Appendix E1

Preliminary Geotechnical Investigation

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PRELIMINARY GEOTECHNICAL INVESTIGATION AND 50-SCALE TENTATIVE MAP REVIEW
RENZULLI ESTATES
11495 CYPRESS CANYON ROAD
SAN DIEGO, CALIFORNIA

Prepared for:
The Phair Company
3330 Bonita Road
Chula Vista, CA 91910

Prepared by:
Advanced Geotechnical Solutions, Inc.
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September 15, 2020
Report No. 1902-06-B-5
P/W 1902-06

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September 15, 2020
P/W 1902-06
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Attention: **Austin Dias**

Subject: **Preliminary Geotechnical Investigation and 50-Scale Tentative Map Review, Renzulli Estates, 11495 Cypress Canyon Road, City of San Diego, California**

References: Attached

Gentleperson:

Pursuant to your request, Advanced Geotechnical Solutions, Inc. (AGS) has prepared this preliminary geotechnical investigation report for the Renzulli Estates residential development located in the City of San Diego, California. This report addresses the 50-scale site development plan prepared by Hunsaker & Associates dated September 11, 2020. It is AGS's opinion, from a geotechnical standpoint, that the subject site is suitable for construction of the proposed development, provided the recommendations presented in this report are incorporated into the design, planning and construction phases of site development.

AGS appreciates the opportunity to provide you with geotechnical consulting services on this project. Should you have questions concerning this report, please do not hesitate to contact the undersigned at (619) 867-0487.

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.

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TABLE OF CONTENTS

ATTACHMENTS:

Preliminary Geotechnical Investigation and 50-Scale Tentative Map Review
Renzulli Estates
11495 Cypress Canyon Road, City of San Diego, California

1.0 INTRODUCTION

1.1. Purpose and Background

This study is aimed at providing geologic and geotechnical information and recommendations for the development of the Renzulli Estates project in the City of San Diego, California. This report has been prepared in a manner consistent with the City of San Diego geotechnical report guidelines and the current standard of practice. Geotechnical conclusions and recommendations are presented herein. Items addressed include: 1) Unsuitable soil removals; 2) Preliminary cut, fill, and natural slope stability; 3) Cut/fill pad over-excavation criteria; 4) Remedial grading recommendations; 5) Handling and disposal of undocumented fills and oversize rock; and 6) Preliminary foundation design recommendations based upon anticipated as-graded soil conditions.

1.2. Scope of Study

This study is aimed at providing geotechnical/geologic conclusions and recommendations for the proposed residential development at the site, including attendant streets and associated improvements. The scope of this study included the following tasks:

- Review previous geotechnical reports, readily available geologic maps, literature and aerial photographs (Appendix A).
- Conduct site geologic mapping.
- Supervise seismic refraction and high-resolution electrical resistivity survey (Appendix B).
- Excavate, log, and sample seven hollow-stem auger borings, two tripod solid-auger borings, three sonic borings and one hand auger boring (Appendix B).
- Laboratory testing of bulk soil samples (Appendix C).
- Evaluation and treatment of existing fill materials and excavation characteristics (i.e. rippability) of onsite formational materials.
- Review of geologic/geotechnical conditions onsite as they relate to the 50-scale vesting tentative map/site development plan prepared by Hunsaker & Associates.
- Limited seismic hazard analysis.
- Provide seismic design parameters in accordance with the 2019 California Building Code.
- Preliminary foundation design recommendations based on anticipated site geotechnical conditions.
- Preliminary pavement design recommendations.
- Preliminary recommendations for design of conventional and mechanically stabilized earth (MSE) retaining structures.
- Preliminary slope stability analysis (surficial and global) of the highest proposed cut and fill slopes (Appendix D).
- Feasibility evaluation of storm water infiltration in accordance with the current Storm Water Standards - BMP Design Manual for San Diego County.

1.3. Geotechnical Study Limitations

The conclusions and recommendations in this report are professional opinions based on the data developed during this investigation and previous investigations by others and the current design reflected on the 50-scale vesting tentative map/site development plan by Hunsaker & Associates dated September 11, 2020. If significant changes to the existing grading plans occur, further review by AGS may be necessary.

The materials immediately adjacent to or beneath those observed may have different characteristics than those observed. No representations are made as to the quality or extent of materials not observed. Any evaluation regarding the presence or absence of hazardous material is beyond the scope of this firm's services.

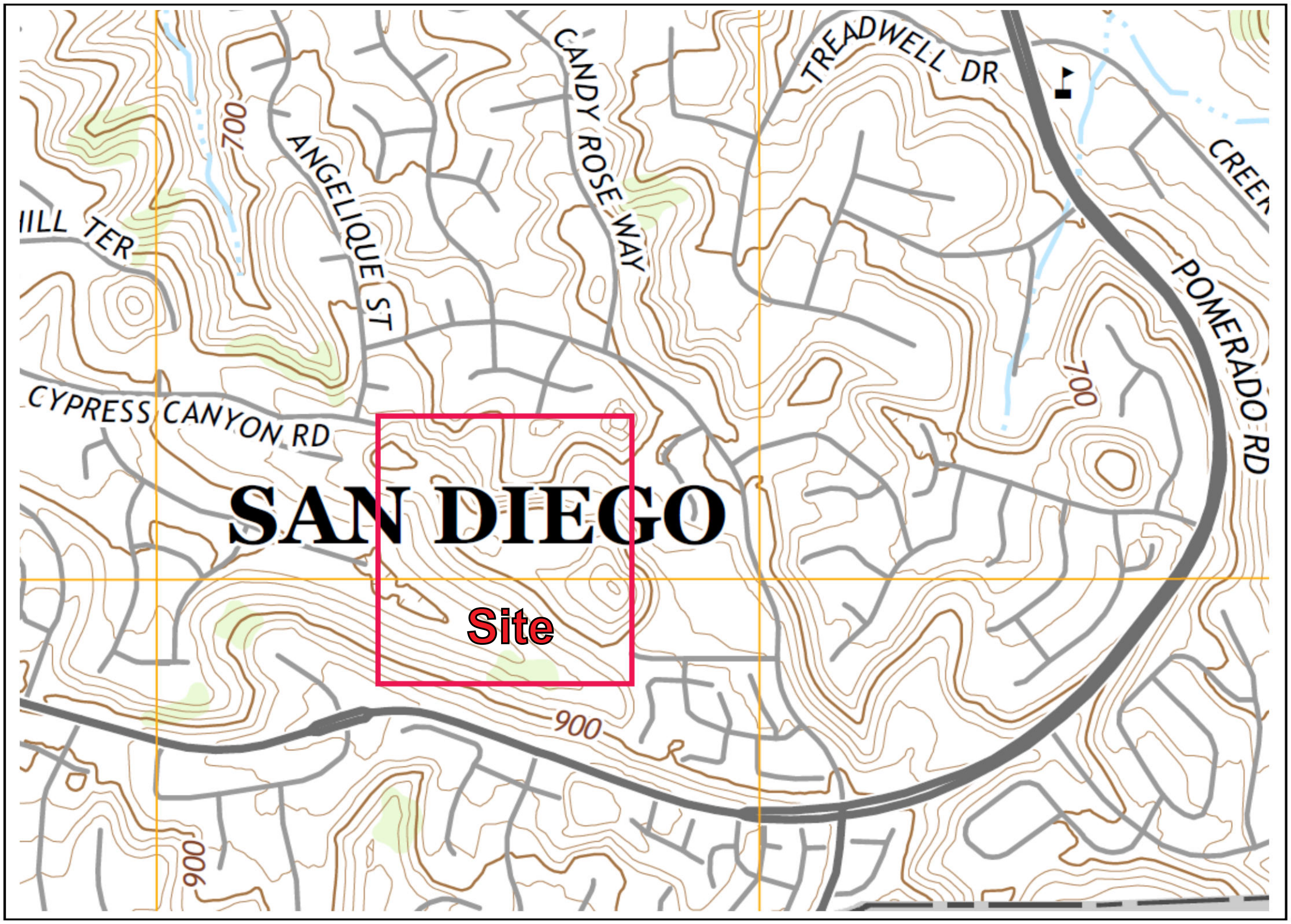
2.0 SITE LOCATION AND DESCRIPTION

The rectangular-shaped site is located at 11495 Cypress Canyon Road, in the City of San Diego, California (Figure 1, Site Location Map) and encompasses approximately 39 acres. The site is bounded by vegetated open space associated with a canyon and intermittent creek to the south, by existing residences, streets and open space to the north and west, and by a park and open space to the east.

It is our understanding that a portion of the site was previously used as a disposal area for construction debris for several years. Mixed debris and soil materials were placed within the large canyon area along the north central portion of the site to create a flat pad. In general, the site is characterized by a central flat ridge area with steep descending slopes to the northern and southern canyons. Elevations onsite range from a high of 982 MSL at a hill on the eastern property boundary, to a low of 756 MSL at the existing canyon on the northern boundary. The site currently supports a large residence, several storage warehouses, a roofed mechanical shop, asphalt paved and unpaved driveways. The site is mostly vacant with vegetation consisting of grass, small shrubs and medium to large trees.

3.0 PROPOSED DEVELOPMENT

The current development plan indicates that the site will support 100 residential lots; appurtenant streets, cul-de-sacs and walkways; engineered slopes; conventional and mechanically stabilized earth retaining walls; water quality basins associated with site BMP’s; and open-space areas and parks. Cut and fill grading techniques are planned to develop the site. Cuts are designed to extend to maximum depths of approximately 58 feet below natural ground, however, due the recommended removal of “dump” materials, the excavations are anticipated to extend to a maximum depth of approximately 100 feet in the north central portion of the site. The deepest design fill is approximately 81 feet in height, but higher fill sections will occur after removal of “dump” materials. The highest design fill slope is approximately 101 feet high at a slope ratio of 2:1 (horizontal to vertical) located in the north central area of the project. In addition, an approximately 58 feet high fill slope underlain by a two-tiered mechanically stabilized earth (MSE) wall with a height of 36 feet is located in the south central area of project. The highest proposed cut slope is approximately 87 feet high at a slope ratio of 2:1 H:V, located in the eastern portion of the project.



SITE LOCATION MAP
SCRIPPS CYPRESS CANYON
SAN DIEGO, SAN DIEGO COUNTY
CALIFORNIA

FIGURE 1

SOURCE MAP(S): Poway Quadrangle, California
San Diego County, 7.5-Minute Series (Topographic)

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P/W 1902-06 **Report No. 1902-06-B-5**

4.0 PREVIOUS GEOTECHNICAL STUDY

A previous geotechnical investigation was conducted at the site by C. W. La Monte Company in 2004. As part of this geotechnical study, thirty trenches (TE-1 through TE-30) were excavated with a backhoe and two hollow-stem auger borings (TB-1 and TB-2) were advanced at the site.

AGS has reviewed this report and interpreted the various data and conclusions in our geotechnical/geologic evaluation of the subject property. The subsurface data gathered during the previous study at the subject site is presented in Appendix B. Associated laboratory test results are presented in Appendix C.

