IS REQUIRED. PIPE MAY BE PLACED ON THE TRENCH BOTTOM OF A RELATIVELY LOOSE, NATIVE SUITABLE WELL GRADED GRANULAR MATERIAL THAT IS ROUGHLY SHAPED TO FIT THE BOTTOM OF THE PIPE, 2" MIN DEPTH. THE BEDDING MATERIAL MAY BE SUITABLE OPEN GRADED GRANULAR BEDDING CONFORMING TO AASHTO SOIL CLASSIFICATIONS A1, A2, OR A3 WITH MAXIMUM PARTICLE SIZE OF 3" PER AASHTO 26.3.8.1	
4			CORRUGATED METAL PIPE	
5	BACKFILL	FREE-DRAINING, ANGULAR, WASHED-STONE PER **AASHTO M 43: 3, 357, 4, 467, 5, 56, 57** OR APPROVED EQUAL *	HAUNCH ZONE MATERIAL SHALL BE HAND SHOVELED OR SHOVEL SLICED INTO PLACE TO ALLOW FOR PROPER COMPACTION WITHOUT SOFT SPOTS. BACKFILL SHALL BE PLACED IN 8" +/- LOOSE LIFTS AND COMPACTED TO 90% STANDARD PROCTOR PER AASHTO T 99. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHOULD BE ADVANCED ALONG THE LENGTH OF THE SYSTEM TO AVOID DIFFERENTIAL LOADING. WHERE CONVENTIONAL COMPACTION TESTING IS NOT PRACTICAL, THE MATERIAL SHALL BE MECHANICALLY COMPACTED UNTIL NO FURTHER YIELDING OF MATERIAL IS OBSERVED UNDER THE COMPACTOR. **IN AREAS WITH HIGH WATER TABLE FLUCTUATIONS THAT INTERACT WITH THE PIPE ZONE, CONSIDER INSTALLING A GEOTEXTILE SEPARATION LAYER TO PREVENT SOIL MIGRATION.	
6	COVER MATERIAL	UP TO MIN. COVER - **AASHTO M 145: A-1, A-2, A-3** ABOVE MIN. COVER - PER ENGINEER OF RECORD	COVER MATERIAL MAY INCLUDE NON-BITUMINOUS, GRANULAR ROADBASE MATERIAL WITHIN MIN COVER LIMITS	
7	RIGID OR FLEXIBLE PAVEMENT (IF APPLICABLE)	PER ENGINEER OF RECORD	FLEXIBLE PAVEMENT SHOULD NOT BE COUNTED AS PART OF THE FILL HEIGHT OVER THE CMP. FINAL BACKFILL MATERIAL SELECTION AND COMPACTION REQUIREMENTS SHALL FOLLOW THE PROJECT PLANS AND SPECIFICATIONS PER THE ENGINEER OF RECORD.	
A	OPTIONAL SIDE GEOTEXTILE	NONE	GEOTEXTILE LAYER IS RECOMMENDED ON SIDES OF EXCAVATION TO PREVENT SOIL MIGRATION.	
B	GEOTEXTILE BETWEEN LAYERS	NONE	IF SOIL TYPES DIFFER AT ANY POINT ABOVE PIPE INVERT, A GEOTEXTILE LAYER IS RECOMMENDED TO BE PLACED BETWEEN THE LAYERS TO PREVENT SOIL MIGRATION.	

NOTES:
- FOR MULTIPLE BARREL INSTALLATIONS, THE RECOMMENDED STANDARD SPACING BETWEEN PARALLEL PIPE RUNS SHALL BE THE PIPE DIAMETER /2 BUT NO LESS THAN 12" FOR DIAMETERS <72". FOR 72" AND LARGER DIAMETERS, THE MINIMUM SPACING IS 36". CONTACT YOUR CONTECH REPRESENTATIVE FOR NONSTANDARD SPACING.
- * APPROVED REGIONAL EQUIVALENTS FOR SECTION 5 INCLUDE CA-7, MIDOT 6AA, 6A, OR 5G, PROVIDED THEY MEET THE PARTICLE SIZES INDICATED.

MANUFACTURER RECOMMENDED BACKFILL

NOT TO SCALE

CONTECH ENGINEERED SOLUTIONS LLC
DYO46190 EPD -Telegraph RD
Infiltration Trench #1
Santa Fe Springs, CA
DETENTION SYSTEM

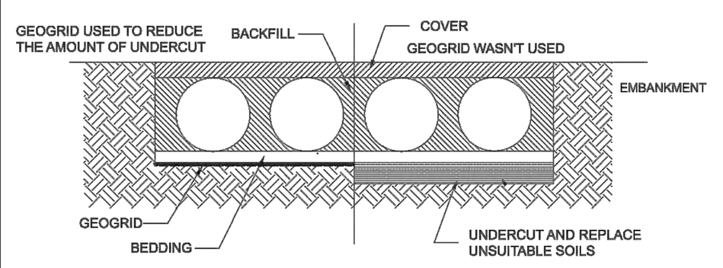
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

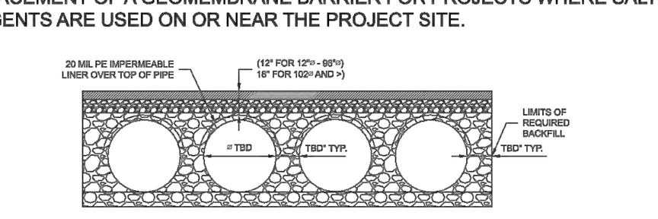


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

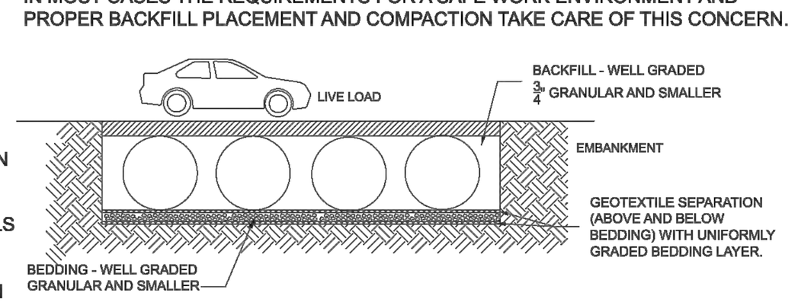
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

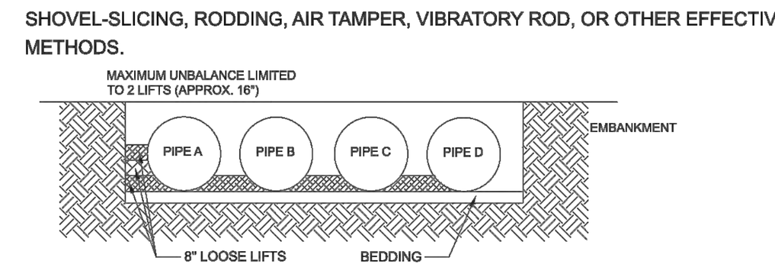
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



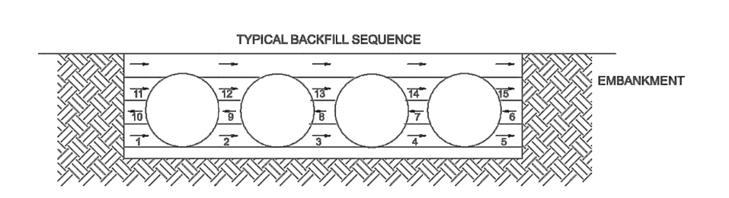
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

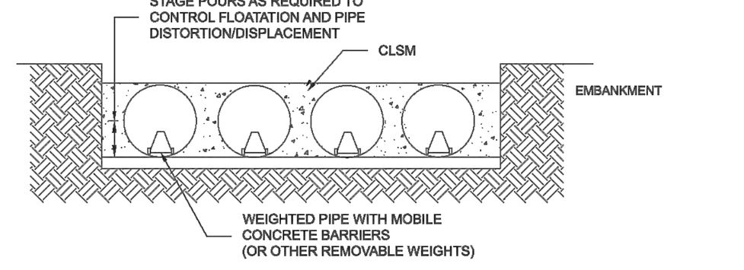


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

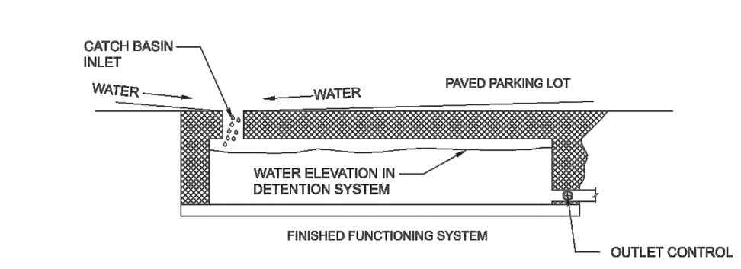


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

CONTECH ENGINEERED SOLUTIONS LLC
DYO46190 EPD -Telegraph RD
Infiltration Trench #1
Santa Fe Springs, CA
DETENTION SYSTEM

BMP 1 - CMP DETAILS

BENCHMARK:
LOS ANGELES COUNTY B.M. NO. OY11864 ELEVATION=154.538'

DESCRIPTION:
A LEAD & TACK IN THE NORTH CATCH BASIN, 1 FOOT WEST OF THE ECR OF THE NW CORNER OF TELEGRAPH ROAD & SANTA FE SPRINGS ROAD.

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

IMPORTANT NOTICE
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIGALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. FOR YOUR DIGALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE: 811 TWO WORKING DAYS BEFORE YOU DIG

REGISTERED PROFESSIONAL ENGINEER JOHN J. VLASSIS No. 49830 CIVIL STATE OF CALIFORNIA

NO	REVISION	PREP.	APPVD.	DATE

PREPARED BY:
HUITT ZOLLARS
90 E. Thousand Oaks Boulevard, Suite 201
Thousand Oaks, California 91360
Phone (805) 418-1802 Fax (805) 418-1819

PREPARED FOR:
BRIDGELAND RESOURCES
BRIDGELAND RESOURCES, INC.
109 NORTH POST OAK LANE, SUITE 230
HOUSTON,TX 77024

BMP DETAILS
10025 BLOOMFIELD AVE
SANTA FE SPRINGS, CA

SHEET NUMBER
2 OF 3

FILENAME: R:\R316710.01 – EPD – Telegraph Road Industrial\10 CADD & BIM\10.1 AutoCAD\10.1.1 Civil\Sheets\316710.01LID01.dwg Feb 26 2024 5:06pm

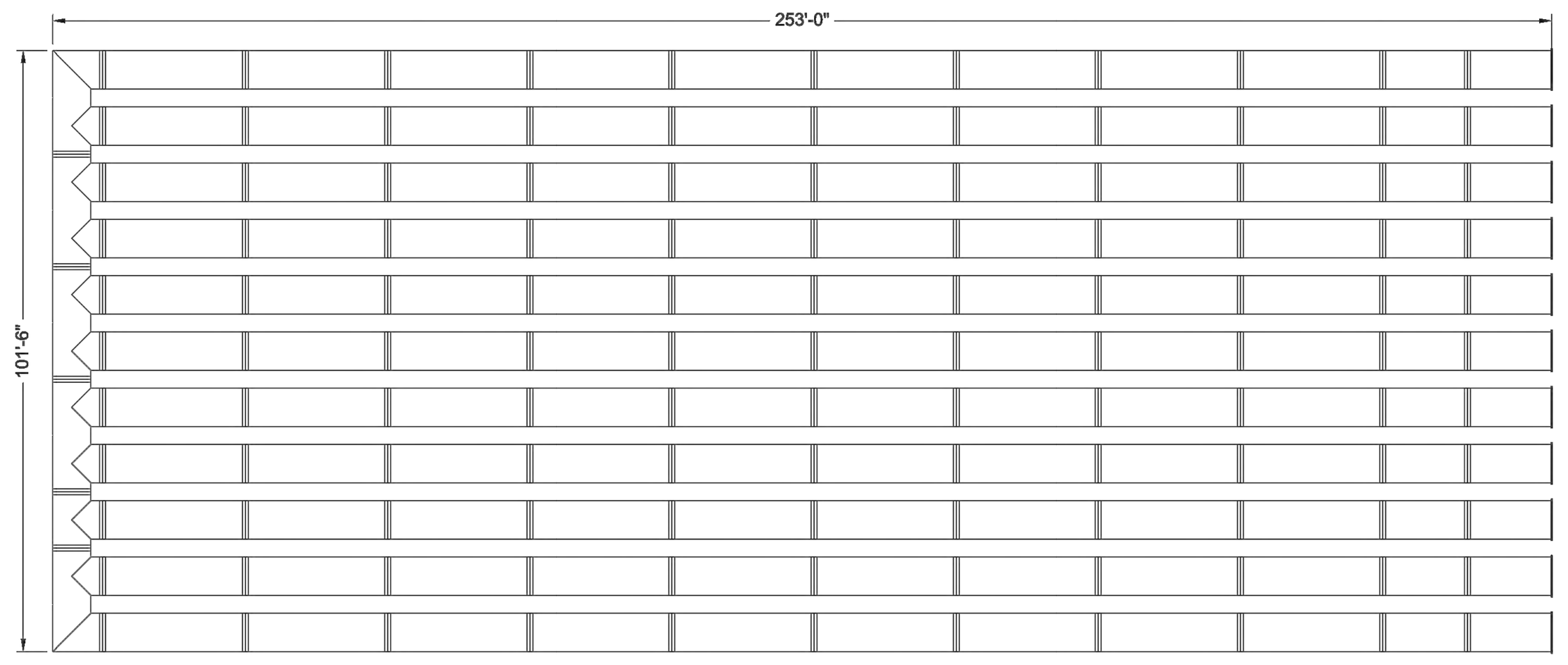
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 2,813 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 135,000 CF
- PIPE STORAGE VOLUME = 93,344 CF
- BACKFILL STORAGE VOLUME = 41,840 CF
- TOTAL STORAGE PROVIDED = 135,184 CF

PIPE DETAILS
- DIAMETER = 78"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = PERFORATED
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 0"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 12"



NOTES
- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE 2⅔" x ½" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 30'

DATE	REVISION DESCRIPTION	BY

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

CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

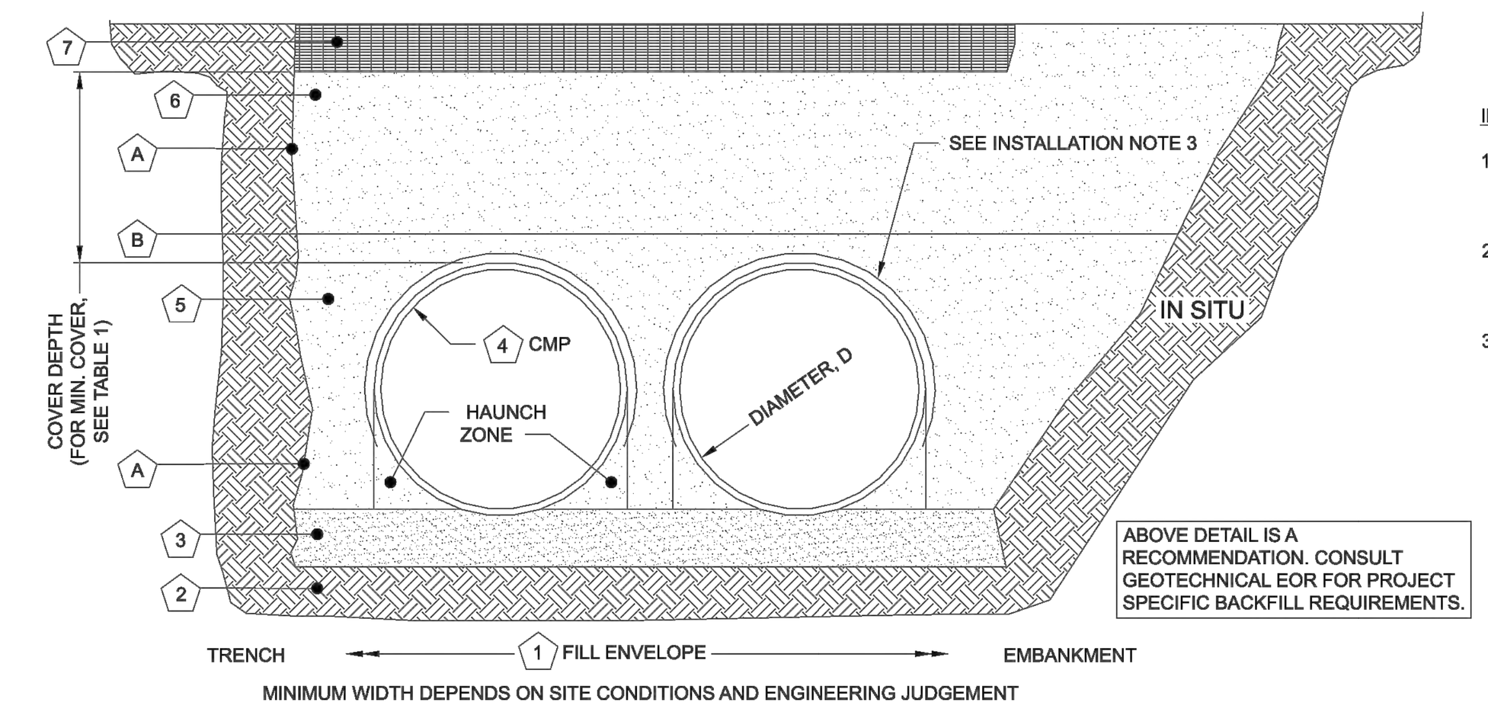
DYO46620 Costco Lancaster
Underground Detention System
Lancaster, PA
DETENTION SYSTEM

PROJECT No.: 32170	SEQ. No.: 46620	DATE: 2/26/2024
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

TABLE 1:

DIAMETER, D	MIN. COVER	CORR. PROFILE
6"-10"	12"	1 1/2" x 1/4"
12"-48"	12"	2 2/3" x 1/2"
>48"-96"	12"	3" x 1", 5" x 1"
>96"	D/8	3" x 1", 5" x 1"

- STRUCTURAL BACKFILL MUST EXTEND TO LIMITS OF THE TABLE
- TOTAL HEIGHT OF COMPACTED COVER FOR CONVENTIONAL HIGHWAY LOADS IS MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TOP OF RIGID PAVEMENT.



INSTALLATION NOTES

1. WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES.
2. OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.
3. AN HDPE MEMBRANE LINER WILL BE PLACED ON THE CROWN OF EACH PIPE TO PROVIDE AN IMPERMEABLE BARRIER AGAINST ENVIRONMENTAL CHANGES THAT MAY ADVERSELY AFFECT THE SYSTEM OVER TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL TECHNICAL DETAILS.

TABLE 2: PERFORATED STANDARD

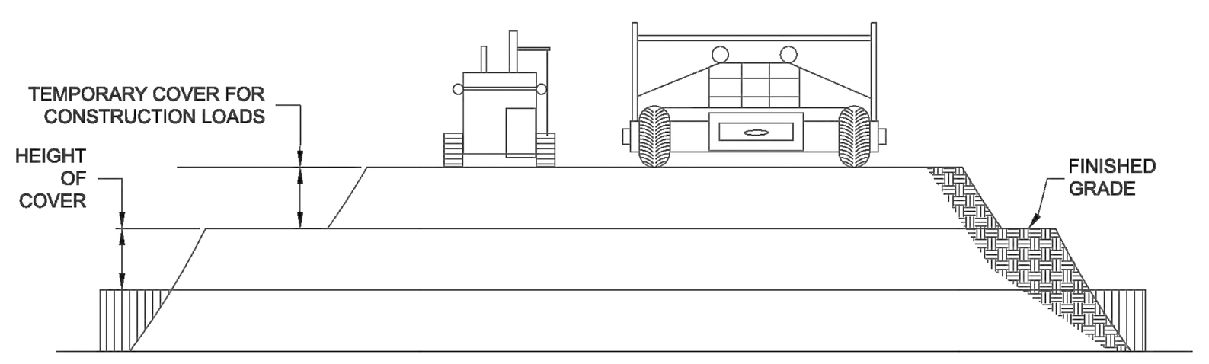
CMP RETENTION STANDARD BACKFILL SPECIFICATIONS

	MATERIAL LOCATION	MATERIAL SPECIFICATION	DESCRIPTION	
1	FILL ENVELOPE WIDTH	PER ENGINEER OF RECORD	MINIMUM TRENCH WIDTH MUST ALLOW ROOM FOR PROPER COMPACTION OF HAUNCH MATERIALS UNDER THE PIPE. THE SUGGESTED MINIMUM TRENCH WIDTH, OR EOR RECOMMENDATION: PIPE ≤ 12": D + 16" PIPE > 12": 1.5D + 12"	MINIMUM EMBANKMENT WIDTH (IN FEET) FOR INITIAL FILL ENVELOPE: PIPE < 24": 3.0D PIPE 24" - 144": D + 4'0" PIPE > 144": D + 10'0"
2	FOUNDATION	**AASHTO 26.5.2** - PER ENGINEER OF RECORD	PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND FOUNDATION BROUGHT BACK TO GRADE WITH A FILL MATERIAL APPROVED BY THE ENGINEER OF RECORD.	
3	BEDDING	**AASHTO M 43: 3, 357, 4, 467, 5, 56, 57**	ENGINEER OF RECORD TO DETERMINE IF BEDDING IS REQUIRED. PIPE MAY BE PLACED ON THE TRENCH BOTTOM OF A RELATIVELY LOOSE, NATIVE SUITABLE WELL GRADED GRANULAR MATERIAL THAT IS ROUGHLY SHAPED TO FIT THE BOTTOM OF THE PIPE, 2" MIN DEPTH. THE BEDDING MATERIAL MAY BE SUITABLE OPEN GRADED GRANULAR BEDDING CONFORMING TO AASHTO SOIL CLASSIFICATIONS A1, A2, OR A3 WITH MAXIMUM PARTICLE SIZE OF 3" PER AASHTO 26.3.8.1	
4			CORRUGATED METAL PIPE	
5	BACKFILL	FREE-DRAINING, ANGULAR, WASHED-STONE PER **AASHTO M 43: 3, 357, 4, 467, 5, 56, 57** OR APPROVED EQUAL *	HAUNCH ZONE MATERIAL SHALL BE HAND SHOVELED OR SHOVEL SLICED INTO PLACE TO ALLOW FOR PROPER COMPACTION WITHOUT SOFT SPOTS. BACKFILL SHALL BE PLACED IN 8" +/- LOOSE LIFTS AND COMPACTED TO 90% STANDARD PROCTOR PER AASHTO T 99. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHOULD BE ADVANCED ALONG THE LENGTH OF THE SYSTEM TO AVOID DIFFERENTIAL LOADING. WHERE CONVENTIONAL COMPACTION TESTING IS NOT PRACTICAL, THE MATERIAL SHALL BE MECHANICALLY COMPACTED UNTIL NO FURTHER YIELDING OF MATERIAL IS OBSERVED UNDER THE COMPACTOR. **IN AREAS WITH HIGH WATER TABLE FLUCTUATIONS THAT INTERACT WITH THE PIPE ZONE, CONSIDER INSTALLING A GEOTEXTILE SEPARATION LAYER TO PREVENT SOIL MIGRATION.	
6	COVER MATERIAL	UP TO MIN. COVER - **AASHTO M 145: A-1, A-2, A-3** ABOVE MIN. COVER - PER ENGINEER OF RECORD	COVER MATERIAL MAY INCLUDE NON-BITUMINOUS, GRANULAR ROADBASE MATERIAL WITHIN MIN COVER LIMITS	
7	RIGID OR FLEXIBLE PAVEMENT (IF APPLICABLE)	PER ENGINEER OF RECORD	FLEXIBLE PAVEMENT SHOULD NOT BE COUNTED AS PART OF THE FILL HEIGHT OVER THE CMP. FINAL BACKFILL MATERIAL SELECTION AND COMPACTION REQUIREMENTS SHALL FOLLOW THE PROJECT PLANS AND SPECIFICATIONS PER THE ENGINEER OF RECORD.	
A	OPTIONAL SIDE GEOTEXTILE	NONE	GEOTEXTILE LAYER IS RECOMMENDED ON SIDES OF EXCAVATION TO PREVENT SOIL MIGRATION.	
B	GEOTEXTILE BETWEEN LAYERS	NONE	IF SOIL TYPES DIFFER AT ANY POINT ABOVE PIPE INVERT, A GEOTEXTILE LAYER IS RECOMMENDED TO BE PLACED BETWEEN THE LAYERS TO PREVENT SOIL MIGRATION.	

NOTES:
- FOR MULTIPLE BARREL INSTALLATIONS, THE RECOMMENDED STANDARD SPACING BETWEEN PARALLEL PIPE RUNS SHALL BE THE PIPE DIAMETER /2 BUT NO LESS THAN 12" FOR DIAMETERS <72". FOR 72" AND LARGER DIAMETERS, THE MINIMUM SPACING IS 36". CONTACT YOUR CONTECH REPRESENTATIVE FOR NONSTANDARD SPACING.

* APPROVED REGIONAL EQUIVALENTS FOR SECTION 5 INCLUDE CA-7, MIDOT 6AA, 6A, OR 5G, PROVIDED THEY MEET THE PARTICLE SIZES INDICATED.

MANUFACTURER RECOMMENDED BACKFILL
NOT TO SCALE



CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM
SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

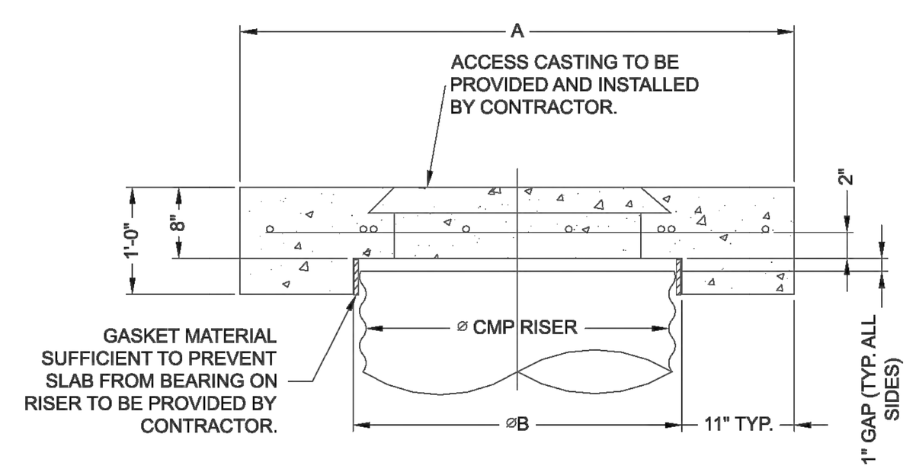
GALVANIZED: AASHTO M-36 OR ASTM A-760

APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745
APPLICABLE
HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.
REQUIREMENTS
INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

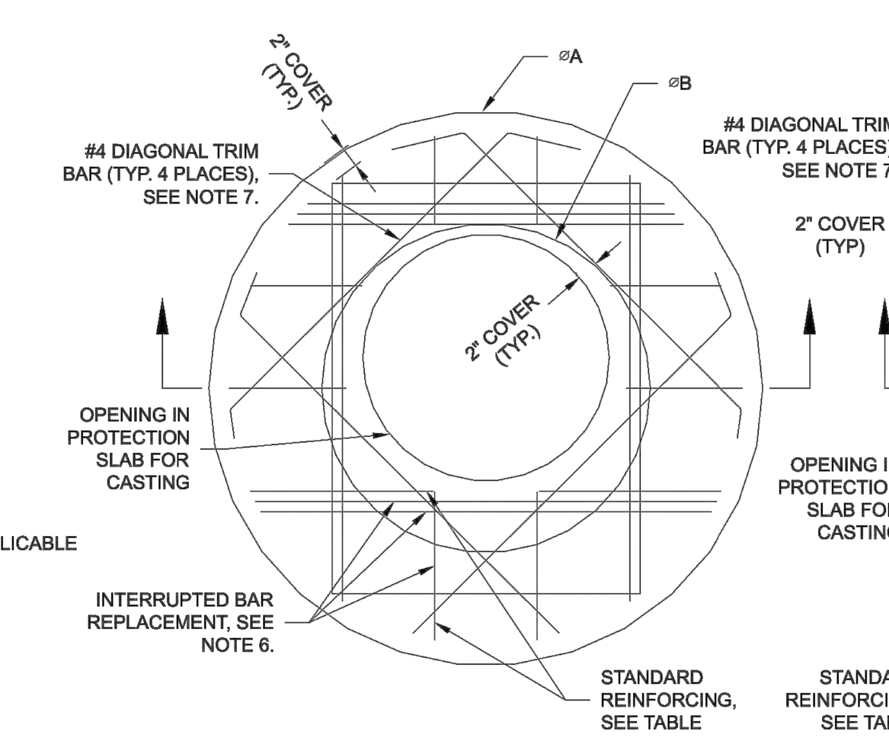


SECTION VIEW

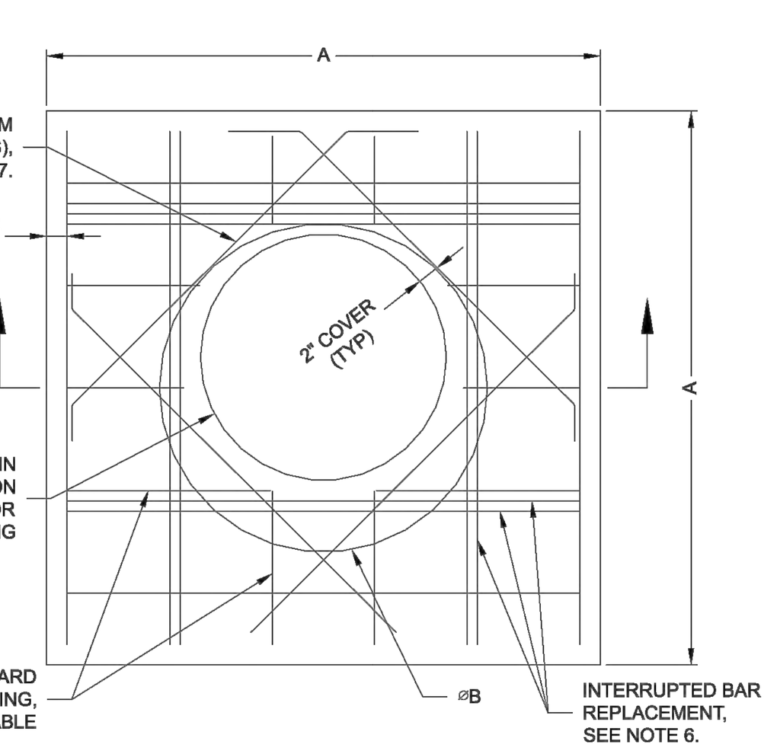
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

REINFORCING TABLE

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:
1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL
SCALE: N.T.S.

