Geotechnical Engineering Report

Agoura Hills County Yard Treatment Facility and Linear Park
Agoura Hills, CA
February 6, 2020
Terracon Project No. 60195152

Prepared for:
CWE Corporation
Fullerton, California

Prepared by:
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February 6, 2020

Terracon GeoReport

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Re: Geotechnical Engineering Report
Agoura Hills County Yard Treatment Facility and Linear Park
Agoura Road and Cornell Road
Agoura Hills, CA
Terracon Project No. 60195152

Dear Mr. Bapna

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. P60195152 dated July 2, 2019. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

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APR review provided by F. Fred Buhamdan, P.E.

REPORT TOPICS

INTRODUCTION 1
SITE CONDITIONS 2
PROJECT DESCRIPTION 3
GEOTECHNICAL CHARACTERIZATION 4
SEISMIC CONSIDERATIONS 6
LIQUEFACTION 7
CORROSIVITY 8
STORMWATER MANAGEMENT 9
GEOTECHNICAL OVERVIEW 11
EARTHWORK 11
SHALLOW FOUNDATIONS 18
DEEP FOUNDATIONS 19
LATERAL EARTH PRESSURES 21
GENERAL COMMENTS 22

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS (Boring Logs and Laboratory Data)
SUPPORTING INFORMATION (General Notes, Unified Soil Classification System, Liquefaction Analysis, Allowable Side Resistance, Allowable Total Pile Capacity and Estimated Settlement)

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INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed County Yard Treatment Facility and Linear Park Project. The proposed treatment facility will be located southwest of Agoura Road and Cornell Road and the linear park will be located on the northeast corner of Agoura Road and Cornell Road. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Site preparation and earthwork
- Shallow Foundation design and construction
- Infiltration Rates and Considerations
- Groundwater conditions
- Seismic site classification per CBC
- Deep Foundation design and construction

The geotechnical engineering Scope of Services for this project included the advancement of nine (9) test borings within the treatment facility and five (5) borings within the linear park. Borings B-2, B-2A and B-2B within the treatment facility and all five borings within the linear park encountered auger refusal. Three (3) of the borings (B-4, B-5, and B-6) within the treatment facility were utilized for percolation testing.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs and as separate graphs in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located Southwest and Northeast of Agoura Road and Cornell Road in Agoura Hills, CA. Approximate coordinates for center of the proposed treatment facility is 34.1421°N, 118.7584°W and linear park is 34.1433°N, 118.7552°W
Existing Improvements	The proposed treatment facility currently contains modular buildings and storage containers along the south side and an access ramp/asphalt concrete paved parking lot on the north side. The existing flood control channel at the proposed linear park contains a building on the south end. The existing channel is a rectangular channel with an approximate width of 32 feet and an approximate depth of 12 feet.
Current Ground Cover	Exposed soils, hardscape and vegetation
Existing Topography	The existing ground surface elevation at the treatment facility ranges between approximate elevations of 838 and 852 feet. Medea Creek is located on the west side and the Cornell Road is on the east side this treatment facility. The Cornell Road is on top of the ascending slope at approximate elevation of 885 feet. The existing flood control channel at the linear park is located just north of Agoura Road. The existing ground surface elevation on both sides of the channel is at approximate elevation of 860 feet.

PROJECT DESCRIPTION

Item	Description
Proposed Systems	The project will include the following: ■ A stormwater treatment facility near the confluence of Medea Creek and Palo Comado. This treatment facility includes a pump station, pre-treatment chamber, below grade storage chamber, ozone treatment tank, an injection skid, diversion pipes, and a grated trench. ■ A linear park along the north side of Agoura Road above the existing flood control channel between Cornell Road to approximately 6000 feet east of Cornell Road. The linear park will incorporate pedestrian and equestrian trails and the existing channel will be covered by spancrete deck supported on pile foundations.
Construction	The project will include the following: ■ At the proposed stormwater facility, we anticipate that pump station and storage chamber will be a pre-fabricated concrete structures supported on shallow foundation systems consisting of mat or spread footings. ■ At the proposed linear park, we anticipate that spancrete deck will be supported on pile foundations.
Finished Floor Elevation	Assumed to be at the depth of about 10 feet below the existing grade for the pump station and storage chamber.
Grading	We assume about 10 feet of excavations at the site for the pump station and storage chamber.

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the data and our understanding of the geologic setting and planned construction. The following table provides our geotechnical characterization at each project site:

Proposed Site	Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency/Density
Treatment Facility	1*	2.5 to 6½	Fill: Clayey Sand and Clay with Sand	N/A
	2	10 to 20	Sand with varying amounts of clay	Loose to medium dense
	3**	5 to 15	Clay with varying amounts of sand	Medium stiff to stiff
	4	Boring termination at 26 feet	Sand with varying amounts of silt and clay	Medium dense to very dense
Linear Park	1	15	Sand with varying amounts of silt, clay and gravel	Loose to medium dense
	2	20 to 25	Sandy Clay	Stiff to hard
	3	Boring termination at 36 feet	Sand with varying amounts of silt and clay	Medium dense to very dense

* Fill materials were encountered in borings B-1, B-2, B-2A, B-2B. Review of historical imagery indicates that that the area within the vicinity of B-2 to B-2B was utilized as a dumping ground for debris. Fill encountered is assumed to be associated with dumping activities. Furthermore, these borings encountered refusal within these debris.
** Clay layers were encountered in borings B-3, B-4 and B-4 between the depths of 5 and 15 feet

The geotechnical characterization forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. As noted in **General Comments**, the characterization is based upon widely spaced exploration points across the site, and variations are likely.

Conditions encountered at each boring location are indicated on the individual boring logs shown in the **Exploration Results** section and are attached to this report. Stratification boundaries on the boring logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

Lab Results

Laboratory tests were conducted on selected soil samples and the test results are presented in the **Exploration Results** section and on the boring logs. Atterberg limit test results indicate that the on-site soils generally have medium plasticity. Direct shear test results are summarized in the following table:

Borehole	Depth (feet)	Friction Angle (°)	Cohesion (psf)
B-3	15.0-16.5	32	612
B-8	5.0-6.5	14	1090
B-8	15.0-16.5	28	660
B-11	10.0-11.5	23	1146

Groundwater Conditions

Groundwater was observed in multiple borings throughout the project sites. The groundwater depth, where encountered, are summarized in the following table:

Location	Borehole	Groundwater Depth (feet, bgs)
Treatment Facility	B-1	10.0
	B-3	15.0
	B-5	14.5
	B-7	11.5
Linear Park	B-8	18.3
	B-9	23.0
	B-11	18.5

In clayey soils with low permeability, the accurate determination of groundwater level may not be possible without long term observation. As such, groundwater elevations encountered during subsurface exploration may not be representative of the actual groundwater elevation. Long term observation after drilling could not be performed as borings were backfilled immediately upon completion due to safety concerns. Groundwater levels can best be determined by implementation of a groundwater monitoring plan.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

Based on review of Plate 1.2, *Historically shallow ground-water depths and borehole data points in alluviated valley areas of the Thousand Oaks Quadrangle* of Seismic Hazard Zone Report for the Thousand Oaks 7.5-Minute Quadrangle[1], the historic high ground water elevation for the project site is approximately 10 feet bgs.

[1] California Geologic Survey Information Warehouse: Regulatory Maps, SHZR 042 "*Seismic Hazard Zone Report for the Thousand Oaks 7.5-Minute Quadrangle, Ventura and Los Angeles Counties, California*" Dated 2000.

SEISMIC CONSIDERATIONS

The 2019 California Building Code (CBC) Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool. This web-based software application calculates seismic design parameters in accordance with ASCE 7-16 and 2019 CBC. The 2019 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_1 value greater than or equal 0.2.

However, Section 11.4.8 of ASCE 7-16 includes an exception from such analysis for specific structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) states that "In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites." Based on our understanding of the proposed structures, it is our assumption that the exception in Section 11.8.4 applies to the proposed structure. However, the structural engineer should verify the applicability of this exception.

Based on this exception, the spectral response accelerations presented below were calculated using the site coefficients (F_a and F_v) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 16.4.4 of the 2019 CBC.

Description	Value	
	Treatment Facility	Linear Park
2019 California Building Code Site Classification (CBC) [1]	D [2]	
Site Latitude (°N)	34.1421	34.1433
Site Longitude (°W)	118.7583	118.7552
S_s Spectral Acceleration for a 0.2-Second Period	1.469[3]	1.470[3]
S_1 Spectral Acceleration for a 1-Second Period	0.518[3]	0.519[3]
F_a Site Coefficient for a 0.2-Second Period	1.000[4]	1.000[4]
F_v Site Coefficient for a 1-Second Period	1.782[4]	1.728[4]

1. Seismic site classification in general accordance with the *2019 California Building Code*.
2. The 2019 California Building Code (CBC) requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope does not include the required 100-foot soil profile determination. Borings were extended to a maximum depth of 36 feet, and this seismic site class definition considers that similar or denser soils continue below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration.
3. From OSHPD Seismic Maps
4. Calculated based on CBC PDF

A site-specific ground motion study may reduce design values and consequently construction costs. We recommend consulting with a structural engineer to evaluate the need for such study and its potential impact on construction costs. Terracon should be contacted if a site-specific ground motion study is desired.

Faulting and Estimated Ground Motions

The site is located in the southern California, which is a seismically active area. The type and magnitude of seismic hazards affecting the site are dependent on the distance to causative faults, the intensity, and the magnitude of the seismic event. As calculated using the USGS Unified Hazard Tool, the San Clemente fault, which is considered to have the most significant effect at the site from a design standpoint, has a maximum credible earthquake magnitude of 6.97 and is located approximately 8.27 kilometers from the site.

Based on the USGS Design Maps Summary Report, using the American Society of Civil Engineers (ASCE 7-16) standard, the peak ground acceleration (PGA_M) at the project site is expected to be 0.673 g. Based on the USGS Unified Hazard Tool, the project site has a mean magnitude of 6.58. Furthermore, the site is not located within an Alquist-Priolo Earthquake Fault Zone based on our review of the State Fault Hazard Maps.[2]

LIQUEFACTION

Liquefaction is a mode of ground failure that results from the generation of high pore water pressures during earthquake ground shaking, causing loss of shear strength. Liquefaction is typically a hazard where loose sandy soils exist below groundwater. The California Geological Survey (CGS) has designated certain areas as potential liquefaction hazard zones. These are areas considered at a risk of liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of a relatively shallow water table.

Based on our review of the California Geologic Survey maps, the proposed treatment facility is not located within a liquefaction potential zone based on the CGS map. The linear park at the flood control channel is located within the liquefaction potential zone. However, liquefaction analyses were performed for both treatment facility and linear park.

At both facility, subsurface soils encountered generally consisted of sand with varying amounts of silt and clay with interbedded layers of clay to boring termination depth. Groundwater was encountered at the time of drilling in the borings. Based on our review of plate 1.2 of the Seismic

[2] California Department of Conservation Division of Mines and Geology (CDMG), *"Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones of California, Southern Region"*, CDMG Compact Disc 2000-003, 2000.

Hazard Zone Report for the Thousand Oaks 7.5-minute Quadrangle, the highest groundwater depth reported in the vicinity of the project site is approximately 10 feet bgs.

A liquefaction analysis for the linear park site was performed in general accordance with the DMG Special Publication 117. The liquefaction study utilized the software "LiquefyPro" by CivilTech Software. This analysis was based on the soil data from the soil borings. A Peak Ground Acceleration (PGA_M) of 0.673 g and the mean magnitude of 6.58 for the project site were used. Calculations utilized the historical high groundwater depth. Settlement analysis used the Tokimatsu, M-correction method and the fines percentage were corrected for liquefaction using the Idriss and Seed method.