Pertinent geologic and geotechnical information has been superimposed on the 50-scale site development plan by Hunsaker & Associates and is presented on Plate 1 - Geologic Map and Exploration Location Plan included herewith. The approximate topographic contours prior to placement of the “dump” fill materials have also been added to Plate 1 for estimation of the fill extents and volume.

5.0 CURRENT INVESTIGATION

On March 2019, AGS retained Southwest Geophysics, Inc. to conduct a geophysical evaluation of the “dump” area which included two high-resolution electrical resistivity tomography (Sting) profiles, STL-1 and STL-2, and one seismic P-wave refraction profile, SL-1. This information was used in the evaluation of the “dump” materials and to further define the geometry of the subsurface bedrock units onsite.

SCS Environmental Engineers was contracted by the client to evaluate the dump fill materials and provide recommendations regarding its reuse and/or disposal. AGS and SCS conducted subsurface exploration at the subject site in March and November 2019 which included advancing seven (7) hollowstem auger borings, three (3) sonic (rotary-vibratory) borings and two (2) tripod continuous flight auger borings (B-1 through B-12) extending to depths ranging from 10½ feet to 100 feet below existing ground surface (bgs). In addition, AGS advanced a hand-auger excavation (HA-1) to 3 feet depth in August 2020. These excavations were logged and sampled by a representative of AGS. Logs of the exploratory borings and results of the geophysical survey are presented in Appendix B. The approximate locations of subsurface exploration are shown on Plate 1.

Bulk samples from the excavations were transported to AGS’ laboratory and tested for organic content, expansion index, remolded shear strength, maximum density and optimum moisture content, and resistivity/corrosion potential. Laboratory results are presented in Appendix C.

6.0 ENGINEERING GEOLOGY

6.1. Regional Geologic and Geomorphic Setting

The subject site is situated within the Peninsular Ranges Geomorphic Province. The Peninsular Ranges province occupies the southwestern portion of California and extends southward to the southern tip of Baja California. In general, the province consists of young, steeply sloped, northwest trending mountain ranges underlain by metamorphosed Late Jurassic to Early Cretaceous-aged extrusive volcanic rock and Cretaceous-aged igneous plutonic rock of the Peninsular Ranges Batholith. The westernmost portion of the province is predominantly underlain by younger marine and non-marine sedimentary rocks. The Peninsular Ranges’ dominant structural feature is northwest-southeast trending crustal blocks bounded by active faults of the San Andreas transform system.

6.2. Site Geology

Based on our site reconnaissance, subsurface excavations, and review of the referenced geologic map, the site is underlain by Tertiary-aged sedimentary bedrock of the Poway Group with associated residual soils (Figure 2, Regional Geologic Map). Other surficial deposits encountered at the site include artificial fill, slope wash, and alluvium.

According to our review of historic aerial photographs, two major episodes of grading resulted in the filling of the northerly canyon. A brief description of the earth materials encountered on this site is presented in the following sections. The major soil and bedrock units are described individually below in order of increasing age. More detailed descriptions of these materials are provided in the boring logs included in Appendix B.

6.2.1. Artificial Fill - Undocumented (Map Symbol: Qafu)

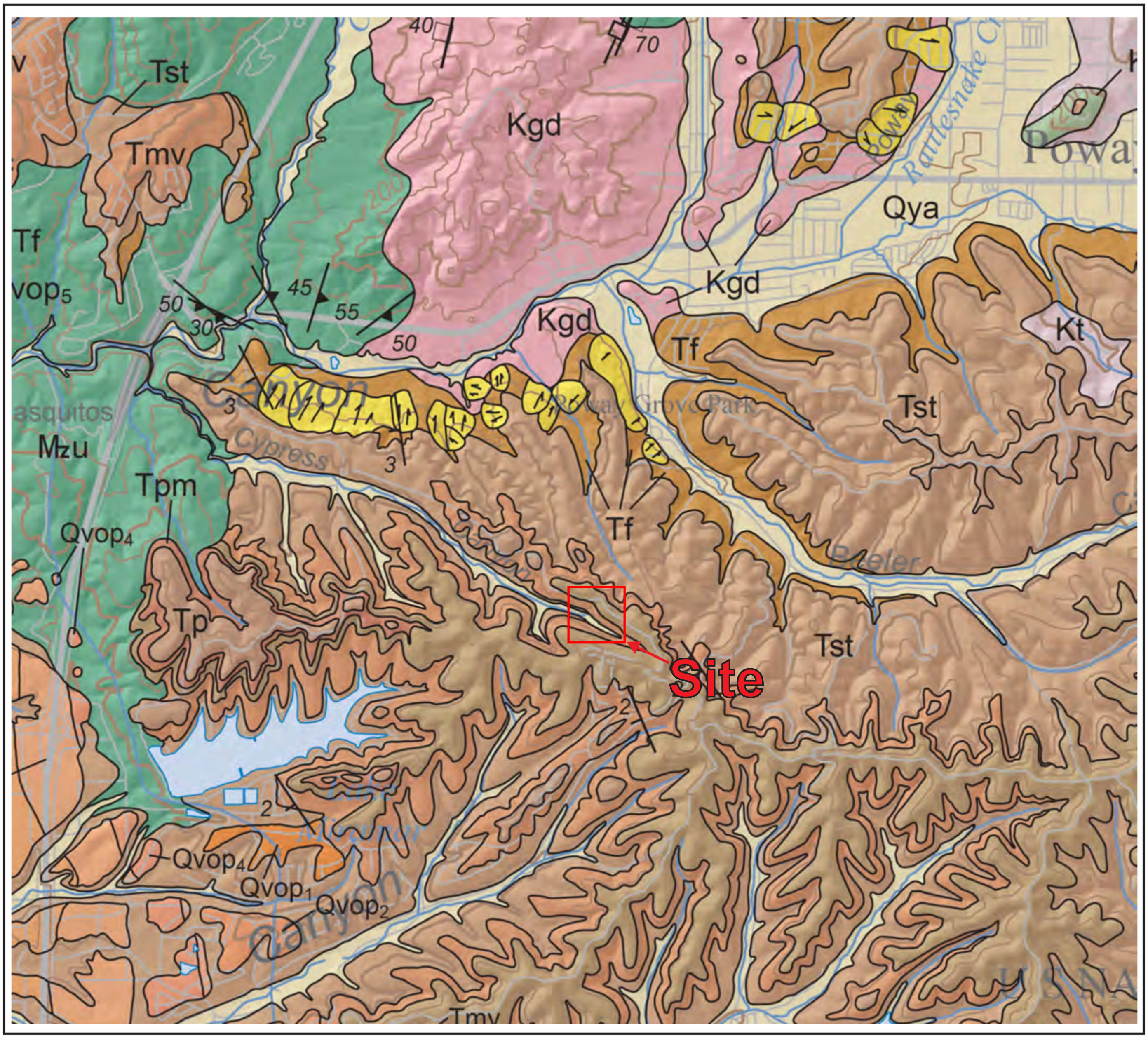
Undocumented fill soils form the level pad east of the existing residence. It is our understanding that “dump” materials were placed within the north central canyon area intermittently over several years. These materials included construction debris and miscellaneous export from nearby grading projects in the Scripps Ranch and surrounding areas. Our site reconnaissance and subsurface exploration indicate a maximum fill thickness of 98 feet. The fills encountered in our borings typically consisted of poorly compacted material including silty sands, clayey sands and sandy clays with gravel and cobbles, over-size rock, and pockets of construction demolition materials including large concrete debris, crushed asphalt pavement, oil-stabilized sand and gravel, rebar, wood and organic waste.

Other minor undocumented fill areas are present across the site and were used to construct the existing building pads and roads. These fill areas appear to be derived from onsite excavations into native materials.

Undocumented fill soils are not suitable to support proposed structures and improvements in their present condition and require removal and/or recompaction in areas to receive improvements or artificial fill. A significant screening operation will be necessary during excavation operations to remove and segregate unsuitable debris and over-sized material excavated from the central “dump” fill mass. Crushing of oversize materials for reuse in the shallow portion of fills is anticipated.

6.2.2. Artificial Fill – Engineered (Map Symbol: Qafd)

It is our understanding that engineered fill was placed in the north central canyon area under the observation and testing of Pacific Soils Engineering (1996). However, the subject grading report was not available for our review to verify the fill condition. These fills are estimated to reach a maximum thickness of 45 feet at the northern end of the property and may exceed 20 feet in thickness where the engineered canyon fill abuts the toe of the undocumented “dump” fill slope. The engineered fill typically consists of tan, medium dense to dense, clayey sands with gravel and cobbles to 20 feet depth underlain by very dense to hard, dark brown, clayey sand and sandy clay with gravel.



REGIONAL GEOLOGIC MAP
SCRIPPS CYPRESS CANYON
SAN DIEGO, SAN DIEGO COUNTY
CALIFORNIA

Qya	Young alluvial flood-plain deposits (Holocene and late Pleistocene)
Tmv	Mission Valley Formation (Middle Eocene)
Tt	Torrey Sandstone (Middle Eocene)

FIGURE 2

SOURCE MAP(S): Geologic Map of the San Diego 30' x 60' Quadrangle, California, Kennedy & Tan 2008

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Left-in-place surficial deposits were encountered underlying the fill along the walls of the filled north central canyon. Based on our observations, the upper 5 to 8 feet of the engineered documented fills are weathered and will require removal and recompaction. In addition, deeper removals of left-in-place deposits will be required along the walls of the filled canyon.

6.2.3. Colluvium (Map symbol: Qc)

Colluvium occurs in localized areas on mid- to lower northern canyon slopes. Colluvial soils are derived from erosion of the adjacent formational units and subsequent deposition by sheet flow and gravitational processes. Colluvium generally consists of relatively loose clayey sands, silty sands, and clays that are subject to creep and excessive settlement under fill or foundation loads. Because of the poor exposures of this unit, the thickness of these soils is not known but may be on the order of 5 feet or more in some areas.

6.2.4. Alluvium (Map symbol: Qal)

Alluvium consisting of relatively loose, stream-deposited sands and clayey sands that may reach a thickness of 10 to 20 feet is present at the bottom of the small reservoir located in the southern portion of the site. Alluvial soils are not suitable for support of proposed structures or artificial fill in their present condition and require removal and/or recompaction. It our understanding alluvium was removed from the north canyon bottom prior to filling under the observation of Pacific Soils Engineering (1996). However, this report was not available for AGS to review. Future studies should determine the limits of the previous removals that were performed in this canyon area.

6.2.5. Slope Wash (Map symbol: Qsw)

Most of the undisturbed canyon wall terrain is overlain with a thin veneer of natural ground slope wash. These materials typically range from approximately 1 to 3 feet in thickness and consist primarily of dark reddish brown, loose, silty sand with gravel and cobbles. Slope wash materials are not suitable for support of proposed structures or artificial fill in their present condition and require removal and/or recompaction.

6.2.6. Questionable Landslide (Map symbol: Qls?)

A small possible or “questionable” landslide near the base of the canyon slope in the northwestern portion of the site was queried by the previous geotechnical consultant (C.W. La Monte 2005). The feature is located outside of the proposed development area and lacks geomorphic evidence indicative of a deep seated landslide. Because of the relatively small size of this feature and poor access, it was not verified by trenching or drilling and will be assessed during grading.