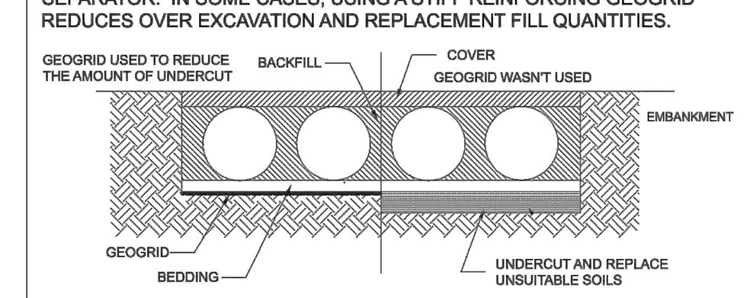
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

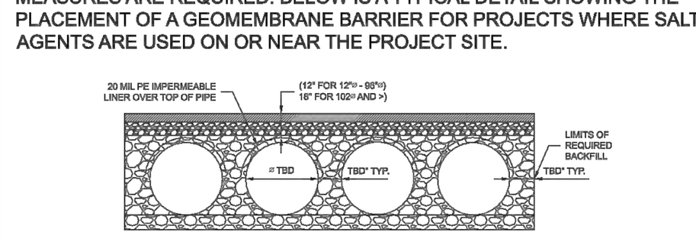


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

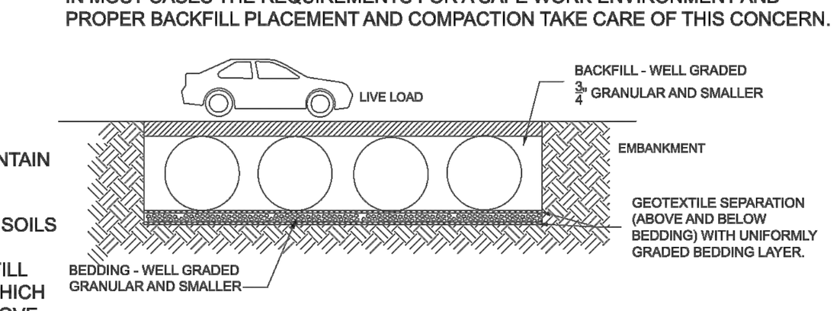
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

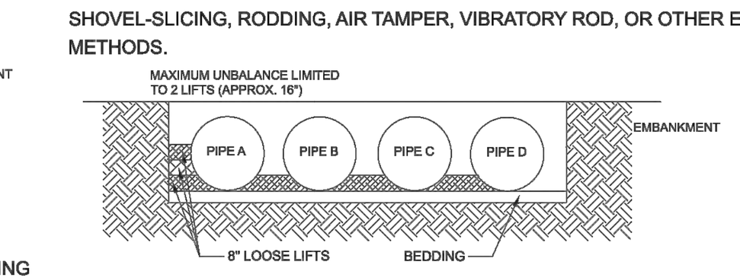
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



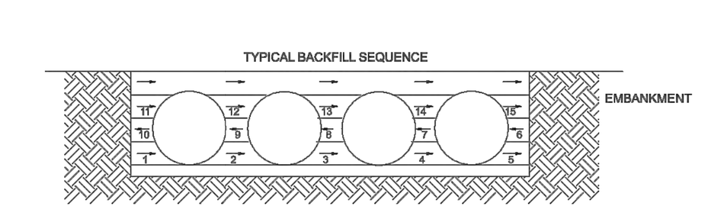
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

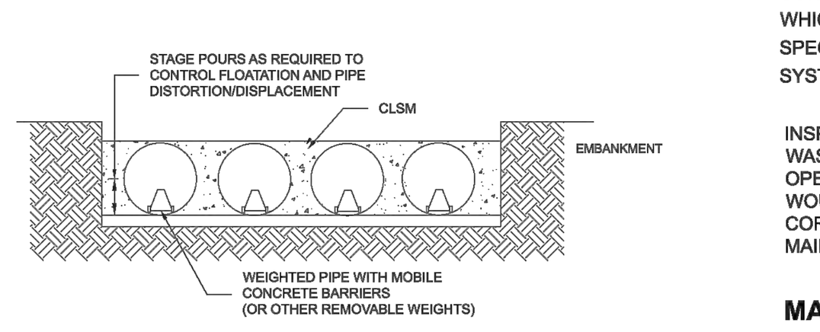


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

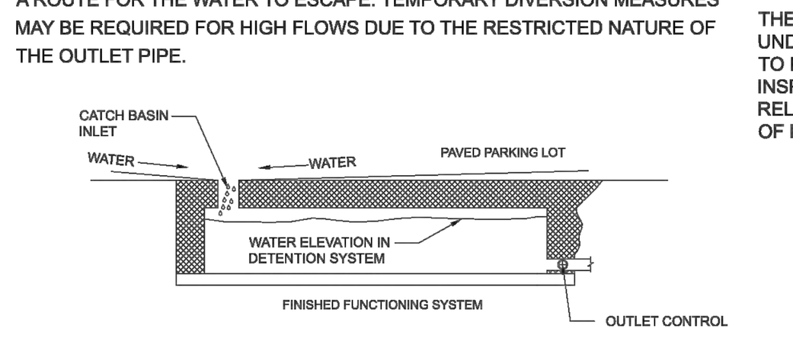


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

BMP 2 - CMP DETAILS

BENCHMARK:
LOS ANGELES COUNTY B.M. NO. OY11864 ELEVATION=154.538'

DESCRIPTION:
A LEAD & TACK IN THE NORTH CATCH BASIN, 1 FOOT WEST OF THE ECR OF THE NW CORNER OF TELEGRAPH ROAD & SANTA FE SPRINGS ROAD.

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

IMPORTANT NOTICE
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIGALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. FOR YOUR DIGALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT
TOLL FREE: 811
TWO WORKING DAYS BEFORE YOU DIG

REGISTERED PROFESSIONAL ENGINEER JOHN J. VLASSIS No. 49830 CIVIL STATE OF CALIFORNIA

NO	REVISION	PREP.	APPVD.	DATE

PREPARED BY:
HUITT ZOLLARS
90 E. Thousand Oaks Boulevard, Suite 201
Thousand Oaks, California 91360
Phone (805) 418-1802 Fax (805) 418-1819

PREPARED FOR:
BRIDGELAND RESOURCES
BRIDGELAND RESOURCES, INC.
109 NORTH POST OAK LANE, SUITE 230
HOUSTON,TX 77024

BMP DETAILS
10025 BLOOMFIELD AVE
SANTA FE SPRINGS, CA

SHEET NUMBER
3 OF 3

Figure No. 5: Grading Plan

PROPOSED WAREHOUSE BUILDING

157.52 FF
156.94 PAD

PROPOSED 200' X 80' UNDERGROUND INFILTRATION TRENCH

PROPOSED 200' X 78' UNDERGROUND INFILTRATION TRENCH

PROPOSED WAREHOUSE BUILDING

157.35 FF
156.77 PAD

NOT A PART

NOT A PART

SANTA FE SPRINGS ROAD

SEE MATCHLINE ON SHEET 2

SCALE 1" = 40'

BENCHMARK:
LOS ANGELES COUNTY B.M. NO. 01I1864 ELEVATION=154.538'

DESCRIPTION:
A LEAD & TACK IN THE NORTH CATCH BASIN, 1 FOOT WEST OF THE EOR OF THE NW CORNER OF TELEGRAPH ROAD & SANTA FE SPRINGS ROAD.

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REGISTERED PROFESSIONAL ENGINEER JEAN J. YEAGER No. 49830 CIVIL STATE OF CALIFORNIA

NO	REVISION	PREP.	APP'D.	DATE

PREPARED BY:
HUITT ZOLLARS
90 E. Thousand Oaks Boulevard, Suite 201
Thousand Oaks, California 91360
Phone (805) 418-1802 Fax (805) 418-1819

PREPARED FOR:
BRIDGELAND RESOURCES
BRIDGELAND RESOURCES, INC.
109 NORTH POST OAK LANE, SUITE 230
HOUSTON,TX 77024

PRELIMINARY GRADING PLAN
10025 BLOOMFIELD AVE
SANTA FE SPRINGS, CA

SHEET NUMBER
1 OF 2

FILENAME: R:\R316710.01 - EPD - Telegraph Road Industrial\10 CADD & BIM\10.1 AutoCAD\10.1.1 Civil\Sheets\316710.01CPG.dwg Feb 27 2024 10:07am

SEE MATCHLINE ON SHEET 1

157.35 FF
156.77 PAD

PROPOSED WAREHOUSE BUILDING

NOT A PART

NOT A PART

NOT A PART

TELEGRAPH ROAD

EX. 51" STORM DRAIN PER PLAN NO. D095

EX. 54" STORM DRAIN PER PLAN NO. D044

EX. 6" MOBIL OIL PER PLAN NO. D044

EX. 12" WATER MAIN PER PLAN NO. 68W36-4

EX. 4" TEXACO WASTE WATER PER PLAN NO. D044

EX. 42" STORM DRAIN PER PLAN NO. D044

EX. 33" STORM DRAIN PER PLAN NO. D059

EX. 12" V.C.P. PER NO. S165

EX. 30" CHEVRON GAS (ABAN.)PER DWG NO. D044

EX. 18" STORM DRAIN LATERAL PER PLAN NO. D059

EX. 8" SEWER PER NO.

EX. 16" WATER MAIN PER PLAN NO. 68W36-4

EX. 6" SEWER PER DWG NO. S165

PROPERTY LINE

EXISTING PROPERTY LINE

PROPOSED PROPERTY LINE

Compiled by Arrowhead Mapping Corporation
From Aerial Photography Dated : 02-27-16
Job # AMC 16-114
1887 BUSINESS CENTER DR
SUITE 5A
San Bernardino, CA 92408
PH # (909) 889-2420

N

0 20 40 80 120
SCALE 1" = 40'

FILENAME: R:\R3167 10.01 – EPD – Telegraph Road Industrial\10 CADD & BIM\10.1 AutoCAD\10.1.1 Civil\Sheets\3167 10.01CPG.dwg Feb 27 2024 10:07am

BENCHMARK:
LOS ANGELES COUNTY B.M. NO. 0Y11864 ELEVATION=154.538'

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BRIDGELAND RESOURCES, INC.
109 NORTH POST OAK LANE, SUITE 230
HOUSTON,TX 77024

PRELIMINARY GRADING PLAN
10025 BLOOMFIELD AVE
SANTA FE SPRINGS, CA

SHEET NUMBER
2 OF 2

Figure No. 6: Non-structural BMP Maintenance Responsibility/Frequency Matrix

	BMP	RESPONSIBILITY	FREQUENCY
N1, N2	Education for Property Owners, Activity Restrictions	Owner will provide educational materials.	Continuous. Information to be provided to employees. Activities restricted to facility operations.
N3	Common Area Landscape Management	Construction Manager during construction, Owner through its landscape maintenance firm	Monthly during regular maintenance; manage landscaping in accordance with the City and County management guidelines for use of fertilizers and pesticides.
N4	BMP Maintenance	Owner	Refer to Attachment B for specific BMP maintenance requirements.
N7	Spill Contingency Plan	Owner	Continuous. Plan to be prepared and updated on an ongoing basis.
N11	Common Area Litter Control	Owner and Employees	Continuous
N12	Employee Training	Owner will train staff and landscape maintenance firm after construction.	Monthly for maintenance personnel and employees to include the educational materials contained in the approved SUSMP.
N13	Housekeeping of Loading Docks	Owner	Refer to Attachment B for specific BMP maintenance requirements.
N14	Catch Basin Inspection	Owner	Inspect, clean and maintained at 100% of the catch basins and inlets on an annual basis. Cleaning to take place in late summer/early fall.
N15	Parking Lots Sweeping	Owner	Parking lots to be swept prior to the beginning of the storm season, in late summer/early fall, as defined by the city of Industry

Figure No. 7: Structural BMP Maintenance Responsibility/Frequency Matrix

	BMP	RESPONSIBILITY	FREQUENCY
S2 (SD-12)	Common Area Efficient Irrigation	Contractor during construction; Owner through its landscape maintenance firm after construction	Once a week, in conjunction with maintenance activities. Verify that runoff minimizing landscape design continues to function by checking that water sensors are functioning properly, that irrigation heads are adjusted properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather and day or night temperatures.
S3 (SD-10)	Common Area Runoff-Minimizing Landscape Design	Owner, through its landscaping maintenance firm after construction	Once a week, in conjunction with maintenance activities and prior to finalizing any replanting schemes. Verify that plants continue to be grouped according to similar water requirements in order to reduce excess irrigation runoff.
S6 (SD-32)	Waste Management (Trash Dumpster) Ares	Owner	As needed
S13 (SD-13)	Catch Basin Stenciling	Contractor during construction and Owner after construction	As needed
S15	Inlet Trash Racks	Contractor during construction and Owner after construction	As needed per manufacturers recommendations for frequency of maintenance.
S17 (MP-40)	Stormwater Filters	Owner	As needed per manufacturers recommendations for frequency of maintenance. See Attachment F.
S22 (TC-10)	Infiltration Trench	Owner	As needed to prevent clogging of media. Monitoring wells shall be inspected on a monthly basis and/or after a storm event.

Attachment A: Flow Calculations

Infiltration Trench Sizing Calculations

Step 1: Calculate the Design Volume (SWQDv)

Facilities shall be sized to capture and filter the design capture volume (V_{design}) of water produced by the stormwater quality design storm event:

$$V_{BMP}\ (ft^3) = \text{HydroCalc Design Volume result}$$

Step 2: Determine the Design Infiltration Rate

The infiltration report for the project provided various recommended infiltration rates based on the location within the project. The recommended reduction factor for the recommended infiltration rate (f) was recommended to be 3.5. The design infiltration rate that will be used is:

$$(f_{design}) = \frac{f}{3.5}$$

Step 3: Calculate the Surface Area

$$d_{max} = \frac{(f_{design})}{12} \times t$$

Where:

D_{max} = Maximum depth of water that can be infiltrated within the maximum retention time [ft]
f_{design} = Design infiltration rate [in/hr]; and
t = Maximum retention time (max 96 hours) [hr]

Select the infiltration trench depth (d_t) such that:

$$d_t \leq \frac{d_{max}}{n_t}$$

Where:

d_t = Depth of infiltration trench fill [ft]
d_{max} = Maximum depth of water that can be infiltrated within the maximum retention time [ft]
n_t = Infiltration trench porosity

Calculate the infiltration surface area (bottom of the infiltration trench) required:

$$A = \frac{SWQDv}{d_t \times n_t}$$

Where:

A = Surface area of the bottom of the infiltration trench [ft^2]
SWQDv = Stormwater quality design volume [ft^3]
d_t = Depth of infiltration trench fill [ft]
n_t = Infiltration trench porosity

Trench #1:

1. **SWQDv = 38,276 ft^3**

2. The infiltration report for the project provided an infiltration rate (f) of 1.2 [in/hr] in the location of the proposed infiltration trench.

   (f_{design}) = 1.2 in/hr /3.5 = **0.34 in/hr**

3. Solve based on t=96 hours
   d_{max} = (0.34)/(12) x (96) = 2.72 ft
   d_t = 6 ft $\leq$ (2.72 ft) / 0.4 = 6.8 ft
   A= 38,276 ft^3 / (6 ft x 0.4) = **15,948.33 ft^2**

Trench #2:

1. **SWQDv = 37,381.17 ft^3**

2. The infiltration report for the project provided an infiltration rate (f) of 1.2 [in/hr] in the location of the proposed infiltration trench.

   (f_{design}) = 1.2 in/hr /3.5 = **0.34 in/hr**

3. Solve based on t=96 hours
   d_{max} = (0.34)/(12) x (96) = 2.72 ft
   d_t = 6 ft $\leq$ (2.72 ft) / 0.4 = 6.8 ft
   A= 37, 381.17 ft^3 / (6 ft x 0.4) = **15,575.5 ft^2**

Peak Flow Hydrologic Analysis

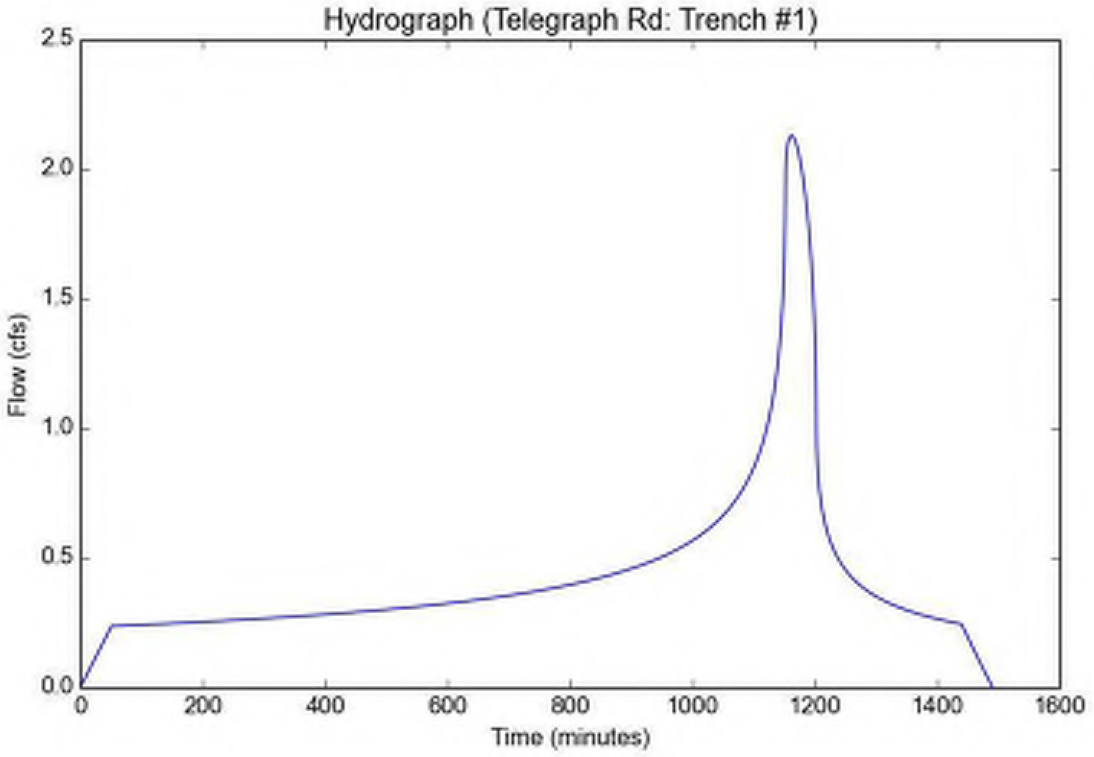
File location: R:/R316710.01 - EPD - Telegraph Road Industrial/06 Regulatory/06.8 LID/Attachments/Attachment A - Flow Calculations/2024-02-23 Hydro
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Telegraph Rd
Subarea ID	Trench #1
Area (ac)	13.26
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.01
85th Percentile Rainfall Depth (in)	0.95
Percent Impervious	0.93
Soil Type	13
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.95
Peak Intensity (in/hr)	0.1903
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.844
Time of Concentration (min)	51.0
Clear Peak Flow Rate (cfs)	2.1295
Burned Peak Flow Rate (cfs)	2.1295
24-Hr Clear Runoff Volume (ac-ft)	0.8787
24-Hr Clear Runoff Volume (cu-ft)	38276.0124



Peak Flow Hydrologic Analysis

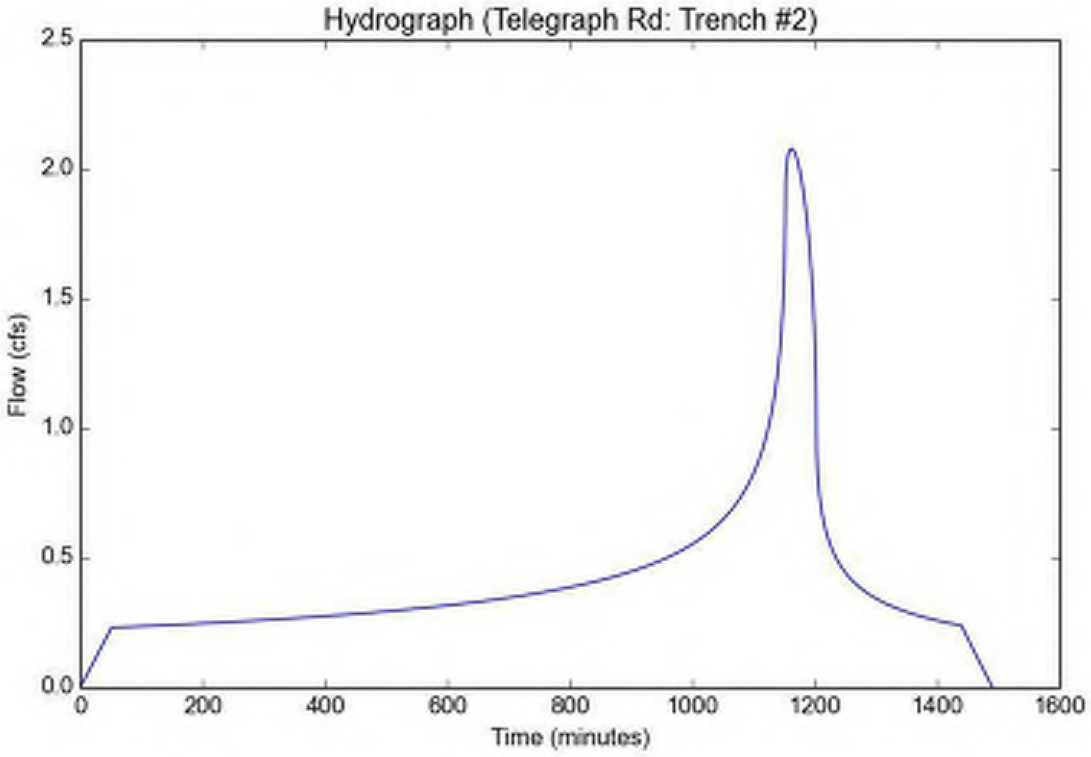
File location: R:/R316710.01 - EPD - Telegraph Road Industrial/06 Regulatory/06.8 LID/Attachments/Attachment A - Flow Calculations/2024-02-23 Hydro
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Telegraph Rd
Subarea ID	Trench #2
Area (ac)	12.95
Flow Path Length (ft)	1500.0
Flow Path Slope (vft/hft)	0.01
85th Percentile Rainfall Depth (in)	0.95
Percent Impervious	0.93
Soil Type	13
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

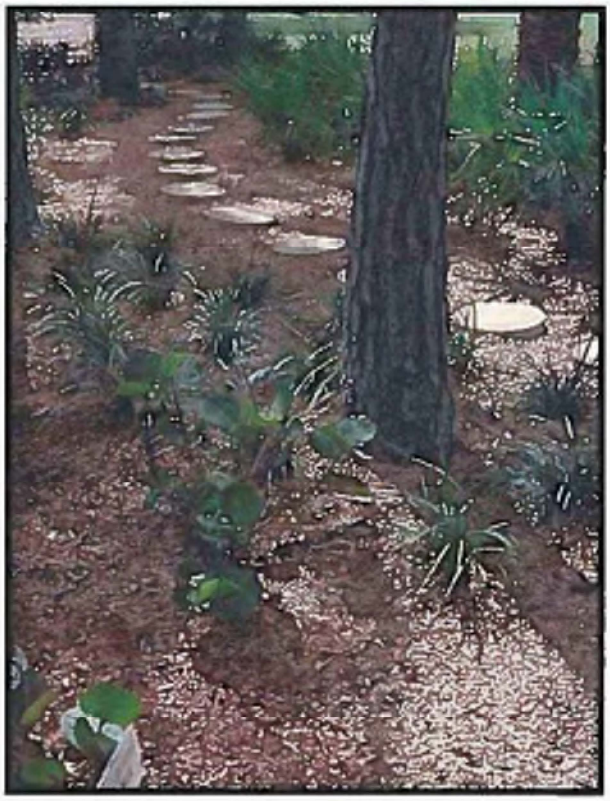
Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.95
Peak Intensity (in/hr)	0.1903
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.844
Time of Concentration (min)	51.0
Clear Peak Flow Rate (cfs)	2.0797
Burned Peak Flow Rate (cfs)	2.0797
24-Hr Clear Runoff Volume (ac-ft)	0.8582
24-Hr Clear Runoff Volume (cu-ft)	37381.1735



Attachment B: Best Management Practices (BMP Fact Sheets)

Site Design & Landscape Planning SD-10



Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING

– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.
- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

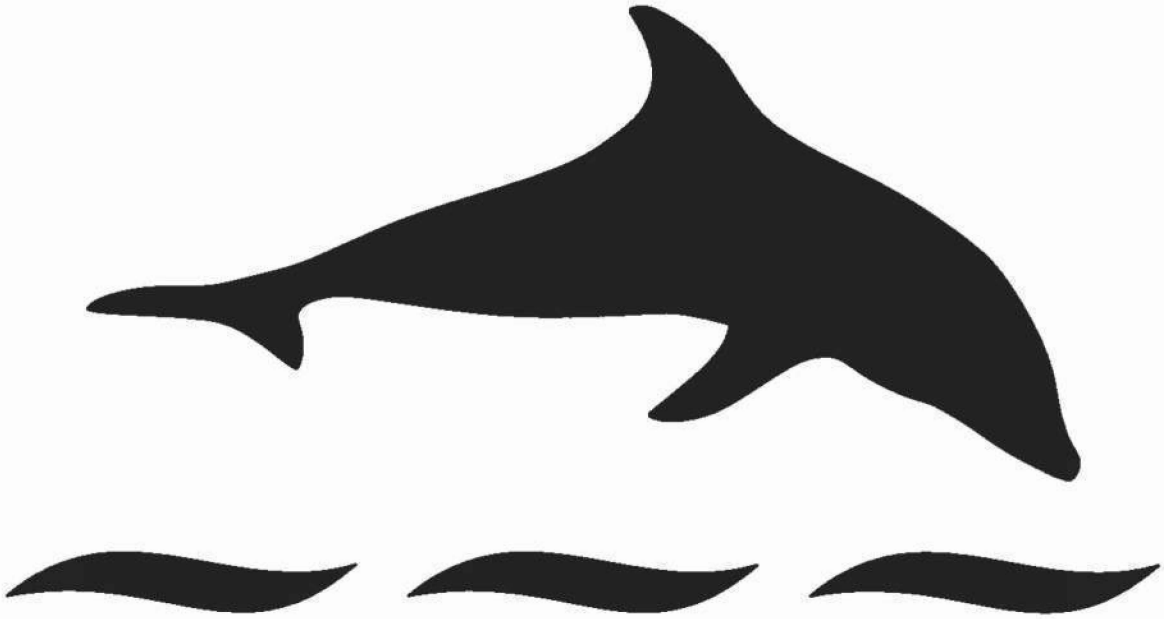
Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Sample Stencil 1

NO DUMPING



DRAINS TO OCEAN

Sample Stencil 2

Maintenance Bays & Docks SD-31

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Several measures can be taken to prevent operations at maintenance bays and loading docks from contributing a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the stormwater conveyance system.

Approach

In designs for maintenance bays and loading docks, containment is encouraged. Preventative measures include overflow containment structures and dead-end sumps. However, in the case of loading docks from grocery stores and warehouse/distribution centers, engineered infiltration systems may be considered.

Suitable Applications

Appropriate applications include commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for vehicle maintenance and repair are governed by Building and Fire Codes, and by current local agency ordinances, and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code requirements.

Designing New Installations

Designs of maintenance bays should consider the following:

- Repair/maintenance bays and vehicle parts with fluids should be indoors; or designed to preclude urban run-on and runoff.
- Repair/maintenance floor areas should be paved with Portland cement concrete (or equivalent smooth impervious surface).

- Repair/maintenance bays should be designed to capture all wash water leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters form entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.
- Other features may be comparable and equally effective.

The following designs of loading/unloading dock areas should be considered:

- Loading dock areas should be covered, or drainage should be designed to preclude urban run-on and runoff.
- Direct connections into storm drains from depressed loading docks (truck wells) are prohibited.
- Below-grade loading docks from grocery stores and warehouse/distribution centers of fresh food items should drain through water quality inlets, or to an engineered infiltration system, or an equally effective alternative. Pre-treatment may also be required.
- Other features may be comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Trash Storage Areas SD-32

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Infiltration Trench TC-10

Maintenance Concerns, Objectives, and Goals

- Accumulation of Metals
- Clogged Soil Outlet Structures
- Vegetation/Landscape Maintenance

General Description

An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. Runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Pretreatment using buffer strips, swales, or detention basins is important for limiting amounts of coarse sediment entering the trench which can clog and render the trench ineffective.

Targeted Constituents

✓	Sediment	■
✓	Nutrients	■
✓	Trash	■
✓	Metals	■
✓	Bacteria	■
✓	Oil and Grease	■
✓	Organics	■
✓	Oxygen Demanding	■

Legend (Removal Effectiveness)

● Low ■ High

▲ Medium

Inspection/Maintenance Considerations

Frequency of clogging is dependant on effectiveness of pretreatment, such as vegetated buffer strips, at removing sediments. See appropriate maintenance factsheets for associated pretreatment. If the trench clogs, it may be necessary to remove and replace all or part of the filter fabric and possibly the coarse aggregate. Clogged infiltration trenches with surface standing water can become a nuisance due to mosquito breeding. Maintenance efforts associated with infiltration trenches should include frequent inspections to ensure that water infiltrates into the subsurface completely at a recommended infiltration rate of 72 hours or less to prevent creating mosquito and other vector habitats. Most of the maintenance should be concentrated on the pretreatment practices, such as buffer strips and swales upstream of the trench to ensure that sediment does not reach the infiltration trench. Regular inspection should determine if the sediment removal structures require routine maintenance. Infiltration trenches should not be put into operation until the upstream tributary area is stabilized.