Based on calculation results, seismically induced settlement of saturated and unsaturated sands is estimated to be on the order of 1.3 inches within both treatment facility and linear park. Differential seismic settlement is anticipated to be between 0.7 and 0.9 inch. The detailed liquefaction potential analysis results are attached to this report in **Supporting Documents** section of the **Appendix**.

CORROSIVITY

The table below lists the results of laboratory soluble sulfate, soluble chloride, electrical resistivity, and pH testing. The values may be used to estimate potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Corrosivity Test Results Summary									
Boring	**Sample Depth (ft)**	**Soil Description**	**Soluble Sulfate (%)**	**Sulfides (ppm)**	**Chlorides (ppm)**	**Red-Ox Potential (mV)**	**Electrical Resistivity (Ω-cm)**	**Total Salts (ppm)**	**pH**
B-1	0-3.0	Clayey Sand	0.02	Nil	80	+684	1,116	1,238	7.58
B-9	0-5.0	Clayey Sand	0.01	Nil	55	+682	2,377	1,007	8.29

Results of soluble sulfate testing indicate samples of the on-site soils tested possess negligible sulfate concentrations when classified in accordance with Table 19.3.1.1 of the ACI Design Manual. Concrete should be designed in accordance with the exposure class S0 provisions of the ACI Design Manual, Section 318, Chapter 19.

STORMWATER MANAGEMENT

Three (3) in-situ percolation tests were performed to approximate depths of 5 and 10 feet bgs. A 2-inch thick layer of gravel was placed in the bottom of each boring after the borings were drilled to investigate the soil profile. A 3-inch diameter perforated pipe was installed on top of the gravel layer in each boring. Gravel was used to backfill between the perforated pipes and the boring sidewall. The borings were then filled with water for a pre-soak period of 24 hours. Testing began after a pre-soak period. At the beginning of the test, the pipes were refilled with water and readings were taken at standardized time intervals. Percolation rates are provided in the following table:

TEST RESULTS				
Test Location (depth, feet bgs)	**Soil Classification**	**Slowest Measured Percolation Rate (in/hr.)**	**Correlated Infiltration Rate[1] (in/hr.)**	**Water Head (in)**
B-4 (5-10')	Clayey Sand (SC) over Sandy Lean Clay (CL)	21.6	1.4	60
B-5 (5-15')	Sandy Lean Clay (CL)	3.5	<0.1	171
B-6 (0-5')	Clayey Sand (SC)	2.5	<0.3	37

[1]If proposed infiltration system will mainly rely on vertical downward seepage, the correlated infiltration rates should be used. The infiltration rates were correlated using the LA County Reduction Factor method.

Based on our test results, the correlated infiltration rates were generally found to be less than 0.3 in/hr. Therefore, infiltration onsite does not appear to be feasible from a geotechnical standpoint.

The field test results are not intended to be design rates. They represent the result of our tests, at the depths and locations indicated, as described above. The design rate should be determined by the designer by applying an appropriate factor of safety. Based on the County of Los Angeles Department of Public Works GS200.2 document, the following reduction factors are recommended:

LA County Reduction Factor	Value
RF_t	2
RF_v	1
RF_s	2
RF, Total Reduction Factor $RF=RF_t x RF_v x RF_s$	4

With time, the bottoms of infiltration systems tend to plug with organics, sediments, and other debris. Long term maintenance will likely be required to remove these deleterious materials to help reduce decreases in actual percolation rates.

The percolation tests were performed with clear water, whereas the storm water will likely not be clear, but may contain organics, fines, and grease/oil. The presence of these deleterious materials will tend to decrease the rate that water percolates from the infiltration systems. Design of the storm water infiltration systems should account for the presence of these materials and should incorporate structures/devices to remove these deleterious materials.

Based on the soils encountered in our borings, we expect the percolation rates of the soils could be different than measured in the field due to variations in fines and gravel content. The design elevation and size of the proposed infiltration system should account for this expected variability in infiltration rates.

It should be noted that siltation and vegetation growth along with other factors may affect the infiltration rates of the infiltration areas. The actual infiltration rate may vary from the values reported here. Infiltration systems should be located a minimum of 10 feet from any existing or proposed foundation system and existing channel wall.

GEOTECHNICAL OVERVIEW

The sites appear suitable for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the recommendations provided in this report are implemented in the design and construction phases of this project.

Within the treatment facility, a pump station vaults and underground storage chambers are proposed. These structures will be supported on mat or spread footing foundation system. Due to the low bearing capacity of subsurface soils, these foundations should bear on engineered fill extending to a minimum depth of 18 inches below the bottom of foundations or to the depth of undocumented fill materials, whichever is greater.

Within the linear park, spancrete decks are proposed on top of the existing channel. These decks are proposed to be supported on drilled piles. The proposed piles will be installed adjacent to the existing channel walls. In order to install the piles adjacent to the existing channel walls, the proposed piles should be installed with permanent casing. The permanent casing should extend to the bottom of the channel. Based on the as-built plans, the invert of the existing channel is between elevations of 836 and 844 feet above mean level within the project limit. Based on the top of the channel elevations, length of the permanent casing would be on the order of 12 feet.

Based on the findings summarized in this report, it is our professional opinion that the proposed construction will not be subjected to a hazard from settlement, slippage, or landslide, provided the recommendations of our report are incorporated into the proposed construction. It is also our opinion that the proposed construction will not adversely affect the geologic stability of the site or adjacent properties provided the recommendations contained in our report are incorporated into the proposed construction.

The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the **Exploration Results** section), engineering analyses, and our current understanding of the proposed project.

The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

The following recommendations include site preparation, excavation, subgrade preparation and placement of engineered fills on the project. The recommendations presented for design and construction of earth supported elements including foundations and exterior slabs are contingent upon following the recommendations outlined in this section.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation,

foundation bearing soils, and other geotechnical conditions exposed during the construction of the project.

Site Preparation

Strip and remove existing vegetation, debris and other deleterious materials from proposed construction areas. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction. The site should be initially graded to create a relatively level surface to receive fill and provide for a relatively uniform thickness of fill beneath proposed structures.

Our explorations indicate the site has approximately 2½ to 6½ feet of fill materials across the proposed treatment facility site. The fill soils consisted of clayey sand and lean clay with sand with debris. We recommend that all fill materials be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Although no evidence of underground facilities such as septic tanks, cesspools, basements, and utilities was not observed during the site reconnaissance, such features could be encountered during construction. If unexpected fills or underground facilities are encountered, such features should be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Subgrade Preparation

Within the treatment facility, due to the low bearing capacity of the subsurface soils, proposed foundations should bear on engineered fill extending to a minimum depth of 18 inches below the bottom of foundations or to the depth of undocumented fill materials, whichever is greater.

Large cobbles sized materials may be encountered near foundation levels. Such conditions could create point loads on the bottom of footings, increasing the potential for differential foundation movement. If such conditions are encountered, any cobbles should be removed and be replaced with engineered fill.

Exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of 10 inches, moisture conditioned, and compacted per the compaction requirements in this report.

Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively workable. However, the workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

Excavation

Within the treatment facility, excavations are anticipated for the construction of pump station vault and underground storage chambers. Additionally, open trench excavation is anticipated for the installation of the diversion pipes. It is anticipated that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. It should be noted that cobbles were encountered in the borings near the surface.

Some additional effort may be necessary to extract cobble, buried debris, boulder sized materials, particularly in deep narrow excavations such as utility trenches. Consideration should be given to obtaining a unit price for difficult excavation in the contract documents for the project.

The bottom of excavations should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

Depending upon depth of excavation and seasonal conditions, groundwater may be encountered in excavations on the site. Pumping from sumps may be utilized to control water within excavations. Well points may be required for significant groundwater flow, or where excavations penetrate groundwater to a significant depth. Excavation contractors are responsible for dewatering the planned temporary excavations.

Prior to the construction phase of the project, additional evaluation of groundwater and fluctuations in groundwater levels should be performed. Depending upon the depth of excavation and seasonal conditions, groundwater may be encountered within the excavations planned on the site.

We recommend that the pump station vaults and underground storage chambers be over-excavated by about 2 feet in plan area to provide adequate access around the excavation for construction. The walls of the proposed excavation should be shored or sloped in conformance with OSHA excavation and trench safety standards. If any excavation is extended to a depth of more than 20 feet, it will be necessary to have the side slopes designed by a professional engineer.

Within the treatment facility, the proposed grated trench crossing is to be constructed within the existing concrete lined channel running adjacent to the proposed treatment facility. Any excavation adjacent to the existing channel should follow the Los Angeles County Flood Control excavation guidelines.

Soils from the excavation should not be stockpiled higher than six (6) feet or within ten (10) feet of the edge of an open trench. Construction of open cuts adjacent to existing structures, including underground pipes, is not recommended within a 1½ H:1V plane extending beyond and down from the perimeter of the structure.

It may be necessary for the contractor to retain a geotechnical engineer to monitor the soils exposed in all excavations and provide engineering services for slopes. This will provide an opportunity to monitor the soils encountered and to modify the excavation slopes as necessary. It also offers an opportunity to verify the stability of the excavation slopes during construction.

Individual contractors are responsible for designing and constructing stable, temporary excavations. Excavations should be sloped or shored in the interest of safety following local, and federal regulations, including current OSHA excavation and trench safety standards.

Fill Materials and Placement

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than 6 inches in size. Pea gravel or other similar non-cementatious, poorly-graded materials should not be used as fill or backfill without the prior approval of the geotechnical engineer.

Clean on-site soils or approved imported materials may be used as fill material for the following. Such soils may be used as fill materials for the following:

- general site grading
- foundation areas
- exterior slab areas
- foundation backfill

Imported soils for use as fill material within proposed building and structure areas should conform to low volume change materials as indicated in the following specifications:

Gradation	**Percent Finer by Weight (ASTM C 136)**
3”	100
No. 4 Sieve	50-100
No. 200 Sieve	10-40

- Liquid Limit ..... 30 (max)
- Plasticity Index ..... 15 (max)
- Maximum expansion index* ..... 20 (max)

*ASTM D 4829

The contractor shall notify the Geotechnical Engineer of import sources sufficiently ahead of their use so that the sources can be observed and approved as to the physical characteristic of the import material. For all import material, the contractor shall also submit current verified reports from a recognized analytical laboratory indicating that the import has a "not applicable" (Class S0) potential for sulfate attack based upon current ACI criteria and is "mildly corrosive" to ferrous metal and copper. The reports shall be accompanied by a written statement from the contractor that the laboratory test results are representative of all import material that will be brought to the job.

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed 10 inches loose thickness.

Compaction Requirements

Recommended compaction and moisture content criteria for engineered fill materials are as follows:

Material Type and Location	Per the Modified Proctor Test (ASTM D 1557)		
	Minimum Compaction Requirement	Range of Moisture Contents for Compaction Above Optimum	
		Minimum	Maximum
On-site soils and low volume change imported fill:			
Beneath foundations:	90%	0%	+3%
Fill greater than 5 feet in depth	95%	0%	+3%
Miscellaneous backfill and behind retain walls:	90%	+0%	+3%
Utility trenches*:	90%	+2%	+3%
Bottom of excavation receiving fill:	90%	0%	+3%

* Upper 12 inches should be compacted to 95% within structural areas. Low-volume change imported soils should be used in structural areas.

Grading and Drainage

Positive drainage should be provided during construction and maintained throughout the life of the development. Infiltration of water into utility trenches or foundation excavations should be prevented during construction. Backfill against footings, exterior walls, and in utility trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration.

Utility Trenches

It is anticipated that the on-site soils and fill materials will provide suitable support for underground utilities and piping that may be installed. Any soft and/or unsuitable material encountered at the bottom of excavations should be removed and be replaced with an adequate bedding material. A non-expansive granular material with a sand equivalent greater than 30 should be used for bedding and shading of utilities, unless allowed or specified otherwise by the utility manufacturer.