6.2.7. Residual Soil (no map symbol)

The formational materials described below are mantled with an intermittent layer of residual soil. The residuum ranges from about 1 to 5 feet in thickness and consists of dark brown, firm to stiff, sandy clay. Residual soils are highly expansive and require removal and/or recompaction for support of proposed structures or artificial fill.

6.2.8. Poway Group (Map symbols: Tst, Tmv, Tp)

Underlying surficial deposits and exposed in cut slopes onsite are sedimentary bedrock of the Poway Group formations. These formations include Stadium Conglomerate (Tst), Mission Valley Formation (Tmv) and Pomerado Conglomerate (Tp). The formational materials generally consist of massively bedded, very dense, tan and light brown, silty and clayey sandstones, and gravel and cobble conglomerate in a clayey sand matrix.

6.3. Groundwater

Groundwater was not encountered in the exploratory borings except for sonic boring B-10 in which the drill casing was observed to be wet during drilling at an approximate depth of 75 feet. After completion of boring B-10, a bailer was lowered to 100 feet depth and no groundwater was encountered. Intermittent seepage was noted near the contact between the undocumented canyon fill in the north central portion of the site and the documented fill soils placed during development of the northerly adjacent property and is further evidenced by the localized presence of wetland type plants. Based on our observations, groundwater is not expected onsite except for potential seepage at the contact between fill and formational materials. Subdrains should be installed during grading to intercept the seepage. Further, it should be anticipated that the groundwater level will vary, due to fluctuations in precipitation, irrigation practices, infiltration water from adjacent properties, or factors not evident at the time of our field explorations.

6.4. Non-Seismic Hazards

6.4.1. Mass Wasting

No evidence of mass wasting was observed onsite nor was any noted on the reviewed maps.

6.4.2. Flooding

According to FEMA, the site is not within a FEMA identified flood hazard zone.

6.4.3. Subsidence and Ground Fissuring

Due to the presence of loose to dense, relatively deep undocumented fill materials the potential for subsidence and ground fissuring is high. The recommended complete removal of undocumented fill material and other compressible soil will mitigate this potential.

6.5. Seismic Hazards

The project is located in the tectonically active southern California and will likely experience some effects from future earthquakes. The type or severity of seismic hazards affecting the site is chiefly dependent upon the distance to the causative faults, the intensity and duration of the seismic events, and the onsite soil characteristics. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction or landsliding. The following is a site-specific discussion of earthquake-induced/seismic hazards and proposed mitigations, if necessary, to reduce the hazard to an acceptable level of risk.

6.5.1. City of San Diego Seismic Safety Study

According to the 2008 City of San Diego Seismic Safety Study the site is mapped as Geologic Hazard Category 53 – Level or sloping terrain, unfavorable geologic structure, low to moderate risk.

6.5.2. Faulting

The closest known active fault to the site is the Rose Canyon/Newport-Inglewood Fault system, located approximately 11.7 miles west of the site. No faults have been mapped within the site or in the site vicinity.

6.5.3. Surface Fault Rupture

Surface rupture is a break in the ground surface during, or as a consequence of, seismic activity. Fault rupture occurs most often along pre-existing fault traces. Based on our observation of the site and review of available geologic maps, there is no known faulting at site. Accordingly, the potential for surface fault rupture within the project is very low.

6.5.4. Seismicity

As noted, the site is within the tectonically active southern California area. The potential exists for strong ground motion that may affect future improvements. At this point in time, non-critical structures (commercial, residential, and industrial) are designed according to the 2019 California Building Code (2019 CBC) and the controlling local agency criteria.

6.5.5. Liquefaction

Liquefaction is the phenomenon where seismic agitation of loose, saturated sands and silty sands can result in a buildup of pore pressures that, if sufficient to overcome overburden stresses, can produce a temporary quick condition. Localized, loose lenses/layers of sandy soils may be subject to liquefaction when a large, prolonged, seismic event affects the site. As the excess pore water pressure dissipates, the liquefied zones/lenses can consolidate causing settlement. Post liquefaction effects at a site can manifest in several ways and may include: 1) ground deformations; 2) loss of shear strength; 3) lateral spread; 4) dynamic settlement; and 5) flow failure.

The subject site is not in a State liquefaction susceptibility zone. The site is mapped by the County of San Diego in an area with generally low liquefaction risk, but some areas (confined to the existing drainages on site) may have soil layers susceptible to liquefaction.

Based on the subsurface data collected by AGS and others, our observation and mapping of the site, and the remedial grading proposed in this report, the likelihood of liquefaction affecting development areas is considered “remote”.

6.5.6. Dynamic Settlement

Dynamic settlement occurs in response to an earthquake event in loose, sandy earth materials. The potential for dynamic settlement at the subject site is considered “low” to “very low” due to the proposed removals of loose and poorly consolidated undocumented fill and the relatively dense nature of the underlying Poway Group formational materials.

6.5.7. Seismically Induced Landsliding

Owing to the relatively dense sandstone and conglomerate formational materials underlying the site and the proposed post-grading configuration, the potential of seismically induced landsliding is considered to be very low. Evaluation of the queried landslide area discussed in Section 6.2.6 by an engineering geologist is recommended during grading; however, it should be noted that the queried landslide is located outside of the proposed development area, there is no geomorphic evidence supporting the presence of a deep seated landslide, and the underlying geologic formations are not typically susceptible to landsliding. Depending on the results of future exploration during grading, removal of landslide debris and/or construction of shear keys may be recommended in this area.

6.5.8. Seiches and Tsunamis

A seiche is a free- or standing-wave oscillation on the surface of water in an enclosed or semi-enclosed basin. The wave can be initiated by an earthquake and can vary in height from several centimeters to a few meters. The potential for a seiche impacting the property is considered to be unlikely due to its distance from an upstream large body of water.

6.5.9. Seismic Design Parameters

It is anticipated that after completion of grading, a portion of the site will be underlain by less than 10 feet of compacted fill on formational soils. Based on 2019 CBC guidelines, it is recommended that building pads underlain by less than 10 feet of fill be classified as Seismic Site Class C consisting of a very dense soil/soft rock profile. Table 6.5.9.1 presents 2019 CBC seismic design parameters for Site Class C in accordance with mapped spectral acceleration parameters (United States Geological Survey, 2020) utilizing site coordinates Latitude 32.9259°N and Longitude 117.0693°W.

TABLE 6.5.9.1
2019 CBC SEISMIC DESIGN PARAMETERS - SITE CLASS C

Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	0.804g
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.296g
Site Coefficient, F_a	1.200
Site Coefficient, F_v	1.500
Adjusted MCE_R[1] Spectral Response Acceleration Parameter at Short Period, S_{MS}	0.965g
1-Second Period Adjusted MCE_R[1] Spectral Response Acceleration Parameter, S_{M1}	0.444g
Short Period Design Spectral Response Acceleration Parameter, S_{DS}	0.643g
1-Second Period Design Spectral Response Acceleration Parameter, S_{D1}	0.296g
Peak Ground Acceleration, PGA_M[2]	0.414g
Seismic Design Category	D

Notes: [1] Risk-Targeted Maximum Considered Earthquake
[2] Peak Ground Acceleration adjusted for site effects

Lots underlain by more than 10 feet of fill may be classified as Seismic Site Class D consisting of a stiff soil profile. Table 6.5.9.2 presents 2019 CBC seismic design parameters for Site Class D in accordance with mapped spectral acceleration parameters (USGS, 2020) utilizing site coordinates Latitude 32.9262°N and Longitude 117.0677°W.

TABLE 6.5.9.2
2019 CBC SEISMIC DESIGN PARAMETERS - SITE CLASS D

Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	0.890g
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.342g
Site Coefficient, F_a	1.144
Site Coefficient, F_v	1.716
Adjusted MCE_R[1] Spectral Response Acceleration Parameter at Short Period, S_{MS}	1.018g
1-Second Period Adjusted MCE_R[1] Spectral Response Acceleration Parameter, S_{M1}	0.587g
Short Period Design Spectral Response Acceleration Parameter, S_{DS}	0.679g
1-Second Period Design Spectral Response Acceleration Parameter, S_{D1}	0.391g
Peak Ground Acceleration, PGA_M[2]	0.401g
Seismic Design Category	D

Notes: [1] Risk-Targeted Maximum Considered Earthquake
[2] Peak Ground Acceleration adjusted for site effects
[3] Requires Site Specific Ground Motion Hazard Analysis per ASCE 7-16 Section 11.4.8

As indicated in Note 3 above, ASCE 7-16 Section 11.4.8 requires a site specific ground motion hazard analysis unless, per Exception 2, the value of the seismic response coefficient, C_S, is determined by Equation (12.8-2) for values of $T \leq 1.5T_S$ and taken as equal to 1.5 times the values computed with either Equation (12.8-3) for $T_L \geq T > 1.5Ts$ or Equation (12.8-4) for $T > T_L$. The applicable seismic site class for individual lots will be provided after site grading is completed.

7.0 GEOTECHNICAL ENGINEERING

Presented herein is a general discussion of the geotechnical properties of the various soil types and the analytic methods used in this report.

7.1. Excavation Characteristics

It is anticipated that excavations within undocumented artificial fill, topsoil, alluvium, colluvium, and the highly weathered portion of formational materials can be accomplished with conventional grading equipment. Based on AGS's experience with Poway group formational materials, heavy ripping will be required to achieve the design cuts at the site.

Oversized rock and concrete fragments will be generated from undocumented fill removals and cuts into Poway group formations. Oversize materials should be handled as discussed in Section 8.7.6. A significant screening operation will be necessary during excavation operations to remove and segregate unsuitable debris and oversize material from the central fill mass. Crushing of oversize materials for reuse in the shallow portion of fills is anticipated.

7.2. Compressibility

Onsite materials that are significantly compressible in their current condition include topsoil, alluvium, slope wash, residual soils, undocumented fill and the highly weathered portions of documented artificial fill and formational units onsite. These materials will require complete removal prior to placement of fill, where exposed at design grade and possibly where exposed in cut slopes. Recommended removal depths are presented in Section 8.1. Earthwork adjustment estimates are presented in Section 7.3.

7.3. Earthwork Adjustments

In consideration of the required grading as proposed on the 50-scale site development plan, the average earthwork adjustment factors presented in Table 7.3 have been formulated for use in earthwork analysis for the project. These values may be used in an effort to balance the earthwork quantities. As is the case with every project, contingencies should be made to adjust the earthwork balance when grading is in progress and actual conditions are better defined.

TABLE 7.3
EARTHWORK ADJUSTMENTS

Geologic Unit	Adjustment Factors
Topsoil/Colluvium	10% - 15% Shrink
Artificial Fill (Soil)	5% - 10% Shrink
Artificial Fill (Oversize Concrete and Rock)	Reused: 0% - 5% Shrink (due to voids) Crushed: 5% - 10% Bulk
Poway Group Formations (Sandstone)	2% - 8% Bulk
Poway Group Formations (Conglomerate)	5% - 10% Bulk

7.4. Collapse Potential/Hydro-Consolidation

Given the dense nature of the formational materials and the removals proposed herein, the potential for hydro-consolidation is considered to be “very low”.