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Inspection Activities	Suggested Frequency
• Inspect after every major storm for the first few months to ensure proper functioning. Drain times should be observed to confirm that designed drain times has been achieved.	After construction
• Inspect facility for signs of wetness or damage to structures, signs of petroleum hydrocarbon contamination, standing water, trash and debris, sediment accumulation, slope stability, standing water, and material buildup. • Check for standing water or, if available, check observation wells following 3 days of dry weather to ensure proper drain time. • Inspect pretreatment devices and diversion structures for damage, sediment buildup, and structural damage.	Semi-annual and after extreme events
• Trenches with filter fabric should be inspected for sediment deposits by removing a small section of the top layer. If inspection indicates that the trench is partially or completely clogged, it should be restored to its design condition.	Annual
Maintenance Activities	**Suggested Frequency**
• Repair undercut and eroded areas at inflow and outflow structures. • Remove sediment, debris, and oil/grease from pretreatment devices and overflow structures.	Standard maintenance (as needed)
• Remove trash, debris, grass clippings, trees, and other large vegetation from the trench perimeter and dispose of properly. • Mow and trim vegetation to prevent establishment of woody vegetation, and for aesthetic and vector reasons.	Semi-annual, more often as needed
• Clean out sediment traps, forebays, inlet/outlet structures, overflow spillway, and trenches if necessary. • Remove grass clippings, leaves, and accumulated sediment from the surface of the trench. Replace first layer of aggregate and filter fabric if clogging appears only to be at the surface. • Clean trench when loss of infiltrative capacity is observed. If drawdown time is observed to have increased significantly over the design drawdown time, removal of sediment may be necessary. This is an expensive maintenance activity and the need for it can be minimized through prevention of upstream erosion.	Annual
• If bypass capability is available, it may be possible to regain the infiltration rate in the short term by providing an extended dry period. • Seed or sod to restore ground cover.	5-year maintenance
• Total rehabilitation of the trench should be conducted to maintain storage capacity within 2/3 of the design treatment volume and 72-hour infiltration rate limit. • Trench walls should be excavated to expose clean soil. • All of the stone aggregate and filter fabric or media must be removed. Accumulated sediment should be stripped from the trench bottom. At this point the bottom may be scarified or tilled to help induce infiltration. New fabric and clean stone aggregate should be refilled.	Upon failure

Additional Information

Infiltration practices have historically had a high rate of failure compared to other stormwater management practices. One study conducted in Prince George's County, Maryland (Galli, 1992), revealed that less than half of the infiltration trenches investigated (of about 50) were still functioning properly, and less than one-third still functioned properly after 5 years. Many of these practices, however, did not incorporate advanced pretreatment. By carefully selecting the location and improving the design features of infiltration practices, their performance should improve.

It is absolutely critical that settleable particles and floatable organic materials be removed from runoff water before it enters the infiltration trench. The trench will clog and become nonfunctional if excessive particulate matter is allowed to enter the trench.

Cold climate considerations – see http://www.cwp.org/cold-climates.htm

References

EPA. Stormwater Technology Fact Sheet - Infiltration Trench. EPA 832-F-99-019. September, 1999.

Metropolitan Council, Urban Small Sites Best Management Practices Manual. Available at: http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm

Michigan Department of Environmental Quality. Infiltration Trench Factsheet. Available at: http://www.deq.state.mi.us/documents/deq-swq-nps-it.pdf

Montgomery County Department of Environmental Protection. Maintaining Urban Stormwater Facilities - A Guidebook for Common Ownership Communities. Available at: http://www.montgomerycountymd.gov/mc/services/dep/Stormwater/maintain.htm

Stormwater Managers Resource Center, Manual Builder. Available at: http://www.stormwatercenter.net/intro_manual.htm

Stormwater Managers Resource Center. On-line: http://www.stormwatercenter.net

U.S. Department of Agriculture, Natural Resources Conservation Service. Illinois Urban Manual: A Technical Manual Designed for Urban Ecosystem Protection and Enhancement, 1995.

U.S. Environmental Protection Agency, Post-Construction Stormwater Management in New Development & Redevelopment BMP Factsheets. Available at: http://www.cfpub.epa.gov/npdes/stormwater/menuofbmps/bmp_files.cfm

Ventura Countywide Stormwater Quality Management Program, Technical Guidance Manual for Stormwater Quality Control Measures. July, 2002.

Attachment C: Educational Materials

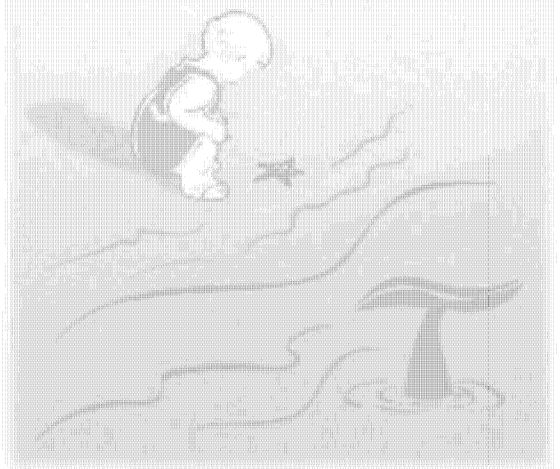
Keeping Our Air and Water Clean ...

Beginning January 1, 1999, Rule 1171 of the South Coast Air Quality Management District (SCAQMD) will require repair and maintenance cleaning operations, including cleaning operations in the auto repair industry, to use water-based cleaners instead of the solvents which are used today.

Making the switch to water-based cleaners is expected to remove *over 20 tons* of smog-forming compounds from the air we breathe.

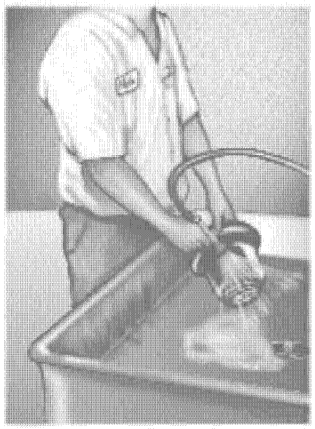
While use of water-based cleaners leads to better air quality, we must not forget that our water resources must also be kept clean. Improper disposal of water-based cleaners can lead to contamination of the ocean, rivers, and groundwater below us...water we depend on for drinking and survival.

This guide will provide you with valuable information on proper disposal practices to help keep our environment clean.



A Guide to the Disposal of

USED Water-Based Cleaners



Auto Repair & Maintenance Shops

Keeping Our Environment Clean!

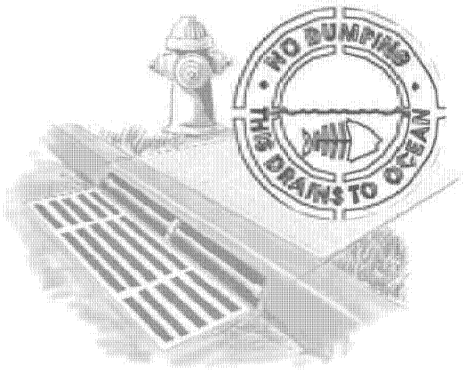
City of Los Angeles • Bureau of Sanitation
Industrial Waste Management Division

Did You Know? ...

- Just as solvent cleaners require proper disposal, so do water-based cleaners. In order to protect our environment, used water-based cleaners must be disposed of in a responsible manner.
- Many water-based cleaners are labeled as non-toxic and bio-degradable as packaged, but once these cleaners have been used, they will contain high levels of oils, grease, metals and solvents.
- Most used water-based cleaners qualify as hazardous waste.
- Because of the high levels of pollutants, it is illegal to discharge used water-based cleaners into storm drains, gutters, or in the street.
- It is illegal to dispose of water-based cleaners into the sewer system unless you have approval from your local sewerage agency.

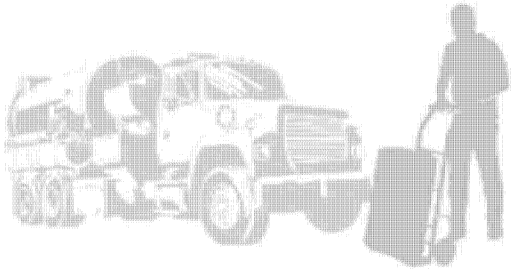
Remember ...

It is illegal to discharge used water-based cleaners into storm drains, gutters, or in the street !



Disposal of Used Water-Based Cleaners

The recommended method of disposal for used water-based cleaners is hauling by a registered hazardous waste transporter. It is your shop's responsibility to verify if your waste hauler is a legally registered transporter. Remember to always maintain waste disposal records in your shop.



If Disposing to the Sewer ...

It is best to legally haul used cleaner off-site. However, If you are interested in discharging used cleaner into the sewer, contact your local sewerage agency for specific requirements.

In general, you will need to ...

- Remove the oil, grease, metals and solvents from the used cleaner by established techniques.
- After treatment, have a lab test the cleaner to determine if it will meet your sewerage agency's requirements for disposal.
- Contact your sewerage agency for permission to discharge.

Your sewerage agency may also require that an Industrial Wastewater Permit be obtained and associated permit fees be paid. Since the used cleaner may be a hazardous waste, you may also be required to obtain a tiered permit from the state if you wish to treat your used cleaner for sewer disposal.

You Can Reduce Costs ...

- You can extend the life of your water-based cleaner by using oil skimmers, filters and absorbents.
- Keep used water-based cleaners separate from other wastewater in your shop. It is easier to dispose of hazardous waste when they are not mixed with other wastes.
- Operate at the optimal concentration and temperature for your water-based cleaner. Contact trade organizations and vendors on how to get the most from your cleaner.
- Avoid spot cleaning parts with solvent-based spray cleaners as these cleaners contain very high levels of toxic organics.

Questions?

Rule 1171 and how to convert to water-based cleaning:

SCAQMD Small Business Hotline
(800) 388-2121

Tiered Permitting or Treatment of Hazardous Waste:

Department of Toxic Substances Control
Southern California Office
(562) 590-4868

Industrial Wastewater Discharge Requirements, Contact the Sewerage Agency in Your Area:

City of Los Angeles
Bureau of Sanitation
Industrial Waste Management Division
(213) 237-0806

Los Angeles County Sanitation Districts
Industrial Waste Section
(562) 699-7411 ext. 2900

Orange County Sanitation Districts
Source Control Division
(714) 962-2411 ext. 3800

Riverside and San Bernardino County Areas
Inland Empire Permit Assistance Center
(909) 391-0723 or (800) 468-1786

How can you help in your community?

Como puedes ayudar en tu communidad?

Home & Garden

Casa y Jardines

- Properly use and store all hazardous household products, including cleaners, solvents and paints.

  Use y almacene de manera adecuada productos domésticos peligrosos, incluyendo limpiadores, solventes, y pinturas.

- Be an environmentally aware consumer. Buy non-toxic products for use in your home and garden whenever possible.

  Sea un consumidor consciente del medio ambiente. Compre productos que no sean tóxicos para su casa o jardín.

- Use pesticides, herbicides and fertilizers carefully and sparingly.

  Use pesticidas, herbicidas y fertilizantes cuidadosamente y a la medida justa.

- Conserve water and reduce the amount of runoff by not over-watering your lawn and garden.

  Conserve el agua y reduzca la cantidad de derrame no sobre-regando el y jardín.

- Use a broom rather than a hose to clean up garden clippings, dirt and litter from sidewalks, patios and driveways.

  Use una escoba en vez de la manguera al limpiar tierra y basura de las aceras, patios y caminos de entrada.

- Compost yard trimmings and leaves. Do not sweep them into the streets or catch basins.

  Conviérta ramas y hojas en abono. No las barra a la calle o drenajes.

- Divert rain spouts and other sources of runoff onto grass or vegetation.

  Desvíe los caños y otros recursos de derrame hacia el césped o la vegetación.

- Dispose of pet waste in trash cans. Leaving it on the lawn sends harmful bacteria into the storm drains whenever you water or when it rains.

  Deseche el excremento de los animales en botes de basura. Si se dejan en el césped, estos crearan bacterias dañinas que iran hacia los drenajes cuando se riege o cuando llueva.

- Donate unwanted paint, fertilizer, etc. to friends or community organizations.

  Regale pintura, fertilizante, etc. a sus amistades u organizaciones communitarias.

Automotive

Automóviles

- When changing car fluids, use a drip pan to collect any spills. If a spill occurs, soak it up using an absorbent material such as kitty litter or sawdust and dispose of it properly.

  Cuando cambie lubricantes, use un envase debajo del gateo para contener cualquier derrame. Si un derrame ocurriera, limpielo usando cualquier material absorbente, como aserrin o "kitty litter", luego deseche de manera apropiada.

- Wash your car with biodegradable soap using as little water as possible. Shut off the hose while washing your car and then rinse.

  Lave su vehículo con jabón biodegradable usando la menor cantidad de agua posible. Cierre la llave del agua mientras lo lave y luego enjuágelo.

- Keep a trash bag in the car and use it! Do not throw anything out the window.

  ¡Mantenga una bolsa de basura dentro del carro y úsela! No arroje nada por la ventana.

- Keep up car maintenance to reduce leakage of oil, anti-freeze and other fluids.

  Dé un buen mantenimiento a su carro para reducir derrames de aceite, anticongelante u otros lubricantes.

- Buy batteries, anti-freeze and motor oil from stores that will recycle used products. or

  Take these items to a local Household Hazardous Waste roundup.

  Compre baterías, anticongelantes y aceites para motores en tiendas que reciclen los productos que los usado. ó

  lleve estos productos a su centro de colección local de desechos domésticos peligrosos.

SPILL RESPONSE AGENCIES
AGENCIAS PARA EL CONTROL DE DERRAMES

City of Los Angeles
Stormwater Program Hotline
(800) 974-9794

Los Angeles County
(888) CLEAN-LA / 253-2652

RECYCLING & HAZARDOUS WASTE DISPOSAL
RECICLAGE Y DESECHO DE DESPERDICIOS PELIGROSOS

City of Los Angeles
Small Business Hazardous Waste Hotline
(800) 98-TOXIC / 988-6942

City of L.A. Recycling
(800) 773-CITY

Los Angeles County
Department of Public Works
(888) CLEAN-LA / 253-2652

TO REPORT ILLEGAL DUMPING
PARA REPORTAR ARROJOS ILEGALES

City of Los Angeles
Stormwater Program Hotline
(800) 974-9794

Los Angeles County
Department of Public Works
Illegal Dumping Hotline
(888) CLEAN-LA / 253-2652

TO REPORT CLOGGED CATCH BASINS
PARA REPORTAR DRENAJES TAPADOS

City of Los Angeles
Stormwater Program Hotline
(800) 974-9794

Los Angeles County
Department of Public Works
(888) CLEAN-LA / 253-2652

WATERSHED PROTECTION
CITY OF LOS ANGELES

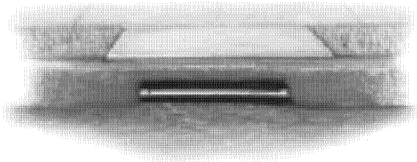
www.LAstormwater.org

Illustration and Design: Oscar Amaro
Printed on Recycled Paper

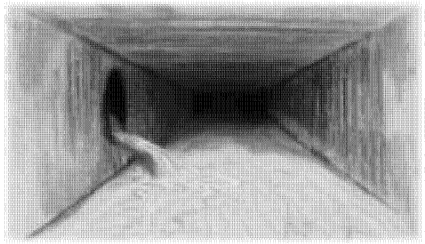
How So?

Water running off your yard, sidewalk or street flows down gutters to curbside openings called **catch basins**.

Curbside catch basin



Underground storm drain tunnel



Anything carried by this runoff — pesticides, pet waste, oil and anti-freeze from leaky cars and trucks, foam containers and plastic bags — ends up trashing the beaches, polluting the ocean, and harming wildlife... and humans. This contaminated flow is the reason some of our most scenic beaches are closed to the public after a heavy rainstorm.

Just one quart of used motor oil dumped into a catch basin can pollute *250,000 gallons of ocean water!*

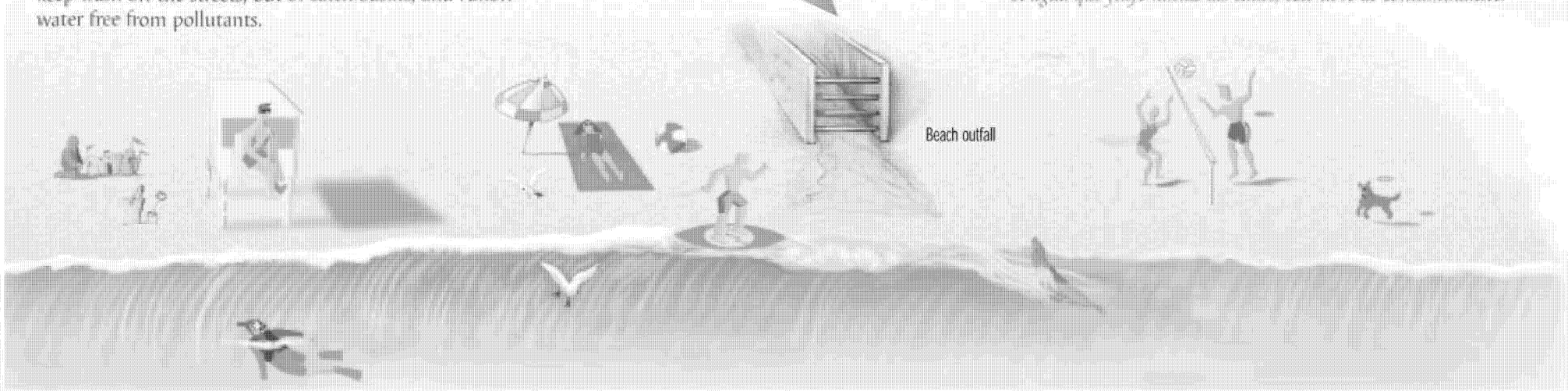
Unlike the wastewater from inside homes and businesses that flows to sewers and treatment plants, outside runoff water flows to the ocean untreated. That's because the storm drain system was designed to prevent flooding during heavy rains by quickly diverting billions of gallons of rainwater to the ocean.

The open portions of this system are called flood control channels.

Flood control channel

Even during the driest day in Southern California, we produce tens of millions of gallons of runoff, the result of activities such as car washing, lawn watering and yard cleanup.

For our own protection, and for a cleaner ocean, we need to keep trash off the streets, out of catch basins, and runoff water free from pollutants.



Beach outfall

¿Cómo Puede Ser?

El agua que se desborda en jardines, aceras y calles se vierte a las cunetas, las cuales la transportan hacia las aperturas en las calzadas llamadas alcantarillas.

De allí, es vaciada al sistema del alcantarillado pluvial, el cual es una gran red de tuberías y canales que eventualmente terminan en el océano.

Cualquier cosa acarreada por este flujo, como por ejemplo pesticidas, excremento de animales, aceite o anticongelante derramados de carros y envases plásticos terminan ensuciando las playas, contaminando el océano, dañando a la fauna y al mismo tiempo a los humanos. Este flujo contaminado es la razón del cierre al público de algunas de nuestras playas más hermosas luego de una tormenta severa.

¡Basta un cuarto de galón de aceite de automóvil arrojado dentro del drenaje para contaminar 250,000 galones de agua marina!

A diferencia de las aguas que fluyen de las casas y negocios por medio del sistema de desagüe hacia las plantas de tratamiento, el agua que fluye por las calles va al océano sin ser tratada. El sistema de drenaje de lluvias es diseñado para prevenir inundaciones durante tormentas severas. Este sistema recoge rápidamente billones de galones de agua de las calles llevándolos directamente al océano.

Aún durante el día más seco en el sur de California se producen decenas de millones de galones de agua que fluyen por las calles como resultado de actividades tales como el lavado de carros, o riego y limpieza de jardines y patios.

Por nuestra propia protección debemos impedir que la basura llegue a nuestras calles y colectores de lluvia, así como asegurar que el agua que fluye hacias las calles, esté libre de contaminantes.

Attachment D: Master Covenant and Agreement

Attachment E: Soils Report and Percolation Data

February 1, 2024 Project No. 23221-01

Mr. Dane Palanjian
EPD Solutions, Inc.
3333 Michelson Drive, Suite 500
Irvine, CA 92612

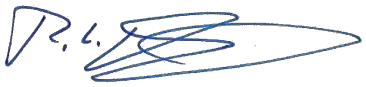
Subject: ***Preliminary Geotechnical Evaluation, Proposed Industrial Development, Site 1, APN 8005-015-051, 12400 Hawkins Street, Santa Fe Springs, California***

In accordance with your request, LGC Geotechnical, Inc. has performed a geotechnical evaluation for the proposed industrial development, Site 1, APN 8005-015-051, located at 12400 Hawkins Street in the City of Santa Fe Springs, California. This report summarizes the results of our background review, subsurface exploration, and geotechnical analyses of the data collected, and presents our findings, conclusions, and preliminary recommendations for the proposed industrial development.

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

Respectfully,

LGC Geotechnical, Inc.



Ryan Douglas, PE, GE 3147
Project Engineer

RLD/RNP/amm

Distribution: (1) Addressee (electronic copy)
(1) Huitt-Zollars (electronic copy)
Attn.: Mr. John Vlassis

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1.0 INTRODUCTION

1.1 Purpose and Scope of Services

This report presents the results of our geotechnical evaluation for the proposed industrial development, Site 1, APN 8005-015-051, located at 12400 Hawkins Street in the City of Santa Fe Springs, California (see Site Location Map, Figure 1). The purpose of our work was to collect subsurface data in order to prepare a geotechnical report providing preliminary recommendations for design and construction of the proposed project. Our scope of services included:

- Review of pertinent readily available geotechnical information and geologic maps (Appendix A).
- Subsurface investigation including excavation, sampling, and logging of 11 small-diameter hollow stem borings.
- Performed 3 infiltration tests within the hollow stem borings.
- Laboratory testing of representative samples obtained during our subsurface investigation (Appendix C).
- Geotechnical analysis and evaluation of the data obtained.
- Preparation of this report presenting our preliminary findings, conclusions and recommendations with respect to the proposed site development.

1.2 Background

The subject industrial development is approximately 26.8-acre site is bound to the west and north by existing commercial and industrial developments, to the east by Santa Fe Springs Road and to the south by Telegraph Road. The site is currently occupied by an active oil field and associated equipment. Review of historic aerial photographs suggests the following.

1953 through 1972 Aerial Photos: At this time, the subject site consisted of undeveloped land with a series of oil derricks, manmade (dirt) access roads, above ground storage tanks, and a few miscellaneous small structures.

1988 Aerial Photo: The above ground storage tanks have been removed and some of the oil derricks appeared to have moved to different locations. A structure appeared in the northwestern portion of the site.

1999 Aerial Photo: The manmade roadways throughout the site appear to have been refurbished and appear more defined. The oil derricks remain across the site.

2005 through 2020 Aerial Photos: The site remained relatively unchanged.

1.3 Project Description

Based on the preliminary conceptual site plan (RGA, 2023), two industrial warehouse structure with on-grade parking areas, drive aisles, and a water quality system are proposed. The two proposed industrial warehouse structure designated as “Building North” and “Building South” are

approximately 300,800 square feet and 288,400 square feet, respectively. The proposed industrial buildings are anticipated to be at-grade concrete tilt-up structures with estimated maximum column and wall loads of approximately 150 kips and 10 kips per linear foot, respectively. Please note no structural loads or preliminary grading plans were provided to us at the time of this report.

The recommendations provided herein are based upon the estimated structural loading and layout information above. We understand that the project plans are currently being developed at this time; LGC Geotechnical should be provided with updated project plans and any changes to the assumed structural loads when they become available, in order to either confirm or modify the recommendations provided herein. Additional field work and/or laboratory testing may be necessary.

1.4 Subsurface Evaluation

LGC Geotechnical performed a recent subsurface geotechnical evaluation of the site consisting of the excavation of eleven hollow-stem auger borings (three of which were used for infiltration testing).

The eight hollow-stem borings (HS-1 through HS-8) and three hollow-stem borings used for infiltration testing (I-1 through I-3) were drilled to a depths ranging from approximately 10 to 50 feet below existing grade. An LGC Geotechnical representative observed the drilling operations, logged the borings, and collected soil samples for laboratory testing. The borings were excavated using a truck-mounted drill rig equipped with an 8-inch-diameter hollow-stem auger. Driven soil samples were collected by means of the Standard Penetration Test (SPT) and Modified California Drive (MCD) sampler generally obtained at 2.5 to 5-foot vertical increments. The MCD is a split-barrel sampler with a tapered cutting tip and lined with a series of 1-inch-tall brass rings. The SPT sampler and MCD sampler were driven using a 140-pound automatic hammer falling 30 inches to advance the sampler a total depth of 18 inches. The raw blow counts for each 6-inch increment of penetration were recorded on the boring logs. Bulk samples were also collected and logged at select depths for laboratory testing. At the completion of drilling, the borings were backfilled with the native soil cuttings and tamped. Some settlement of the backfill soils may occur over time.

Infiltration testing was performed within three of the borings (I-1 through I-3) between depths of approximately 10 and 15 feet below existing grade, per the direction of the civil engineer. An LGC Geotechnical staff engineer installed standpipes, backfilled the boring annulus with crushed rock, and pre-soaked the infiltration wells prior to testing. Infiltration testing was performed in accordance with the County of Los Angeles testing guidelines. The infiltration test wells were subsequently backfilled with native soils and tapped at the completion of testing. Some settlement of the backfill soils may occur over time.

The approximate locations of borings are shown on the Boring Location Map (Figure 2). Boring logs are presented in Appendix B.

1.5 Laboratory Testing

Laboratory testing was performed on representative soil samples obtained from our subsurface evaluation. Laboratory testing included in-situ moisture and density tests, laboratory compaction, fines content, Atterberg Limits, expansion index, consolidation, direct shear, R-value, and corrosion (sulfate, chloride content, pH, and minimum resistivity).

The following is a summary of the recent laboratory test results.

- Dry density of the samples collected ranged from approximately 80 pounds per cubic foot (pcf) to 123 pcf, with an average of 101.5 pcf. Field moisture contents ranged from approximately 2 to 47 percent, with an average of approximately 24.5 percent.
- Four fines content tests were performed and indicated a fines content (passing No. 200 sieve) ranging from approximately 15 to 78 percent. Based on the Unified Soils Classification System (USCS), the tested samples would be classified as "coarse-grained" and "fine-grained."
- Two Atterberg Limit (liquid limit and plastic limit) tests were performed. Results indicate Plasticity Index values of Non-Plastic and 8. The plots are provided in Appendix C
- One laboratory compaction tests of near surface samples indicated a maximum dry density of 123.0 pcf with optimum moisture content of 10.0 percent.
- One direct shear test was performed. The plot is provided in Appendix C.
- Two consolidation tests were performed. The load versus deformation plots are provided in Appendix C.
- Expansion potential testing indicated expansion index values of 12 and 15, corresponding to "Very Low" expansion potential.
- One R-value test was performed. Results indicated an R-value of 43.
- Corrosion testing indicated soluble sulfate contents less than approximately 0.01 percent, a chloride content of 160 parts per million (ppm), pH of 7.82, and a minimum resistivity of 1,048 ohm-centimeters.

A summary of the results is presented in Appendix C. The moisture and dry density test results are presented on the boring logs in Appendix B.

LGC Geotechnical, Inc.

FIGURE 1
Site Location Map

PROJECT NAME	EPD - 12400 Hawkins Street (Site 1)
PROJECT NO.	23221-01
ENG. / GEOL.	RLD
SCALE	Not to Scale
DATE	February 2024

2.0 GEOTECHNICAL CONDITIONS

2.1 Regional Geology

The site is generally located within the Peninsular Ranges Geomorphic Province, specifically within an area known as the Downey Plain, at the eastern margin of the broad Los Angeles Sedimentary Basin. The subject site is bounded approximately 4 miles to the north by the uplifted, northwest-trending Puente Hills. The active, right-lateral strike slip, Whittier Fault Zone is located along the southern front of the Puente Hills. The San Gabriel and Rio Honda Rivers to the west of the site provides major drainage of the areas to the north of the Puente Hills. Existing local drainage pathways to the east of the subject site include the La Canada Verde drainage, respectively. Surface sediments within the area generally consist of older, alluvial fan deposits, except where the local drainages dissect the fans and recent alluvium is deposited.

The Puente Hills located north of the subject site are the nearest bedrock outcrops that were uplifted along the Whittier Hills Fault. Alluvial deposits in this area extend to the ocean going south to the area of Long Beach (Dibblee, 2001).

2.2 Generalized Subsurface Conditions

Based on review of available geologic maps (Dibblee, 2001; Saucedo, 2016), the primary geologic unit underlying the site is Quaternary old alluvial fan deposits, late to middle Pleistocene deposits generally described as moderately to well consolidated sand, clay, and silt. As encountered in our subsurface evaluation, older alluvial deposits consisted of gray to brown, dry to slightly moist, silty sand, sand, and sandy silts, with lesser amounts of clay to the total depth evaluated, approximately 51.5 feet below the surface.

Additionally, undocumented artificial fill consisting generally of silt, sand, and clay was observed at depths of up to approximately 15 feet. The encountered undocumented fill is likely associated with the site history of oil drilling and extraction development within the site.

It should be noted that the borings are only representative of the location and time where/when they are performed and varying subsurface conditions may exist outside of the performed location. In addition, subsurface conditions can change over time. The soil descriptions provided above should not be construed to mean that the subsurface profile is uniform, and that soil is homogeneous within the project area. For details on the stratigraphy at the exploration locations, refer to Appendix B.

2.3 Geologic Structure

Geologic structure was not identified in the subject site geotechnical evaluation. The alluvial materials encountered can be considered generally massive. No faults have been mapped on or in the vicinity of the site nor were any encountered during our field study.

2.4 Groundwater

Groundwater was not encountered to the maximum explored depth of approximately 51.5 feet below existing grade during this evaluation. Historic high groundwater is mapped at approximately 30 feet below current grade based on the seismic hazard zone report for the Whittier quadrangle (CDMG, 1998).