On-site materials are considered suitable for backfill of utility and pipe trenches from one foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed beneath slabs or footings, the backfill should satisfy the gradation and expansion index requirements of engineered fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of slabs. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become desiccated, saturated, or disturbed, the affected material should be removed, or these materials should be scarified, moisture conditioned, and recompacted prior to foundation construction.

On-site clayey soils may pump, and unstable subgrade conditions could develop during general construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. The use of light construction equipment would aid in reducing subgrade disturbance. The use of remotely operated equipment, such as a backhoe, would be beneficial to perform cuts and reduce subgrade disturbance.

Should unstable subgrade conditions develop stabilization measures will need to be employed. Stabilization measures may include placement of aggregate base and multi-axial geogrid. Use of lime, fly ash, kiln dust or cement could also be considered as a stabilization technique. Laboratory evaluation is recommended to determine the effect of chemical stabilization on subgrade soils prior to construction.

We recommend that the earthwork portion of this project be completed during extended periods of dry weather if possible. If earthwork is completed during the wet season (typically November through April) it may be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork operations may require additional mitigative measures beyond that which would be expected during the drier summer and fall months. This could include diversion of surface runoff around exposed soils and draining of ponded water on the site. Once subgrades are established, it may be necessary to protect the exposed subgrade soils from construction traffic.

Based on our understanding of the project, we anticipate that excavations up to 11-½ feet below existing grade are planned for this project. The sides of below grade structure excavations may either be sloped or formed with vertical cuts. For vertical sided excavations greater than 5 feet in depth, the excavations will require the use of shoring, bracing or some form of retention to prevent sloughing and caving of the soil into the excavation.

As a safety measure, no equipment should be operated within 5 feet of the edge of the excavation and no materials should be stockpiled within 10 feet of the excavation. Excavations should not approach closer than a distance equal to the depth of excavation from existing structures/facilities without some form of protection for the facilities. Proper berming or ditching should be performed to divert any surface runoff away from the excavation.

Construction Observation and Testing

The geotechnical engineer should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation, proof-rolling, placement and compaction of controlled compacted fills, backfilling of excavations to the completed subgrade.

The exposed subgrade and each lift of compacted fill should be tested, evaluated, and reworked as necessary until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2500 square feet of compacted fill in the structure areas. One density and water content test for every 50 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. In the event that unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations. Based on our understanding of the project, we understand that a pump stations and underground storage chambers are proposed to be supported on mat or spread foundation system.

Foundation Design Recommendations

DESCRIPTION	RECOMENDATION
Foundation Type	Reinforced mat foundations or conventional spread foundations
Bearing Material	A minimum of 18 inches of engineered fill.
Design Modulus of Subgrade Reaction, k*	150 pci
Modulus Correction Factor*	$k_c = k/B$ – bottom of footing is in clay $k_c = k\,[(B+1)/2B)]^2$ – bottom of footing is in sand
Allowable Bearing Capacity	1,500 psf
Minimum Width	24 inch
Minimum Depth	2 feet
Total Estimated Static Settlement	1 inch or less
Estimated Differential Settlement	½ inch
*K values should be reduced to account for dimensional effects of large loaded areas. Where k_c is the corrected or design modulus value and B is the mat width in feet.	

Foundation excavations should be observed by the geotechnical engineer. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required

DEEP FOUNDATIONS

Deep Foundation Design Recommendations

Within the linear park, spancrete decks are proposed on top of the existing channel and these decks will be supported on drilled piles. Due to the proximity to the existing channel walls, the drilled piles should be installed within permanent casings extending to bottom of the existing channel.

DESCRIPTION	VALUE
Structures	Proposed spancrete decks
Minimum Dimensions	Minimum drilled shaft diameter of 24 inches Straight sided shafts with Permanent Casing
Anticipated Length of Permanent Casing	12 feet
Total Estimated Settlement	Less than 1 inch

The allowable axial shaft capacities were determined using side friction and end bearing components of resistance. Permanent casings will be installed to approximate depth of 12 feet. Allowable skin friction, allowable total capacity and estimated settlement charts are attached to this report. The allowable uplift capacities should only be based on the side friction of the shaft; however, the weight of the foundation should be added to these values to obtain the actual allowable uplift capacities for drilled shafts. The allowable skin friction and bearing capacity values are based on a minimum factor of safety of 2.5.

It is our understanding that lateral demand and pile head deflections of these drilled piles are not anticipated. Structural designers should verify the lateral demand and pile head deflections. If pile head deflections are anticipated, Terracon should be notified regarding lateral capacity analysis. Furthermore, structural designers also should verify the integrity of the existing channel wall due to any additional stresses imposed by pile head movement.

Drilled shafts should have a minimum (center-to-center) spacing of three diameters. Closer spacing may require a reduction in axial load capacity. Axial capacity reduction can be determined by comparing the allowable axial capacity determined from the sum of individual shafts in a group versus the capacity calculated using the perimeter and base of the shaft group acting as a unit. The lesser of the two capacities should be used in design.

We recommend that all drilled shaft installations be observed on a full-time basis by Terracon in order to confirm that soils encountered are consistent with the recommended design parameters.

Deep Foundation Construction Considerations

Drilling to design depths should be possible with conventional single flight power augers. For drilled shaft depths above the depth of groundwater, temporary steel casing will likely be required to properly drill and clean shafts prior to concrete placement. For drilled shaft depths below groundwater level, we recommend the use of slurry drilling methods with polymers to keep the solids in suspension during the drilling.

Drilled shaft foundation concrete should be placed immediately after completion of drilling and cleaning. If foundation concrete cannot be placed in dry conditions, a tremie should be used for concrete placement. Due to potential sloughing and raveling, foundation concrete quantities may exceed calculated geometric volumes.

If temporary casing is used for drilled shaft construction, it should be withdrawn in a slow continuous manner maintaining a sufficient head of concrete to prevent infiltration of water or the creation of voids in shaft concrete. Shaft concrete should have a relatively high fluidity when placed in cased shaft holes or through a tremie. Shaft concrete with slump in the range of 6 to 8 inches is recommended. Formation of mushrooms or enlargements at the tops of shafts should be avoided during shaft drilling. If mushrooms develop at the tops of the shafts during drilling, sono-tubes should be placed at the shaft tops to help isolate the shafts.

We recommend that all drilled shaft installations be observed on a full-time basis by Terracon in order to evaluate that the soils encountered are consistent with the recommended design parameters. If the subsurface soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

The contractor should check for gas and/or oxygen deficiency prior to any workers entering the excavation for observation and manual cleanup. All necessary monitoring and safety precautions as required by OSHA, State or local codes should be strictly enforced.

LATERAL EARTH PRESSURES

Cantilevered Shoring Recommendations

For engineered fill comprised of on-site materials above any free water surface, recommended equivalent fluid pressures for unrestrained foundation elements are:

ITEM	VALUE[a, b]
Active Case	38
Passive Case	375
At-Rest Case	58
Coefficient of Friction	0.35
Surcharge Pressure	0.3*(Surcharge)

[a]Note: The values are based on on-site soils used as backfill.

[b]Note: Uniform, horizontal backfill, compacted to at least 90% of the ASTM D 1557 maximum dry density, rendering a maximum unit weight of 125 pcf.

The lateral earth pressures herein do not include any factor of safety and are not applicable for submerged soils/hydrostatic loading. Additional recommendations may be necessary if such conditions are to be included in the design.

The design of any shoring system should consider surcharge loads imposed by the existing structures and vehicular loads in the vicinity of the shoring. In general, surcharge loads should be considered where they are located within a horizontal distance behind the shoring equal to the height of the shoring.

Surcharge loads acting at the top of the shoring should be applied to the shoring over the backfill as a uniform pressure over the entire shoring height and should be added to the static earth pressures. Surcharge stresses due to point loads, line loads, and those of limited extent, such as compaction equipment, should be evaluated using elastic theory.

Braced Shoring Recommendations

For the design of braced shoring, we recommend such shoring be designed using a rectangular-shaped distribution of lateral earth pressure of 25H (in psf) (H is the total height of excavation).

The design of the shored excavation should be performed by an engineer knowledgeable and experienced with the on-site soil conditions. The contractor should be aware that slope height, slope inclination or excavation depths should in no case exceed those specified in local, state or federal safety regulations, e.g. OSHA Health and Safety Standards for Excavation, 29 CFR Part 1926, or successor regulations. Such regulations are strictly enforced and, if not followed, the owner or the contractor could be liable for substantial penalties.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Sub-Project	Boring	Type of Boring	Boring Depth (feet)
Treatment Facility	B-1	Hollow-Stem Auger Boring	26.0
	B-2, B-2A and B-2B	Hollow-Stem Auger Boring	2.5 to 6.5*
	B-3	Hollow-Stem Auger Boring	25.5
	B-4	Percolation Test Boring	10.0
	B-5	Percolation Test Boring	15.0
	B-6	Percolation Test Boring	5.0
	B-7	Hollow-Stem Auger Boring	25.3
Linear Park	B-8	Hollow-Stem Auger Boring	36.0*
	B-9	Hollow-Stem Auger Boring	31.0*
	B-10, B-10A	Hollow-Stem Auger Boring	21.0*
	B-11	Hollow-Stem Auger Boring	23.0*

*Refusal encountered.

Boring Layout and Elevations: Boring layout was prepared by Terracon personnel. The borings were located in the field by using the proposed site plan, an aerial photograph of the site, and handheld GPS. The accuracy of boring locations should only be assumed to the level implied by the method used.

Subsurface Exploration Procedures: We advanced the borings with a truck and track-mounted drill rig using continuous hollow stem flight augers. Samples were obtained at intervals of 5 feet. Soil sampling was performed using split-barrel sampling procedures. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon is driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. A 2.5-inch O.D. split-barrel Modified California sampling spoon with 2.0-inch I.D. tube lined sampler was also used for sampling. The Modified California split-barrel sampling procedures are similar to standard split spoon sampling procedure; however, blow counts are typically recorded for 6-inch intervals for a total of 18 inches of penetration. In addition, we observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with cement grout after their

completion and surface patched with rapid set concrete. Excess soil cuttings were spread evenly in dirt areas along the site.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D7263 Standard Test Methods for Laboratory Determination of Dry Density (Unit Weight) of Soil Specimens
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D1140 Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing
- ASTM D3080 Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions
- Corrosivity Testing will include pH, chlorides, sulfates, sulfides, Redox potential, and electrical lab resistivity

The laboratory testing program included examination of soil samples by an engineer. Based on the material’s texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

SITE LOCATION AND EXPLORATION PLANS

SITE LOCATION

Agoura Hills County Yard Treatment Facility and Linear Park ■ Agoura Hills, CA
February 5, 2020 ■ Terracon Project No. 60195152