7.5. Expansion Potential

Based upon previous and current laboratory testing, the expansion potential of onsite materials is anticipated range from "low" to "high" when classified in accordance with ASTM D4829.

7.6. Shear Strength

Based upon our familiarity with the onsite geologic units and laboratory testing, AGS has summarized the recommended shear strengths for compacted fill and the various geologic units onsite in Table 7.6.

TABLE 7.6
SHEAR STRENGTH

Geologic Unit	Cohesion (psf)	Friction Angle (degrees)
Artificial Fill - Compacted	200	31
Poway Group Formations (Sandstone)	400	28
Poway Group Formations (Conglomerate)	500	28

7.7. Chemical and Resistivity Test Results

Based upon our test results and our previous experience in the area, the onsite soils exhibit negligible sulfate concentrations when classified in accordance with ACI 318-14 Table 19.3.1.1 (per 2019 CBC) and are anticipated to be "moderately corrosive" to metals in direct contact with soil. Final determination of actual chemical/resistivity design parameters for foundations and buried metallic structures will be determined at the conclusion of the grading and will be presented in the grading report.

7.8. Bearing Capacity and Lateral Earth Pressures

Ultimate bearing capacity values were obtained using the graphs and formulas presented in NAVFAC DM-7.1. Allowable bearing was determined by applying a factor of safety of at least three (3) to the ultimate bearing capacity.

Static lateral earth pressures were calculated using Rankine methods for active and passive cases. If it is desired to use Coulomb forces, a separate analysis specific to the application can be conducted.

7.9. Pavement Support Characteristics

It is anticipated that the onsite soils will have moderate support characteristics. Depending upon the final distribution of site soils, pavement support characteristics could vary. An assumed R-value of 30 can be utilized for the preliminary structural design of concrete and asphalt pavements. Final design should be based upon representative sampling of the as-graded soils.

8.0 GRADING RECOMMENDATIONS

Development of the subject site as proposed is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are issues identified by this study or previous studies as possibly impacting site development. Recommendations to mitigate these issues and geotechnical recommendations for use in planning and design are presented in the following sections of this report.

8.1. Site Preparation and Removals/Overexcavation

Grading should be accomplished under the observation and testing of the project soils engineer and engineering geologist or their authorized representative in accordance with the recommendations contained herein, the current Municipal Code of the City of San Diego. Existing vegetation, trash, debris and other deleterious materials should be removed and wasted from the site prior to removal of unsuitable soils and placement of compacted fill.

Undocumented artificial fill, topsoil, alluvium, colluvium, and highly weathered Stadium Conglomerate, Pomerado and Mission Valley formations should be removed in areas planned to receive fill or where exposed at final grade. The resulting undercuts should be replaced with engineered fill. Estimated depths of removals based upon specific geologic units are presented in Table 8.1.

TABLE 8.1
ESTIMATED DEPTH OF REMOVAL

Geologic Unit (Map Symbol)	Estimated Removal Depth
Undocumented Artificial Fill (Qafu)	3 - 98 feet
Documented Artificial Fill (Qafd)	3 - 8 feet
Topsoil (No Map Symbol)	2 - 5 feet
Alluvium (Qal), Slopewash (Qsw)	4 - 15 feet
Weathered Poway Group Formations (Tst, Tp, Tm)	3 - 6 feet

It should be noted that local variations can be expected requiring an increase in the depth of removal for unsuitable and weathered deposits. The extent of removals can best be determined in the field during grading when observation and evaluation can be performed by the soil engineer and/or engineering geologist. Removals should expose competent formational materials or engineered fill and be observed and mapped by the engineering geologist prior to fill placement. In general, soils removed during remedial grading will be suitable for reuse in compacted fills provided they are properly moisture conditioned and do not contain deleterious materials.

8.2. Overexcavation of Building Pads and Streets

8.2.1. Cut/Fill Transition Lots

Where design grades and/or remedial grading activities create a cut/fill transition, the cut and shallow fill portions of the building pad should be overexcavated a minimum depth of three (3) feet and replaced to design grade with compacted fill. All undercuts should be graded such that a gradient of at least one (1) percent is maintained toward deeper fill areas or the front of the pad to allow for potential subsurface drainage. The entire pad area of these lots should be undercut. "Select" replacement material should be eight- (8) inch minus and should be compacted to project specifications as discussed in Section 8.7.

8.2.2. Steep Cut and Cut/Fill Transitions

In order to reduce the differential settlement potential on lots with steep fill or cut/fill transitions, or highly variable fill thickness, the cut or shallow fill portion of steep transitions shall be overexcavated to a depth equal to one-third (1/3) the deepest fill section within the lot to a maximum thickness of twenty-five (25) feet.

8.2.3. Overexcavation of Streets

It is suggested that the street areas with design cut or shallow fill located in dense formational materials areas be overexcavated a minimum of one (1) feet below the deepest utility and replaced with compacted, eight- (8) inch minus, select soils. This will facilitate the use of conventional trenching equipment for utility construction.

8.3. Slope Stability and Remediation

Close geologic inspection should be conducted during grading to observe if soil and geologic conditions differ significantly from those anticipated. Should field conditions dictate, modifications to the recommendations presented herein may be necessary and should be based upon conditions exposed in the field during grading activities

8.3.1. Cut Slopes

Proposed cut slopes have been designed at slope ratios of 2:1 (horizontal to vertical). The highest proposed cut slope is approximately 87 feet, located in the eastern boundary of the project. It is anticipated that slopes excavated in competent formational materials will be grossly and surficially stable to the proposed heights. Stability calculations supporting this conclusion are presented on Plates D-1 through D-3 (Appendix D).

Loose, large, rounded boulders at the top of cut slopes can create a rock fall issue. At this time, AGS has not identified any rock fall issues at the site. However, final determination as to rock fall hazards will be provided during mass grading. Possible mitigations for rock fall conditions include: identification and removal during grading, dedicated impact zones at the toe of slope, catchment fencing, and other restraints. All cut slopes should be observed by the engineering geologist during grading. Modifications to the recommendations presented herein may be necessary and should be based upon conditions exposed in the field at the time of grading.

If conditions exposed during grading necessitate the need for stabilization fills, then the backcuts for stabilization fills should be made no steeper than 1:1 (horizontal to vertical). Shallower backcuts may be required if conditions dictate. Final determination should be made in the field by the project geologist. All stabilization fills will require backdrain systems as shown on Detail 3 (Appendix E). Additional backdrains could be required in backcuts where geologic contacts daylight in the backcuts. Terrace drains and benches should be constructed on cut slopes in accordance with the City of San Diego Grading Ordinance.

8.3.2. Fill Slopes

Fill slopes are designed at ratios of 2:1 (horizontal to vertical) or flatter. The highest design fill slope is approximately 101 feet high at a slope ratio of 2:1 (horizontal to vertical) located in the north central area of the project. In addition, a 58 feet high slope underlain by a two-tiered mechanically stabilized earth (MSE) wall with a total height up to 36 feet is located in the south central area of project. Fill slopes, when properly constructed with onsite materials, are expected to be grossly and surficially stable as designed and maintained as described in Appendix F. Stability calculations are presented on Plates D-4 through D-8 (Appendix D).

Marginal surficial stability may exist if slopes are not properly maintained or are subjected to inappropriate irrigation practices. Slope protection and appropriate landscaping will improve surficial stability and should be considered.

Keyways should be constructed at the toe of all fill slopes toeing on existing or cut grade. Fill keys should have a minimum width equal to fifteen (15) feet or one-half (1/2) the height of the ascending slope, whichever is greater. Proposed keyways are presented on Plate 1.

Where possible, unsuitable soil removals below the toe of proposed fill slopes should extend outward from the catch point of the design toe at a minimum 1:1 projection to an approved cleanout as shown on Detail 5 (Appendix E). Backcuts should be cut no steeper than 1:1 or as recommended by the geotechnical engineer. Terrace drains and benches should be constructed on fill slopes in accordance with the City of San Diego Grading Ordinance.

8.3.3. Natural Slopes and Skin Fills

Where possible, skin fills or thin fill sections against natural slopes should be avoided. If skin fill conditions are identified in the field or are created by remedial grading, it is recommended that a backcut and keyway be established such that a minimum fill thickness equal to one-half (1/2) the remaining slope height [not less than fifteen (15) feet] is provided for all skin fill conditions. This criterion should be implemented for the entire slope height. Drains are recommended at the heel of skin fills and will be designed based upon exposed conditions.

8.4. Survey Control During Grading

Removal bottoms, keyways, subdrains and backdrains should be surveyed by the civil engineer after observation by the geotechnical engineer/engineering geologist and prior to the placement of fill. Toe stakes should be provided by the civil engineer in order to verify required key dimensions and locations.

8.5. Subsurface Drainage

8.5.1. Canyon Drains

Six- (6) and eight- (8) inch diameter canyon subdrains may be installed along the deeper canyons on the project. The drains are to be placed along the lowest alignment of canyon removals to intercept, transport and dispose of infiltrating water. Final determination of drain locations will be made in the field, based on exposed conditions and depth to groundwater. Drains should be constructed in accordance with the details shown on Details 1 and 2 (Appendix E).

8.5.2. Heel Drains

Heel drains will be required for all stabilization fill keyways, fill-over-cut slope keyways, and side-hill fill-over-natural slope keyways. Heel drains should be outletted to proposed subdrains or storm drains, where possible, and should be constructed in accordance with the Grading Details (Appendix E).

8.5.3. Cut Slope Toe Drains and Subdrains

Due to the nature of the formational material, it is common for post-grading irrigation runoff to surface on cut slopes. Consideration should be given to placing toe drains at the base of all major cut slopes in order to provide drainage for possible future nuisance water emanating from the slopes. Toe drains should be outletted into the proposed storm drain system or within designated active drainage channels.

Backdrains on the cut slope face may be required if nuisance water surfaces on the slope face during grading. These drains may be tied into the toe drain if it is installed, or if no toe drains are installed, it will need to be tied to adjacent canyon subdrains or the storm drain system.

8.6. Excavation and Temporary Cut Slopes

All excavations should be shored or laid back in accordance with applicable Cal-OSHA standards. The bedrock units on site can be considered a Type “B” soil. Topsoil/alluvium/artificial fill is considered Type “C” soil. Any temporary excavation greater than 5 feet in depth should be laid back at the appropriate slope ratio. These excavations should not become saturated or allowed to dry out. Surcharge loads should not be permitted within a distance equal to the height of the excavation from the top of the excavation. The top of the excavation should be a minimum of 10 feet from the edge of existing improvements. Excavations steeper than those recommended or closer than 10 feet from an existing surface improvement should be temporarily shored in accordance with applicable OSHA codes and regulations.

8.7. Earthwork Considerations

8.7.1. Compaction Standards

Fill and processed natural ground shall be compacted to a minimum relative compaction of 90 percent as determined by ASTM Test Method D 1557. Fills greater than 50 feet and all fill to be placed below subdrains should be compacted to at least 93 percent of maximum dry density. Compaction shall be achieved at slightly above the optimum moisture content, and as generally discussed in the attached Earthwork Specifications (Appendix E).