In general, groundwater levels fluctuate with the seasons and local zones of perched groundwater may be present within the near-surface deposits due to local seepage or during rainy seasons. Groundwater conditions below the site may be variable, depending on numerous factors including seasonal rainfall, local irrigation and groundwater pumping, among others.

2.5 Field Infiltration Testing

Estimation of infiltration rates was performed in general accordance with guidelines set forth by the County of Los Angeles (2021). In general, a 3-inch diameter perforated PVC pipe was placed in each borehole to be tested and the annulus was backfilled with gravel, including placement of about 2 to 4 inches of gravel at the bottom of the borehole. Infiltration tests were performed using relatively clean water free of particulates, silt, etc. The infiltration wells were pre-soaked during the day of drilling and a 30-minute pre-test was performed during the day of testing. During the pre-test, water was added to the boring and was observed after 10 minutes and 30 minutes to determine test methodology. The measured infiltration rates are considered representative of the site soils in the area of the proposed infiltration system. These measured infiltration rates do not include any factor of safety. Measured infiltration rates have been normalized to correct the 3-Dimensional flow that occurs within the field test to 1-Dimensional flow out of the bottom of the boring. The approximate infiltration test locations are shown on the Boring Location Map (Figure 2) and the infiltration test data is located in Appendix D and is summarized below in Table 1.

TABLE 1

Summary of Infiltration Testing

Infiltration Test Location	Infiltration Test Approx. Depth Below Existing Grade (ft)	Measured Infiltration Rate* (inch/hour)
I-1	10.0	0.0
I-2	15.0	1.2
I-3	15.0	0.5

*Normalized to One-Dimensional Flow, does not include any Reduction Factors.

It should be emphasized that infiltration test results are only representative of the location and depth where they are performed. Varying subsurface conditions may exist outside of the test locations which could alter the calculated infiltration rates indicated above. Infiltration tests are performed using relatively clean water free of particulates, silt, etc. Please refer to Section 4.8 for

subsurface water infiltration recommendations including a discussion on Reduction Factors.

2.6 Faulting and Seismic Hazards

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

The subject site is not located within a State of California Earthquake Fault Zone (i.e., Alquist-Priolo Earthquake Fault Act Zone) and no faults were identified on the site during our evaluation. The possibility of damage due to ground rupture is considered low since no active faults are known to cross the site.

Secondary effects of seismic shaking resulting from large earthquakes on the major faults in the Southern California region, which may affect the site, include ground lurching, shallow ground rupture, soil liquefaction and dynamic settlement. These secondary effects of seismic shaking are a possibility throughout the Southern California region and are dependent on the distance between the site and causative fault and the onsite geology. Some of the major active nearby faults that could produce these secondary effects include the Lake Elsinore-Whittier Fault Zone, Newport-Inglewood, and San Andreas Faults, among others (CGS, 2018). A discussion of these secondary effects is provided in the following sections.

2.6.1 Liquefaction and Dynamic Settlement

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

Based on our review of the State of California Seismic Hazard Zone for liquefaction potential (CDMG, 1999), the site is not located within a liquefaction hazard zone. However, historic high groundwater is mapped at a depth of approximately 30 feet below existing grade (CDMG, 1998); therefore, liquefaction analysis was performed. The alluvial soils encountered below a depth of approximately 30 feet were generally found to be either fine-grained or relatively dense sandy soils and generally not susceptible to liquefaction, except for a few isolated layers. Liquefaction potential was evaluated using the procedures outlined by Special Publication 117A (SCEC, 1999 & CGS, 2008) and the applicable seismic criteria (e.g., 2022 CBC). Liquefaction induced settlement was estimated using the PGA_M per the 2022 CBC and a moment of magnitude of 6.87 (USGS, 2014).

Based on the data obtained from our field evaluation, liquefaction settlement is estimated to be on the order of about 1-inch. Differential seismic settlement may be estimated as one-half of the total seismic settlement over a horizontal span of 40 feet.

2.6.2 Lateral Spreading

Lateral spreading is a type of liquefaction induced ground failure associated with the lateral displacement of surficial blocks of sediment resulting from liquefaction in a subsurface layer. Once liquefaction transforms the subsurface layer into a fluid mass, gravity plus the earthquake inertial forces may cause the mass to move downslope towards a free face (such as a river channel or an embankment). Lateral spreading may cause large horizontal displacements and such movement typically damages pipelines, utilities, bridges, and structures.

Due to the depth to groundwater, low potential for liquefaction, and lack of nearby "free face" conditions, the potential for lateral spreading is considered low.

2.7 Seismic Design Criteria

The site seismic characteristics were evaluated per the guidelines set forth in Chapter 16, Section 1613 of the 2022 California Building Code (CBC) and applicable portions of ASCE 7-16 which has been adopted by the CBC. **Please note that the following seismic parameters are only applicable for code-based acceleration response spectra and are not applicable for where site-specific ground motion procedures are required by ASCE 7-16.** Representative site coordinates of latitude 33.9441 degrees north and longitude -118.0661 degrees west were utilized in our analyses. The maximum considered earthquake (MCE) spectral response accelerations (S_{MS} and S_{M1}) and adjusted design spectral response acceleration parameters (S_{DS} and S_{D1}) for Site Class D are provided in Table 2 on the following page. Since site soils are Site Class D, additional adjustments are required to code acceleration response spectrums as outlined below and provided in ASCE 7-16. The structural designer should contact the geotechnical consultant if structural conditions (e.g., number of stories, seismically isolated structures, etc.) require site-specific ground motions.

A deaggregation of the PGA based on a 2,475-year average return period (MCE) indicates that an earthquake magnitude of 6.87 at a distance of approximately 10.21 km from the site would

contribute the most to this ground motion (USGS, 2014).

Section 1803.5.12 of the 2022 CBC (per Section 11.8.3 of ASCE 7) states that the maximum considered earthquake geometric mean (MCE_G) Peak Ground Acceleration (PGA) should be used for liquefaction potential. The PGA_M for the site is equal to 0.827g (SEAOC, 2023).

TABLE 2

Seismic Design Parameters

Selected Parameters from 2022 CBC, Section 1613 - Earthquake Loads	**Seismic Design Values**	**Notes/Exceptions**
Distance to applicable faults classifies the site as a "Near-Fault" site.		Section 11.4.1 of ASCE 7
Site Class	D*	Chapter 20 of ASCE 7
Ss (Risk-Targeted Spectral Acceleration for Short Periods)	1.743g	From SEAOC, 2023
S_1 (Risk-Targeted Spectral Accelerations for 1-Second Periods)	0.623g	From SEAOC, 2023
F_a (per Table 1613.2.3(1))	1.000	For Simplified Design Procedure of Section 12.14 of ASCE 7, F_a shall be taken as 1.4 (Section 12.14.8.1)
F_v (per Table 1613.2.3(2))	1.700	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
S_{MS} for Site Class D [Note: $S_{MS} = F_aS_S$]	1.743g	-
S_{M1} for Site Class D [Note: $S_{M1} = F_vS_1$]	1.059g	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
S_{DS} for Site Class D [Note: $S_{DS} = (^2/_3)S_{MS}$]	1.162g	-
S_{D1} for Site Class D [Note: $S_{D1} = (^2/_3)S_{M1}$]	0.706g	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
C_{RS} (Mapped Risk Coefficient at 0.2 sec)	0.903	ASCE 7 Chapter 22
C_{R1} (Mapped Risk Coefficient at 1 sec)	0.901	ASCE 7 Chapter 22
*Since site soils are Site Class D and S_1 is greater than or equal to 0.2, the seismic response coefficient Cs is determined by Eq. 12.8-2 for values of $T \leq 1.5T_s$ and taken equal to 1.5 times the value calculated in accordance with either Eq. 12.8-3 for $T_L \geq T > T_s$, or Eq. 12.8-4 for $T > T_L$. Refer to ASCE 7-16.		

2.8 Oversized Material

Oversized material (material larger than 8 inches in maximum dimension) may be encountered during site grading. Recommendations are provided for appropriate handling of oversized materials in Appendix E. If feasible, crushing oversized materials onsite or exporting oversized materials may be considered. Incorporating oversized materials into "rock fills" (windrows, rock blankets or individual rock burial) is likely not feasible due to the limited depth of grading. Special handling recommendations should be provided on a case-by-case basis, if necessary.

2.9 Expansion Potential

Based on the results of previous laboratory testing, site soils are anticipated to have a "Very Low" expansion potential. Final expansion potential of site soils should be determined at the completion of grading. Results of expansion testing at finish grades will be utilized to confirm final foundation design.

3.0 CONCLUSIONS

Based on the results of our subsurface geotechnical evaluation, it is our opinion that the proposed improvements are feasible from a geotechnical standpoint, provided that the recommendations contained in the following sections are incorporated during site grading and development. A summary of our geotechnical conclusions are as follows:

- As encountered at the subject site, soils encountered below the recommended removal and recompaction depth generally consisted of medium dense to very dense sands and silty sands and stiff to very stiff sandy silts and clays to the maximum explored depth of approximately 50 feet below existing grade. The near-surface loose and compressible soils are not suitable for the planned improvements in their present condition (refer to Section 4.1).
- From a geotechnical perspective, onsite soils are anticipated to be suitable for use as general compacted fill, provided they are screened of construction debris and any oversized material (8 inches in greatest dimension).
- Groundwater was not encountered during our subsurface evaluation at a maximum explored depth of approximately 51.5 feet below existing ground surface. Historic high groundwater is estimated to be about 30 feet below existing grade (CDMG, 1998).
- The subject study area is not located within a mapped State of California Earthquake Fault Zone (i.e., Alquist-Priolo Earthquake Fault Act Zone), and based upon our review of published geologic mapping, no known active or potentially active faults are known to exist within or in the immediate vicinity of the site. Therefore, the potential for ground rupture as a result of faulting is considered very low.
- The main seismic hazard that may affect the site is ground shaking from one of the active regional faults. The subject site will likely experience strong seismic ground shaking during its design life.
- The site is not located in a State of California Seismic Hazard Zone for liquefaction. Site soils are considered susceptible to liquefaction. Total dynamic settlement is estimated to be on the order of 1-inch or less. Differential dynamic settlement can be estimated at half of the total settlement over a horizontal span of 40 feet for design of foundations.
- Based on the results of preliminary laboratory testing, site soils are anticipated to have “Very Low” expansion potential. Final design expansion potential must be determined at the completion of grading.
- Oversized material (material larger than 8 inches in maximum dimension) may be encountered during site grading. Recommendations are provided for appropriate handling of oversized materials in Appendix E.
- Excavations into the existing site soils should be feasible with heavy construction equipment in good working order. We anticipate that the sandy and silty earth materials generated from the excavations will be generally suitable for re-use as compacted fill, provided they are relatively free of rocks larger than 8 inches in dimension, construction debris, and significant organic material.
- Some of the on-site soils should be suitable for backfill of site retaining walls; therefore, select grading and stockpiling and/or import of select sandy materials should be anticipated by the contractor.

4.0 RECOMMENDATIONS

The following recommendations are to be considered preliminary and should be confirmed upon completion of grading and earthwork operations. In addition, they should be considered minimal from a geotechnical viewpoint, as there may be more restrictive requirements from the architect, structural engineer, building codes, governing agencies, or the owner.

It should be noted that the following geotechnical recommendations are intended to provide sufficient information to develop the site in general accordance with the 2022 CBC requirements. With regard to the possible occurrence of potentially catastrophic geotechnical hazards such as fault rupture, earthquake-induced landslides, liquefaction, etc. the following geotechnical recommendations should provide adequate protection for the proposed development to the extent required to reduce seismic risk to an "acceptable level." The "acceptable level" of risk is defined by the California Code of Regulations as "that level that provides reasonable protection of the public safety, though it does not necessarily ensure continued structural integrity and functionality of the project" [Section 3721(a)]. Therefore, repair and remedial work of the proposed improvement may be required after a significant seismic event. With regards to the potential for less significant geologic hazards to the proposed development, the recommendations contained herein are intended as a reasonable protection against the potential damaging effects of geotechnical phenomena such as expansive soils, fill settlement, groundwater seepage, etc. It should be understood, however, that our recommendations are intended to maintain the structural integrity of the proposed development and structures given the site geotechnical conditions but cannot preclude the potential for some cosmetic distress or nuisance issues to develop as a result of the site geotechnical conditions.

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

4.1 Site Earthwork

We anticipate that earthwork at the site will consist of required earthwork removals, precise grading and construction of the proposed new improvements, including the industrial structures, subsurface utilities, and vehicular/truck pavement areas.

We recommend that earthwork onsite be performed in accordance with the following recommendations, future grading plan review report(s), the 2022 CBC/City of Santa Fe Springs requirements, and the General Earthwork and Grading Specifications for Rough Grading included in Appendix E. In case of conflict, the following recommendations shall supersede those included in Appendix E. The following recommendations may be revised within future grading plan review reports or based on the actual conditions encountered during site grading.

4.1.1 Site Preparation

Prior to grading of areas to receive structural fill or engineered improvements, the areas should be cleared of existing asphalt, surface obstructions, structures, foundations and

demolition debris. Vegetation and debris should be removed and properly disposed of off-site. Holes resulting from the removal of buried obstructions, oil wells, or other existing improvements which extend below proposed finish grades, should be replaced with suitable compacted fill material. Any abandoned sewer or storm drain lines should be completely removed and replaced with properly placed compacted fill. Deeper demolition may be required in order to remove existing foundations. We recommend the trenches associated with demolition which extend below the remedial grading depth be backfilled and properly compacted prior to the demolition contractor leaving the site.

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

4.1.2 Removal and Recompaction Depths and Limits

In order to provide a relatively uniform bearing condition for the planned building structures, upper loose/compressible soils are to be temporarily removed and recompacted as properly compacted fills. Existing undocumented artificial fill was encountered at depths ranging from approximately 5 to 15 feet below existing grades (Appendix B). Within the influence of the proposed structural improvements, existing undocumented artificial fill should be removed to suitable, competent native materials prior to placement of artificial fill to design grades. For preliminary planning purposes, the depth of required removals and recompaction may be estimated as indicated below. Updated recommendations may be required based on additional fieldwork, changes to building layouts, and actual structural loads.

Buildings: Soils shall be temporarily removed and recompacted to a minimum depth of 6 feet below existing grade or 3 feet below the bottom of foundations, whichever is deeper. Additionally, existing undocumented fill (up to approximately 15 feet deep) encountered within the building footprints should be temporarily removed to competent native materials and recompacted as fill. Where space is available, the envelope for removal and recompaction should extend laterally a minimum distance equal to the depth of removal and recompaction below finish grade or 5 feet beyond the edges of the proposed building improvements, whichever is larger.

Minor Site Structures: For minor site structures such as free-standing walls, retaining walls, etc., removal and recompaction should extend at least 3 feet below existing grade or 2 feet below the base of foundations, whichever is deeper. Where space is available, the envelope for removal and recompaction should extend laterally a minimum distance of 3 feet beyond the edges of the proposed minor site structure improvements.

Pavement and Hardscape: Within pavement and hardscape areas, removal and recompaction should extend to a depth of at least 2 feet below the existing grade or 2 feet

below finished subgrade (i.e., below planned aggregate base/asphalt concrete or PCC pavement), whichever is deeper. In general, the envelope for removal and recompaction should extend laterally a minimum distance of 2 feet beyond the edges of the proposed pavement and hardscape improvements.

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

4.1.3 Temporary Excavations

Temporary excavations should be performed in accordance with project plans, specifications, and applicable Occupational Safety and Health Administration (OSHA) requirements. Excavations should be laid back or shored in accordance with OSHA requirements before personnel or equipment are allowed to enter. Based on our field investigation, the majority of site soils are anticipated to be OSHA Type "B" soils (refer to the attached boring logs). Sandy soils are present and should be considered susceptible to caving. Soil conditions should be regularly evaluated during construction to verify conditions are as anticipated. The contractor shall be responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination with the geotechnical consultant should be maintained to facilitate construction while providing safe excavations. Excavation safety is the sole responsibility of the contractor.

Vehicular traffic, stockpiles, and equipment storage should be set back from the perimeter of excavations a minimum distance equivalent to a 1:1 projection from the bottom of the excavation or 5 feet, whichever is greater. Once an excavation has been initiated, it should be backfilled as soon as practical. Prolonged exposure of temporary excavations may result in some localized instability. Excavations should be planned so that they are not initiated without sufficient time to shore/fill them prior to weekends, holidays, or forecasted rain.

It should be noted that any excavation that extends below a 1:1 (horizontal to vertical) projection of an existing foundation will remove existing support of the structure foundation. If requested, temporary shoring parameters can be provided.

4.1.4 Subgrade Preparation

In general, areas to receive compacted fill should be scarified to a minimum depth of 6 inches, brought to a near-optimum moisture condition (generally within optimum and 2 percent above optimum moisture content), and re-compacted per project requirements. Removal bottoms and areas to receive fill should be observed and accepted by the geotechnical consultant prior to subsequent fill placement.

4.1.5 Material for Fill

From a geotechnical perspective, the onsite soils are generally considered suitable for use as general compacted fill, provided they are screened of organic materials, construction debris and any oversized material (8 inches in greatest dimension).

From a geotechnical viewpoint, import soils for general fill (i.e., non-retaining wall backfill) should consist of clean, granular soils of Very Low expansion potential (expansion index of 20 or less based on ASTM D4829). Import for retaining wall backfill should meet the criteria outlined in the paragraph below. Source samples should be provided to the geotechnical consultant for laboratory testing a minimum of three working days prior to any planned importation.

Retaining wall backfill should consist of sandy soils with a maximum of 35 percent fines (passing the No. 200 sieve) per American Society for Testing and Materials (ASTM) Test Method D1140 (or ASTM D6913/D422) and a Very Low expansion potential (EI of 20 or less per ASTM D4829). Soils should also be screened of organic materials, construction debris, and any material greater than 3 inches in maximum dimension. Some of the on-site soils should be suitable for retaining wall backfill due to their low fines content (i.e., silt and clay content) and very low expansion potential; therefore, select grading and stockpiling or import of select sandy materials should be anticipated by the contractor. Samples of retaining wall backfill should be sampled prior to construction to confirm the findings of the investigation.

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

The placement of demolition materials in compacted fill is acceptable from a geotechnical viewpoint provided the demolition material is broken up into pieces not larger than typically used for aggregate base (approximately 1 to 3 inches in maximum dimension) and well blended into fill soils with essentially no resulting voids. Demolition material placed in fills must be free of construction debris (wood, organics, etc.) and reinforcing steel. If asphalt concrete fragments will be incorporated into the demolition materials, approval from an environmental viewpoint may be required and is not the purview of the geotechnical consultant. From our previous experience, we recommend that asphalt concrete fragments be limited to fill areas within planned street areas (i.e., not within building pad areas).

4.1.6 Placement and Compaction of Fills

Material to be placed as fill should be brought to near-optimum moisture content (generally within optimum and 2 percent above optimum moisture content) and recompacted to at least 90 percent relative compaction (per ASTM D1557). Moisture conditioning of site soils will be required in order to achieve adequate compaction. Drying and/or mixing the very moist soils may be required prior to reusing the materials in

compacted fills. Generally, soils are present that will require additional moisture in order to achieve the recommended compaction criteria.

The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts not exceeding 8 inches in compacted thickness. Each lift should be thoroughly compacted and accepted prior to subsequent lifts. Generally, placement and compaction of fill should be performed in accordance with local grading ordinances and with observation and testing by LGC Geotechnical. Oversized material as previously defined should be removed from site fills, if encountered.

During backfill of excavations, the fill should be properly benched into firm and competent soils of temporary backcut slopes as it is placed in lifts.

Aggregate base material should be compacted to a minimum of 95 percent relative compaction at or slightly above optimum moisture content per ASTM D1557. Subgrade below aggregate base should be compacted to a minimum of 90 percent relative compaction, per ASTM D1557 at near-optimum moisture content (generally within optimum and 2 percent above optimum moisture content), unless otherwise noted in the pavement recommendations section (see Sections 4.5 and 4.6).

If gap-graded ¾-inch rock is used for backfill (around storm drain storage chambers, retaining wall backfill, etc.) it will require compaction. Rock shall be placed in thin lifts (typically not exceeding 6 inches) and mechanically compacted with observation by geotechnical consultant. Backfill rock shall meet the requirements of ASTM D2321. Gap-graded rock is recommended to be wrapped in filter fabric (Mirafi 140N or approved alternative) or at the very minimum to be vertically separated from the trench backfill with filter fabric to prevent the migration of fines into the rock backfill.

4.1.7 Trench and Retaining Wall Backfill and Compaction

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

Retaining wall backfill should consist of sandy soils as outlined in preceding Section 4.1.5. The limits of select sandy backfill should extend at minimum ½ the height of the retaining wall or the width of the heel (if applicable), whichever is greater, refer to Figure 3 (rear of

text). Retaining wall backfill soils should be compacted in relatively uniform thin lifts to at least 90 percent relative compaction (per ASTM D1557). Jetting or flooding of retaining wall backfill materials should not be permitted.

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

A representative from LGC Geotechnical should observe, probe, and test the backfill to verify compliance with the project recommendations.

4.1.8 Shrinkage and Subsidence

Allowance in the earthwork volumes budget should be made for an estimated 5 to 20 percent reduction (shrink) in volume of near-surface (upper approximate 5 feet) soils. It should be stressed that these values are only estimates and that an actual shrinkage factor would be extremely difficult to predetermine. Subsidence, due to earthwork operations, is expected to be on the order of 0.1 feet. These values are estimates only and exclude losses due to removal of vegetation or debris. The effective shrinkage of onsite soils will depend primarily on the type of compaction equipment and method of compaction used onsite by the contractor and accuracy of the topographic survey. The above shrinkage estimates are intended as an aid for others in determining preliminary earthwork quantities. However, these estimates should be used with some caution since they are not absolute values.

4.2 Preliminary Foundation Recommendations

The proposed structures may be supported on spread or continuous footings and conventional slabs, provided earthwork is performed in accordance with the recommendations presented in this report. Since the site soils are anticipated to be "Very Low" expansion potential (EI of 20 or less per ASTM D4829), special design considerations from a geotechnical perspective are not anticipated, however, this must be verified based on as-graded conditions. Footings should be supported on properly compacted fill. Please note that the following foundation recommendations are preliminary and must be confirmed by LGC Geotechnical at the completion of grading.

Preliminary foundation recommendations are provided in the following sections. The foundation design must be performed by the structural engineer based on the following geotechnical parameters and minimum values provided.

4.2.1 Slab Design and Construction

From a geotechnical perspective, minimum slab thicknesses of 6 inches and 4 inches are recommended for new slabs in the warehouse areas and office areas, respectively. Slabs

are to be supported on compacted fill soils properly prepared in accordance with the recommendations provided in this report. Actual slab reinforcement and thickness should be determined by the structural engineer based on the imposed loading. Additional slab-on-grade recommendations can be provided for alternative building types upon request.

The foundation designer may use a modulus of vertical subgrade reaction (k) of 200 pounds per cubic inch (pounds per square inch per inch of deflection). This value is for a 1-foot by 1-foot square loaded area and should be adjusted by the structural designer for the area of the proposed footing using the following formula:

$k = 200 \times [(B+1)/2B]^2$
k = modulus of vertical subgrade reaction, pounds per cubic inch (pci)
B = foundation width (feet)

It is recommended that subgrade soils below slabs be moisture conditioned in order to maintain the recommended moisture content up to the time of concrete placement. The recommended moisture content of the slab subgrade soils should be between optimum moisture content and approximately 2 percent above optimum moisture content to a minimum depth of 12 inches. The moisture content of the slab subgrade should be verified by the geotechnical consultant within 1 to 2 days prior to concrete placement. In addition, this moisture content should be maintained around the immediate perimeter of the slab during construction and up to occupancy of the building structures.

The following recommendations are for informational purposes only, as they are unrelated to the geotechnical performance of the foundation. The following recommendations may be superseded by the foundation engineer and/or owner. Some post-construction moisture migration should be expected below the foundation. In general, interior floor slabs with moisture sensitive floor coverings should be underlain by a minimum 10 mil thick polyolefin material vapor retarder, which has a water vapor transmission rate (permeance) of less than 0.03 perms. The need for sand and/or the sand thickness (above and/or below the vapor retarder) should be specified by the structural engineer, architect or concrete contactor. The selection and thickness of sand is not a geotechnical engineering issue and is therefore outside our purview.

4.2.2 Foundation Design Parameters

For the proposed industrial warehouse structures, minimum continuous wall and column footing widths should be 12 inches and 24 inches, respectively, minimum foundation embedment should extend a minimum of 18 inches below the adjacent exterior grade, and interior column footings should be embedded a minimum of 12 inches beneath the adjacent subgrade. The following allowable bearing pressures for both continuous and column spread footings presented in Table 3 on the following page are recommended for corresponding footing widths and embedments.

TABLE 3

Allowable Soil Bearing Pressures

Allowable Static Bearing Pressure (psf)	Minimum Footing Width (feet)	Minimum Footing Embedment* (feet)
4,000	4.0	2.0
3,500	3.0	2.0
3,000	2.0	1.5
2,000	1.0	1.0

* Refers to minimum depth measured below lowest adjacent grade.

These allowable bearing values indicated above (exclusive of the weight of the footings) are for total dead loads and frequently applied live loads and may be increased by ⅓ for short duration loading (i.e., wind or seismic loads). The allowable bearing pressures are applicable for level (ground slope equal to or flatter than 5H:1V) conditions only.

In utilizing the above-mentioned allowable bearing capacity and provided our earthwork recommendations are implemented, foundation settlement due to structural loads is anticipated to be on the order of 1-inch or less. Differential static settlement may be taken as half of the static settlement (i.e., ½-inch over a horizontal span of 40 feet). Seismic settlement potential is discussed in Section 2.6.1.

4.2.3 Foundation Construction

The foundation is to be excavated into competent compacted artificial fill placed during grading operations. It is recommended that the foundation subgrade soils be evaluated by the geotechnical engineer prior to steel and/or concrete placement.

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

4.2.4 Lateral Load Resistance

Resistance to lateral loads can be provided by friction acting at the base of foundations and by passive earth pressure. For concrete/soil frictional resistance, an allowable coefficient

of friction of 0.35 may be assumed with dead-load forces. An allowable passive lateral earth pressure of 250 psf per foot of depth (or pcf) to a maximum of 2,500 psf may be used for the sides of footings poured against properly compacted fill. Allowable passive pressure may be increased to 340 pcf (maximum of 3,400 psf) for short duration seismic loading. This passive pressure is applicable for level (ground slope equal to or flatter than 5H:1V) conditions. Frictional resistance and passive pressure may be used in combination without reduction. We recommend that the upper foot of passive resistance be neglected if finished grade will not be covered with concrete or asphalt. The provided allowable passive pressures are based on a factor of safety of 1.5 and 1.1 for static and seismic loading conditions, respectively.

4.3 Lateral Earth Pressures for Retaining Walls

The following preliminary lateral earth pressures may be used for site retaining walls. Lateral earth pressures are provided as equivalent fluid unit weights, in pound per square foot (psf) per foot of depth or pcf. These values do not contain an appreciable factor of safety, so the retaining wall designer should apply the applicable factors of safety and/or load factors during design. A soil unit weight of 120 pcf may be assumed for calculating the actual weight of soil over the wall footing.

The following lateral earth pressures are presented on Table 4 for approved select granular soils with a maximum of 35 percent fines (passing the No. 200 sieve per ASTM D-421/422) and Very Low expansion potential (EI of 20 or less per ASTM D4829). Retaining wall backfill should also be limited to fill material not exceeding 3 inches in greatest dimension. The wall designer should clearly indicate on the retaining wall plans the required sandy soil backfill criteria. Some of the on-site soils should be suitable for retaining wall backfill due to their low fines content (i.e., silt and clay content) and very low expansion potential; therefore, select grading and stockpiling or import of select sandy materials should be anticipated by the contractor.

TABLE 4

Lateral Earth Pressures – Select Sandy Backfill

Conditions	**Equivalent Fluid Unit Weight (pcf)**	**Equivalent Fluid Unit Weight (pcf)**
	Level Backfill	**2:1 Sloped Backfill**
	Approved Sandy Soils	**Approved Sandy Soils**
Active	35	55
At-Rest	55	70

If the wall can yield enough to mobilize the full shear strength of the soil, it can be designed for "active" pressure. If the wall cannot yield under the applied load, the earth pressure will be higher. The equivalent fluid pressure values assume free-draining conditions. Retaining wall structures should be provided with appropriate drainage and appropriately waterproofed (Refer

to Figure 3). Please note that waterproofing and outlet systems are not the purview of the geotechnical consultant. If conditions other than those assumed above are anticipated, the equivalent fluid pressure values should be provided on an individual-case basis by the geotechnical consultant.

Surcharge loading effects from any adjacent structures should be evaluated by the retaining wall designer. In general, structural loads within a 1:1 (horizontal to vertical) upward projection from the bottom of the proposed retaining wall footing will surcharge the proposed retaining structure. In addition to the recommended earth pressure, retaining walls adjacent to streets should be designed to resist vehicular traffic if applicable. Uniform surcharges may be estimated using the applicable coefficient of lateral earth pressure using a rectangular distribution. A factor of 0.35 and 0.5 may be used for the active and at-rest conditions, respectively. The vertical traffic surcharge may be determined by the structural designer. The retaining wall designer should contact the geotechnical engineer for any required geotechnical input in estimating any applicable surcharge loads.

If required, the retaining wall designer may use a seismic lateral earth pressure increment of 10 pcf for level backfill conditions up to a maximum retained height of 10 feet. This increment should be applied in addition to the provided static lateral earth pressure using a "normal" triangular distribution with the resultant acting at H/3 in relation to the base of the retaining structure (where H is the retained height). For the restrained, at-rest condition, the seismic increment may be added to the applicable active lateral earth pressure (in lieu of the at-rest lateral earth pressure) when analyzing short duration seismic loading. Per Section 1803.5.12 of the 2022 CBC, the seismic lateral earth pressure is applicable to structures assigned to Seismic Design Category D through F for retaining wall structures supporting more than 6 feet of backfill height. This seismic lateral earth pressure is estimated using the procedure outlined by the Structural Engineers Association of California (Lew, et al, 2010).