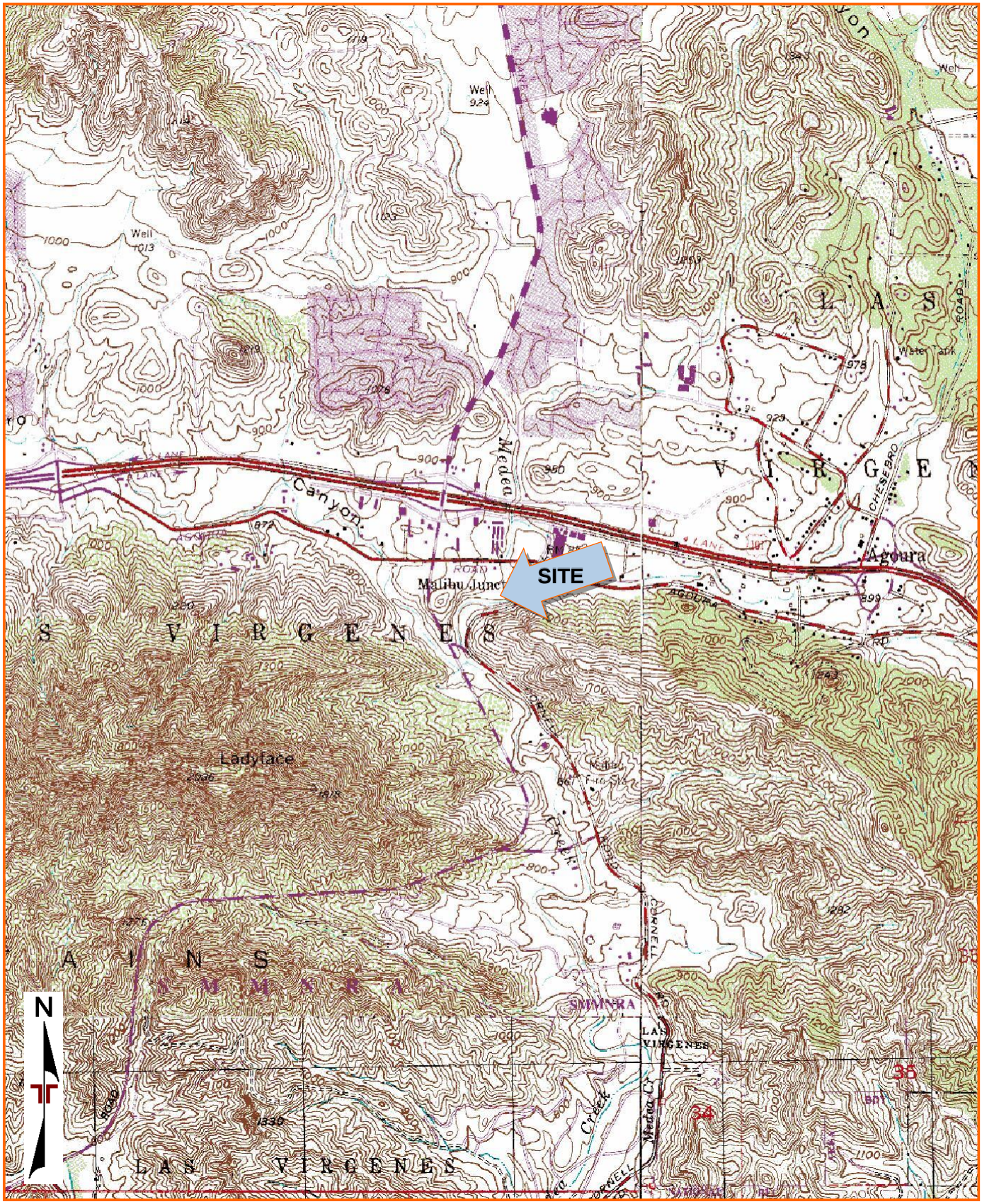


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY QUADRANGLES INCLUDE: THOUSAND OAKS, CA (1/1/1981), CALABASAS, CA (1/1/1967), POINT DUME, CA (1/1/1995) and MALIBU BEACH, CA (1/1/1995).

EXPLORATION PLAN

Agoura Hills County Yard Treatment Facility and Linear Park ■ Agoura Hills, CA
February 5, 2020 ■ Terracon Project No. 60195152

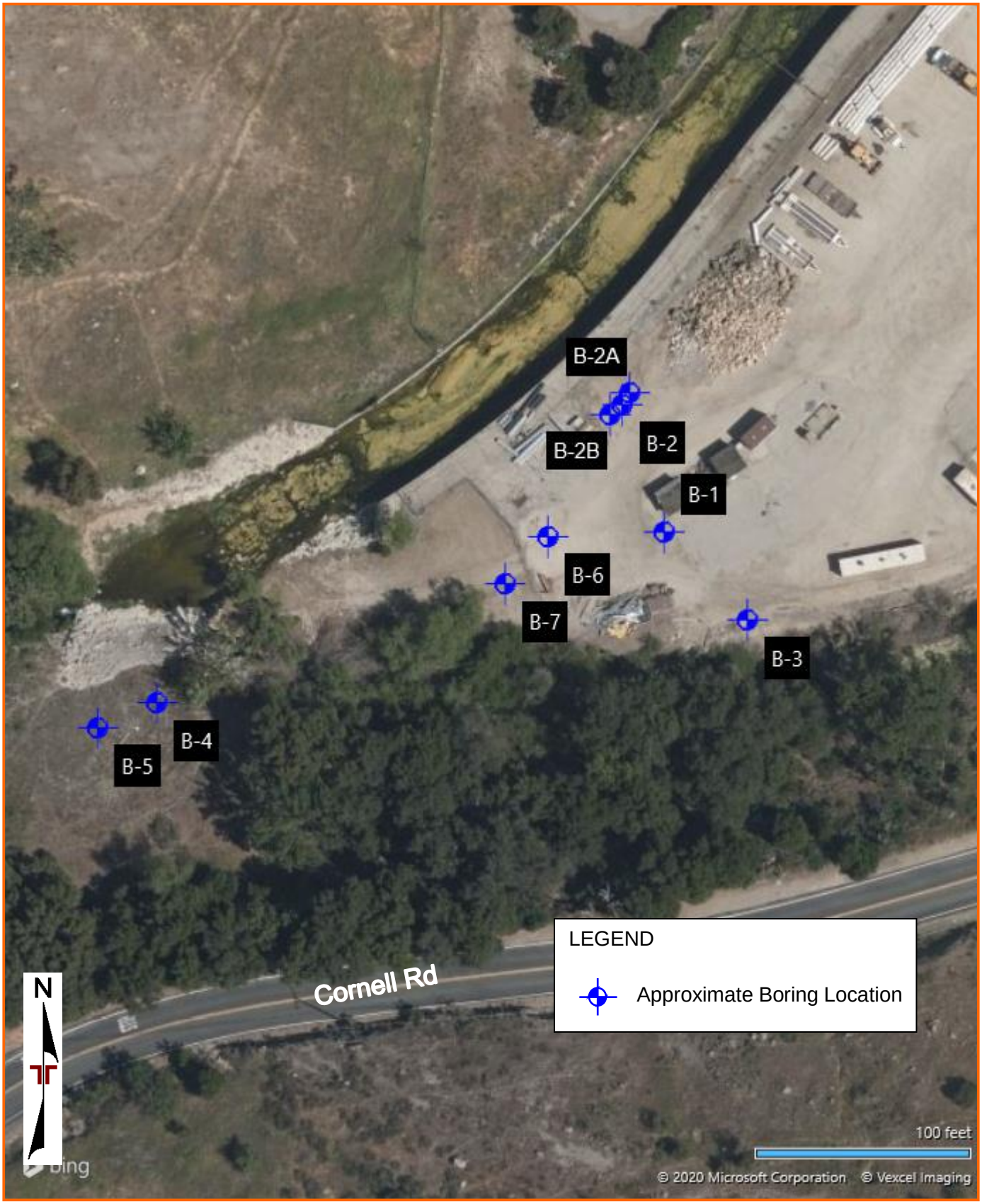


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Agoura Hills County Yard Treatment Facility and Linear Park ■ Agoura Hills, CA
February 5, 2020 ■ Terracon Project No. 60195152

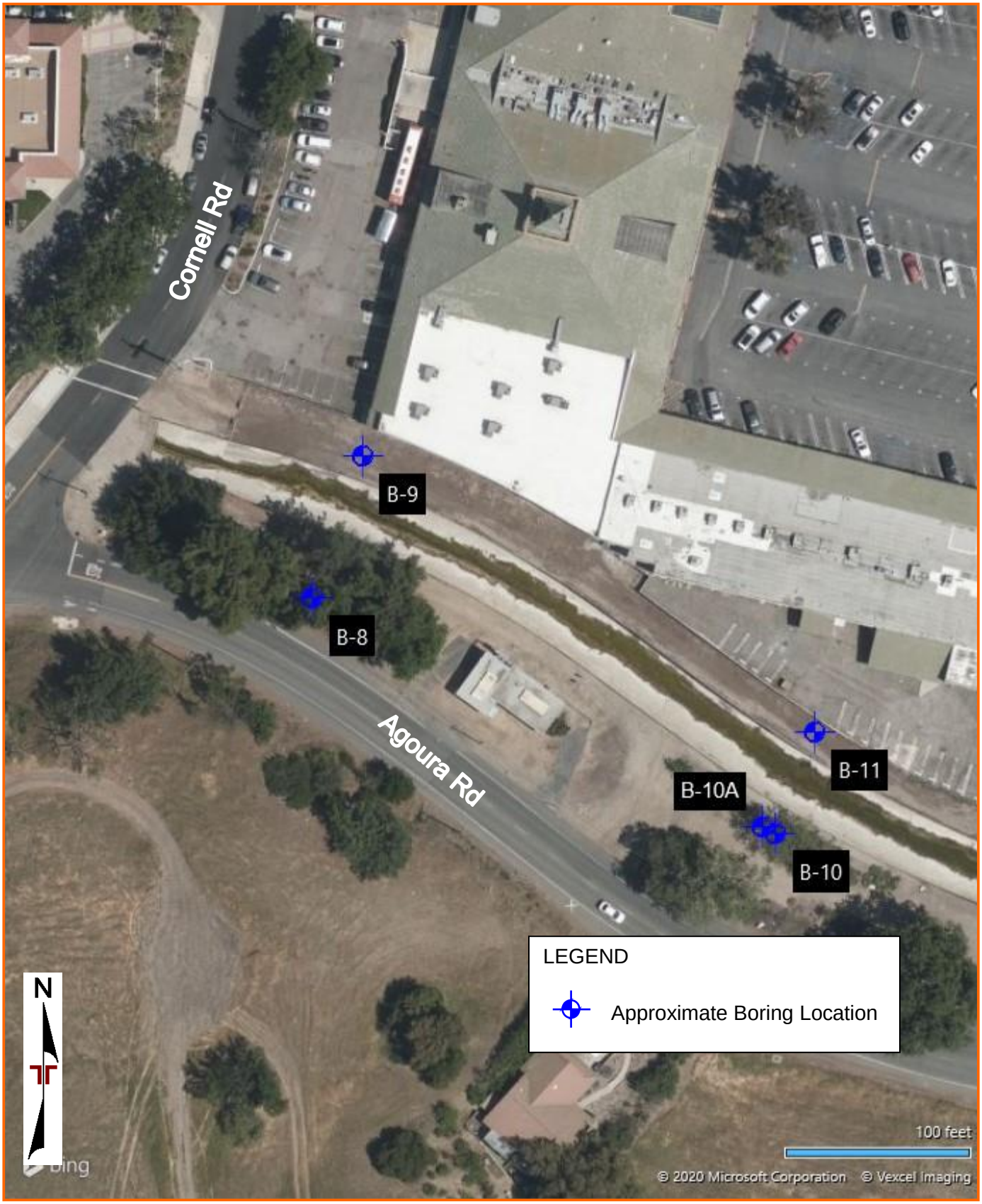


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

BORING LOG NO. B-01

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.142° Longitude: -118.7584°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
		FILL - CLAYEY SAND (SC), medium plasticity, light brown, brick-like colored material along with plastics and other trash										36-20-16	32
3.0		**CLAYEY SAND (SC)**, light brown, medium dense				11-14-15				15	96		
			5			6-6-6 N=12							
		brown, loose, disturbed sample				6-6-6				18	88		
		trace gravel, grayish brown	10	▽		2-3-3 N=6							48
		dark brown				2-4-6				27	94		
		grayish brown	15			3-4-4 N=8							
20.0		**CLAYEY SAND WITH GRAVEL (SC)**, light brown, medium dense	20			7-17-30				20	113		
26.0		blackish brown, very dense	25			10-50/6"							
		Boring Terminated at 26 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

The estimated depth of the fill materials should not be considered exact due to the similarity of lithology, color and densities of the graded materials and native soils.