8.7.2. Benching

Where the natural slope is steeper than 5-horizontal to 1-vertical and where determined by the project geotechnical engineer or engineering geologist, compacted fill material shall be keyed and benched into competent materials.

8.7.3. Mixing and Moisture Control

In order to prevent layering of different soil types and/or different moisture contents, mixing and moisture control of materials may be necessary. The preparation of the earth materials through mixing and moisture control should be accomplished prior to and as part of the compaction of each fill lift. Water trucks or other water delivery means may be necessary for moisture control. Discing may be required when either excessively dry or wet materials are encountered.

8.7.4. Haul Roads

All haul roads, ramp fills, and tailing areas shall be removed prior to engineered fill placement.

8.7.5. Import Soils

Import soils, if required, should consist of clean, structural quality, compactable materials similar to the on-site soils and should be free of trash, debris or other objectionable materials. Import soils should be tested and approved by the geotechnical consultant prior to importing. At least three working days should be allowed in order for the geotechnical consultant to sample and test the potential import material.

8.7.6. Oversize Rock

Oversized rock material [i.e., rock fragments greater than eight (8) inches] will be produced during the excavation of the existing fill, design cuts and undercuts. Provided that the procedure is acceptable to the developer and governing agency, this rock may be incorporated into the compacted fill section to within three (3) feet of finish grade within residential areas and to two (2) foot below the deepest utility in street and house utility connection areas. Maximum rock size in the upper portion of the hold-down zone is restricted to eight (8) inches. Disclosure of the above rock hold-down zone should be made to prospective homebuyers explaining that excavations to accommodate swimming pools, spas, and other appurtenances will likely encounter oversize rock [i.e., rocks greater than eight (8) inches] below three (3) feet. Rock disposal details are presented on Detail 10, Appendix E. Rocks in excess of eight (8) inches in maximum dimension may be placed within the deeper fills, provided rock fills are handled in a manner described below. In order to separate oversized materials from the rock hold-down zones, the use of a rock rake may be necessary. Due to the anticipated volume of oversize material, onsite crushing to reduce rock size and incorporation in fill materials may be necessary.

8.7.6.1. *Rock Blankets*

Rock blankets consisting of a mixture of gravel, sand and rock to a maximum dimension of two (2) feet may be constructed. The rocks should be placed on prepared grade, mixed with sand and gravel, watered and worked forward with bulldozers and pneumatic compaction equipment such that the resulting fill is comprised of a mixture of the various particle sizes, contains no significant voids, and forms a dense, compact, fill matrix.

Rock blankets should be placed on a sloping surface (minimum of 2 percent), and the total thickness of the rock fill should not exceed 2 feet unless approved by the geotechnical consultant. The base surface shall slope towards a subdrain or other suitable drainage outlet. Adequate subdrains should be provided so that hydrostatic pressure is not allowed to develop within the rock blanket. The need to place graded material surrounding the rock blanket should be evaluated by the geotechnical consultant.

Rock blanket fills should not be placed within ten (10) feet of finish grade, within two (2) vertical feet of the lowest buried utility conduit in structural fills, or within fifteen (15) feet of the finish slope surface unless specifically approved by the developer, geotechnical consultant, and governing agency.

8.7.6.2. *Rock Windrows*

Rocks to maximum dimension of four (4) feet may be placed in windrows in deeper fill areas in accordance with Detail 10 (Appendix E). The base of the windrow should be excavated an equipment-width into the compacted fill core with rocks placed in single file within the excavation. Sands and gravels should be added and thoroughly flooded and tracked until voids are filled. Windrows should be separated horizontally by at least fifteen (15) feet of compacted fill, be staggered vertically, and separated by at least four (4) vertical feet of compacted fill. Windrows should not be placed within ten (10) feet of finish grade, within two (2) vertical feet of the lowest buried utility conduit in structural fills, or within fifteen (15) feet of the finish slope surface unless specifically approved by the developer, geotechnical consultant, and governing agency.

8.7.6.3. *Individual Rock Burial*

Rocks in excess of four (4) feet, but no greater than eight (8) feet may be buried in the compacted fill mass on an individual basis. Rocks of this size may be buried separately within the compacted fill by excavating a trench and covering the rock with sand/gravel, and compacting the fines surrounding the rock. Distances from slope face, utilities, and building pad areas (i.e., hold-down depth) should be the same as windrows.

8.7.6.4. *Rock Disposal Logistics*

The grading contractor should consider the amount of available rock disposal volume afforded by the design when excavation techniques and grading logistics are formulated. Rock disposal techniques should be discussed and approved by the geotechnical consultant and developer prior to implementation.

8.7.7. Utility Trench Excavation and Backfill

All utility trenches should be shored or laid back in accordance with applicable Cal/OSHA standards. Excavations in bedrock areas should be made in consideration of underlying geologic structure. The geotechnical consultant should be consulted on these issues during construction.

Mainline and lateral utility trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D 1557. Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable. Onsite soils will not be suitable for use as bedding material but will be suitable for use in backfill, provided oversized materials are removed. No surcharge loads should be imposed above excavations. This includes spoil piles, lumber, concrete trucks or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils.

To reduce moisture penetration beneath the slab-on-grade areas, shallow utility trenches should be backfilled with lean concrete or concrete slurry where they intercept the foundation perimeter. As an alternative, such excavations can be backfilled with native soils, moisture-conditioned to over optimum, and compacted to a minimum of 90 percent relative compaction.

9.0 DESIGN RECOMMENDATIONS

From a geotechnical standpoint, it is AGS's opinion that the subject site is suitable for construction of the proposed development, provided the recommendations presented in this report are incorporated into the design, planning and construction phases of site development.

9.1. Structural Design – Residential

It is our understanding that the site will be graded to support single family residences, associated streets and other improvements. Loading conditions and locations are not currently available. It is expected that for typical one- to three-story residential products and loading conditions (1 to 3 ksf for spread and continuous footings), conventional shallow slab-on-grade foundations can be utilized in areas with low expansive and shallow fill (<25 feet) and the as-graded differential fill depth meets h/3 criteria (where h is the maximum depth of fill). Post-tensioned slab/foundations may also be used for the residential lots. Typically post-tensioned slab/foundations are used for lots which exhibit expansion potentials ranging from “medium” to “high” and for lots in areas where the fill depth exceeds fifty (50) feet or where the as-graded differential fill depth exceeds h/3 criteria.

Upon the completion of rough grading, finish grade samples should be collected and tested to develop specific recommendations as they relate to final foundation design recommendations for individual lots. These test results and corresponding design recommendations should be presented in a Final Rough Grading Report. It is anticipated that the majority of the onsite soils will generally vary from "Low" to "Medium" in expansion potential when tested in general accordance with ASTM D 4829. However, some isolated soils onsite could exhibit “High” expansion potential.

9.1.1. Foundation Design

Residential structures can be supported on conventional shallow foundations and slab-on-grade or post-tensioned slab/foundation systems, as discussed above. The design of foundation systems should be based on as-graded conditions as determined after grading completion. The following values may be used in preliminary foundation design:

Allowable Bearing: 2000 psf.

Lateral Bearing: 250 lbs./sq.ft. at a depth of 12 inches plus
125 lbs./sq.ft. for each additional 12 inches
embedment to a maximum of 2000 lbs./sq.ft.

Sliding Coefficient: 0.35

The above values may be increased as allowed by Code to resist transient loads such as wind or seismic. Building code and structural design considerations may govern. Depth and reinforcement requirements and should be evaluated by a qualified engineer.

9.1.2. Conventional Slab Recommendations

Based upon the anticipated lot categories and preliminary expansion potential of “Very Low” to “Medium” for the onsite soil conditions and information supplied by 2019 CBC, conventional foundation systems should be designed in accordance with Section 9.1.1 and Table 9.1.2.

TABLE 9.1.2
CONVENTIONAL SLAB ON GRADE FOUNDATION DESIGN RECOMMENDATIONS

Expansion Potential	Very Low to Low (Cat. I)	Medium (Cat. II)
Footing Depth Below Lowest Adjacent Finish Grade		
One-Story	12 inches	18 inches
Two-Story	18 inches	18 inches
Footing Width		
One-Story	12 inches	12 inches
Two-Story	15 inches	15 inches
Footing Reinforcement		
One-Story	No. 4 rebar, one (1) on top and one (1) on bottom	No. 4 rebar, two (2) on top and two (2) on bottom or No. 5 rebar one (1) on top and one (1) on bottom
Two-Story	No. 4 rebar, one (1) on top and one (1) on bottom	No. 4 rebar, two (2) on top and two (2) on bottom or No. 5 rebar one (1) on top and one (1) on bottom
Slab Thickness	4 inches (actual)	4 inches (actual)
Slab Reinforcement	No. 3 rebar spaced 18 inches on center, each way	No. 3 rebar spaced 15 inches on center, each way
Slab Subgrade Moisture	Minimum of 110% optimum moisture 24 hours prior to placing concrete.	Minimum of 130% of optimum moisture to a depth of 12 inches 48 hours prior to placing concrete.
<u>Garages</u> A grade beam reinforced continuously with the garage footings shall be constructed across the garage entrance, tying together the ends of the perimeter footings and between individual spread footings. This grade beam should be embedded at the same depth as the adjacent perimeter footings. A thickened slab, separated by a cold joint from the garage beam, should be provided at the garage entrance. Minimum dimensions of the thickened edge shall be six (6) inches deep. Footing depth, width and reinforcement should be the same as the structure. Slab thickness, reinforcement and underslab treatment should be the same as the structure.		
<u>Isolated Spread Footings</u> Isolated spread footings should be embedded a minimum of 18 inches below lowest adjacent finish grade and should at least 24 inches wide. A grade beam should also be constructed for interior and exterior spread footings and should be tied into the structure in two orthogonal directions, footing dimensions and reinforcement should be similar to the aforementioned continuous footing recommendations. Final depth, width and reinforcement should be determined by the structural engineer.		

9.1.3. Post-Tensioned Slab Foundation System Design Recommendations

Post-tensioned slab foundation systems can be considered for all foundations and varying soils conditions. Minimally, AGS recommends that post-tensioned slabs should be considered for lots that exhibit “medium” to “high” expansion conditions and for residential structures situated on deep fill areas (>50 feet). Final foundation design should be provided by the project geotechnical engineer based upon the as-graded conditions

Preliminary geotechnical engineering design and construction parameters for post-tensioned slab foundations are provided in Section 9.1.1 and Table 9.1.3 below.

TABLE 9.1.3
POST-TENSIONED FOUNDATION DESIGN PARAMETERS

Soil Category	Expansion Index	Edge Beam Embedment (inches)*	Edge Lift**		Center Lift**	
			Em (ft.)	Ym (in.)	Em (ft.)	Ym (in.)
I	“Very Low” to “Low”	12	5.4	0.54	9.0	0.23
II	“Medium”	18	4.6	0.90	9.0	0.38
III	“High”	24	3.9	1.26	7.5	0.51

Moisture Barrier	An approved moisture and vapor barrier should be placed below all slabs-on-grade within living and moisture sensitive areas as discussed in Section 9.1.5	
Slab Subgrade Presaturation	Soil Category I	Minimum of 110 percent of optimum moisture to a depth of 12 inches 24 hours prior to placing concrete
	Soil Category II	Minimum of 130 percent of optimum moisture to a depth of 12 inches 48 hours prior to placing concrete
	Soil Category III	Minimum of 140 percent of optimum moisture to a depth of 12 inches 48 hours prior to placing concrete

Notes: * Post-tensioned slabs should incorporate a perimeter-thickened edge to reduce the potential for moisture infiltration, seasonal moisture fluctuation and associated differential movement around the slab perimeter. Depth of embedment should be measured below lowest adjacent finish grade.