Soil bearing and lateral resistance (friction coefficient and passive resistance) are provided in Section 4.2. Earthwork considerations (temporary backcuts, backfill, compaction, etc.) for retaining walls are provided in Section 4.1 (Site Earthwork) and the subsequent earthwork related sub-sections.

4.4 Corrosivity to Concrete and Metal

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

Corrosion testing of near-surface bulk samples indicated soluble sulfate contents less than approximately 0.01 percent, chloride content of approximately 160 parts per million (ppm), pH value of approximately 7.82, and minimum resistivity value of 1,048 ohm-cm. Based on Caltrans Corrosion Guidelines (2021), soils are considered corrosive if the pH is 5.5 or less, or the chloride concentration is 500 ppm or greater, or the sulfate concentration is 1,500 ppm (0.15 percent) or greater. Based on the test results, soils are not considered corrosive using Caltrans criteria. Note

that based on minimum resistivity the soils are considered corrosive to metallic improvements. If improvements that may be susceptible to corrosion are proposed, it is recommended that further evaluation by a corrosion engineer be performed.

Based on laboratory sulfate test results, the near surface soils are designated to a class "S0" per ACI 318, Table 19.3.1.1 with respect to sulfates. Concrete in direct contact with the onsite soils can be designed according to ACI 318, Table 19.3.2.1 using the "S0" sulfate classification.

Laboratory testing may need to be performed at the completion of grading by the project corrosion engineer to further evaluate the as-graded soil corrosivity characteristics. Accordingly, revision of the corrosion potential may be needed, should future test results differ substantially from the conditions reported herein. The client and/or other members of the development team should consider this during the design and planning phase of the project and formulate an appropriate course of action.

4.5 Preliminary Asphalt Concrete Pavement Sections

Preliminary laboratory test of the onsite soils indicated an R-value of 43. For the purposes of these preliminary recommendations, we used a design R-value of 40 and calculated pavement sections for Traffic Indices of 5.0 (or less), 7.0, and 9.0. R-value testing of the drive aisles and parking lot subgrade will need to be performed to confirm our preliminary testing results/assumptions once the drive aisles and parking areas have been graded to finish subgrade elevations and the final Traffic Index is determined by the Civil Engineer. Determination of the Traffic Index is not the purview of the geotechnical consultant. Final street sections should be confirmed by the project civil engineer based upon the projected design Traffic Index. If requested, LGC Geotechnical will provide sections for alternate TI values.

TABLE 5

Preliminary Asphalt Concrete Pavement Sections

Assumed Traffic Index	5.0 (or less)	7.0	9.0
R -Value Subgrade	40	40	40
AC Thickness	4.0 inches	4.5 inches	6.0 inches
CAB Thickness	4.0 inches	6.0 inches	9.0 inches

Increasing the thickness of asphalt or adding additional base material will reduce the likelihood of the pavement experiencing distress during its service life. The above recommendations are based on the assumption that proper maintenance and irrigation of the areas adjacent to the roadway will occur through the design life of the pavement. Failure to maintain a proper maintenance and/or irrigation program may jeopardize the integrity of the pavement.

Earthwork recommendations are provided in Section 4.1 "Site Earthwork" and the related sub-sections of this report.

4.6 Preliminary Portland Cement Concrete Pavement Sections

The provided preliminary Portland Cement concrete (PCC) section options are based on the guidelines of the American Concrete Institute (ACI 330.2R-17). For the final design section, we recommend a traffic study be performed as LGC Geotechnical does not perform traffic engineering. Traffic study should include the design vehicle (number of axles and load per axle) and estimated number of daily repetitions/trips. LGC Geotechnical does not perform traffic engineering and determination of traffic loading is not the purview of the geotechnical consultant. The concrete should have a minimum compressive strength of 4,000 psi and a minimum flexural strength of 550 psi at the time the pavement is subjected to traffic. Steel reinforcement is not required (ACI, 2017). The provided pavement sections assume that edge restraints like a curb and gutter will be provided. To reduce the potential (but not eliminate) for cracking, paving should provide control joints at regular intervals in each direction not exceeding the maximum values provided below. Decreasing the spacing of these joints will further reduce, but not eliminate the potential for unsightly cracking.

The primary input for anticipated loadings over the lifetime of the concrete pavement is based on the Average Daily Truck Traffic (ADTT). Truck loading is defined one 16-kip axle and two 32-kip tandem axles. Other factor to be considered are potentially the use of industrial vehicles (e.g., lift trucks, mobile cranes, gantry cranes, reach stackers, etc.). Static loads from containers and temporary structures stored on the pavement. If semi-trailers are to be disconnected from the tractors from dolly jacks the design should consider concentrated loads imposed on the concrete pavement. These loads typically exceed the axle loads of the semi-trailer combination and are applied to smaller contact areas, especially if applied near joint locations. If these irregular loadings are confined to specific areas of the site the pavement section required thickness can be economized. These and other factors (e.g., traffic patterns, irregular loading, doweled vs un-doweled joints, etc.) outlined in ACI, 2017 should be addressed for the final design.

TABLE 6

Preliminary Portland Cement Concrete Pavement Section Options

No. of Trucks per day design lane	Concrete Thickness* (inch)	Aggregate Base Thickness (inch)	Maximum Joint Spacing Thickness (inch)
10	5.5	4.0	12
100	6.5	6.0	14
300	7.0	6.0	15

*Minimum concrete compressive strength and Modulus of Rupture as indicated above.

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

the integrity of the pavement.

Additional earthwork recommendations regarding aggregate base are provided in Section 4.1 "Site Earthwork" and the related sub-sections of this report.

4.7 Nonstructural Concrete Flatwork

Nonstructural concrete (such as flatwork, sidewalks, etc.) has a potential for cracking due to changes in soil volume related to soil-moisture fluctuations. To reduce the potential for excessive cracking and lifting, concrete should be designed in accordance with the minimum guidelines outlined below. These guidelines will reduce the potential for irregular cracking and promote cracking along construction joints but will not eliminate all cracking or lifting. Thickening the concrete and/or adding additional reinforcement will further reduce cosmetic distress.

Nonstructural and non-vehicular concrete flatwork placed on compacted subgrade may be a minimum 4-inches in thickness with crack control joints spaced 8 feet apart for flatwork slabs and 6 feet apart for flatwork sidewalks. Crack control joints should be sawcut or deep open tool joint to a minimum of 1/3 the concrete thickness. The compacted subgrade below the nonstructural and non-vehicular concrete flatwork should be wet down prior to placing concrete.

To reduce the potential for nonstructural concrete flatwork to separate from entryways and doorways, the owner may elect to install dowels to tie these two elements together.

4.8 Subsurface Water Infiltration

It should be noted that intentionally infiltrating storm water conflicts with the geotechnical engineering objective of directing surface water away from structures and improvements. The geotechnical stability and integrity of a site is reliant upon appropriately handling surface water.

In general, the vast majority of geotechnical distress issues are directly related to improper drainage. Distress in the form of movement of foundations and other improvements could occur as a result of soil saturation and loss of soil support of foundations and pavements, settlement, collapse, internal soil erosion, and/or expansion. Additionally, off-site properties and improvements may be subjected to seepage, springs, instability, movements of foundations or other impacts as a result of water infiltration and migration. Infiltrated water may enter underground utility pipe zones or other highly permeable layers and migrate laterally along these layers, potentially impacting other improvements located far away from the point of infiltration. Any proposed infiltration system should not be located near slopes or settlement sensitive existing/proposed improvements in order to reduce the potential for slope failures and geotechnical distress issues related to infiltration.

If water must be infiltrated due to regulatory requirements, we recommend the absolute minimum amount of water be infiltrated and that the infiltration areas not be located near settlement-sensitive existing/proposed improvements, basement/retaining walls, or any slopes. As with all systems that are designed to concentrate surface flow and direct the water into the subsurface

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

The design infiltration rate is determined by dividing the measured infiltration rate by total reduction factor. The total reduction factor is calculated from a series of reduction factors, including; test procedure (RF_t), site variability (RF_v) and long-term siltation plugging and maintenance (RF_s). Based on the Los Angeles County testing guidelines (2021), the reduction factor for long-term siltation plugging and maintenance (RF_s) is the purview of the infiltration system designer (others).

The reduction factor recommendations are provided in Table 7 below. The total reduction factor is calculated as the product of the series of reduction factors listed in Table 7 below (RF_t + RF_v + RF_s).

TABLE 7

Shallow Surface Infiltration - Reduction Factors Applied to Measured Infiltration Rate

Consideration	Reduction Factor
Test procedure, boring percolation, RF_t	1.0
Site variability, number of tests, etc., RF_v	1.5
Long-term siltation plugging and maintenance, RF_s	1.0*
Total Reduction Factor, RF = RF_t + RF_v + RF_s	**3.5****

*Reduction Factor for long-term siltation plugging and maintenance to be provided by civil engineer
**Total Reduction Factor to be confirmed by civil engineer.

Per the requirements of the Los Angeles County testing guidelines (2021), subsurface materials shall have a design infiltration rate equal to or greater than 0.3 inches per hour. The test procedure, site variability considerations and long-term siltation plugging and maintenance (RF_t, RF_v and RF_s) result in a total reduction factor of 3.5 (to be confirmed by the civil engineer). When total reduction factor presented in Table 7 is applied to the measured infiltration rates presented in Table 1, only one of the three design infiltration rates have a possibility of being greater than the minimum infiltration rate required by the County of Los Angeles for infiltration. Results of infiltration testing are provided in Appendix D.

The following should be considered for design of any required infiltration system:

- Due to the fine-grained nature of the soils in the upper 20 to 30 feet below existing grade, we recommend that prior to the installation of any infiltration facilities a series of 12 to 18-inch

diameter borings be drilled to approximately 35 feet below existing grade and backfilled with clean well sand to a minimum of 5 feet above the bottom of the proposed infiltration facility bottom. Above this depth the borings can be backfilled with cuttings as these soils will be removed during excavation of the infiltration facility. The clean well sand should be saturated with water during placement to ensure consolidation.

- We recommend the design of any infiltration system include at least one redundancy or overflow system. It may be prudent to provide an overflow system directly connected to the storm drain system in order to prevent failure of the infiltration system, either as a result of lower than anticipated infiltration and/or very high flow volumes.
- Water discharge from any infiltration systems should not occur within the zone of influence of foundation footings (column and load bearing wall locations). From a geotechnical perspective we recommend a minimum infiltration system setback of 15 feet from the structural improvements.
- An adequate setback distance between any infiltration facility and adjacent property lines should be maintained.
- We recommend the design of any infiltration system include at least one redundancy or overflow system. It may be prudent to provide an overflow system directly connected to the storm drain system in order to prevent failure of the infiltration system, either as a result of lower than anticipated infiltration and/or very high flow volumes.
- The infiltration values provided are based on clean water and this requires the removal of trash, debris, soil particles, etc., and on-going maintenance. Over time, siltation and plugging may reduce the infiltration rate and subsequent effectiveness of the infiltration system. It should be noted that methods to prevent this shall be the responsibility of the infiltration designer and are not the purview of the geotechnical consultant. If adequate measures cannot be incorporated into the design and maintenance of the system, then the infiltration rates may need to be further reduced. These and other factors should be considered in selecting a design infiltration rate.
- Any designed infiltration system will require routine periodic maintenance.
- Contamination and environmental suitability of the site for infiltration was not evaluated by us and should be evaluated by others (environmental consultant). We only addressed the geotechnical issues associated with stormwater infiltration.

LGC Geotechnical should be provided with details for any planned required infiltration system early in the design process for geotechnical input.

4.9 Control of Surface Water and Drainage Control

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

system will prevent ponding within 5 feet of the foundation. Code compliance of grades is not the purview of the geotechnical consultant.

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

4.10 Geotechnical Plan Review

Project plans (grading, foundation, retaining wall, etc.) should be reviewed by this office prior to construction to verify that our geotechnical recommendations have been incorporated. Additional or modified geotechnical recommendations may be required based on the proposed layout.

4.11 Geotechnical Observation and Testing

The recommendations provided in this report are based on limited subsurface observations and geotechnical analysis. The interpolated subsurface conditions should be checked in the field during construction by a representative of LGC Geotechnical. Geotechnical observation and testing is required per Section 1705 of the 2022 California Building Code (CBC).

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

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

5.0 LIMITATIONS

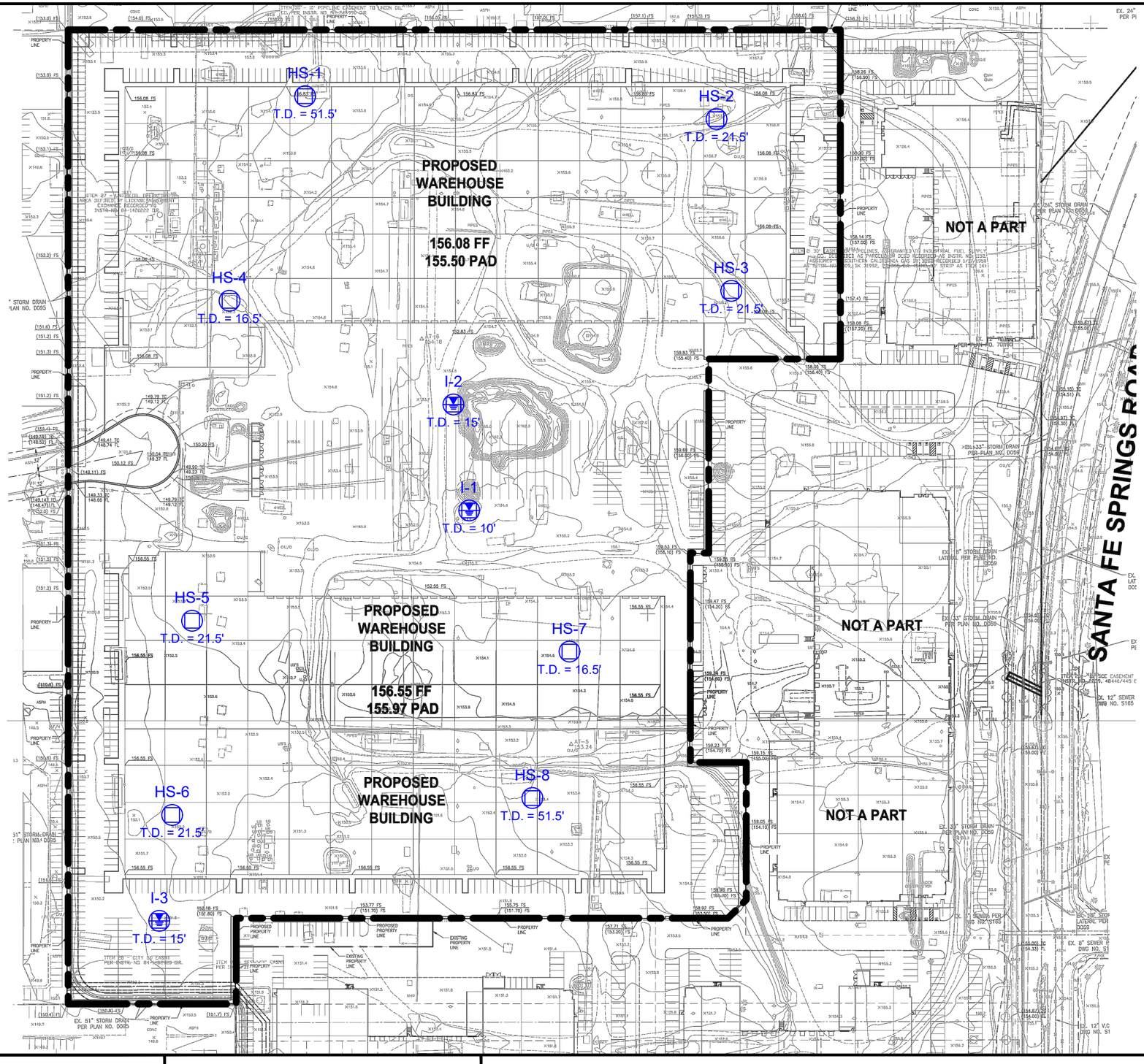
Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

This report is based on data obtained from limited observations of the site, which have been extrapolated to characterize the site. While the scope of services performed is considered suitable to adequately characterize the site geotechnical conditions relative to the proposed development, no practical evaluation can completely eliminate uncertainty regarding the anticipated geotechnical conditions in connection with a subject site. Variations may exist and conditions not observed or described in this report may be encountered during grading and construction.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the other consultants (at a minimum the civil engineer, structural engineer, landscape architect) and incorporated into their plans. The contractor should properly implement the recommendations during construction and notify the owner if they consider any of the recommendations presented herein to be unsafe, or unsuitable.

The findings of this report are valid as of the present date. However, changes in the conditions of a site can and do occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. The findings, conclusions, and recommendations presented in this report can be relied upon only if LGC Geotechnical has the opportunity to observe the subsurface conditions during grading and construction of the project, in order to confirm that our preliminary findings are representative for the site. This report is intended exclusively for use by the client, any use of or reliance on this report by a third party shall be at such party's sole risk.

In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and modification.



LEGEND

HS-8
T.D. = 51.5'

Approximate Location of Hollow Stem Auger Boring by LGC Geotechnical, With Total Depth in Feet

I-3
T.D. = 15'

Approximate Location of Hollow Stem Auger Infiltration Boring by LGC Geotechnical, With Total Depth in Feet

Approximate Limits of This Report

SCALE: 1"=150'

150' 0 150' 300'

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FIGURE 2
Boring Location Map

PROJECT NAME	EPD - 12400 Hawkins Street (Site 1)
PROJECT NO.	23221-01
ENG. / GEOL.	RLD
SCALE	1" = 150'
DATE	February 2024

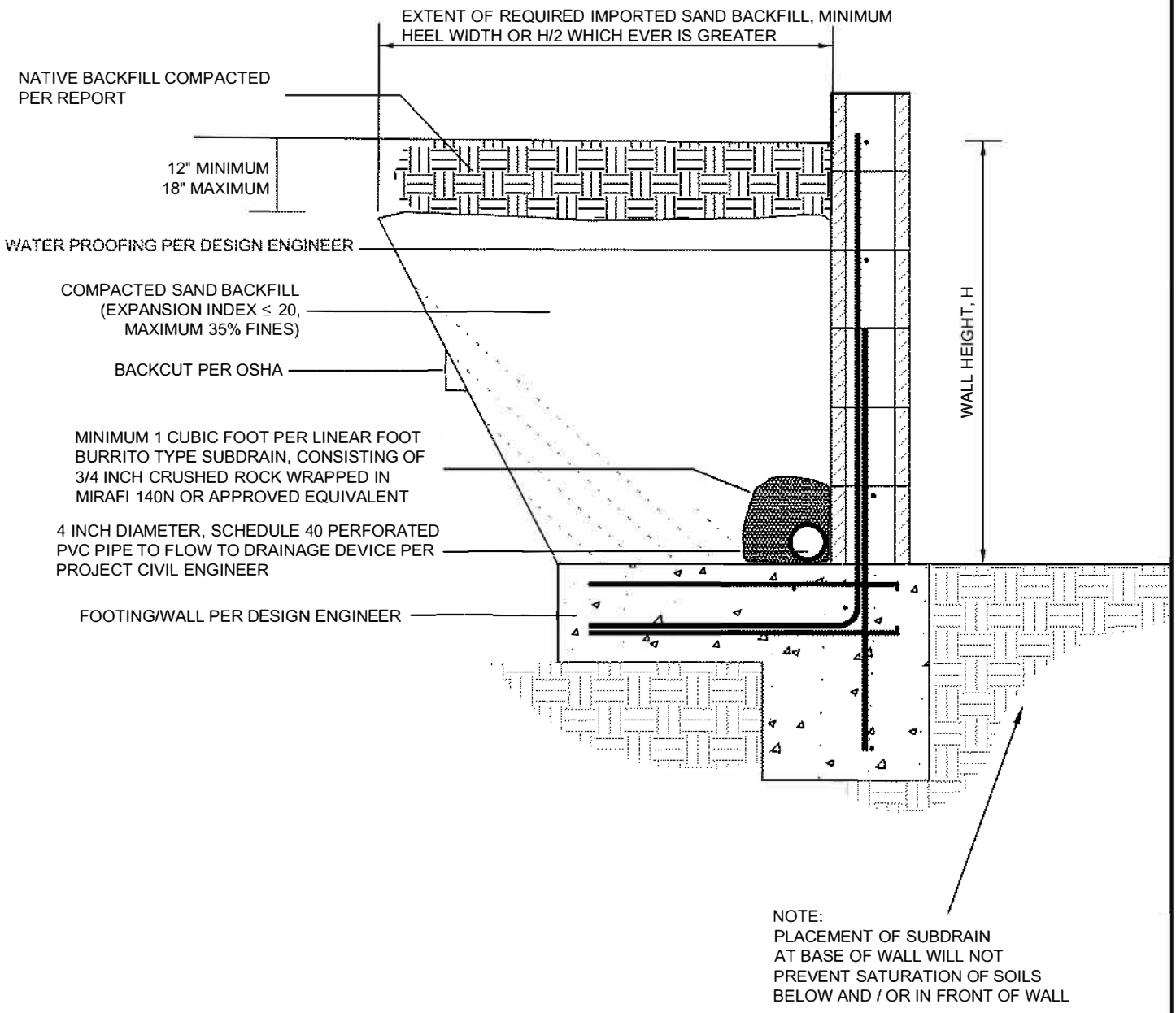

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FIGURE 3
Retaining Wall Backfill Detail

PROJECT NAME	EPD - 12400 Hawkins Street (Site 1)
PROJECT NO.	23221-01
ENG. / GEOL.	RLD
SCALE	Not to Scale
DATE	February 2024

Appendix A
References

APPENDIX A

References

American Concrete Institute (ACI), 2013, Guider for the Design and Construction of Concrete Parking Lots (ACI 330R-08), fifteenth printing, November 2013.

_____, 2014, Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary (ACI 318R-14).

_____, 2017, Guide for the Design and Construction of Concrete Site Paving for Industrial and Trucking Facilities (ACI 3302R-17), May 2017.

American Society of Civil Engineers (ASCE), 2017, Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-16, 2017.

_____, 2018, Standard 7-16, Minimum Design Loads for Buildings and Associated Criteria for Buildings and Other Structures, Supplement 1, effective: December 12, 2018.

ASTM International, Annual Book of ASTM Standards, Volume 04.08.

Bray, J.D., and Sancio, R. B., 2006, Assessment of Liquefaction Susceptibility of Fine-Grained Soils, *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, pp. 1165-1177, dated September 2006.

California Building Standards Commission, 2022, California Building Code, California Code of Regulations Title 24, Volumes 1 and 2, dated July 2022.

California Department of Transportation (Caltrans), 2020, Highway Design Manual, Updated July 1, 2020.

_____, 2021, Corrosion Guidelines, Version 3.2, dated May 2021.

California Geological Survey (CGS), (Previously California Division of Mines and Geology [CDMG]), 1997, Guidelines for Evaluating and Mitigating Seismic Hazards in California, CDMG Special Publication 117.

_____, 1998, Seismic Hazard Evaluation of the Whittier 7.5-Minute Quadrangle, Los Angeles County, California, Seismic Hazard Zone Report 98-28, dated 1998.

_____, 1999, State of California Seismic Hazard Zones, Whittier Quadrangle Official Map, dated March 25, 1999.

_____, 2007, Fault-Rupture Hazard Zones in California, Special Publication 42, Interim Revision 2007.

_____, 2008, California Geological Society Special Publication 117A: Guidelines for Evaluating

and Mitigating Seismic Hazards in California.

_____, 2015, Fault Activity Map of California, Retrieved April 12, 2021, from: https://maps.conservation.ca.gov/cgs/fam/.

_____, 2018, Earthquake Fault Zones, Special Publication 42, Revised 2018.

County of Los Angeles, 2021, Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration, GS200.1, dated June 30, 2021.

Dibblee Jr., Thomas W., 2001, Geologic Map of Whittier and La Habra Quadrangles (Western Puente Hills), Los Angeles and Orange Counties, California, "Dorothy L. Stout Honorary Map," published in cooperation with CDMG.

Lew, et al, 2010, Seismic Earth Pressures on Deep Basements, Structural Engineers Association of California (SEAOC) Convention Proceedings.

Pradel, Daniel, 1998, Procedure to evaluate earthquake-induced settlement in dry sandy soils, *Journal of Geotechnical and Geoenvironmental Engineering*, Volume 124(4), pp. 364-368, dated April and October 1998.

RGA, 2023, Overall Site Plan, Telegraph Road and Santa Fe Springs Development, Santa Fe Springs, California, dated November 29, 2023.

Saucedo, G.J., H.G. Greene, M.P. Kennedy, S.P. Bezore, 2016, Geologic Map of the Long Beach 30' x 60' Quadrangle, California: Department of Conservation, California Geological Survey.

Southern California Earthquake Center (SCEC), 1999, "Recommended Procedure for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigation Liquefaction Hazards in California", Edited by Martin, G.R., and Lew, M., dated March 1999.

Structural Engineers Association of California (SEAOC), 2022, Seismic Design Maps, Retrieved June 22, 2024, from https://seismicmaps.org/

United States Geological Survey (USGS), 2014, Unified Hazard Tool, Dynamic: Conterminous U.S. 2014 (update) (v4.2.0), Retrieved June 22, 2024, from: https://earthquake.usgs.gov/hazards/interactive/

Appendix B
Boring & Geotechnical Trench Logs

Geotechnical Boring Log Borehole HS-1

Date: 12/18/23	**Drilling Company:** 2R Drilling
Project Name: EPD - Santa Fe Springs (Site 1)	**Type of Rig:** Truck Mounted
Project Number: 23221-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~154' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0					6.5	SM	**Artificial Fill - Undocumented (afu)** @ 0' - Silty SAND: brown, slightly moist	
150	5	B-1	R-1	17 22 30	119.3	12.4	ML	@ 5' - Sandy SILT: dark brown, moist, hard	
			R-2	7 9 12	108.5	13.7	CL	@ 7.5' - Lean CLAY: yellowish brown, moist, very stiff	CN
145	10		R-3	6 16 25	106.9	11.6	ML	@ 10' - Sandy SILT: dark brown, moist, hard	
140	15							**Quaternary Older Alluvium (Qoa)**	
			SPT-1	7 10 15		15.4		@ 15' - Sandy SILT: olive, very moist, hard	-#200
135	20		R-4	13 23 28	96.0	3.7	SM	@ 20' - Silty SAND: gray, dry, dense	
130	25		SPT-2	5 8 14		27.5	CL	@ 25' - CLAY: blueish gray, very moist, very stiff	
125	30								

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

SAMPLE TYPES:

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

TEST TYPES:

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

Last Edited: 10/20/2022

Geotechnical Boring Log Borehole HS-1

Date: 12/18/23 | **Drilling Company:** 2R Drilling

Project Name: EPD - Santa Fe Springs (Site 1) | **Type of Rig:** Truck Mounted

Project Number: 23221-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~154' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		R-5	13 16 20	103.8	10.5	SM	@ 30' - Silty SAND: grayish olive, moist, medium dense	-#200 AL
120									
	35		SPT-3	12 30 31		4.4		@ 35' - Silty SAND: gray, dry, very dense	
115									
	40		R-6	25 40 50/5"	97.7	3.0		@ 40' - Silty SAND: gray, dry, very dense	
110									
	45		SPT-4	9 15 22		26.6	ML	@ 45' - SILT with Sand: dark olive gray, very moist, hard	-#200
105									
	50		R-7	30 50/5"	101.1	2.2	SM	@ 50' - Silty SAND: gray, dry, very dense	
100								Total Depth = 50.9' No Groundwater Encountered Caving after removing augers = 34' (from surface) Backfilled with Cuttings on 12/18/23	
	55								
95									
	60								

LGC Geotechnical, Inc.

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

SAMPLE TYPES:

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

TEST TYPES:

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

Geotechnical Boring Log Borehole HS-2

Date: 12/18/23	**Drilling Company:** 2R Drilling
Project Name: EPD - Santa Fe Springs (Site 1)	**Type of Rig:** Truck Mounted
Project Number: 23221-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~157' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
155	0					9.5	ML	**Artificial Fill - Undocumented (afu)** @0' - Sandy SILT: dark brown, moist	EI RV
	5	B-1	R-1	8 17 21	122.1	10.9		@ 5' - Sandy SILT: very dark brown with brown mottling, moist, hard	
150			R-2	9 12 19	118.0	13.8		@ 7.5' - Sandy SILT: dark gray to brown mottled, moist, very stiff	
	10		R-3	9 16 24	118.3	10.6		**Quaternary Older Alluvium (Qoa)** @ 10' - Sandy SILT: dark gray, moist, hard	
145									
	15		R-4	16 28 34	98.8	22.9		@ 15' - SILT: dark gray, very moist, hard	
140									
	20		SPT-1	5 9 14		24.8	CL	@ 20' - CLAY: brown, very moist, very stiff	
135								Total Depth = 21.5' No Groundwater Encountered Caving after removing augers = 13' (from surface) Backfilled with Cuttings on 12/18/23	
	25								
130									
	30								

LGC Geotechnical, Inc.

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

SAMPLE TYPES:

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

TEST TYPES:

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

Last Edited: 10/20/2022

Geotechnical Boring Log Borehole HS-3

Date: 12/18/23	**Drilling Company:** 2R Drilling
Project Name: EPD - Santa Fe Springs (Site 1)	**Type of Rig:** Truck Mounted
Project Number: 23221-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~157' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
155	0	B-1				8.6	SC	**Artificial Fill - Undocumented (afu)** @ 0' - Clayey SAND: brown, moist	
	5		R-1	4 9 22	115.8	8.9	ML	**Quaternary Older Alluvium (Qoa)** @ 5' - Sandy SILT: dark brown, slightly moist, very stiff, some pinhole porosity	
150			R-2	13 20 22	119.3	11.6		@ 7.5' - Sandy SILT: dark brown, moist, hard, some pinhole porosity	
	10		R-3	12 21 30	119.2	13.7		@ 10' - Sandy SILT: brown, moist, hard	
145									
	15		SPT-1	3 5 8		20.4		@ 15' - SILT: gray, very moist, very stiff	
140									
	20		R-4	13 21 30	105.2	5.4	SM	@ 20' - Sandy SILT: brown, slightly moist, dense	
135								Total Depth = 21.5' No Groundwater Encountered Caving after removing augers = 13' (from surface) Backfilled with Cuttings on 12/18/23	
	25								
130									
	30								

LGC Geotechnical, Inc.