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-15-2020 | Boring Completed: 01-15-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-02

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.1421° Longitude: -118.7585°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
											33-19-14	34
					7-10-50/5"				23	100		
		5			6-50/6"							
6.0												
6.5												

FILL - CLAYEY SAND (SC), trace gravel, trace cobbles, medium plasticity, dark brown, asphalt chunks, brick-like colored material

very stiff, trace cobbles

trace gravel, light brown, very dense

FILL - POORLY GRADED GRAVEL (GP)

Auger Refusal at 6.5 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

The estimated depth of the fill materials should not be considered exact due to the similarity of lithology, color and densities of the graded materials and native soils.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-15-2020 | Boring Completed: 01-15-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-02A

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 34.1421° Longitude: -118.7585° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	FILL - LEAN CLAY WITH SAND (CL), trace gravel, trace cobbles, dark brown, asphalt chunks, brick-like colored material, and plastic 2.5											
	Auger Refusal at 2.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

The estimated depth of the fill materials should not be considered exact due to the similarity of lithology, color and densities of the graded materials and native soils.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-15-2020 | Boring Completed: 01-15-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-02B

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.1421° Longitude: -118.7585°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	FILL - LEAN CLAY WITH SAND (CL), trace gravel, trace cobbles, dark brown, asphalt chunks, brick-like colored material, and plastic											
	4.0											
	Auger Refusal at 4 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

The estimated depth of the fill materials should not be considered exact due to the similarity of lithology, color and densities of the graded materials and native soils.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-15-2020

Boring Completed: 01-15-2020

Drill Rig: CME 75

Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-03

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.1419° Longitude: -118.7583°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
											31-19-12	29
		5			7-7-7				16	103		
10.0												
SANDY LEAN CLAY (CL), brown and dark gray, medium stiff to stiff		10			2-4-4 N=8							52
15.0			▽									
SILTY SAND (SM), trace gravel, gray, very loose, disturbed sample observed tree roots during sampling		15			5-4-2				26	90		
tan, loose		20			1-2-3 N=5							15
25.5 very dense		25			50/6"				25	94		
Boring Terminated at 25.5 Feet												

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-15-2020 | Boring Completed: 01-15-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-04

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.1417° Longitude: -118.7592°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, dark brown										35-20-15	50
	7.5	5										
	SANDY LEAN CLAY (CL), tan to light brown, very stiff				7-7-14 N=21							53
	10.0	10										
	Boring Terminated at 10 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-15-2020 | Boring Completed: 01-15-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-05

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.1417° Longitude: -118.7593°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, trace cobbles											
	5.0	5			2-2-4 N=6							
	SANDY LEAN CLAY (CL), trace gravel, dark brown, medium stiff											
	tan to light brown, stiff	10			5-5-6 N=11							
	light brown, medium stiff		▽		3-3-2 N=5							
	15.0	15										
	Boring Terminated at 15 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-15-2020 | Boring Completed: 01-15-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-06

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.142° Longitude: -118.7586°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, trace cobbles, brown											
	5.0	5										
	Boring Terminated at 5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-15-2020 | Boring Completed: 01-15-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-07

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.1419° Longitude: -118.7587°

DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
CLAYEY SAND (SC), trace gravel, trace cobbles, medium plasticity, brown										37-21-16	27
trace gravel, brown, medium dense	5			3-4-9 N=13							
black to brown, loose	10	▽		2-3-4 N=7							42
trace gravel, dark gray, very loose	15	▽		4-1-1 N=2							
grayish brown, very dense	20			50/5"							
25.0 / 25.3 **POORLY GRADED SAND (SP)**, trace gravel, trace silt, grayish brown, very dense	25			50/3"							
Boring Terminated at 25.3 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

▽ *At completion of drilling*

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-15-2020 | Boring Completed: 01-15-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-08

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.1434° Longitude: -118.7556°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, medium plasticity, brown										31-18-13	43
	brown to light brown, medium dense	5			9-15-16				10	102		
	light brown	10			3-5-5 N=10						29-18-11	39
	15.0 **SANDY LEAN CLAY (CL)**, brown, stiff	15	▽		4-6-7				30	88		
	20.0 **SILTY SAND (SM)**, trace gravel, tan to brown, medium dense	20			3-5-7 N=12							18
	25.0 **CLAYEY SAND (SC)**, light brown, medium dense, disturbed sample	25			4-14-25				31	88		
	30.0	30										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-16-2020 | Boring Completed: 01-16-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-08

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.1434° Longitude: -118.7556°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	POORLY GRADED SAND WITH CLAY (SP-SC), trace gravel, brown, medium dense				2-5-18 N=23							12
	tan, very dense	35			50/3"				20	107		
	36.0											
	Auger Refusal at 36 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-16-2020 | Boring Completed: 01-16-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-09

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.1436° Longitude: -118.7556°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
											36-21-15	49
		5			6-8-9				15	109		
10.0		10			3-4-2 N=6							20
15.0		15			23-37-35				17	108		
		20	▽		50/6"							
25.0		25			50/6"				30	100		
30.0		30										

CLAYEY SAND (SC), trace gravel, medium plasticity, brown

light brown to brown, loose

SILTY CLAYEY SAND (SC-SM), trace gravel, light brown, loose

SANDY LEAN CLAY (CL), brown, hard

CLAYEY SAND (SC), brown, very dense

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-16-2020 | Boring Completed: 01-16-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-09

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.1436° Longitude: -118.7556°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	31.0				50/3"							

SANDY LEAN CLAY (CL), blackish gray, hard, trace cobbles

Auger Refusal at 31 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-16-2020 | Boring Completed: 01-16-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-10

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.143° Longitude: -118.7548°

DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.0	**CLAYEY SAND (SC)**, trace gravel, brown										31-17-14	40
	medium dense	5			5-6-8 N=14							
10.0	**CLAYEY SAND WITH GRAVEL (SC)**, tan, medium dense	10			12-17-8 N=25							
15.0	**SANDY LEAN CLAY WITH GRAVEL (CL)**, olive brown, hard	15			16-50/5"							
21.0	brown	20			50/6"							
	Auger Refusal at 21 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-16-2020 | Boring Completed: 01-16-2020

Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-10A

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.143° Longitude: -118.7548°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, brown	5										
	7.5											
	Auger Refusal at 7.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-16-2020

Boring Completed: 01-16-2020

Drill Rig: CME 75

Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

BORING LOG NO. B-11

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

CLIENT: CWE Corp
Fullerton, CA

SITE: S/W and N/E Corner of Agoura Road and Cornell Road
Agoura Hills, CA

LOCATION See Exploration Plan

Latitude: 34.1432° Longitude: -118.7548°

DEPTH	GRAPHIC LOG	DESCRIPTION	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0		**SILTY SAND (SM)**, trace gravel, light brown										22
5.0		**POORLY GRADED SAND (SP)**, trace gravel, light brown, loose			4-5-4 N=9							
7.5		**CLAYEY SAND (SC)**, trace gravel, trace cobbles, brown loose			4-6-9				24	101	37-22-15	44
15.0		**SANDY LEAN CLAY (CL)**, brown, hard, trace cobbles	▽		14-22-50/5"							
20.0		**POORLY GRADED GRAVEL (GP)**, brown, very dense, trace cobbles			50/6"							
23.0		***Auger Refusal at 23 Feet***										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 01-16-2020 | Boring Completed: 01-16-2020

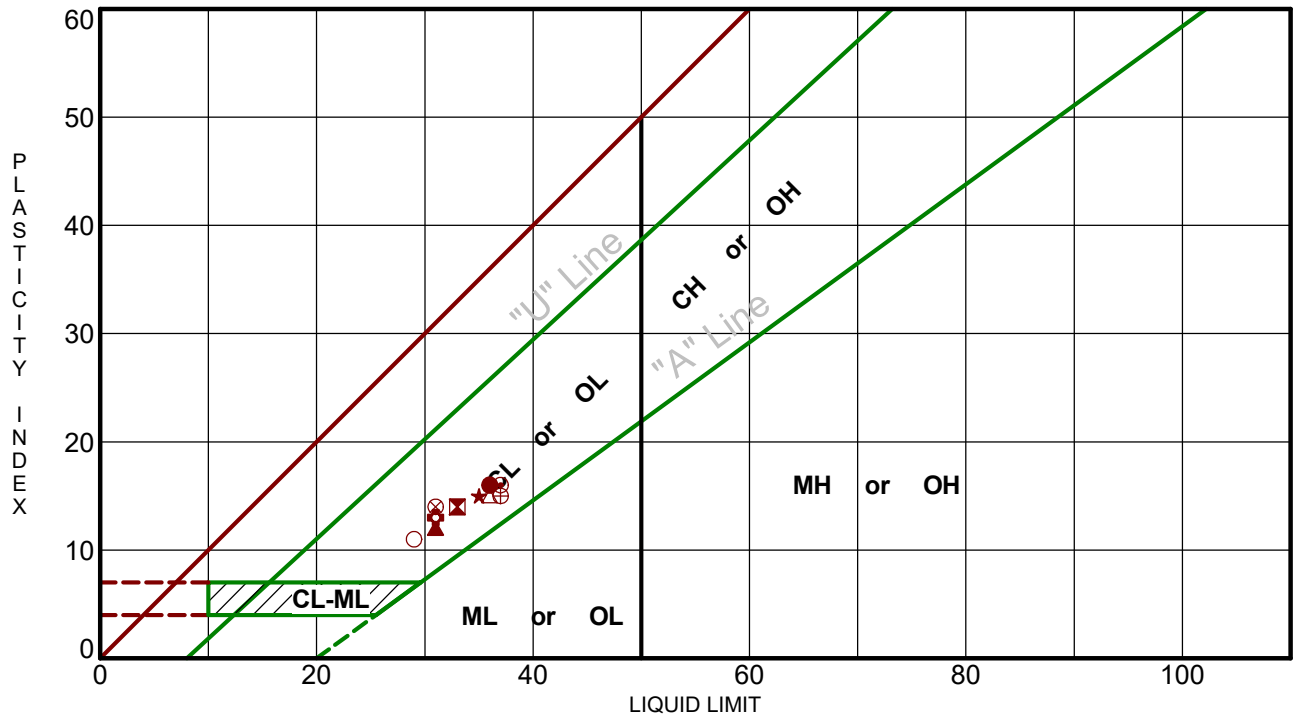
Drill Rig: CME 75 | Driller: 2R Drilling

Project No.: 60195152

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/6/20

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth	LL	PL	PI	Fines	USCS	Description
●	B-01	0 - 3	36	20	16	31.9	SC	CLAYEY SAND
⊠	B-02	0 - 3	33	19	14	34.3	SC	CLAYEY SAND
▲	B-03	0 - 5	31	19	12	29.3	SC	CLAYEY SAND
★	B-04	0 - 5	35	20	15	49.8	SC	CLAYEY SAND
⊙	B-07	0 - 5	37	21	16	27.0	SC	CLAYEY SAND
✿	B-08	0 - 5	31	18	13	42.6	SC	CLAYEY SAND
○	B-08	10 - 11.5	29	18	11	39.5	SC	CLAYEY SAND
△	B-09	0 - 5	36	21	15	48.6	SC	CLAYEY SAND
⊗	B-10	0 - 5	31	17	14	39.6	SC	CLAYEY SAND
⊕	B-11	10 - 11.5	37	22	15	44.0	SC	CLAYEY SAND

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

SITE: Southwest and Northeast Corner of Agoura Road and Cornell Road Aguora Hills, CA