** The values of predicted lift are based on the procedures outlined in the *Design of Post-Tensioned Slabs-on-Ground*, Third Edition and related addendums. No correction for vertical barriers at the edge of the slab or other conditions (e.g. horizontal barriers, tree roots, adjacent planters) are assumed. The values assume Post-Equilibrium conditions exist (as defined by the Post Tensioning Institute), and these conditions created during construction should be maintained throughout the life of the structure. Please refer to the appended Homeowner Maintenance Guidelines for a summary of recommended practices to maintain the conditions created during construction.

*** Final design parameters should be provided in a final grading report and should be based on as-graded soil conditions. For budgeting purposes, Soil Category II may be assumed.

Additional design and construction considerations include:

- Design and construction of the post-tensioned foundations should be undertaken by firms experienced in the field. It is the responsibility of the foundation design engineer to select the design methodology and properly design the foundation system for the onsite soils conditions. The slab designer should provide deflection potential to the project architect/structural engineer for incorporation into the design of the structure.
- The project foundation design engineer should use the Post-Tensioning Institute (PTI) foundation design procedures as described in 2019 CBC, based upon appropriate soil design parameters relating to edge moisture variation and differential swell provided by the geotechnical consultant at the completion of rough grading operations.

9.1.4. Total and Differential Settlement

In addition to the potential effects of expansive soils, the proposed residential structures should be designed in anticipation of total and differential settlements. The following lot categories are presented based upon anticipated settlement, fill thickness and expansion potential.

Category I

“Very low to low” expansion potential and fill depths less than 25 feet. Minimum fill depth meets h/3 criteria where h is the maximum fill thickness.

Total = 3/4 inch

Differential = 3/8 inch in 20 feet

Category II

“Medium” expansion potential and/or fill depths less than 50 feet. Minimum fill depth meets h/3 criteria where h is the maximum fill thickness.

Total = 1 inch

Differential = 1/2 inch in 20 feet

Category III

“High” expansion potential and/or fill depths more than 50 feet. Minimum fill depth meets h/3 criteria where h is the maximum fill thickness.

Total = 1 inch

Differential = 3/4 inch in 20 feet

9.1.5. Moisture and Vapor Barrier

A moisture and vapor retarding system should be placed below the slab-on-grade in portions of the structure considered to be moisture sensitive. The retarder should be of suitable composition, thickness, strength, and low permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as *Visqueen*, placed between one to four inches of clean sand, has been used for this purpose. More recently Stego® Wrap or similar underlayments have been used to lower permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. The use of this system or other systems, materials, or techniques can be considered, at the discretion of the designer, provided the system reduces the vapor transmission rates to acceptable levels.

9.1.6. Footing Embedment Next to Swales and Slopes

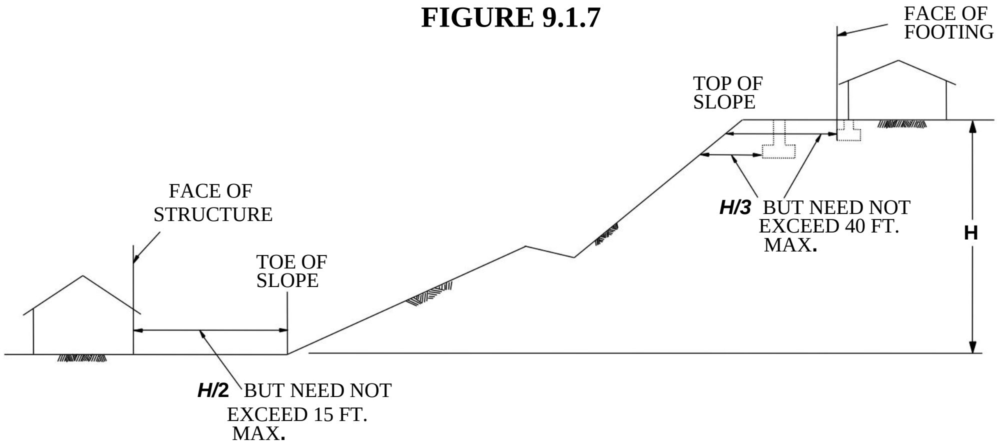
If exterior footings adjacent to drainage swales are to exist within five (5) feet horizontally of the swale, the footing should be embedded sufficiently to assure embedment below the swale bottom is maintained. Footings adjacent to slopes should be embedded such that a least seven (7) feet are provided horizontally from edge of the footing to the face of the slope.

9.1.7. Deepened Footings and Structural Setbacks

It is generally recognized that improvements constructed in proximity to natural slopes or properly-constructed, manufactured slopes can, over a period of time, be affected by natural processes including gravity forces, weathering of surficial soils, and long-term (secondary) settlement. Most building codes, including the 2019 CBC, require that structures be set back or footings deepened, where subject to the influence of these natural processes.

For the subject site, where foundations for residential structures are to exist in proximity to slopes, the footings should be embedded to satisfy the requirements presented in Figure 9.1.7.

FIGURE 9.1.7



9.1.8. Miscellaneous Foundation Design Recommendations

Soils from the footing excavations should not be placed in slab-on-grade areas unless properly compacted and tested. The excavations should be cleaned of all loose/sloughed materials and be neatly trimmed at the time of concrete placement.

9.1.9. Earth Pressures for Retaining Wall Design

The recommended active, passive and at rest lateral earth pressures, which may be utilized for design of retaining walls with level and 2:1 backfill are as follows:

Static Conditions

Compacted Artificial Fill, (afc$_{90}$): phi = 31°, unit wt. = 125 pcf

Level Backfill	**Rankine Coefficients**	**Equivalent Fluid Pressure (psf/lin.ft.)**
Coefficient of Active Pressure:	$K_a = 0.32$	40
Coefficient of Passive Pressure:	$K_p = 3.12$	391
Coefficient of at Rest Pressure:	$K_o = 0.48$	61

2 : 1 Backfill	**Rankine Coefficients**	**Equivalent Fluid Pressure (psf/lin.ft.)**
Coefficient of Active Pressure:	$K_a = 0.50$	62
Coefficient of At Rest Pressure:	$K_o = 0.70$	88

For rigid restrained walls it is recommended that “At-Rest” values should be used. For cantilever retaining walls which can undergo minor rotations active pressures can be used. The above values may be increased by 1/3 as allowed by Code to resist transient loads. Building Code and structural design considerations may govern.

Seismic Design

In addition to the above static pressures, unrestrained retaining walls should be designed to resist seismic loading as required by 2019 CBC. The seismic load can be modeled as a thrust load applied at a point 0.6H above the base of the wall, where H is equal to the height of the wall. The seismic load (in pounds per lineal foot of wall) may be calculated as follows:

$$Pe = \tfrac{3}{8} * \gamma * H^2 * k_h$$

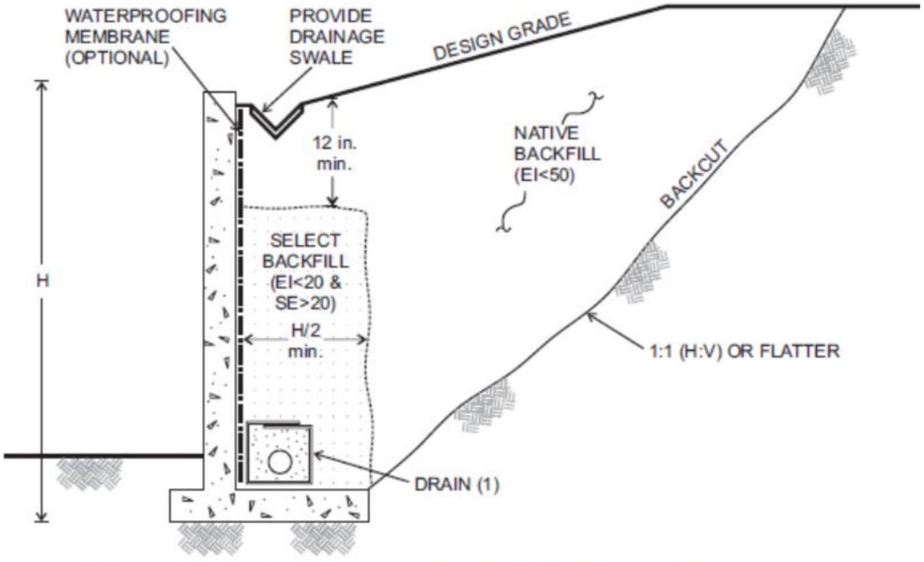
Where: Pe = Seismic thrust load
H = Height of the wall (feet)
γ = soil density = 130 pounds per cubic foot (pcf)
k_h = seismic pseudostatic coefficient = 0.5 * PGA_M

Walls should be designed to resist the combined effects of static pressures and the above seismic thrust load.

9.1.10. Retaining Wall Drainage

Retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic pressures. To relieve the potential for hydrostatic pressure, wall backfill should consist of free draining soil (sand equivalent “SE” >20). In addition, a wall drain should be constructed as shown in Figure 9.1.9. The wall drain should be placed at the heel of the wall and should consist of a 4-inch diameter perforated pipe (SDR35 or SCHD 40) surrounded by 4 cubic feet of crushed rock (3/4-inch) per lineal foot, wrapped in filter fabric (Mirafi® 140N or equivalent).

FIGURE 9.1.10



NOTES: (1) DRAIN: 4-INCH PERFORATED ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE PLACED PERFORATIONS DOWN AND SURROUNDED BY A MINIMUM OF 1 CUBIC FEET OF 3/4 INCH ROCK OR APPROVED EQUIVALENT SUBSTITUTE AND WRAPPED IN MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

Proper drainage devices should be installed along the top of the wall backfill, which should be properly sloped to prevent surface water ponding adjacent to the wall. In addition to the wall drainage system, for building perimeter walls extending below the finished grade, the wall should be waterproofed and/or damp-proofed to effectively seal the wall from moisture infiltration through the wall section to the interior wall face.

The wall should be backfilled with granular soils placed in loose lifts no greater than 8-inches thick, at or near optimum moisture content, and mechanically compacted to a minimum 90 percent of the maximum dry density as determined by ASTM D1557. Flooding or jetting of backfill materials generally do not result in the required degree and uniformity of compaction and, therefore, is not recommended. No backfill should be placed against concrete until minimum design strengths are achieved as verified by compression tests of cylinders. The geotechnical consultant should observe the retaining wall footings, back drain installation, and be present during placement of the wall backfill to confirm that the walls are properly backfilled and compacted.