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

SAMPLE TYPES:

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

TEST TYPES:

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

Last Edited: 10/20/2022

Geotechnical Boring Log Borehole HS-4

Date: 12/18/23	**Drilling Company:** 2R Drilling
Project Name: EPD - Santa Fe Springs (Site 1)	**Type of Rig:** Truck Mounted
Project Number: 23221-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~152' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
150	0	B-1				12.0	CL	**Artificial Fill - Undocumented (afu)** @0' - Sandy CLAY: brown, moist	
145	5		R-1	4 6 14	94.6	25.9	ML	@ 5' - Sandy SILT: dark brown, very moist, very stiff	
			R-2	11 25 37	115.9	15.8		**Quaternary Older Alluvium (Qoa)** @ 7.5' - Sandy SILT: dark brown, very moist, hard	
140	10		R-3	8 8 10	116.3	13.4	SM	@ 10' - Silty SAND: dark gray, very moist, medium dense	
135	15		R-4	5 10 17	91.4	30.8	ML	@ 15' - SILT: grayish green, very moist, very stiff	
130	20							Total Depth = 16.5' No Groundwater Encountered Caving after removing augers = 10.5' (from surface) Backfilled with Cuttings on 12/18/23	
125	25								
	30								

LGC Geotechnical, Inc.

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

SAMPLE TYPES:

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

TEST TYPES:

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

Last Edited: 10/20/2022

Geotechnical Boring Log Borehole HS-5

Date: 12/18/23	**Drilling Company:** 2R Drilling
Project Name: EPD - Santa Fe Springs (Site 1)	**Type of Rig:** Truck Mounted
Project Number: 23221-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~153' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
150	0					6.6	ML	**Artificial Fill - Undocumented (afu)** @ 0' - Sandy SILT and Gravel: dark brown, slightly moist	DS EI MD
	5	B-1	R-1	10 14 27	113.0	8.5		**Quaternary Older Alluvium (Qoa)** @ 5' - Sandy SILT: dark brown, slightly moist, hard, some pinhole porosity	
145			R-2	19 30 43	123.3	11.6		@ 7.5' - Sandy SILT: dark brown, moist, hard	
	10		R-3	14 28 35	88.2	22.7	CL	@ 10' - Sandy CLAY: dark brown, very moist, hard	
140									
	15		SPT-1	3 5 8		24.2		@ 15' - CLAY: gray, very moist, very stiff	
135									
	20		R-4	8 15 23	98.6	22.7	ML	@ 20' - SILT: olive gray, very moist, hard	
130								Total Depth = 21.5' No Groundwater Encountered Caving after removing augers = 14.5' (from surface) Backfilled with Cuttings on 12/18/23	
125	25								
	30								

LGC Geotechnical, Inc.

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

SAMPLE TYPES:

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

TEST TYPES:

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

Last Edited: 10/20/2022

Geotechnical Boring Log Borehole HS-6

Date: 12/18/23	**Drilling Company:** 2R Drilling
Project Name: EPD - Santa Fe Springs (Site 1)	**Type of Rig:** Truck Mounted
Project Number: 23221-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~152' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
150	0					6.3	SM	**Artificial Fill - Undocumented (afu)** @ 0' - Silty SAND: brown, slightly moist	
	5	B-1	R-1	10 20 37	116.7	11.5	CL/ML	**Quaternary Older Alluvium (Qoa)** @ 5' - CLAY/SILT: brown, slightly moist to moist, hard	
145			R-2	15 20 23	121.8	12.0		@ 7.5' - Sandy CLAY/Sandy SILT: brown, slightly moist to moist, hard	
	10		R-3	12 15 15	109.6	13.5	ML	@ 10' - Sandy SILT: brown, moist, very stiff	
140									
	15		R-4	20 27 45	109.6	2.7	SM	@ 15' - Silty SAND: gray, dry, very dense	
135									
	20		SPT-1	5 19 29		1.9	SM	@ 20' - Silty SAND: gray, dry, very dense	
130								Total Depth = 21.5' No Groundwater Encountered Caving after removing augers = 13' (from surface) Backfilled with Cuttings on 12/18/23	
125	25								
	30								

LGC Geotechnical, Inc.

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

SAMPLE TYPES:

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

TEST TYPES:

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

Last Edited: 10/20/2022

Geotechnical Boring Log Borehole HS-7

Date: 12/18/23 | **Drilling Company:** 2R Drilling

Project Name: EPD - Santa Fe Springs (Site 1) | **Type of Rig:** Truck Mounted

Project Number: 23221-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~155' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0					7.4	ML	**Artificial Fill - Undocumented (afu)** @ 0' - Sandy SILT: brown, slightly moist	
150	5	B-1	R-1	6 7 15	110.2	7.5	ML	**Quaternary Older Alluvium (Qoa)** @ 5' - Sandy SILT: brown, slightly moist, very stiff, some pinhole porosity	
			R-2	15 18 20	114.4	13.9	CL/ML	@ 7.5' - Sandy CLAY/Sandy SILT: brown, moist, hard	
145	10		R-3	5 6 6	104.2	11.6	ML	@ 10' - Sandy SILT: dark brown, moist, stiff	
140	15		R-4	15 24 34	105.2	9.6	ML	@ 15' - Sandy SILT: bluish gray, slightly moist, hard	
135	20							Total Depth = 16.5' No Groundwater Encountered Caving after removing augers = 9' (from surface) Backfilled with Cuttings on 12/18/23	
130	25								
125	30								

LGC Geotechnical, Inc.

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

SAMPLE TYPES:

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

TEST TYPES:

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

Last Edited: 10/20/2022

Geotechnical Boring Log Borehole HS-8

Date: 12/19/23 | **Drilling Company:** 2R Drilling

Project Name: EPD - Santa Fe Springs (Site 1) | **Type of Rig:** Truck Mounted

Project Number: 23221-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~154' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0					8.8	ML	**Artificial Fill - Undocumented (afu)** @ 0' - Sandy SILT: brown, slightly moist	
150								**Quaternary Older Alluvium (Qoa)**	
	5	B-1	R-1	14 20 34	119.2	11.3	CL/ML	@ 5' - CLAY/SILT: brown, slightly moist to moist, hard, some pinhole porosity	
			R-2	11 19 20	116.3	11.3		@ 7.5' - CLAY/SILT: brown, slightly moist to moist, hard	
145	10		R-3	5 5 14	110.0	17.6	CL-ML	@ 10' - Silty CLAY: brown, moist to very moist, very stiff	CN
140									
	15		SPT-1	5 10 11		15.6	CL	@ 15' - CLAY: gray, moist, very stiff	
135									
	20		R-4	15 30 50/5"	100.6	3.5	SM	@ 20' - Silty SAND: gray, dry, very dense	
130									
	25		SPT-2	9 20 24		2.5	SM	@ 25' - Silty SAND: gray, dry, very dense	
125	30								

LGC Geotechnical, Inc.

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

SAMPLE TYPES:

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

TEST TYPES:

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

Last Edited: 10/20/2022

Geotechnical Boring Log Borehole HS-8

Date: 12/19/23 | **Drilling Company:** 2R Drilling

Project Name: EPD - Santa Fe Springs (Site 1) | **Type of Rig:** Truck Mounted

Project Number: 23221-01 | **Drop:** 30" | **Hole Diameter:** 6"

Elevation of Top of Hole: ~154' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		R-5	34 50/5"	111.8	1.9	SP-SM	@ 30' - Poorly-Graded SAND with Silt: gray, dry, very dense	
120									
	35		SPT-3	3 9 17		23.5	CL	@ 35' - Sandy CLAY: grayish olive, very moist, hard	-#200 AL
115									
	40		R-6	15 35 50/5"	109.5	12.5	ML	@ 40' - Sandy SILT: dark gray, moist, hard	
110									
	45		SPT-4	12 25 26		2.6	SM	@ 45' - Silty SAND: gray, dry, very dense	
105									
	50		R-7	30 50/5"	104.3	3.6	SM	@ 50' - Silty SAND: gray, dry, very dense	
								Total Depth = 50.9' No Groundwater Encountered Caving after removing augers = 34' (from surface) Backfilled with Cuttings on 12/19/23	
100	55								
95	60								

LGC Geotechnical, Inc.

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SAMPLE TYPES:

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

TEST TYPES:

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

Geotechnical Boring Log Borehole I-1

Date: 12/18/23 | **Drilling Company:** 2R Drilling

Project Name: EPD - Santa Fe Springs (Site 1) | **Type of Rig:** Truck Mounted

Project Number: 23221-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~154' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map |

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
150	0							@0' - Topsoil	
	5	B-1	SPT-1	3 5 7		11.9	CL	@ 5' - CLAY: brown, slightly moist, very stiff	
			SPT-2	5 10 13		14.8		@ 8' - CLAY: brown, moist, very stiff	
145	10							Total Depth = 10' No Groundwater Encountered 3" Perforated Pipe with Filter Sock and Gravel installed Pipe Removed and Backfilled with Cuttings on 12/19/2023	
140	15								
135	20								
130	25								
125	30								

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SAMPLE TYPES:

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

TEST TYPES:

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

Last Edited: 10/20/2022

Geotechnical Boring Log Borehole I-2

Date: 12/18/23	**Drilling Company:** 2R Drilling
Project Name: EPD - Santa Fe Springs (Site 1)	**Type of Rig:** Truck Mounted
Project Number: 23221-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~155' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@0' - Topsoil	
150	5	B-1	SPT-1	5 13 15		10.7	CL	@ 5' - CLAY: brown, slightly moist, hard	
145	10		SPT-2	6 15 19		9.8	ML	@ 13' - Sandy SILT: brown, slightly moist, hard	
140	15							Total Depth = 15' No Groundwater Encountered 3" Perforated Pipe with Filter Sock and Gravel installed Pipe Removed and Backfilled with Cuttings on 12/19/2023	
135	20								
130	25								
125	30								

LGC Geotechnical, Inc.

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

SAMPLE TYPES:

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

TEST TYPES:

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

Last Edited: 10/20/2022

Geotechnical Boring Log Borehole I-3

Date: 12/19/23	**Drilling Company:** 2R Drilling
Project Name: EPD - Santa Fe Springs (Site 1)	**Type of Rig:** Truck Mounted
Project Number: 23221-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~151' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By RNP
Sampled By RNP
Checked By RLD

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
150	0							@0' - Topsoil	
145	5	B-1	SPT-1	8 10 15		10.2	CL	@ 5' - CLAY: brown, slightly moist, hard	
140	10		SPT-2	4 7 9		11.6	ML	@ 13' - Sandy SILT: brown, moist, very stiff	
135	15							Total Depth = 15' No Groundwater Encountered 3" Perforated Pipe with Filter Sock and Gravel installed Pipe Removed and Backfilled with Cuttings on 12/20/2023	
130	20								
125	25								
	30								

LGC Geotechnical, Inc.

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

SAMPLE TYPES:

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

TEST TYPES:

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

Last Edited: 10/20/2022

Appendix C
Laboratory Test Results

APPENDIX C

Laboratory Testing Procedures and Test Results

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

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

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

Sample Location	Expansion Index	Expansion Potential*
HS-2 @ 0-5 feet	12	Very Low
HS-5 @ 0-5 feet	15	Very Low

* ASTM D4829

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

Sample Location	Description	% Passing # 200 Sieve
HS-1 @ 15 feet	Sandy Silt	59
HS-1 @ 30 feet	Silty Sand	15
HS-1 @ 45 feet	Silt with Sand	78
HS-8 @ 35 feet	Sandy Clay	63

Laboratory Testing Procedures and Test Results

Atterberg Limits: The liquid and plastic limits ("Atterberg Limits") were determined in accordance with ASTM Test Method D4318 for engineering classification of fine-grained material and presented in the table below. The USCS soil classification indicated in the table below is based on the portion of sample passing the No. 40 sieve and may not necessarily be representative of the entire sample. The plot is provided in this Appendix.

Sample Location	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS Soil Classification
HS-1 @ 30 ft	NP	NP	NP	NP
HS-8 @ 35 ft	31	23	8	CL

Direct Shear: One direct shear test was performed on a remolded sample, which was soaked for a minimum of 24 hours prior to testing. The samples were tested under various normal loads using a motor-driven, strain-controlled, direct-shear testing apparatus (ASTM D3080). The plot is provided in this Appendix.

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

Maximum Density Tests: The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM D1557. The results of these tests are presented in the table below:

Sample Location	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
HS-5 @ 0-5 feet	Dark Brown Sandy Silt with Gravel	123.0	10.0
HS-5 @ 0-5 feet	Dark Brown Sandy Silt with Gravel Correction (20% Gravel)	130.0	8.0

Laboratory Testing Procedures and Test Results

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

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

Sample Location	Chloride Content, ppm
HS-2 @ 0-5 feet	160

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

Sample Location	Sulfate Content (ppm)	Sulfate Exposure Class *
HS-2 @ 0-5 feet	74	S0

*Based on ACI 318R-14, Table 19.3.1.1

Minimum Resistivity and pH Tests: Minimum resistivity and pH tests were performed in general accordance with CTM 643 and standard geochemical methods. The results are presented in the table below.

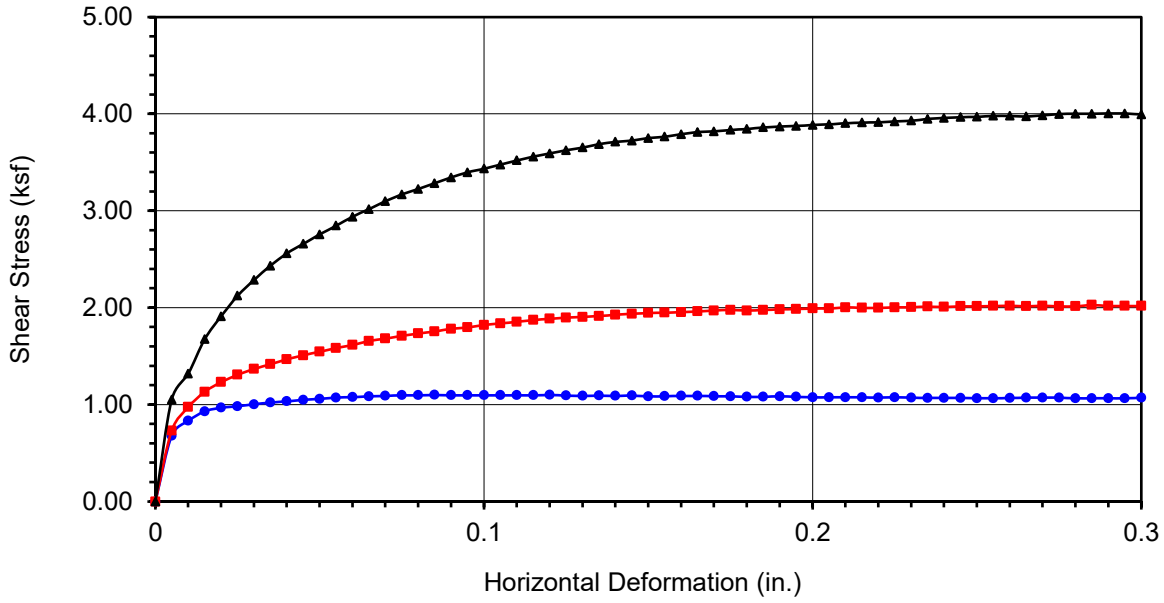
Sample Location	pH	Minimum Resistivity (ohms-cm)
HS-2 @ 0-5 feet	7.82	1048

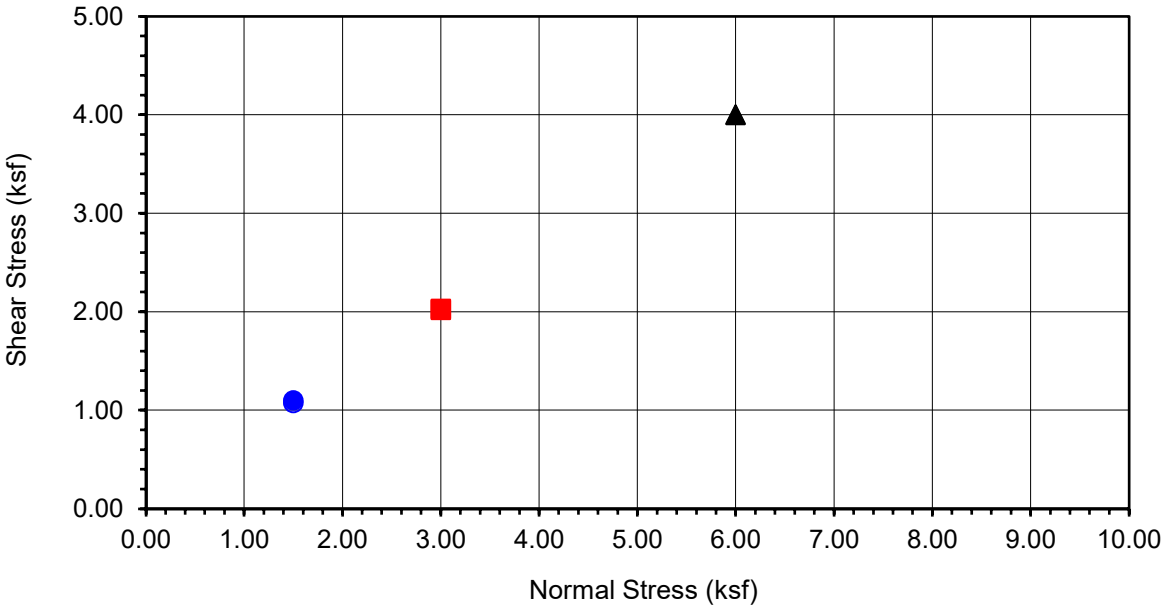
DIRECT SHEAR TEST

Consolidated Drained - ASTM D 3080

Project Name:	Telegraph Rd Santa Fe Springs Site 1	Tested By:	G. Bathala	Date:	01/09/24
Project No.:	23221-01	Checked By:	J. Ward	Date:	01/15/24
Boring No.:	HS-5	Sample Type:	90% Remold		
Sample No.:	B-1	Depth (ft.):	0-5		
Soil Identification:	Dark brown sandy silt with gravel s(ML)g				

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	192.27	191.52	189.83
Weight of Ring(gm):	45.27	44.47	42.54
Before Shearing			
Weight of Wet Sample+Cont.(gm):	159.16	159.16	159.16
Weight of Dry Sample+Cont.(gm):	151.04	151.04	151.04
Weight of Container(gm):	68.52	68.52	68.52
Vertical Rdg.(in): Initial	0.2315	0.2560	0.0000
Vertical Rdg.(in): Final	0.2470	0.2777	-0.0321
After Shearing			
Weight of Wet Sample+Cont.(gm):	215.84	216.74	191.05
Weight of Dry Sample+Cont.(gm):	194.45	195.60	171.85
Weight of Container(gm):	61.83	63.20	39.45
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**HS-5**
Sample No.	**B-1**
Depth (ft)	**0-5**
Sample Type: 90% Remold	
Soil Identification: Dark brown sandy silt with gravel s(ML)g	

Normal Stress (kip/ft²)	1.500	3.000	6.000
Peak Shear Stress (kip/ft²)	● 1.100	■ 2.028	▲ 4.005
Shear Stress @ End of Test (ksf)	○ 1.072	□ 2.018	△ 3.996
Deformation Rate (in./min.)	0.0017	0.0017	0.0017
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	9.84	9.84	9.84
Dry Density (pcf)	111.3	111.3	111.5
Saturation (%)	51.6	51.7	51.9
Soil Height Before Shearing (in.)	0.9845	0.9783	0.9679
Final Moisture Content (%)	16.1	16.0	14.5

DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 23221-01

Telegraph Rd Santa Fe Springs_Site 1

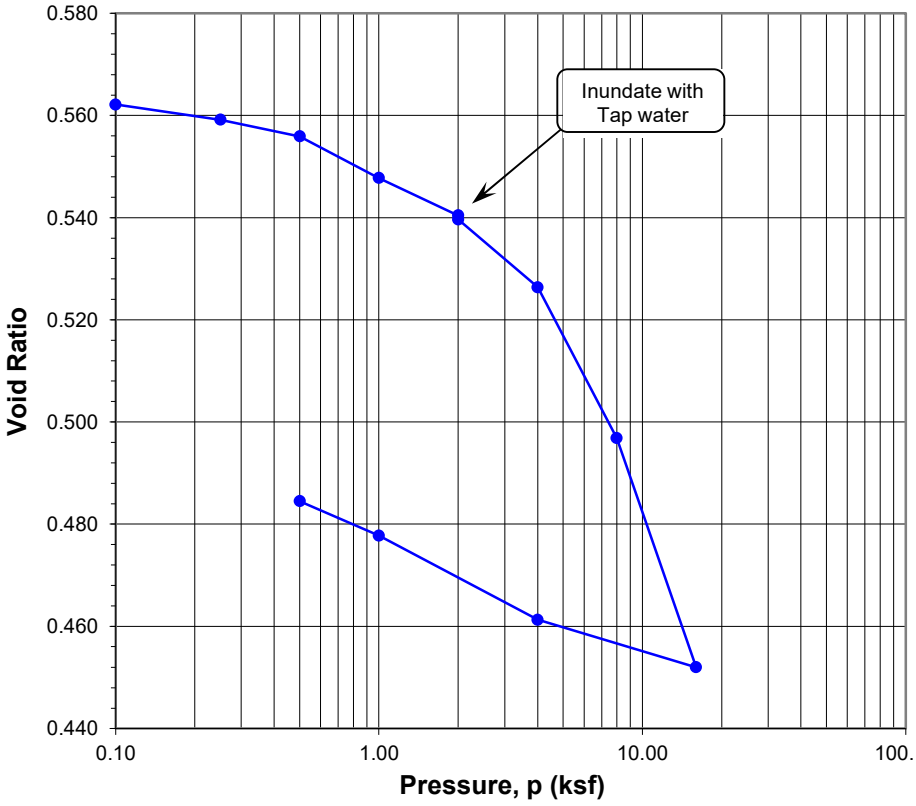
01-24

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name:	Telegraph Rd Santa Fe Springs_Site 1	Tested By: GB/JD	Date: 01/04/24
Project No.:	23221-01	Checked By: J. Ward	Date: 01/15/24
Boring No.:	HS-1	Depth (ft.): 7.5	
Sample No.:	R-2	Sample Type: Ring	
Soil Identification:	Yellowish brown lean clay (CL)		

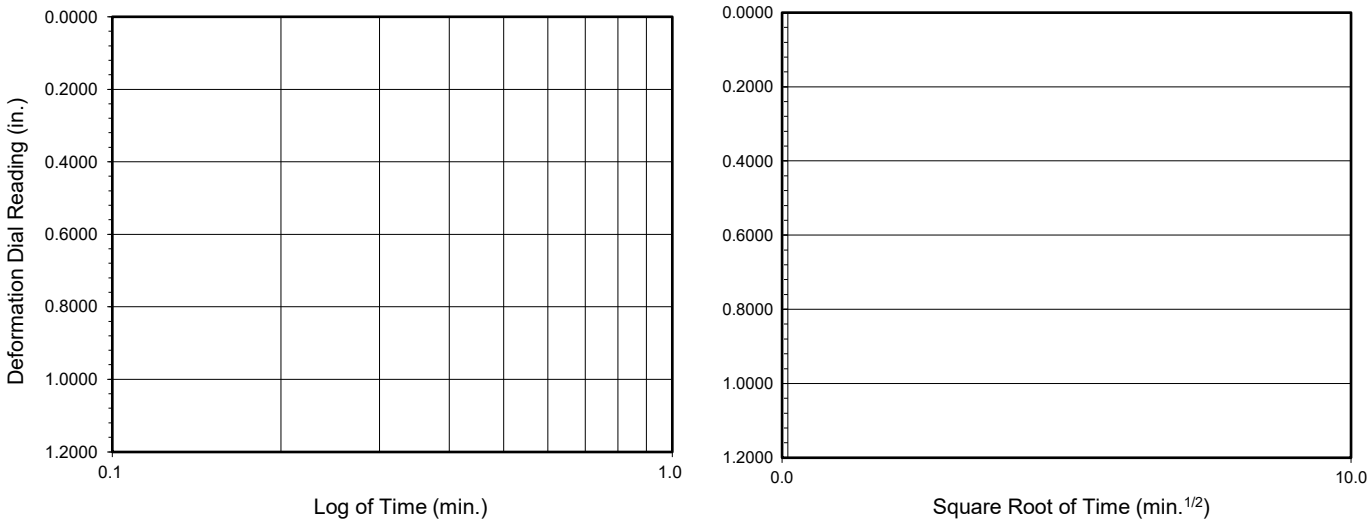
Sample Diameter (in.):	2.415
Sample Thickness (in.):	1.000
Weight of Sample + ring (g):	189.96
Weight of Ring (g):	42.50
Height after consol. (in.):	0.9502
Before Test	
Wt. of Wet Sample+Cont. (g):	190.22
Wt. of Dry Sample+Cont. (g):	173.98
Weight of Container (g):	55.14
Initial Moisture Content (%)	13.7
Initial Dry Density (pcf)	107.9
Initial Saturation (%):	66
Initial Vertical Reading (in.)	0.1418
After Test	
Wt. of Wet Sample+Cont. (g):	248.84
Wt. of Dry Sample+Cont. (g):	225.72
Weight of Container (g):	55.52
Final Moisture Content (%)	18.10
Final Dry Density (pcf):	111.8
Final Saturation (%):	96
Final Vertical Reading (in.)	0.1960
Specific Gravity (assumed):	2.70
Water Density (pcf):	62.43

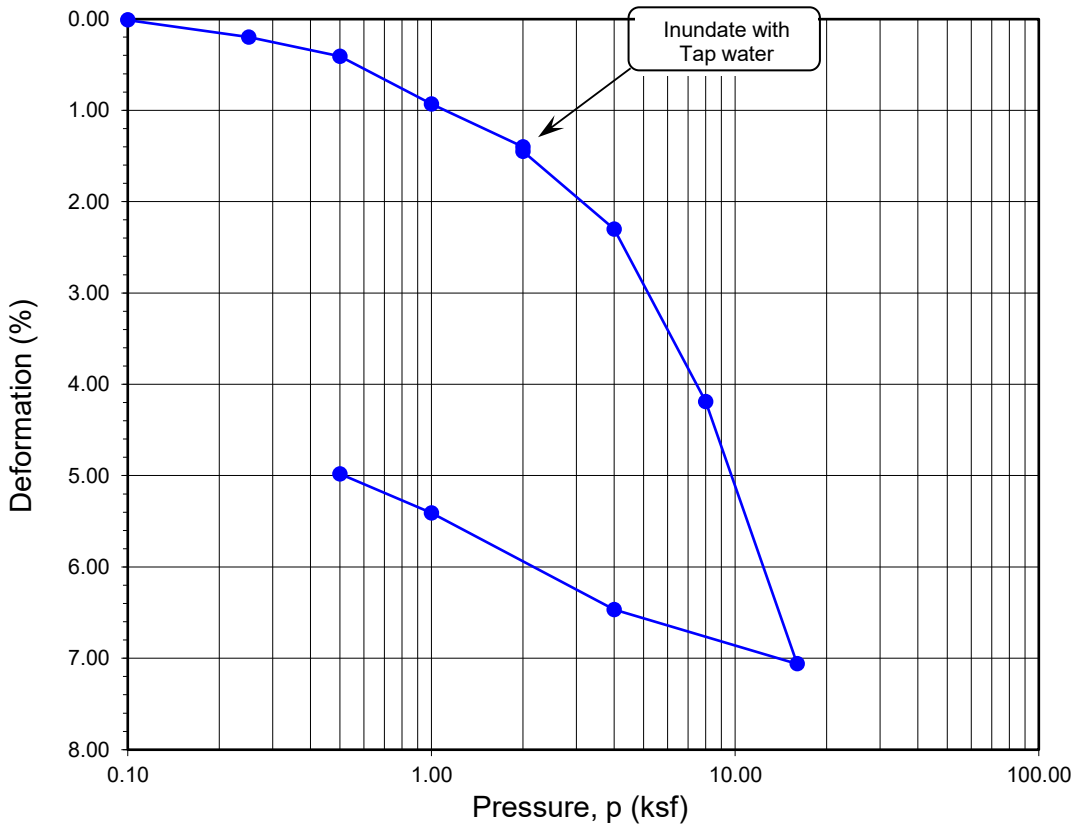


Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.1419	0.9999	0.00	0.01	0.562	0.01
0.25	0.1444	0.9974	0.06	0.26	0.559	0.20
0.50	0.1471	0.9947	0.12	0.53	0.556	0.41
1.00	0.1531	0.9887	0.20	1.13	0.548	0.93
2.00	0.1588	0.9830	0.30	1.70	0.540	1.40
2.00	0.1593	0.9825	0.30	1.75	0.540	1.45
4.00	0.1689	0.9729	0.41	2.71	0.526	2.30
8.00	0.1892	0.9526	0.55	4.74	0.497	4.19
16.00	0.2196	0.9222	0.72	7.78	0.452	7.06
4.00	0.2125	0.9294	0.60	7.07	0.461	6.47
1.00	0.2008	0.9410	0.49	5.90	0.478	5.41
0.50	0.1960	0.9458	0.44	5.42	0.485	4.98

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

Time Readings





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-1	**R-2**	**7.5**	**13.7**	**18.1**	**107.9**	**111.8**	**0.562**	**0.485**	**66**	**96**

Soil Identification: Yellowish brown lean clay (CL)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 23221-01