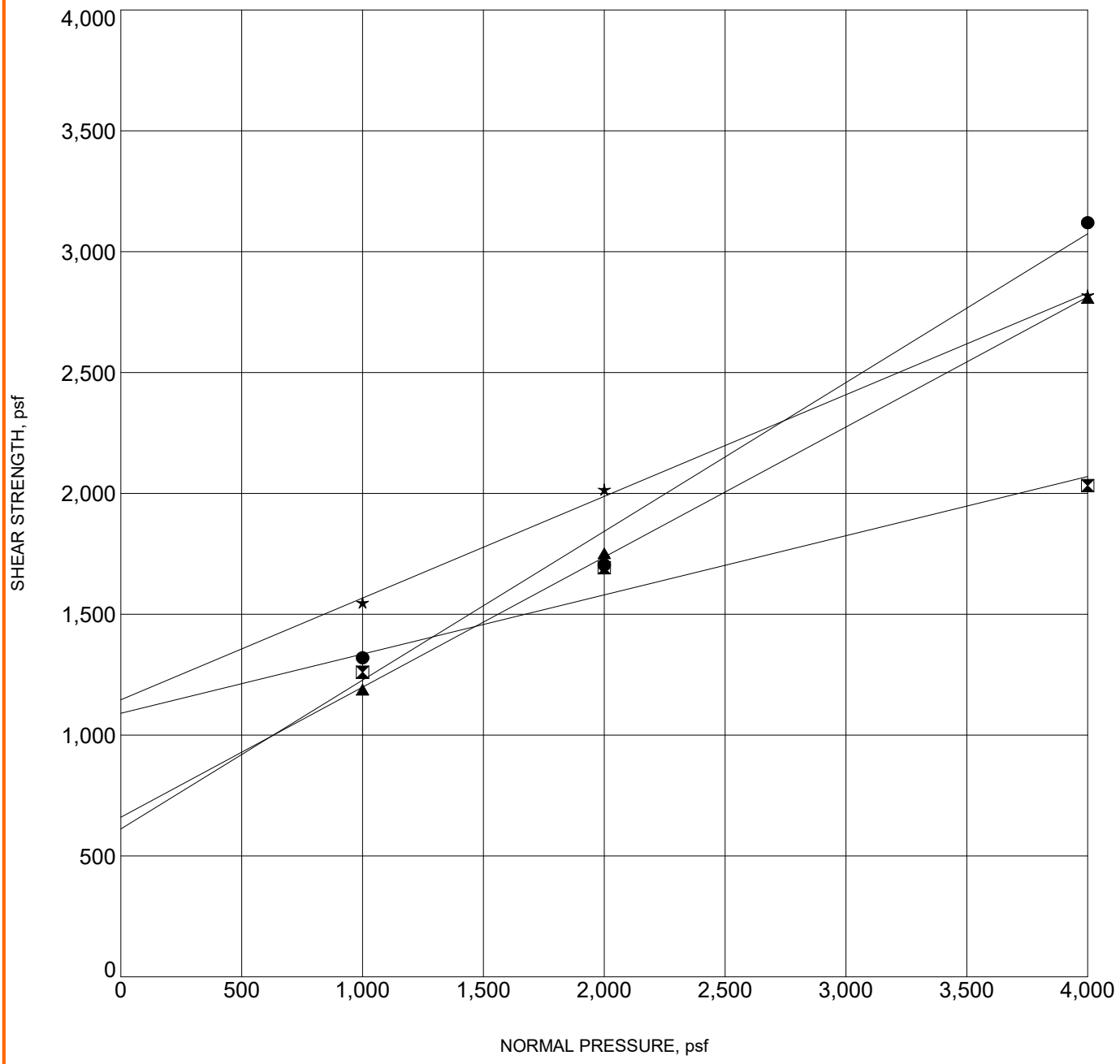
Terracon
1421 Edinger Ave, Ste C
Tustin, CA

PROJECT NUMBER: 60195152

CLIENT: CWE Corp
Fullerton, CA

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/3/20

DIRECT SHEAR TEST ASTM D3080



Specimen Identification			Classification	γ_d, pcf	WC,%	c, psf	$\phi°$
●	B-03	15.0ft	SILTY SAND (SM)	90	26	612	32
⧓	B-08	5.0ft	CLAYEY SAND (SC)	102	10	1090	14
▲	B-08	15.0ft	SANDY LEAN CLAY (CL)	88	30	660	28
★	B-11	10.0ft	CLAYEY SAND (SC)	101	24	1146	23

PROJECT: Agoura Hills Stormwater Treatment Facility and Linear Park

SITE: S/W and N/E Corner of Agoura Road and Cornell Road Agoura Hills, CA

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

PROJECT NUMBER: 60195152

CLIENT: CWE Corp
Fullerton, CA

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. TC_DIRECT_SHEAR 60195152 AGOURA HILLS STOR.GPJ TERRACON_DATATEMPLATE.GDT 2/5/20

SUPPORTING INFORMATION

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or [Cc<1 or Cc>3.0] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or [Cc<1 or Cc>3.0] [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K, L, M, N]
			Liquid limit - not dried			Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K, L, M, P]
			Liquid limit - not dried			Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

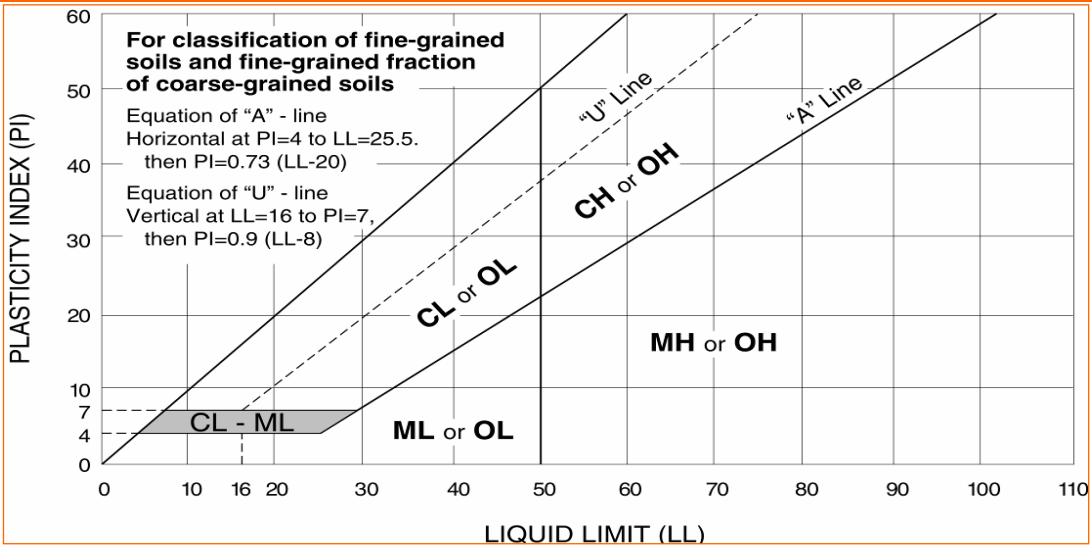
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



GENERAL NOTES

Terracon GeoReport

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING


Auger


Shelby Tube


Split Spoon


Rock Core


Macro Core


Modified California Ring Sampler


Grab Sample


No Recovery


Modified Dames & Moore Ring Sampler

WATER LEVEL


Water Initially Encountered


Water Level After a Specified Period of Time


Water Level After a Specified Period of Time

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	Hand Penetrometer
(T)	Torvane
(b/f)	Standard Penetration Test (blows per foot)
N	N value
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer
(WOH)	Weight of Hammer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength, Qu, psf**	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**
Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15	10 - 18
Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30	19 - 42
			Hard	> 8,000	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

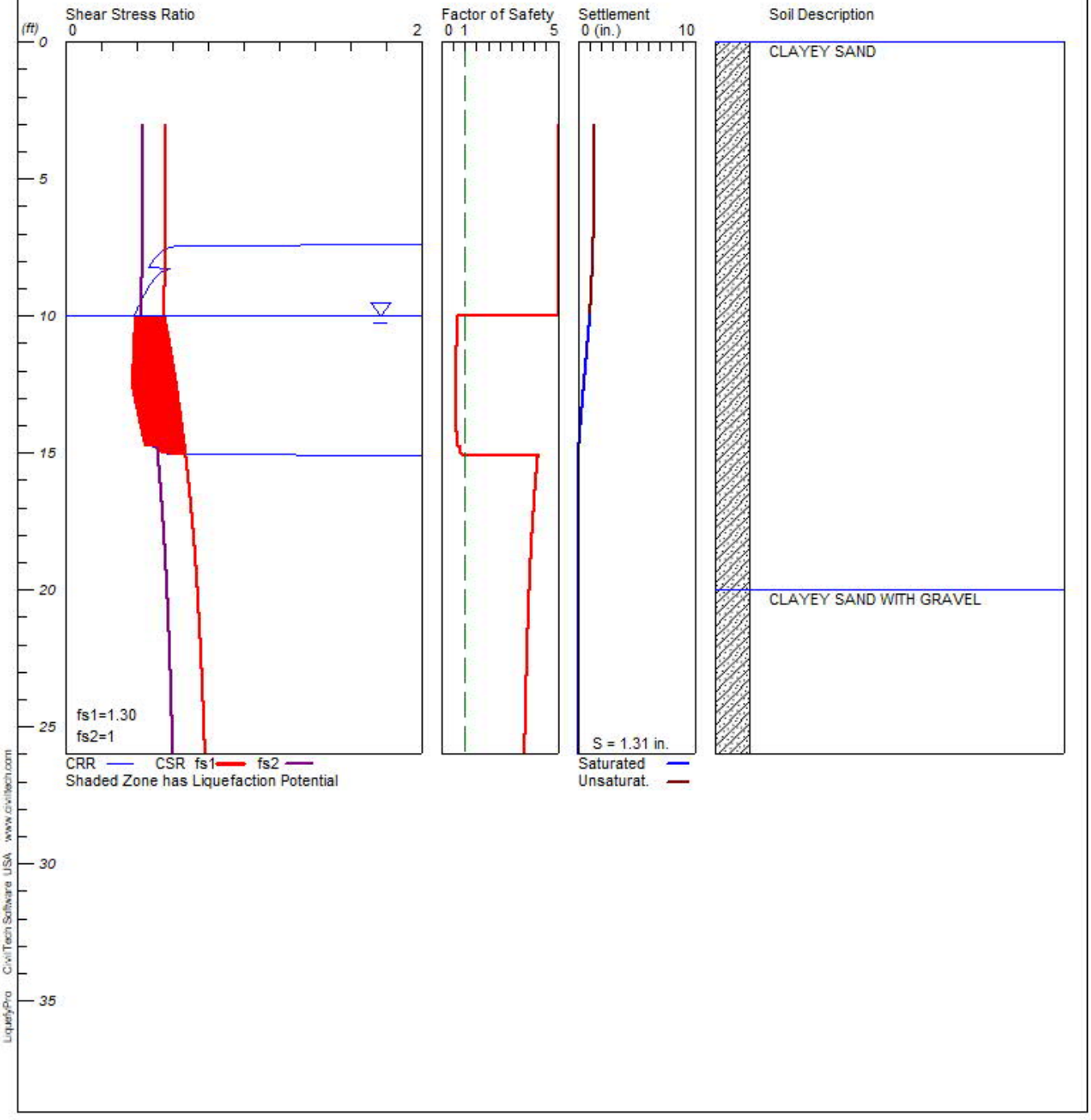
Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

LIQUEFACTION ANALYSIS

Agoura Hills Stormwater Treatment Facility

Hole No.=B-1 Water Depth=10 ft

Magnitude=6.58
Acceleration=0.673g



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LIQUEFACTION ANALYSIS SUMMARY