9.2. Civil Design Recommendations

9.2.1. Drainage

Final site grading should assure positive drainage away from structures, and positive drainage away from structures should be maintained. The use of gutters and down spouts to carry roof drainage well away from structures is recommended. Planter areas should be provided with area drains to transmit irrigation and rainwater away from structures. Raised planters should be provided with a positive means to remove water through the face of the containment wall.

9.2.2. Concrete Flatwork and Lot Improvements

- In an effort to minimize shrinkage cracking, concrete flatwork should be constructed of uniformly cured, low-slump concrete and should contain sufficient control/contraction joints (typically spaced at 8 to 10 feet, maximum).
- Concrete flatwork should be designed utilizing 4-inch minimum thickness.
- Consideration should be given to reinforcing any exterior flatwork.
- Consideration should be given to construct a thickened edge (scoop footing) at the perimeter of slabs and walkways adjacent to landscape areas to minimize moisture variation below these improvements. The thickened edge (scoop footing) should extend approximately 8 inches below concrete slabs and should be a minimum of 6 inches wide.
- Additional provisions need to be incorporated into the design and construction of all improvements exterior to the proposed structures (pools, spas, walls, patios, walkways, planters, etc.) to account for the hillside nature of the project, as well as being designed to account for potential expansive soil conditions. Design considerations on any given lot may need to include provisions for differential bearing materials (bedrock vs. compacted fill), ascending/descending slope conditions, bedrock structure, perched

(irrigation) water, special surcharge loading conditions, potential expansive soil pressure, and differential settlement/heave.

- All exterior improvements should be designed and constructed by qualified professionals using appropriate design methodologies that account for the onsite soils and geologic conditions. The aforementioned considerations should be used when designing, constructing, and evaluating long-term performance of the exterior improvements on the lots.
- The homeowners should be advised of their maintenance responsibilities as well as geotechnical issues that could affect design and construction of future homeowner improvements. The information presented in Appendix F should be considered for inclusion in homeowner packages in order to inform the homeowner of issues relative to drainage, expansive soils, landscaping, irrigation, sulfate exposure, and slope maintenance.

9.2.3. Preliminary Pavement Design

For preliminary design and estimating purposes, the following pavement structural sections can be used for the range of likely traffic indices. The structural sections are based upon an assumed "R"-Value of 30.

TABLE 9.2.3
PRELIMINARY PAVEMENT SECTIONS

Traffic Index (TI)	Asphaltic Concrete - AC (inch)	Class II Aggregate Base - AB (inch)
5.0	3	6
6.0	4	7
7.0	4	10
8.0	5	11

Subgrade soils should be compacted to at least 95 percent of maximum density as determined by ASTM D 1557. Aggregate base materials should be compacted to at least 95 percent of maximum density as determined by California Test 216. Final determination of pavement sections should be based upon sampling and testing of as-graded subgrade soils, in accordance with City of San Diego guidelines.

9.2.4. Stormwater BMPs

The project site can generally be characterized as a northwest-southeast trending ridge that is moderately dissected and flanked with steep, descending slopes. Tertiary-age sedimentary bedrock units assigned to the Poway Group underlie the site and are locally exposed in canyon walls and topographic high areas. The formational materials generally consist of conglomerate and sandstone in a dense/moderately hard condition. Significant portions of the site are covered with pre-existing fill soils greater than 5 feet in thickness. Online soil mapping provided by the National Resources Conservation Service (NRCS), indicates the site is underlain by soil unit RtF - Redding cobbly loam, 15 to 50 percent slopes. The RtF soil unit is classified as Hydrologic Soil Group D with an estimated infiltration/saturated hydraulic conductivity (K_{sat}) rate of 0.00 to 0.06 inches/hour. The description of the RtF soil unit is consistent with the conglomeratic units (Stadium Conglomerate and Pomerado Formation) encountered during subsurface explorations onsite.

The project site has been separated into four Drainage Management Areas (DMAs), DMA-1 through -4, each with an associated BMP. In consideration of the site's steep topography and the presence of deep pre-existing fill soils, the majority of the project site is not considered suitable for support of infiltration type BMPs. More specifically, BMP BF-1-1 for DMA-1 is located in an area underlain by deep pre-existing fill soils. BMPs BF-3-3 and -3-4 for DMA-3 and -4, respectively, cannot avoid placement within 50 feet of a natural slope steeper than 25 percent or within a distance of 1.5H from a fill slope where H is the height of the fill slope. BMP BF-1-2 for DMA-2 may be suitable for partial infiltration as it is located outside of the required slope setback area and is anticipated to be sited within the sandstone member of the Mission Valley Formation. BMP BF-1-2 is located in an area of significant proposed cut (~40 feet), therefore site specific infiltration testing has not been performed. For planning phase purposes, the City of San Diego default infiltration rate of 0.05 inches/hour for Hydrologic Soil Group D which can be used for BMP BF-1-2. Site specific infiltration testing for BMP BF-1-2 is recommended.

10.0 FUTURE STUDY NEEDS

This report represents a geotechnical review of the current 50-scale tentative map/site development plans for the project. As the project design progresses, additional site specific geologic and geotechnical issues will need to be considered in the ultimate design and construction of the project. Consequently, future geotechnical studies and reviews may be necessary. These may include:

- Review of final grading plans
- Review of foundation plans
- Review of retaining wall plans

As plans are refined, they should be forwarded to the project geotechnical engineer/geologist for evaluation and comment, as necessary.

11.0 CLOSURE

11.1. Geotechnical Review

As is the case in any grading project, multiple working hypotheses are established utilizing the available data, and the most probable model is used for the analysis. Information collected during the grading and construction operations is intended to evaluate the hypotheses, and some of the assumptions summarized herein may need to be changed as more information becomes available. Modification of the grading and construction recommendations may become necessary, should the conditions encountered in the field differ significantly than those hypothesized to exist.

AGS should review the pertinent plans and sections of the project specifications, to evaluate conformance with the intent of the recommendations contained in this report. If the project description or final design varies from that described in this report, AGS must be consulted regarding the applicability of, and the necessity for, any revisions to the recommendations presented herein. AGS accepts no liability for any use of its recommendations if the project description or final design varies and AGS is not consulted regarding the changes.

11.2. Limitations

This report is based on the project as described and the information obtained from our investigation and the referenced reports. The findings are based on the review of the field and laboratory data provided combined with an interpolation and extrapolation of conditions between and beyond the reviewed exploratory excavations. The results reflect an interpretation of the direct evidence obtained. Services performed by AGS have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by geotechnical engineers and engineering geologists who are familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report. AGS should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations of this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of AGS. AGS has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the CONTRACTOR, or any other person performing any of the construction, or for the failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

APPENDIX A

REFERENCES

REFERENCES

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APPENDIX B

SUBSURFACE EXPLORATION (AGS, CWLM) AND GEOPHYSICAL EVALUATION REPORT (SGI)

APPENDIX B
SUBSURFACE EXPLORATION

Field Procedure for the Collection of Disturbed Samples

Disturbed soil samples were obtained in the field using the following methods.

Bulk Samples

Bulk samples of representative earth materials were obtained from the exploratory borings. The samples were bagged and transported to the laboratory for testing.

The Standard Penetration Test (SPT) Sampler

Disturbed drive samples of earth materials were obtained by means of a Standard Penetration Test sampler. The sampler is composed of a split barrel with an external diameter of 2 inches and an unlined internal diameter of 1-3/8 inches. The sampler was driven into the ground 12 to 18 inches with a 140-pound hammer free-falling from a height of 30 inches in general accordance with ASTM D 1586. The blow counts were recorded for every 6 inches of penetration; the blow counts reported on the logs are those for the last 12 inches of penetration. Soil samples were observed and removed from the sampler, bagged, sealed and transported to the laboratory for testing.

Field Procedure for the Collection of Relatively Undisturbed Samples

Relatively undisturbed soil samples were obtained in the field using the following method.

The Modified Split-Barrel Drive Sampler

The sampler, with an external diameter of 3.0 inches, was lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with the weight of a 140-pound hammer, in general accordance with ASTM D 3550. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the hammer, and the number of blows per foot of driving are presented on the boring logs as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

BORING NUMBER B-1
PAGE 1 OF 2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT The Phair Company
PROJECT NAME Renzulli Estates
PROJECT NUMBER 1902-06
PROJECT LOCATION 11495 Cypress Canyon Road
DATE STARTED 3/22/19 **COMPLETED** 3/22/19
GROUND ELEVATION 912 ft **HOLE SIZE** 6
DRILLING CONTRACTOR Baja Exploration
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		SC	**CRUSHED ASPHALT CONCRETE** 2-inch thick layer.										
			ARTIFICIAL FILL - UNDOCUMENTED (Qafu) Clayey SAND with gravel, fine- to coarse-grained, dark brown, moist, medium dense, with concrete and asphalt fragments. @ 1 ft. light reddish brown.										
5			@ 5 ft. same.	SPT	12-15-8 (23)								
10			@ 10 ft. 2.5-inch rock in shoe, no recovery.	SPT	3-3-3 (6)								
15		SM	@ 15 ft. Silty SAND with gravel, fine-grained, dark gray, moist, medium dense, with abundant decomposed wood and organics, strong odor.										
20			@ 20 ft. dark gray to black, strong odor.	SPT	5-5-8 (13)								
			@ 22 ft. with rebar fragments.										
25													

(Continued Next Page)

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-1

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
25		SM	**ARTIFICIAL FILL - UNDOCUMENTED (Qafu)** (continued) Silty SAND with gravel, fine-grained, dark gray to black, moist, medium dense, with abundant decomposed wood and organics, strong odor.	SPT	10-11-11 (22)								
30				SPT	10-10-12 (22)								
35													
40			@ 40 ft. grinding on rock or concrete. Refusal.	SPT	50/0"								

Total Depth = 40 ft. (Refusal)
No groundwater.
No caving.
Backfilled in accordance with SDCDEH requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-2
PAGE 1 OF 2

CLIENT The Phair Company
PROJECT NAME Renzulli Estates
PROJECT NUMBER 1902-06
PROJECT LOCATION 11495 Cypress Canyon Road
DATE STARTED 3/22/19 **COMPLETED** 3/22/19
GROUND ELEVATION 907 ft **HOLE SIZE** 6
DRILLING CONTRACTOR Baja Exploration
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		SC	**CRUSHED ASPHALT CONCRETE** 2-inch thick layer.										
			ARTIFICIAL FILL- UNDOCUMENTED (Qafu) Clayey SAND with gravel, fine- to coarse-grained, reddish brown, moist, medium dense, with abundant asphalt fragments.	BU									
5			@ 5 ft. damp, with cobbles, no recovery.										
10				MC	8-8-8 (16)								
			@ 12 ft. light reddish brown, moist, with cobbles, no recovery.										
15			@ 15 ft. with brick fragments.	MC	8-6-7 (13)								
20			@ 20 ft. with concrete fragments.	MC	5-6-7 (13)								
25													

(Continued Next Page)

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-2

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
25		SC	**ARTIFICIAL FILL- UNDOCUMENTED (Qafu)** Clayey SAND with gravel, fine- to coarse-grained, reddish brown, moist, medium dense, with abundant concrete and brick fragments. @ 27 ft. grinding on rock or concrete. Refusal.	MC	6-7-50/5"								

Total Depth = 27 ft. (Refusal)
No groundwater.
No caving.
Backfilled in accordance with SDCDEH requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-3

PAGE 1 OF 2

CLIENT The Phair Company
PROJECT NAME Renzulli Estates
PROJECT NUMBER 1902-06
PROJECT LOCATION 11495 Cypress Canyon Road
DATE STARTED 3/22/19 **COMPLETED** 3/22/19
GROUND ELEVATION 910 ft **HOLE SIZE** 6
DRILLING CONTRACTOR Baja Exploration
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		SC	**CRUSHED ASPHALT CONCRETE** 2-inch thick layer. **ARTIFICIAL FILL- UNDOCUMENTED (Qafu)** Clayey SAND with gravel, fine- to coarse-grained, light reddish brown, moist, medium dense, with concrete and asphalt fragments.										
5				MC	15-15-17 (32)								4
10				MC	17-10-20 (30)								
15			@ 15 ft. abundant gravel up to 3-inch size.	MC	9-12-18 (30)								
20				MC BU	28-50/3"								
			@ 23.5 ft. abundant decomposed wood, dark brown to black, strong odor.										
25													

(Continued Next Page)

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-3

PAGE 2 OF 2

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
25		SC	**ARTIFICIAL FILL- UNDOCUMENTED (Qafu)** Clayey SAND with gravel, fine- to coarse-grained, dark brown, moist, medium dense, abundant coarse gravel.	MC	13-11-25 (36)								
				BU									
30			@ 30 ft. abundant decomposed wood, dark brown to black, strong odor.	MC	36-16-16 (32)								
			@ 32 ft. grinding on rock or concrete. Refusal.										