Telegraph Rd Santa Fe Springs_Site 1

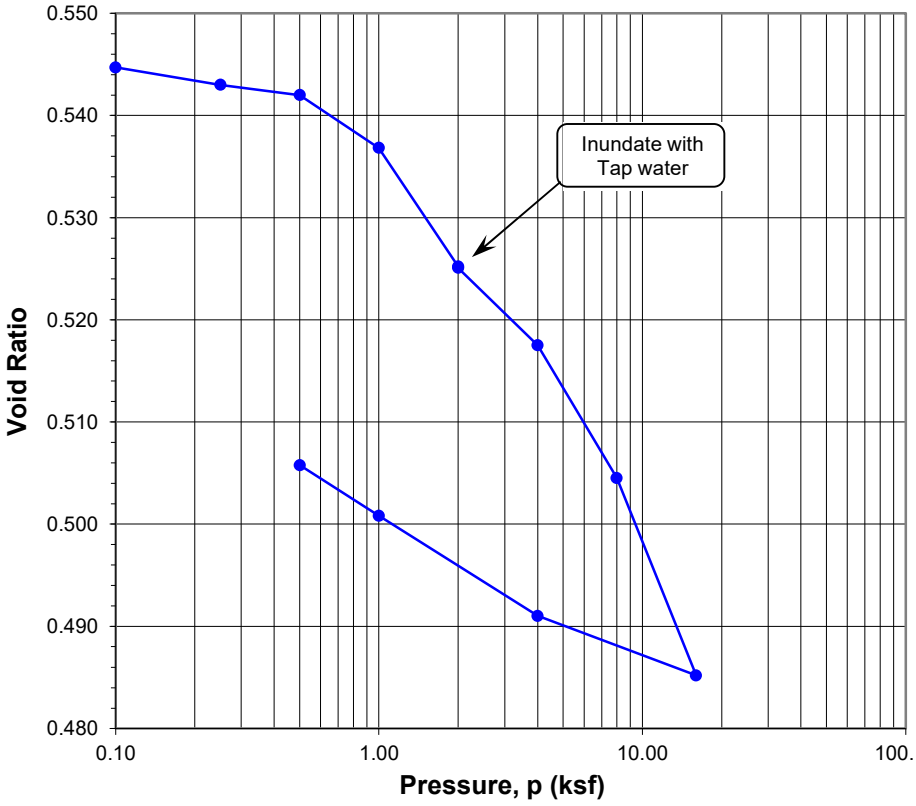
01-24

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name:	Telegraph Rd Santa Fe Springs_Site 1	Tested By: GB/JD	Date: 01/04/24
Project No.:	23221-01	Checked By: J. Ward	Date: 01/15/24
Boring No.:	HS-8	Depth (ft.): 10.0	
Sample No.:	R-3	Sample Type: Ring	
Soil Identification:	Brown silty clay (CL-ML)		

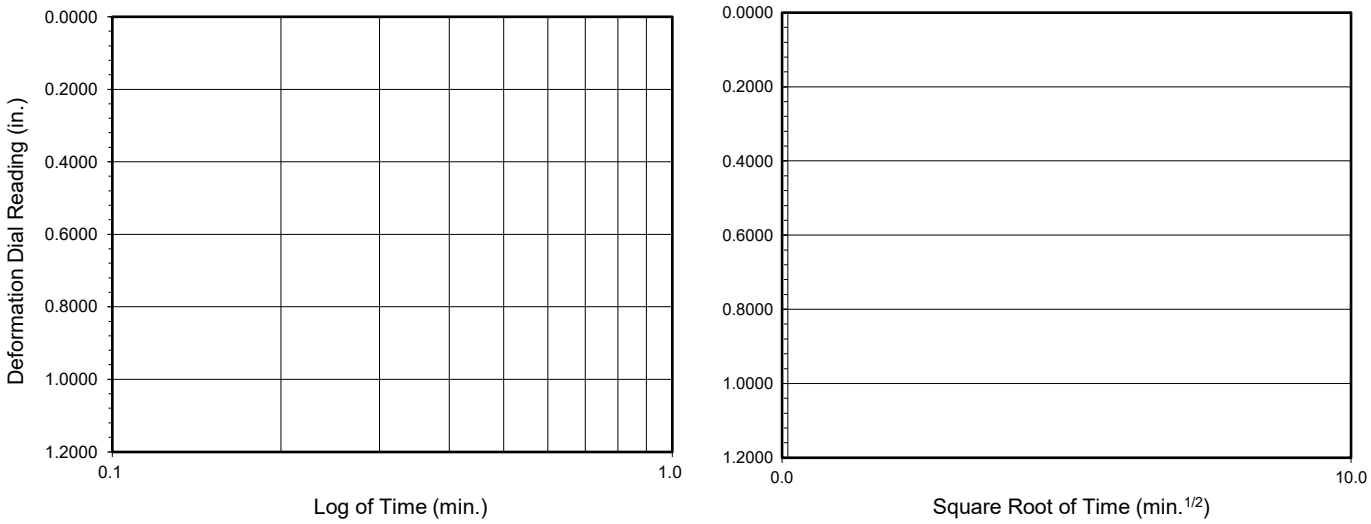
Sample Diameter (in.):	2.415
Sample Thickness (in.):	1.000
Weight of Sample + ring (g):	199.00
Weight of Ring (g):	44.70
Height after consol. (in.):	0.9745
Before Test	
Wt. of Wet Sample+Cont. (g):	196.85
Wt. of Dry Sample+Cont. (g):	176.96
Weight of Container (g):	64.16
Initial Moisture Content (%)	17.6
Initial Dry Density (pcf)	109.1
Initial Saturation (%):	87
Initial Vertical Reading (in.)	0.1420
After Test	
Wt. of Wet Sample+Cont. (g):	252.00
Wt. of Dry Sample+Cont. (g):	229.21
Weight of Container (g):	52.21
Final Moisture Content (%)	17.23
Final Dry Density (pcf):	112.9
Final Saturation (%):	94
Final Vertical Reading (in.)	0.1759
Specific Gravity (assumed):	2.70
Water Density (pcf):	62.43

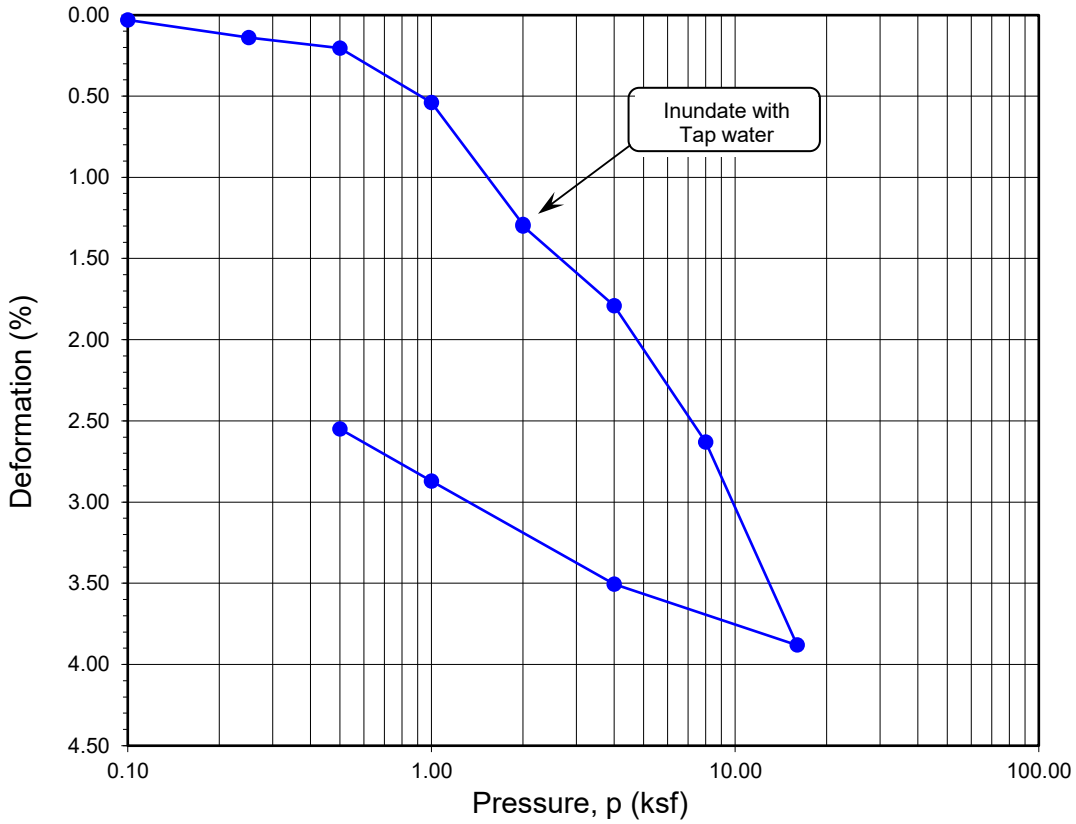


Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.1423	0.9997	0.00	0.03	0.545	0.03
0.25	0.1448	0.9972	0.14	0.28	0.543	0.14
0.50	0.1471	0.9950	0.30	0.51	0.542	0.21
1.00	0.1523	0.9897	0.49	1.03	0.537	0.54
2.00	0.1614	0.9806	0.65	1.94	0.525	1.29
2.00	0.1615	0.9805	0.65	1.95	0.525	1.30
4.00	0.1680	0.9740	0.81	2.60	0.518	1.79
8.00	0.1778	0.9642	0.95	3.58	0.505	2.63
16.00	0.1917	0.9503	1.09	4.97	0.485	3.88
4.00	0.1870	0.9551	0.99	4.50	0.491	3.51
1.00	0.1796	0.9624	0.89	3.76	0.501	2.87
0.50	0.1759	0.9661	0.84	3.39	0.506	2.55

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

Time Readings





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-8	**R-3**	**10**	**17.6**	**17.2**	**109.1**	**112.9**	**0.545**	**0.506**	**87**	**94**

Soil Identification: Brown silty clay (CL-ML)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 23221-01

Telegraph Rd Santa Fe Springs_Site 1

01-24

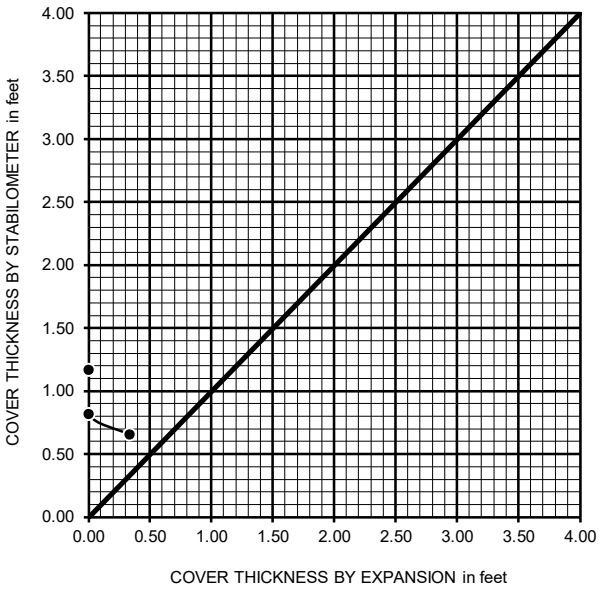
R-VALUE TEST RESULTS
DOT CA Test 301

PROJECT NAME:	Telegraph Rd Santa Fe Springs_Site 1	PROJECT NUMBER:	23221-01
BORING NUMBER:	HS-2	DEPTH (FT.):	0-5
SAMPLE NUMBER:	B-1	TECHNICIAN:	O. Figueroa
SAMPLE DESCRIPTION:	Dark brown sandy silt s(ML)	DATE COMPLETED:	1/9/2024

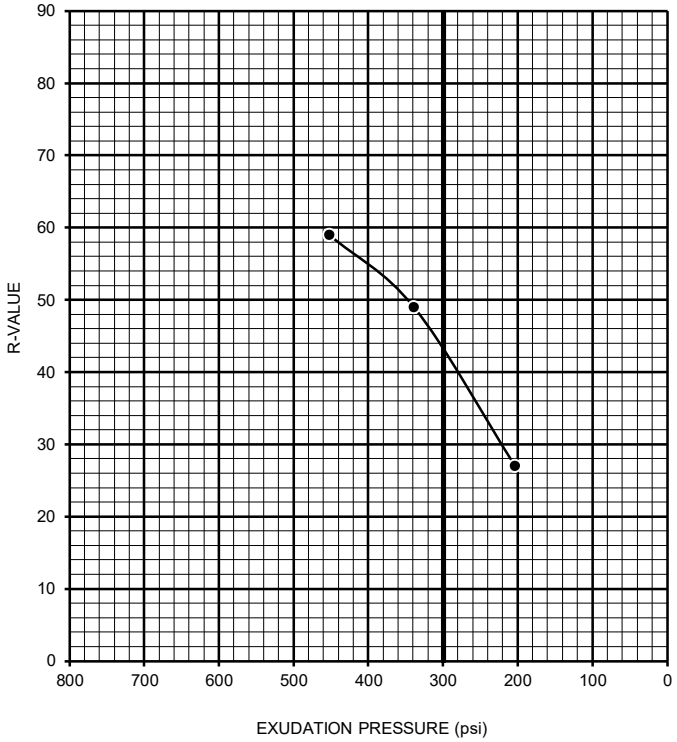
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	11.0	11.6	12.5
HEIGHT OF SAMPLE, Inches	2.46	2.48	2.54
DRY DENSITY, pcf	124.7	123.6	121.3
COMPACTOR PRESSURE, psi	180	120	70
EXUDATION PRESSURE, psi	452	339	204
EXPANSION, Inches x 10exp-4	10	0	0
STABILITY Ph 2,000 lbs (160 psi)	45	56	94
TURNS DISPLACEMENT	4.48	4.75	4.85
R-VALUE UNCORRECTED	59	49	27
R-VALUE CORRECTED	59	49	27

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.66	0.82	1.17
EXPANSION PRESSURE THICKNESS, ft.	0.33	0.00	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	64
R-VALUE BY EXUDATION:	43
EQUILIBRIUM R-VALUE:	43

Appendix D
Infiltration Results

Infiltration Test Data Sheet

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

Project Name: EPD - Santa Fe Springs (Site 1)
Project Number: 23221-01
Date: 12/19/2023
Location: I-1

Test hole dimensions (if circular)	
Boring Depth (feet)*:	10
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

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

Pre-Soak /Pre-Test

No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Comments
Pre-Test	14:22	14:52	30.0	6.44	6.48	0.04	

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Surface Area of Test Section (feet ^2)	Raw Percolation Rate (in/hr)
1	14:54	15:24	30.0	6.48	6.54	0.06	7.72	0.1
2	15:26	15:56	30.0	6.45	6.50	0.05	7.78	0.1
3	15:58	16:28	30.0	6.43	6.46	0.03	7.83	0.0
4	16:30	17:00	30.0	6.48	6.49	0.01	7.72	0.0
5	17:00	17:30	30.0	6.47	6.48	0.01	7.74	0.0
6	17:46	18:16	30.0	6.45	6.46	0.01	7.78	0.0
7								
8								
9								
10								
11								
12								

Measured Infiltration Rate	**0.0**
Reduction Factor	See Report
Design Infiltration Rate	**See Report**

Sketch:

Notes:

Based on Guidelines from: LA County dated 06/2021
Spreadsheet Revised on: 6/22/2023

Infiltration Test Data Sheet

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

Project Name: EPD - Santa Fe Springs (Site 1)
Project Number: 23221-01
Date: 12/19/2023
Location: I-2

Test hole dimensions (if circular)	
Boring Depth (feet)*:	15
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

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

Pre-Soak /Pre-Test

No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Comments
Pre-Test	14:25	14:55	30.0	11.58	13.51	1.93	

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Surface Area of Test Section (feet ^2)	Raw Percolation Rate (in/hr)
1	14:57	15:27	30.0	12.53	13.57	1.04	5.52	1.6
2	15:29	15:59	30.0	12.77	14.00	1.23	5.02	2.1
3	16:01	16:31	30.0	12.41	13.37	0.96	5.77	1.4
4	16:33	17:03	30.0	12.43	13.23	0.80	5.73	1.2
5	17:05	17:35	30.0	12.60	13.38	0.78	5.38	1.2
6	17:51	18:21	30.0	12.55	13.31	0.76	5.48	1.2
7								
8								
9								
10								
11								
12								

Measured Infiltration Rate	**1.2**
Reduction Factor	See Report
Design Infiltration Rate	**See Report**

Sketch:

Notes:

Based on Guidelines from: LA County dated 06/2021
Spreadsheet Revised on: 6/22/2023

Infiltration Test Data Sheet

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

Project Name: EPD - Santa Fe Springs (Site 1)
Project Number: 23221-01
Date: 12/19/2023
Location: I-3

Test hole dimensions (if circular)	
Boring Depth (feet)*:	15
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

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

Pre-Soak /Pre-Test

No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Comments
Pre-Test	14:30	15:00	30.0	11.91	12.46	0.55	

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Surface Area of Test Section (feet ^2)	Raw Percolation Rate (in/hr)
1	15:02	15:32	30.0	12.11	12.49	0.38	6.40	0.5
2	15:34	16:04	30.0	12.32	12.76	0.44	5.96	0.6
3	16:06	16:36	30.0	12.15	12.52	0.37	6.32	0.5
4	16:38	17:08	30.0	12.06	12.47	0.41	6.51	0.5
5	17:10	17:40	30.0	12.19	12.57	0.38	6.23	0.5
6	17:55	18:25	30.0	12.23	12.62	0.39	6.15	0.5
7								
8								
9								
10								
11								
12								

Measured Infiltration Rate	**0.5**
Reduction Factor	See Report
Design Infiltration Rate	**See Report**

Sketch:

Notes:

Based on Guidelines from: LA County dated 06/2021
Spreadsheet Revised on: 6/22/2023

Appendix E
General Earthwork and Grading Specifications for Rough Grading

General Earthwork and Grading Specifications for Rough Grading

1.0 General

1.1 Intent

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

1.2 The Geotechnical Consultant of Record

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

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

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

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

1.3 The Earthwork Contractor

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

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

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

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing

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

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

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

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

2.2 Processing

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

2.3 Over-excavation

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

2.4 Benching

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

2.5 Evaluation/Acceptance of Fill Areas

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

3.0 Fill Material

3.1 General

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

3.2 Oversize

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

3.3 Import

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

4.0 Fill Placement and Compaction

4.1 Fill Layers

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

4.2 Fill Moisture Conditioning

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

4.3 Compaction of Fill

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

4.4 Compaction of Fill Slopes

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

4.5 Compaction Testing

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

4.6 Frequency of Compaction Testing

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

4.7 Compaction Test Locations

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

5.0 Subdrain Installation

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

6.0 Excavation

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

7.0 Trench Backfills

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

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

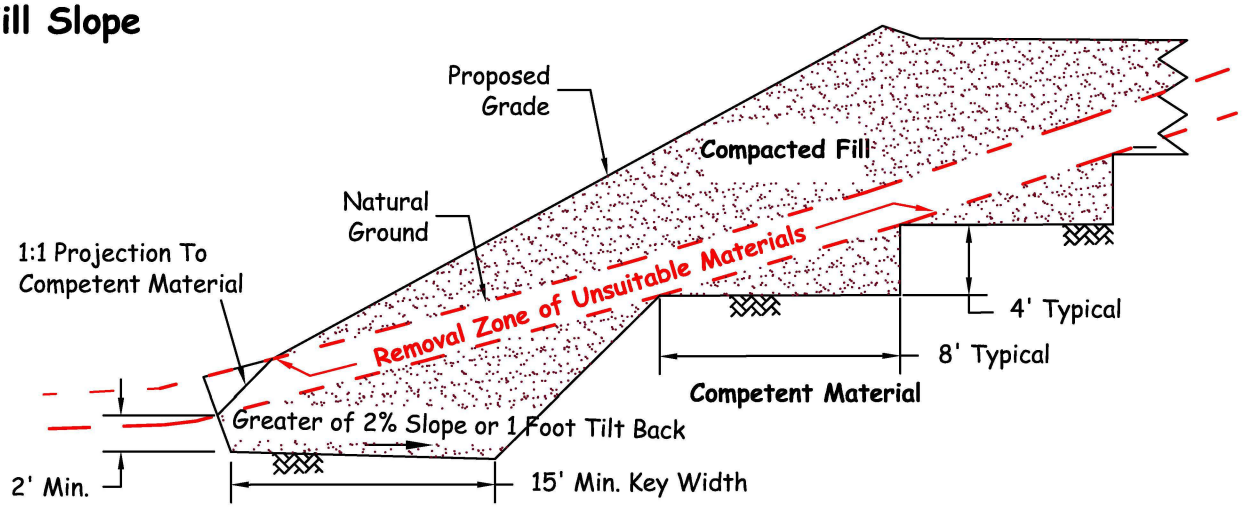
the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.

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

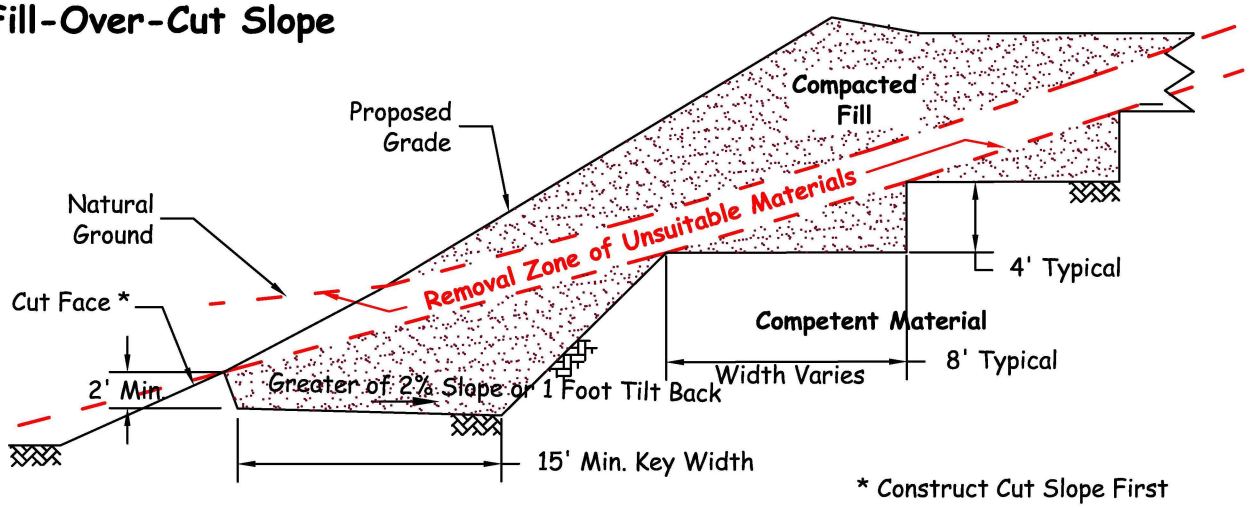
7.4 The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

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

Fill Slope

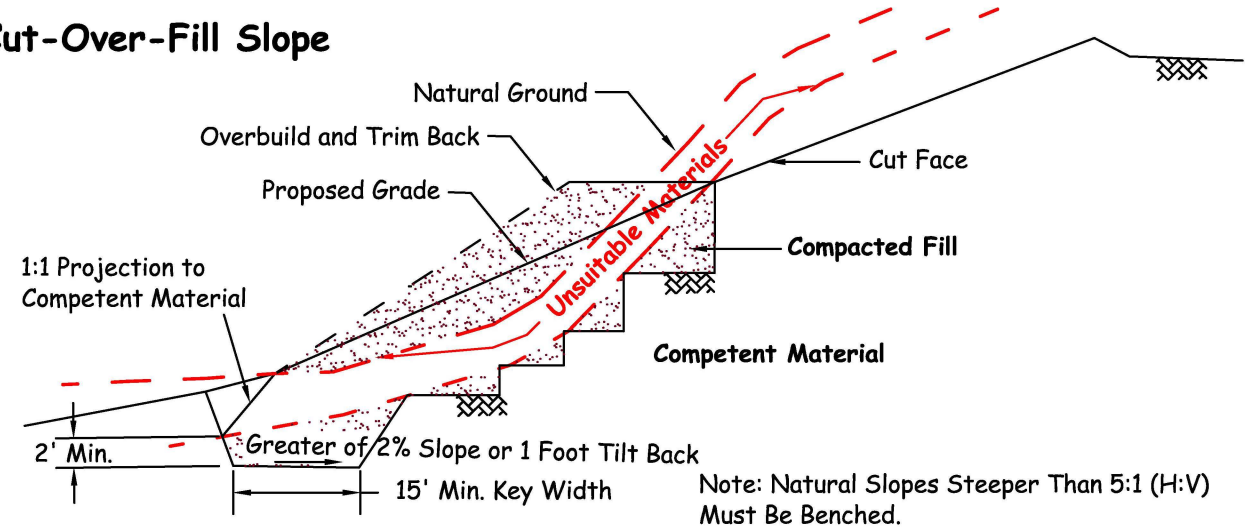


Fill-Over-Cut Slope



* Construct Cut Slope First

Cut-Over-Fill Slope



Note: Natural Slopes Steeper Than 5:1 (H:V) Must Be Benched.

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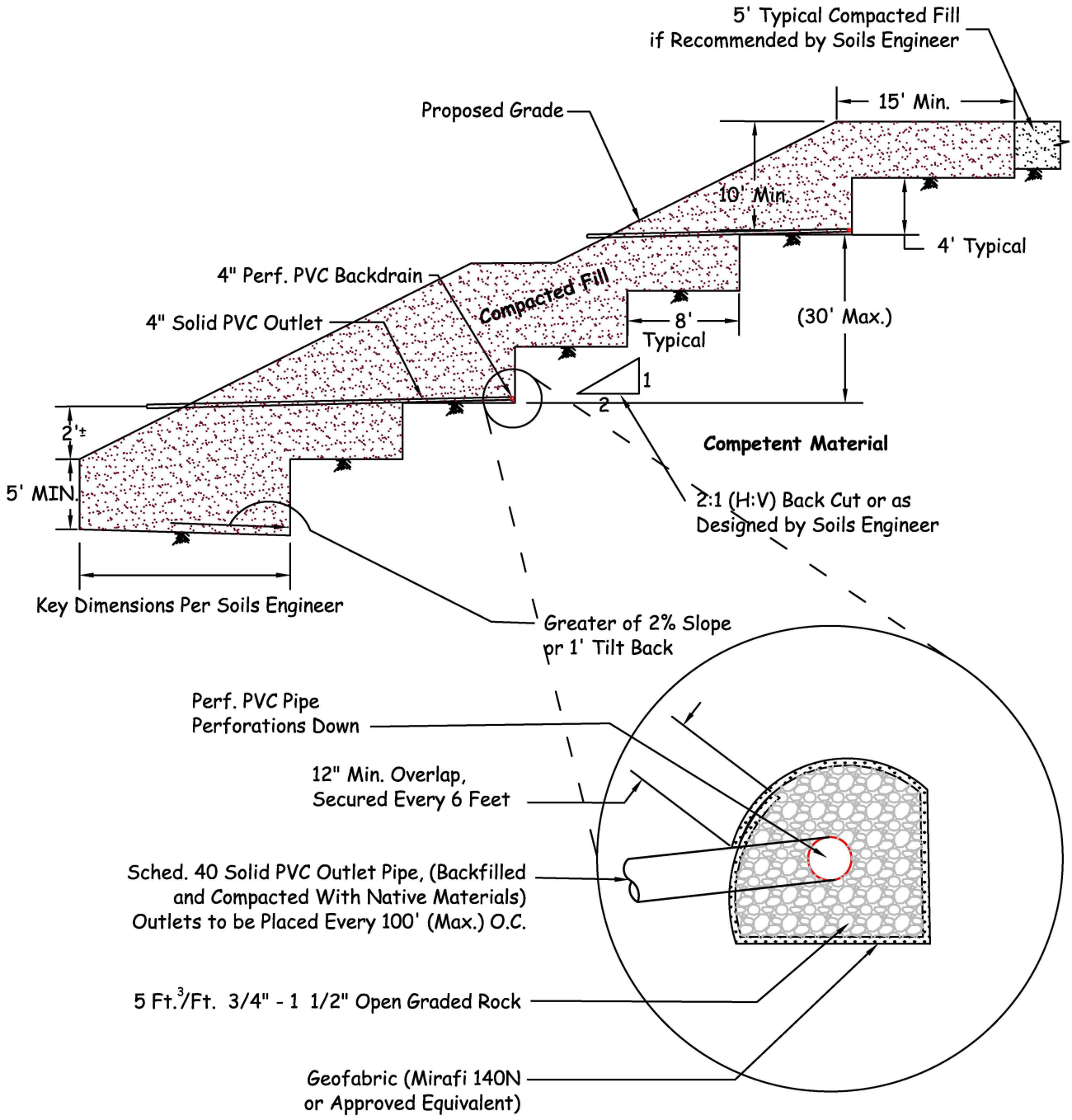
KEYING AND BENCHING



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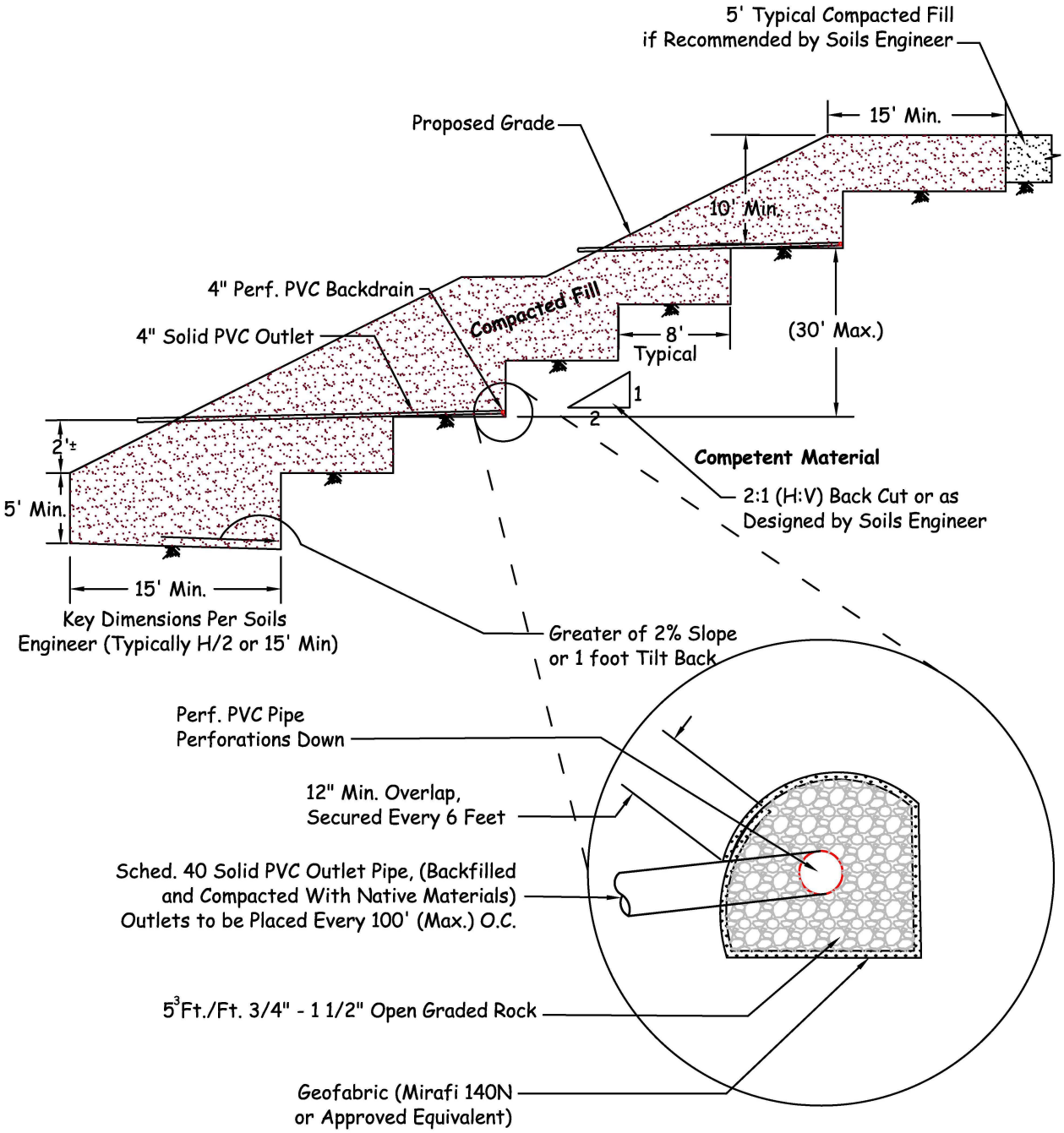
TYPICAL BUTTRESS DETAIL