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Input File Name: N:\Projects\2019\60195152\Working Files\Calculations-Analyses\Liquefaction\60195152 B-1.liq
Title: Agoura Hills Stormwater Treatment Facility
Subtitle: 60195152

Surface Elev.=
Hole No.=B-1
Depth of Hole= 26.00 ft
Water Table during Earthquake= 10.00 ft
Water Table during In-Situ Testing= 10.00 ft
Max. Acceleration= 0.67 g
Earthquake Magnitude= 6.58

Input Data:
Surface Elev.=
Hole No.=B-1
Depth of Hole=26.00 ft
Water Table during Earthquake= 10.00 ft
Water Table during In-Situ Testing= 10.00 ft
Max. Acceleration=0.67 g
Earthquake Magnitude=6.58
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Ishihara / Yoshimine
3. Fines Correction for Liquefaction: Modify Stark/Olson
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.45
7. Borehole Diameter, Cb= 1.15
8. Sampling Method, Cs= 1.2
9. User request factor of safety (apply to CSR) , User= 1.3
   Plot two CSR (fs1=User, fs2=1)
10. Use Curve Smoothing: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
3.00	19.00	110.00	48.00
5.00	12.00	107.00	48.00
7.50	8.00	103.00	48.00
10.00	6.00	119.00	48.00
12.50	6.00	119.00	48.00
15.00	8.00	119.00	48.00
20.00	30.00	136.00	40.00
25.00	50.00	136.00	40.00

Output Results:

Settlement of Saturated Sands=0.98 in.
Settlement of Unsaturated Sands=0.34 in.
Total Settlement of Saturated and Unsaturated Sands=1.31 in.
Differential Settlement=0.657 to 0.867 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
3.00	2.79	0.56	5.00	0.98	0.34	1.31
4.00	2.79	0.56	5.00	0.98	0.34	1.31
5.00	2.79	0.56	5.00	0.98	0.33	1.31
6.00	2.79	0.56	5.00	0.98	0.33	1.30
7.00	2.79	0.56	5.00	0.98	0.31	1.29
8.00	0.49	0.56	5.00	0.98	0.25	1.23
9.00	0.46	0.56	5.00	0.98	0.13	1.11
10.00	0.39	0.56	0.69*	0.98	0.00	0.98
11.00	0.38	0.58	0.65*	0.78	0.00	0.78
12.00	0.37	0.61	0.61*	0.58	0.00	0.58
13.00	0.38	0.63	0.60*	0.36	0.00	0.36
14.00	0.42	0.65	0.63*	0.17	0.00	0.17
15.00	0.54	0.67	0.80*	0.01	0.00	0.01
16.00	2.79	0.69	4.04	0.00	0.00	0.00
17.00	2.79	0.71	3.96	0.00	0.00	0.00
18.00	2.79	0.72	3.88	0.00	0.00	0.00
19.00	2.79	0.73	3.82	0.00	0.00	0.00
20.00	2.79	0.74	3.77	0.00	0.00	0.00
21.00	2.79	0.75	3.72	0.00	0.00	0.00
22.00	2.79	0.76	3.68	0.00	0.00	0.00
23.00	2.79	0.77	3.65	0.00	0.00	0.00
24.00	2.79	0.77	3.62	0.00	0.00	0.00
25.00	2.79	0.78	3.59	0.00	0.00	0.00
26.00	2.79	0.78	3.57	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight =

pcf; Depth = ft; Settlement = in.

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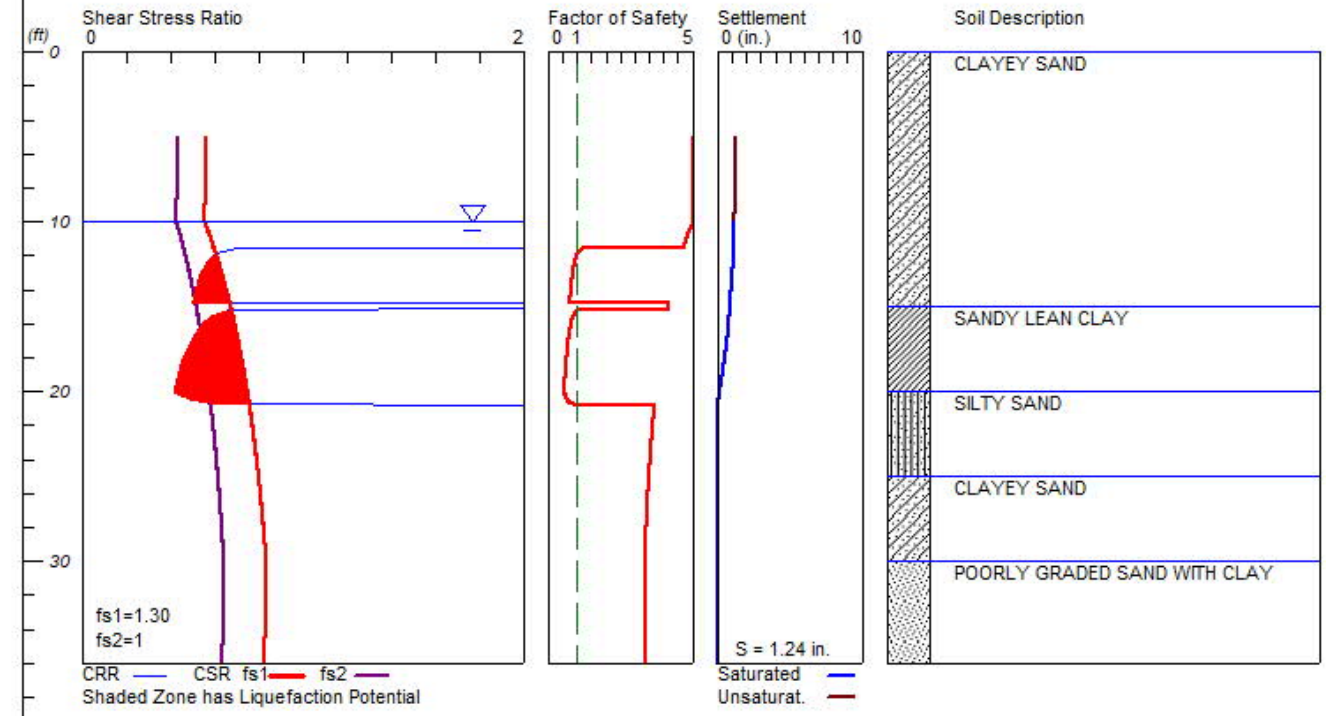
1 atm (atmosphere) = 1 tsf (ton/ft2)
CRRm Cyclic resistance ratio from soils
CSRsf Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat Settlement from saturated sands
S_dry Settlement from Unsaturated Sands
S_all Total Settlement from Saturated and Unsaturated Sands
NoLiq No-Liquefy Soils

LIQUEFACTION ANALYSIS

Agoura Hills Linear Park

Hole No.=B-8 Water Depth=10 ft

Magnitude=6.58
Acceleration=0.673g



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LIQUEFACTION ANALYSIS SUMMARY

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Input File Name: N:\Projects\2019\60195152\Working Files\Calculations-Analyses\Liquefaction\60195152 B-8.liq
Title: Agoura Hills Linear Park
Subtitle: 60195152

Surface Elev.=
Hole No.=B-8
Depth of Hole= 36.00 ft
Water Table during Earthquake= 10.00 ft
Water Table during In-Situ Testing= 18.30 ft
Max. Acceleration= 0.67 g
Earthquake Magnitude= 6.58

Input Data:
Surface Elev.=
Hole No.=B-8
Depth of Hole=36.00 ft
Water Table during Earthquake= 10.00 ft
Water Table during In-Situ Testing= 18.30 ft
Max. Acceleration=0.67 g
Earthquake Magnitude=6.58
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Ishihara / Yoshimine
3. Fines Correction for Liquefaction: Modify Stark/Olson
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.45
7. Borehole Diameter, Cb= 1.15
8. Sampling Method, Cs= 1.2
9. User request factor of safety (apply to CSR) , User= 1.3
   Plot two CSR (fs1=User, fs2=1)
10. Use Curve Smoothing: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
5.00	20.00	112.00	43.00
10.00	10.00	112.00	39.00
15.00	8.00	114.00	60.00
20.00	12.00	114.00	18.00
25.00	25.00	115.00	39.00
30.00	23.00	115.00	12.00
35.00	50.00	128.00	12.00

Output Results:

Settlement of Saturated Sands=1.11 in.
Settlement of Unsaturated Sands=0.12 in.
Total Settlement of Saturated and Unsaturated Sands=1.24 in.
Differential Settlement=0.619 to 0.817 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
5.00	2.79	0.56	5.00	1.11	0.12	1.24
6.00	2.79	0.56	5.00	1.11	0.12	1.23
7.00	2.79	0.56	5.00	1.11	0.12	1.23
8.00	2.79	0.56	5.00	1.11	0.11	1.22
9.00	2.79	0.56	5.00	1.11	0.08	1.20
10.00	2.79	0.56	5.00	1.11	0.00	1.11
11.00	2.79	0.58	4.79	1.11	0.00	1.11
12.00	0.60	0.61	0.98*	1.09	0.00	1.09
13.00	0.54	0.63	0.85*	1.01	0.00	1.01
14.00	0.51	0.65	0.78*	0.91	0.00	0.91
15.00	2.79	0.67	4.15	0.82	0.00	0.82
16.00	0.55	0.69	0.79*	0.75	0.00	0.75
17.00	0.49	0.71	0.70*	0.64	0.00	0.64
18.00	0.46	0.72	0.63*	0.49	0.00	0.49
19.00	0.43	0.74	0.59*	0.31	0.00	0.31
20.00	0.41	0.75	0.55*	0.12	0.00	0.12
21.00	2.79	0.76	3.67	0.00	0.00	0.00
22.00	2.79	0.77	3.62	0.00	0.00	0.00
23.00	2.79	0.78	3.57	0.00	0.00	0.00
24.00	2.79	0.79	3.53	0.00	0.00	0.00
25.00	2.79	0.80	3.49	0.00	0.00	0.00
26.00	2.79	0.81	3.46	0.00	0.00	0.00
27.00	2.79	0.82	3.43	0.00	0.00	0.00
28.00	2.79	0.82	3.40	0.00	0.00	0.00
29.00	2.79	0.83	3.37	0.00	0.00	0.00
30.00	2.79	0.84	3.35	0.00	0.00	0.00
31.00	2.79	0.84	3.35	0.00	0.00	0.00
32.00	2.79	0.83	3.35	0.00	0.00	0.00
33.00	2.79	0.83	3.36	0.00	0.00	0.00
34.00	2.79	0.83	3.36	0.00	0.00	0.00