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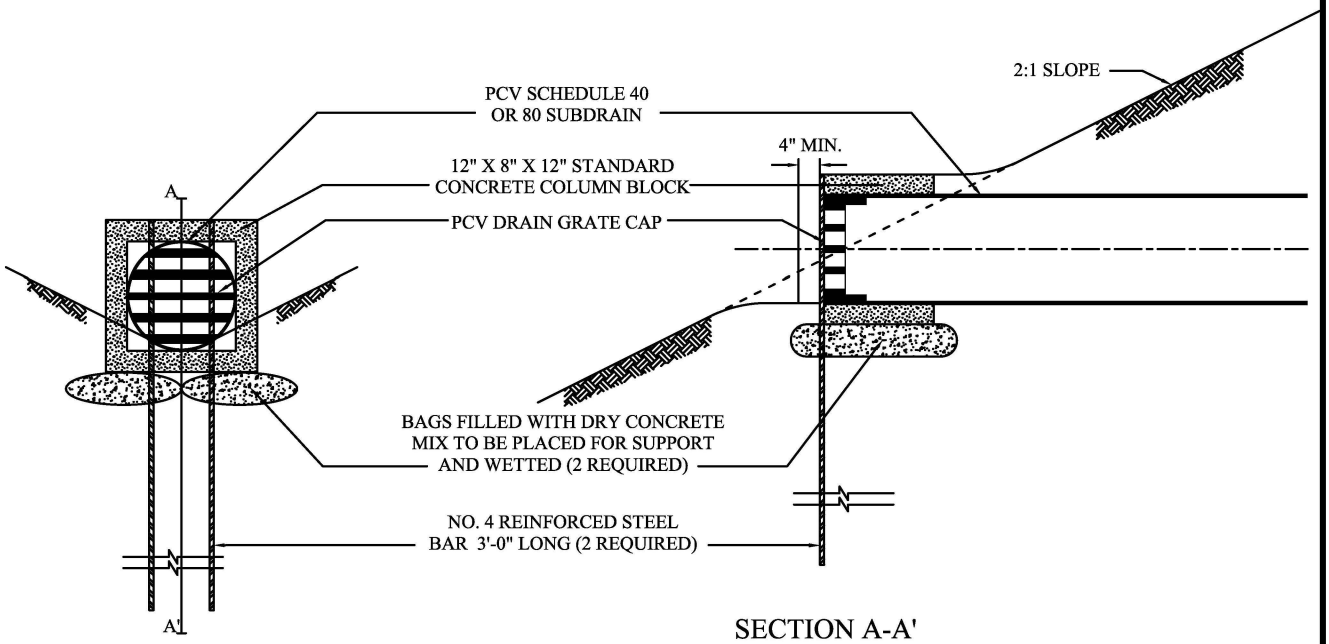
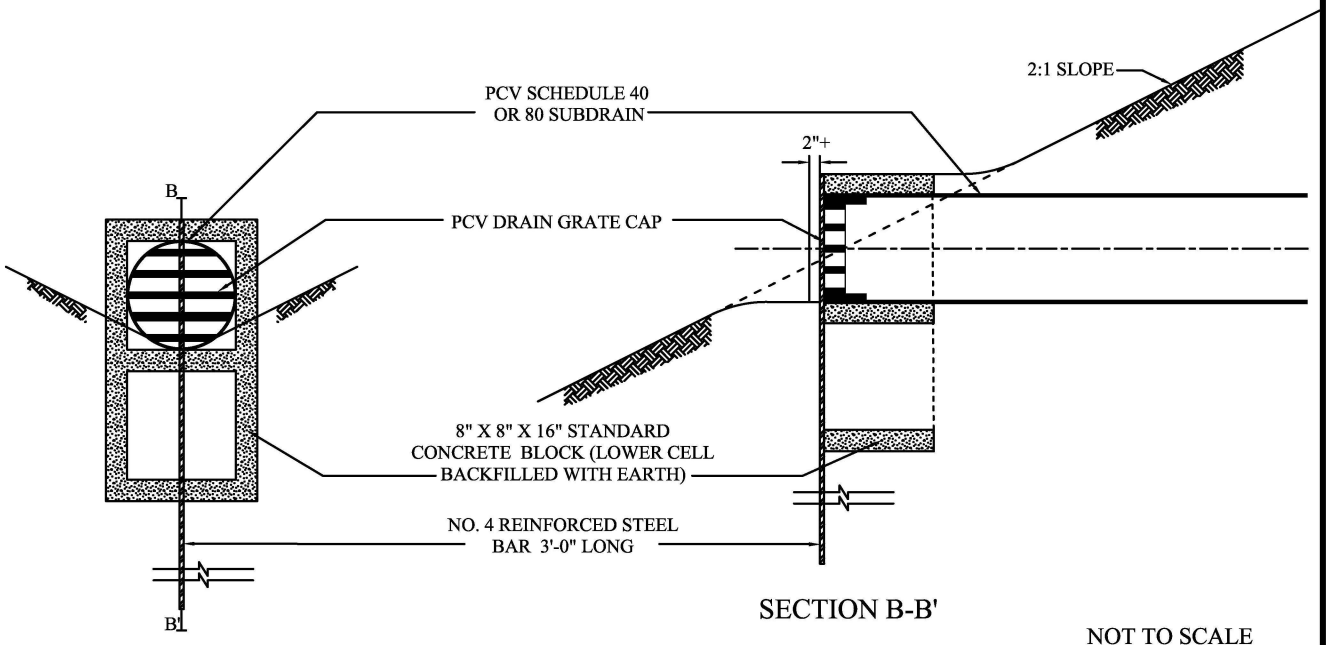
TYPICAL STABILIZATION FILL DETAIL

SUBDRAIN OUTLET MARKER -6" & 8" PIPE



SECTION A-A'

SUBDRAIN OUTLET MARKER -4" PIPE



SECTION B-B'

NOT TO SCALE

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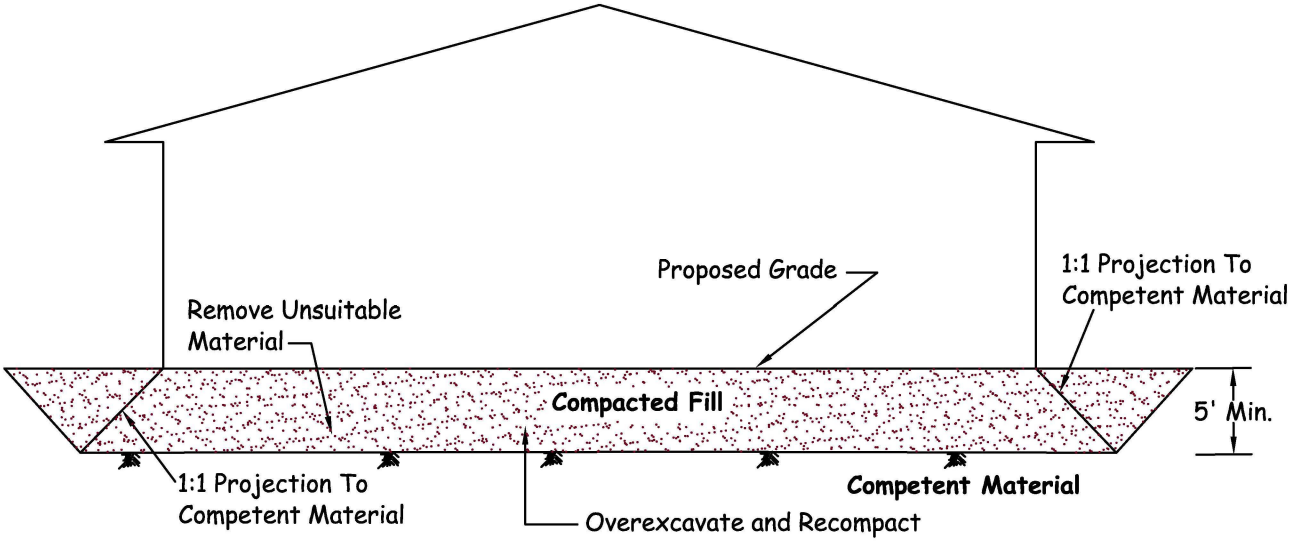
SUBDRAIN OUTLET MARKER DETAIL

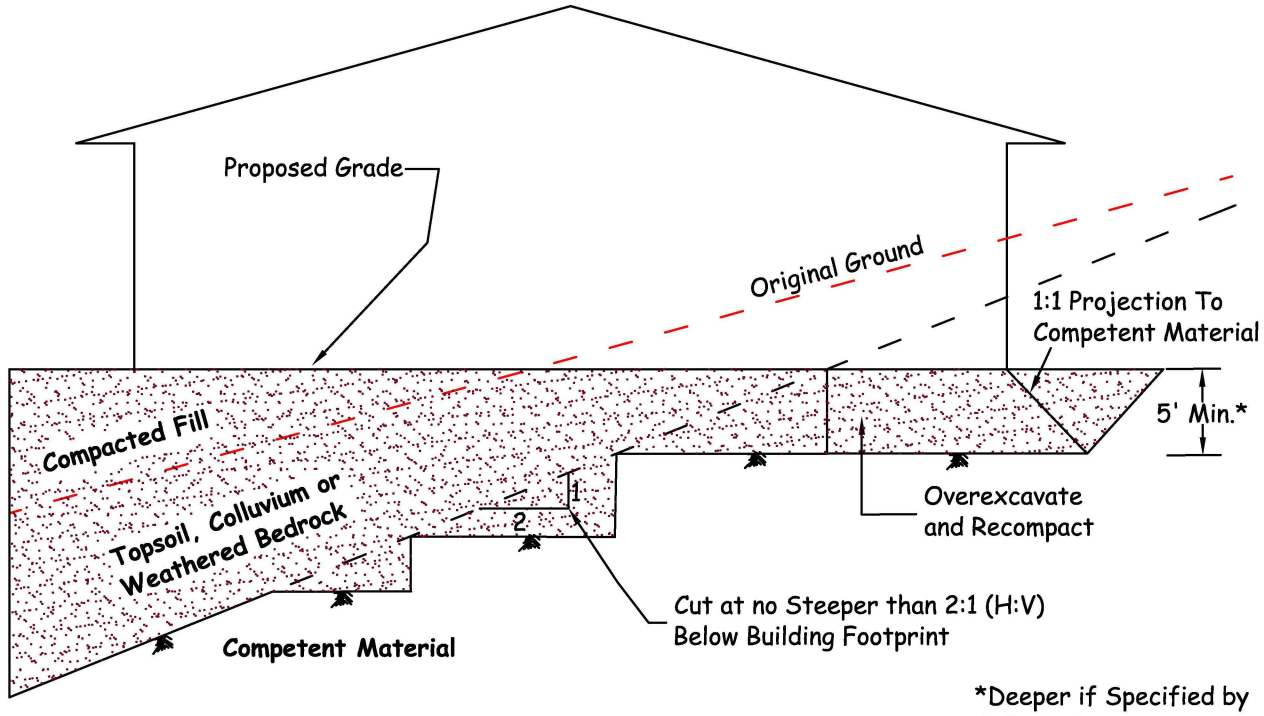
Cut Lot
(Exposing Unsuitable Soils at Design Grade)



Note 1: Removal Bottom Should be Graded With Minimum 2% Fall Towards Street or Other Suitable Area (as Determined by Soils Engineer) to Avoid Ponding Below Building

Note 2: Where Design Cut Lots are Excavated Entirely Into Competent Material, Overexcavation May Still be Required for Hard-Rock Conditions or for Materials With Variable Expansion Characteristics.

Cut/Fill Transition Lot



*Deeper if Specified by Soils Engineer

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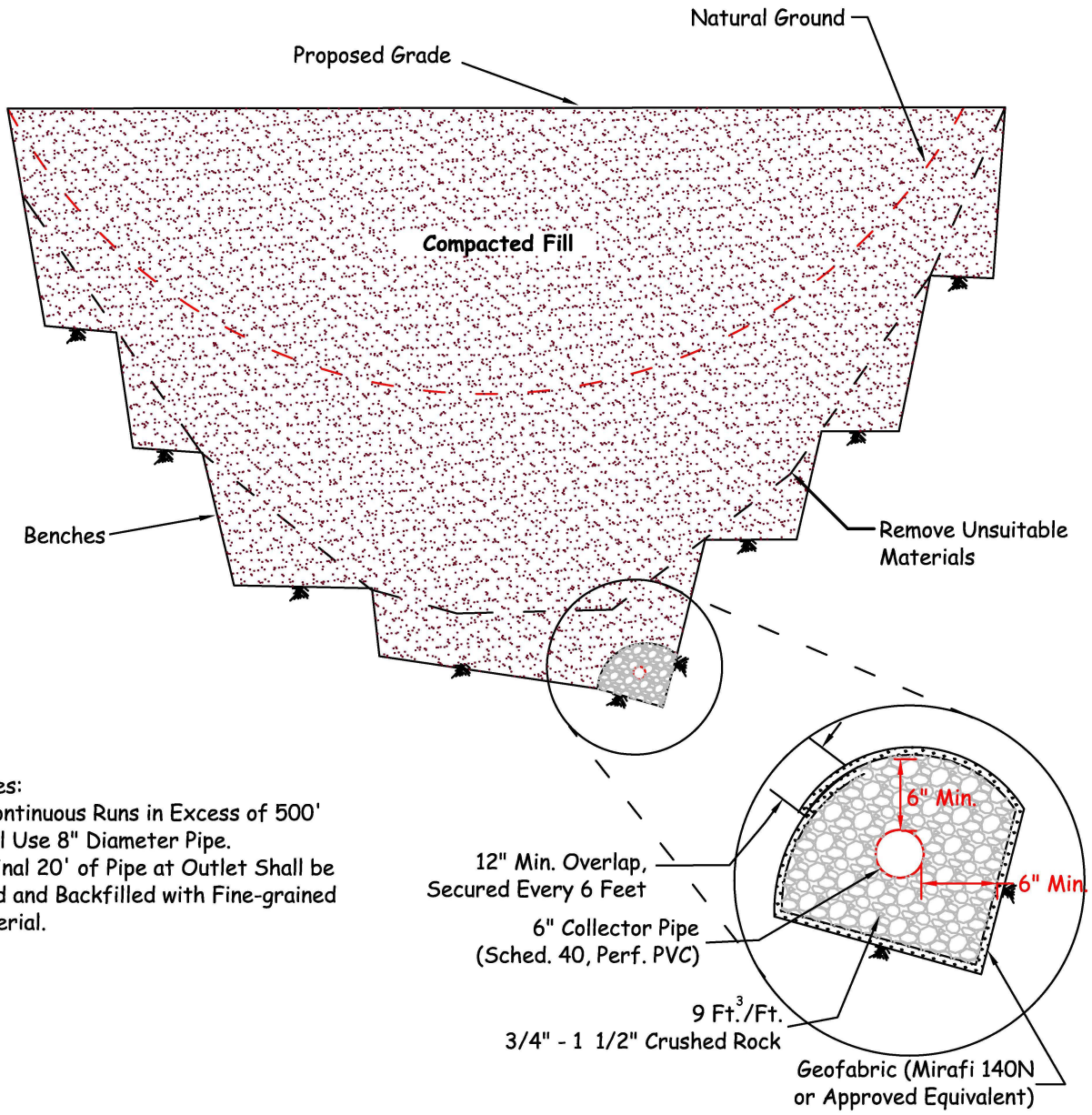
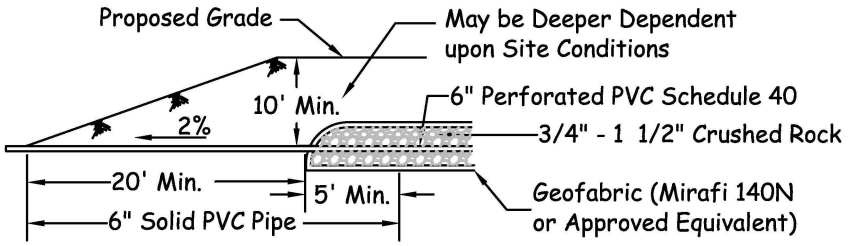
CUT AND TRANSITION LOT OVEREXCAVATION DETAIL



Notes:
1) Continuous Runs in Excess of 500' Shall Use 8" Diameter Pipe.
2) Final 20' of Pipe at Outlet Shall be Solid and Backfilled with Fine-grained Material.

Proposed Outlet Detail



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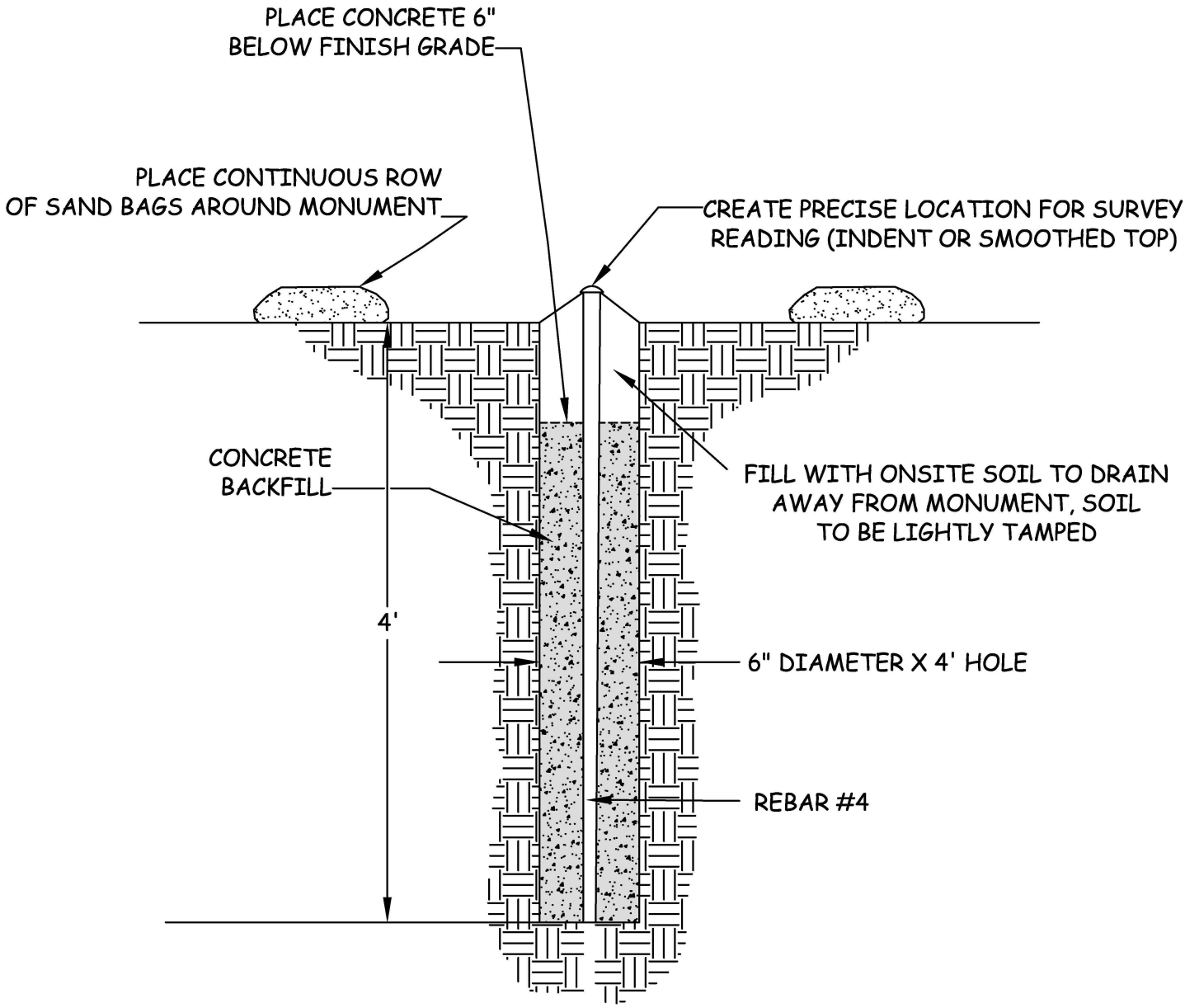
CANYON SUBDRAINS



NO CONSTRUCTION EQUIPMENT WITHIN 25 FEET
OF ANY INSTALLED SETTLEMENT MONUMENTS

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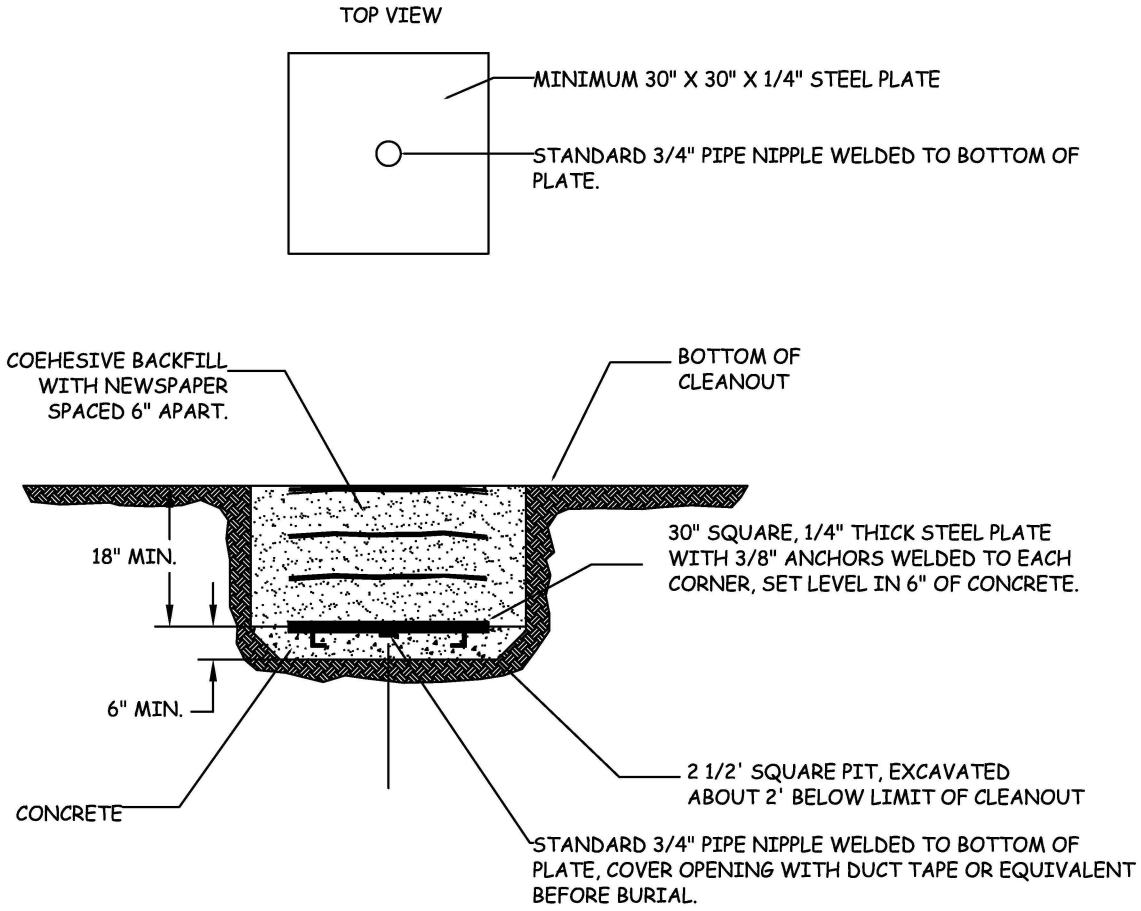
TYPICAL SURFACE SETTLEMENT MONUMENT



1. SURVEY FOR HORIZONTAL AND VERTICAL LOCATION TO NEAREST .01 INCH PRIOR TO BACKFILL USING KNOW LOCATIONS THAT WILL REMAIN INTACT DURING THE DURATION OF THE MONITORING PROGRAM. KNOW POINTS EXPLICITELY NOT ALLOWED ARE THOSE LOCATED ON FILL OR THAT WILL BE DESTROYED DURING GRADING.
2. IN THE EVENT OF DAMAGE TO SETTLEMENT PLATE DURING GRADING, CONTRACTOR SHALL IMMEDIATELY NOTIFY THE GEOTECHNICAL ENGINEER AND SHALL BE RESPONSIBLE FOR RESTORING THE SETTLEMENT PLATES TO WORKING ORDER.
3. DRILL TO RECOVER AND ATTACH RISER PIPE.

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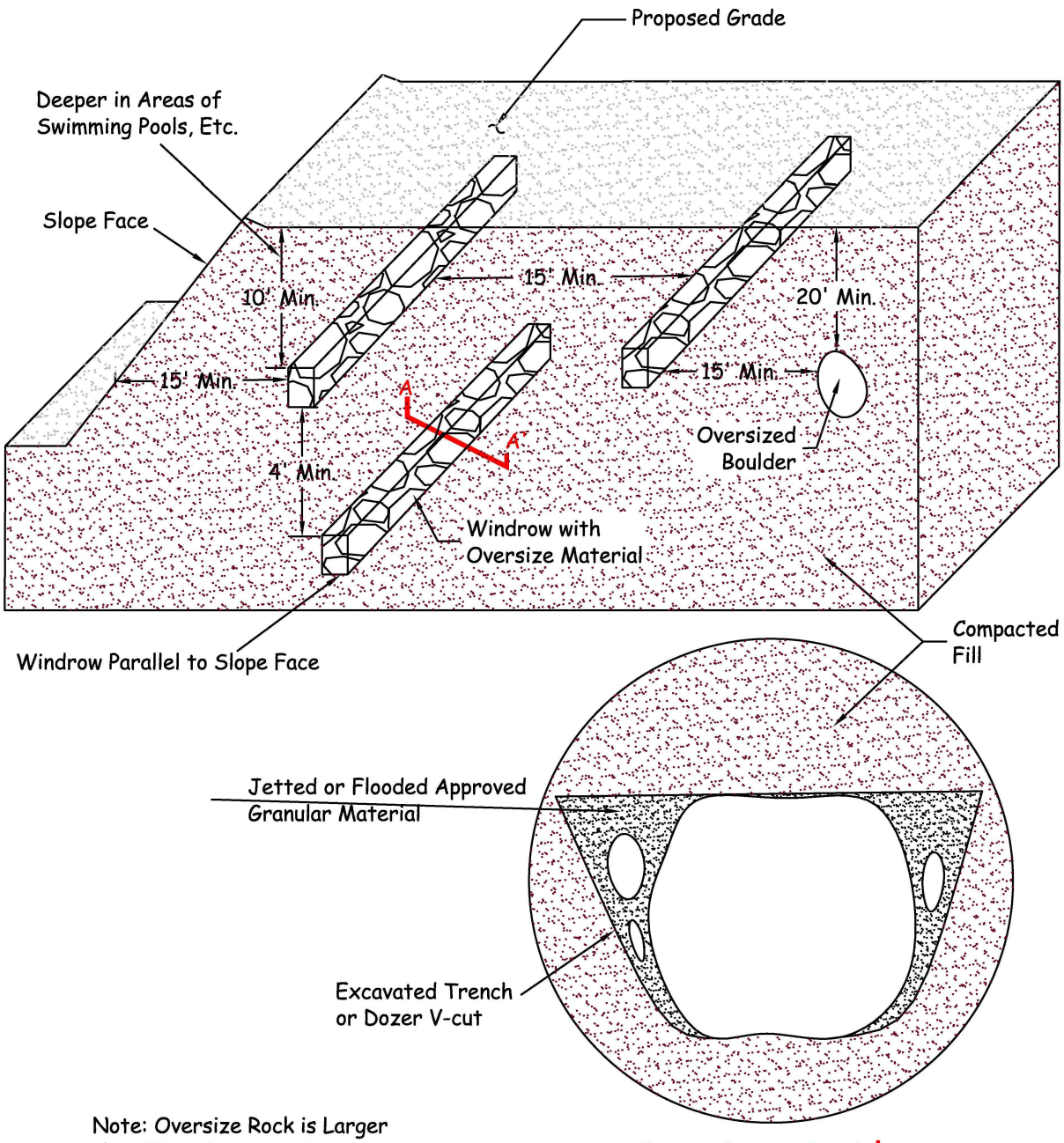
TYPICAL SETTLEMENT PLATE AND RISER



Note: Oversize Rock is Larger than 8" in Maximum Dimension.

Section A-A'

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OVERSIZE ROCK DISPOSAL DETAIL