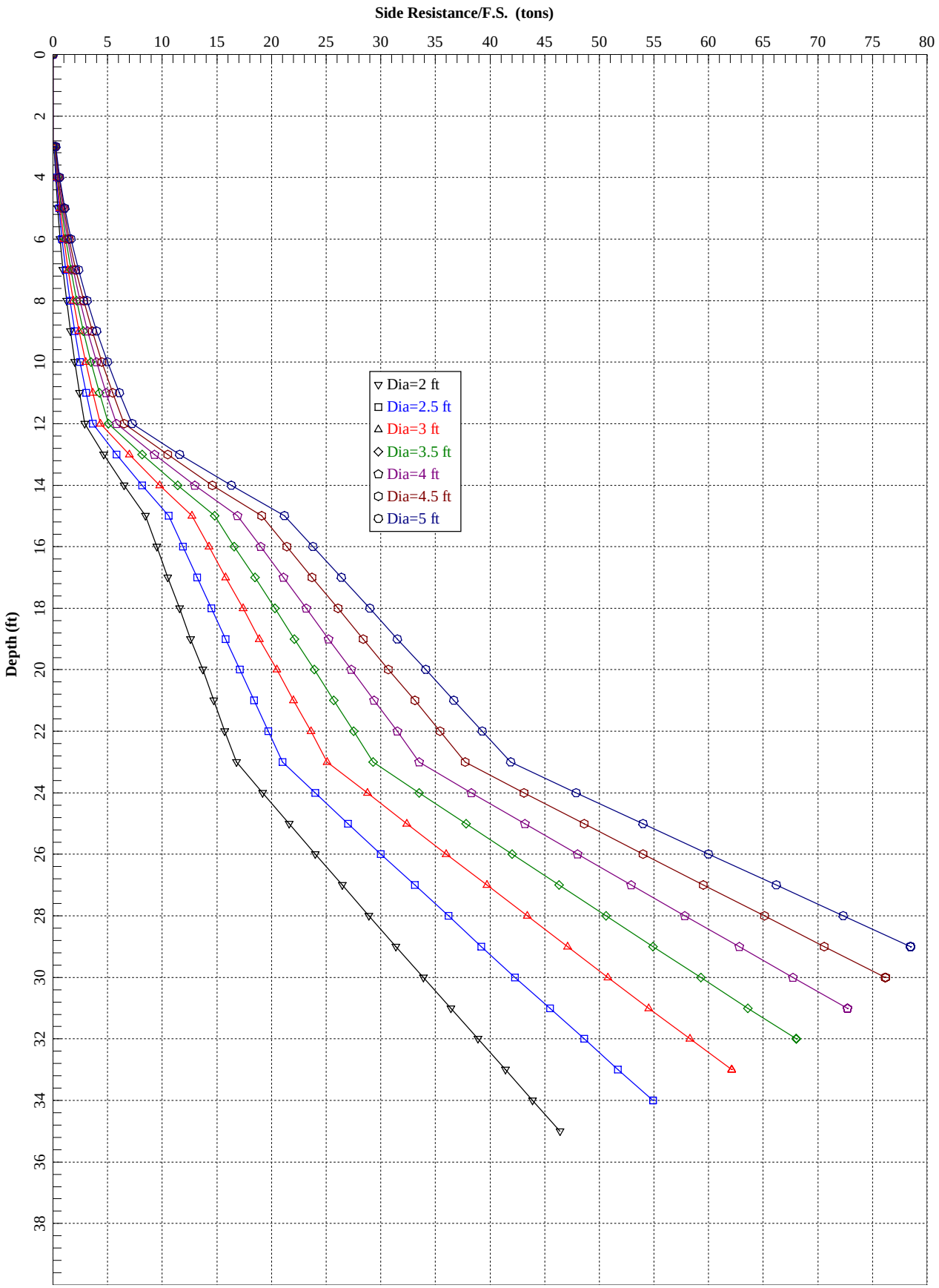
35.00	2.79	0.83	3.38	0.00	0.00	0.00
36.00	2.79	0.82	3.39	0.00	0.00	0.00

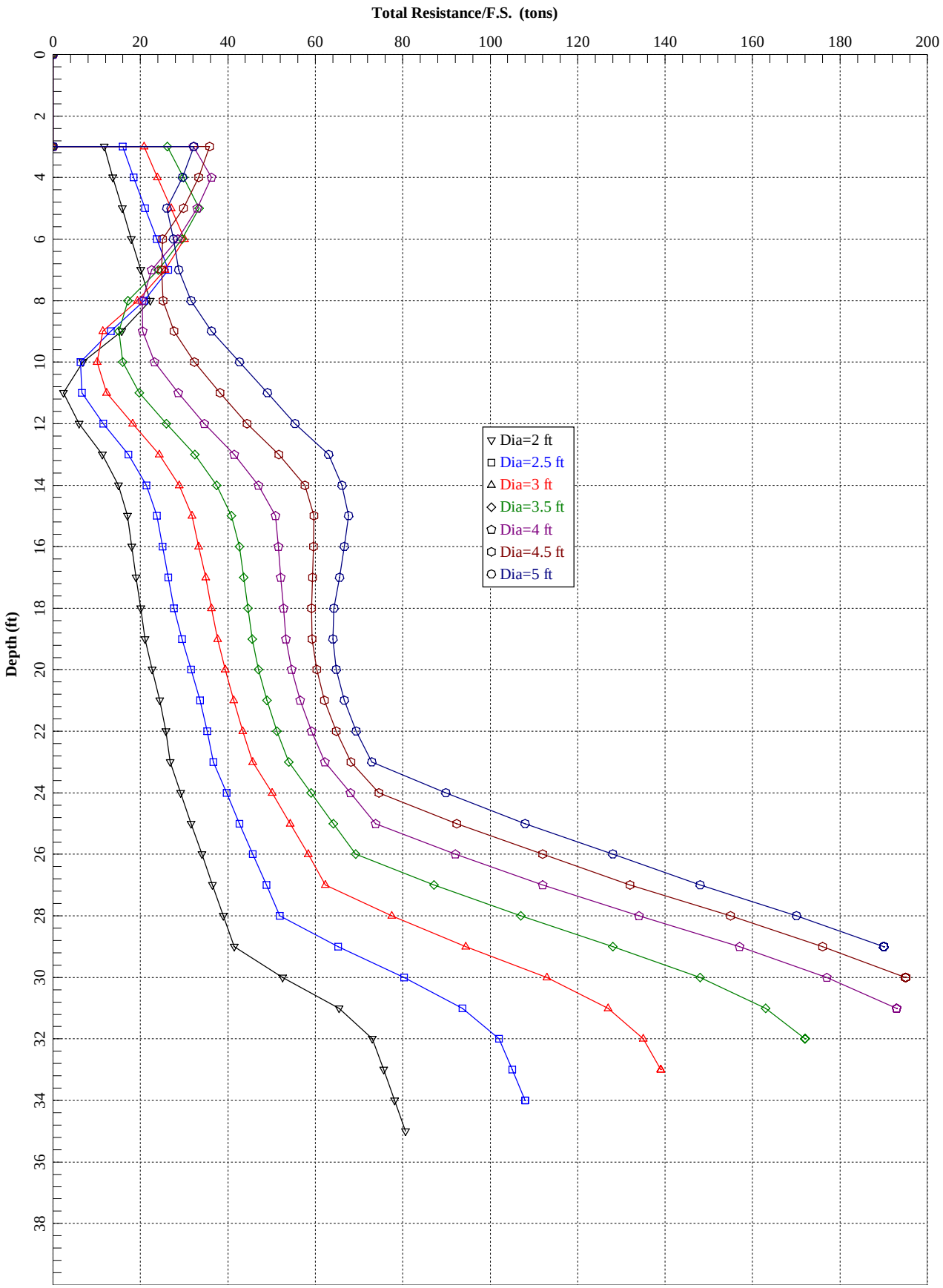
* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

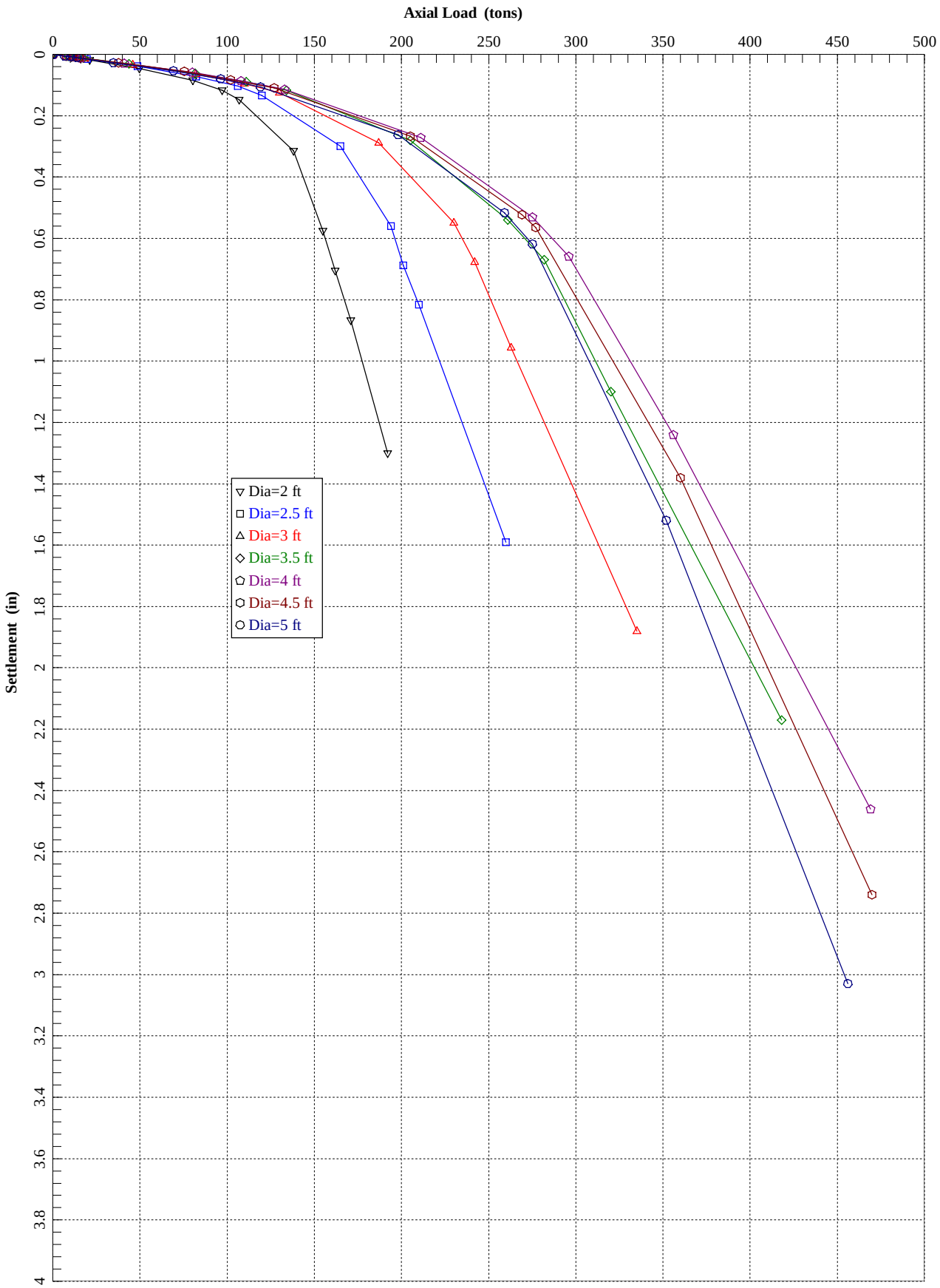
Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

---

1 atm (atmosphere) = 1 tsf (ton/ft2)
CRRm Cyclic resistance ratio from soils
CSRsf Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat Settlement from saturated sands
S_dry Settlement from Unsaturated Sands
S_all Total Settlement from Saturated and Unsaturated Sands
NoLiq No-Liquefy Soils


Side Resistance/F.S. (tons)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Dia=2 ft
Dia=2.5 ft
Dia=3 ft
Dia=3.5 ft
Dia=4 ft
Dia=4.5 ft
Dia=5 ft


Total Resistance/F.S. (tons)
0
20
40
60
80
100
120
140
160
180
200
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Dia=2 ft
Dia=2.5 ft
Dia=3 ft
Dia=3.5 ft
Dia=4 ft
Dia=4.5 ft
Dia=5 ft


Axial Load (tons)
0
50
100
150
200
250
300
350
400
450
500
Settlement (in)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
Dia=2 ft
Dia=2.5 ft
Dia=3 ft
Dia=3.5 ft
Dia=4 ft
Dia=4.5 ft
Dia=5 ft