Total Depth = 32 ft. (Refusal)
No groundwater.
No caving.
Backfilled in accordance with SDCDEH requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-4

PAGE 1 OF 3

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DATE STARTED 3/22/19 **COMPLETED** 3/22/19

GROUND ELEVATION 908 ft **HOLE SIZE** 6

DRILLING CONTRACTOR Baja Exploration

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING ---

LOGGED BY AB **CHECKED BY** PJD

AT END OF DRILLING ---

NOTES

AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		SC	**CRUSHED ASPHALT CONCRETE** 2-inch thick layer. **ARTIFICIAL FILL- UNDOCUMENTED (Qafu)** Clayey SAND with gravel, fine- to coarse-grained, light reddish brown, moist, medium dense, with concrete and asphalt fragments, some roots.	BU									
5		SM	Silty SAND, fine- to medium-grained, light gray, dense, micaceous.	SPT	9-5-5 (10)								
10				SPT	5-5-8 (13)								
			@ 14 ft. light reddish brown, with brick fragments.										
15				MC	12-9-9 (18)								
20			@ 20 ft. same, no brick fragments.	SPT	24-15-28 (43)								
			@ 23 ft. with rebar, grinding on cobble.										
25													

(Continued Next Page)

CLIENT The Phair Company **PROJECT NAME** Renzulli Estates

PROJECT NUMBER 1902-06 **PROJECT LOCATION** 11495 Cypress Canyon Road

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
25			**ARTIFICIAL FILL- UNDOCUMENTED (Qafu)** Clayey to silty SAND with gravel, fine- to coarse-grained, yellowish brown, moist, medium dense, with concrete and asphalt fragments, some roots.	MC	10-13-13 (26)								
30				MC	16-16-20 (36)								
				BU									
35		SC	Clayey SAND with gravel, fine- to coarse-grained, reddish brown, moist, medium dense, with concrete fragments. Dark brown to black silty sand in shoe.	SPT	14-8-8 (16)								
40		SM	@ 40 ft. oil/asphalt treated sand with gravel fragments.	SPT	5-5-20 (25)								
		GW	@44 ft. grinding on cobbles.										
45		CL	Silty CLAY with gravel, gray, dense.	SPT	14-16-20 (36)								
50				MC	19-14-28 (42)								
				BU									

(Continued Next Page)

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-4

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
55	▨	CL	**ARTIFICIAL FILL- UNDOCUMENTED (Qafu)** Silty CLAY with gravel, gray, moist, dense. *(continued)*										
	▨			MC	19-14-28 (42)								
			@57.5 ft. grinding on rock or concrete. Refusal.										

Total Depth = 58 ft. (Refusal)
No groundwater.
No caving.
Backfilled in accordance with SDCDEH requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-5

PAGE 1 OF 1

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DATE STARTED 11/14/19 **COMPLETED** 11/14/19

GROUND ELEVATION 761 ft **HOLE SIZE** 5

DRILLING CONTRACTOR Native Drilling

GROUND WATER LEVELS:

DRILLING METHOD Tri-Pod

AT TIME OF DRILLING ---

LOGGED BY AB **CHECKED BY** PJD

AT END OF DRILLING ---

NOTES

AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		SM	**ARTIFICIAL FILL - DOCUMENTED (Qafd)** Silty SAND, fine- to coarse-grained, reddish brown, moist, loose, with gravel and cobbles to 4-inch size.										
2.5		SC-SM	@ 2.5 ft. Silty SAND to clayey SAND, light gray, iron oxide staining, with gravel and cobbles.	SPT	5-5-5 (10)								
5.0				SPT	5-5-8 (13)								
		SC	@ 6 ft. Clayey SAND, reddish brown, with gravel and cobbles.										
7.5			@ 7.5 ft. yellowish brown, with gravel and cobbles.	SPT	5-15-17 (32)								
		SM	@ 9 ft. Silty SAND, light yellowish brown to tan, iron oxide staining, with gravel and cobbles.	SPT	7-10-15 (25)								
10.0			@ 10.5 ft. grinding on rock. Refusal.										

Total Depth = 10.5 ft. (Refusal)
No groundwater.
No caving.
Backfilled in accordance with SDCDEH requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-6

PAGE 1 OF 1

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DATE STARTED 11/13/19 **COMPLETED** 11/13/19

GROUND ELEVATION 828 ft **HOLE SIZE** 6

DRILLING CONTRACTOR Pacific Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING ---

LOGGED BY AB **CHECKED BY** PJD

AT END OF DRILLING ---

NOTES

AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		SM	**ARTIFICIAL FILL - DOCUMENTED (Qafd)** Silty SAND, light yellowish brown, moist, medium dense, iroin oxide staining.										
				SPT	4-5-6 (11)								
5			@ 5 ft. moist	SPT	9-7-5 (12)								
			@ 7.5 ft. 1.5 inch gravel fragment in shoe, partial revovery.	SPT	9-8-7 (15)								
10		SC	@ 10 ft. Clayey SAND, light to dark reddish brown, damp to moist, iron oxide staining. 2-inch sandstone clast in bottom.	SPT	8-9-8 (17)								
		SM	**STADIUM CONGLOMERATE (Tst)** Silty to clayey SANDSTONE, light reddish brown, damp, very dense, iron oxide staining. @ 12.5 ft. difficult drilling, grinding on rock, no recovery.	SPT	26/0"								
15				SPT	29-50/4"								
			@ 17.5 ft. difficult drilling, grinding on rock, no recovery.	SPT	25/0"								
20			@ 20 ft. Silty SANDSTONE, light yellowish gray, highly weathered, friable, with gravel, trace iron oxide staining.	SPT	45-35-50/4"								
			@ 22.5 ft. difficult drilling, bouncing on rock, no recovery. Refusal.	SPT	44-50/1"								

Total Depth = 23.1 ft. (Refusal)
No groundwater.
No caving.
Backfilled in accordance with SDCDEH requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-7

PAGE 1 OF 1

CLIENT The Phair Company
PROJECT NAME Renzulli Estates
PROJECT NUMBER 1902-06
PROJECT LOCATION 11495 Cypress Canyon Road
DATE STARTED 11/13/19 **COMPLETED** 11/13/19
GROUND ELEVATION 828 ft **HOLE SIZE** 6
DRILLING CONTRACTOR Pacific Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		SM	**ARTIFICIAL FILL - UNDOCUMENTED (Qafu)** Silty SAND, reddish brown, damp, medium dense, with gravel and cobble to 4 inch size, some clay.										
				SPT	5-4-4 (8)								
5			@ 5 ft. same, no cobbles.	SPT	4-4-6 (10)								
		SM	**STADIUM CONGLOMERATE (Tst)** Silty SAND with gravel, light tan, damp, very dense.	SPT	46-50/2"								
10			@ 10 ft. Silty SAND with gravel to Gravelly SAND, light reddish brown to tan, damp.	SPT	32-50/2"								
			@ 12.5 ft. no recovery.	SPT	50/5"								
15			@ 15 ft. Silty to clayey SAND with gravel, light reddish brown, moist.	SPT	12-47-50/4"								
		SM	@ 16 ft. Silty SANDSTONE, light reddish brown, highly weathered, friable, with gravel.										

Total Depth = 16.3 ft.
No groundwater.
No caving.
Backfilled in accordance with SDCDEH requirements.

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-8

PAGE 1 OF 1

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DATE STARTED 11/13/19 **COMPLETED** 11/13/19

GROUND ELEVATION 892 ft **HOLE SIZE** 6

DRILLING CONTRACTOR Pacific Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING ---

LOGGED BY AB **CHECKED BY** PJD

AT END OF DRILLING ---

NOTES

AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		SM	**ARTIFICIAL FILL - UNDOCUMENTED (Qafu)** Silty SAND, light yellowish brown, damp, medium dense, with gravel and cobble to 4 inch size.										
2.5			@ 2.5 ft. light reddish brown, some gravel.	SPT	6-9-8 (17)								
5.0			@ 5 ft. no recovery.	SPT	16-14-12 (26)								
7.5		SM	**TOPSOIL** Silty SAND to gravelly SAND, brown, with roots and organic content.	SPT	6-8-7 (15)								
		SM	**ARTIFICIAL FILL - UNDOCUMENTED (Qafu)** Silty SAND, light reddish brown, damp, medium dense, with gravel.										
		SM	**MISSION VALLEY FORMATION (Tmv)** Silty SANDSTONE, light reddish brown, damp, very dense, highly weathered, friable.										
10.0			@ 10 ft. iron oxide staining.	SPT	8-10-11 (21)								
12.5			@ 12.5 ft. light gray brown, highly weathered, friable, micaceous, iron oxide staining.	SPT	9-23-37 (60)								

Total Depth = 14 ft.
No groundwater.
No caving.
Backfilled in accordance with SDCDEH requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-9

PAGE 1 OF 2

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DATE STARTED 11/12/19 **COMPLETED** 11/12/19

GROUND ELEVATION 913 ft **HOLE SIZE** 6

DRILLING CONTRACTOR BC2 Environmental

GROUND WATER LEVELS:

DRILLING METHOD Sonic Drilling

AT TIME OF DRILLING ---

LOGGED BY AB **CHECKED BY** PJD

AT END OF DRILLING ---

NOTES

AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0			**CRUSHED ASPHALT CONCRETE** 1-foot thick layer.										
		SC	**ARTIFICIAL FILL - UNDOCUMENTED (Qafu)** Silty to clayey SAND with gravel, fine- to coarse-grained, reddish brown and gray, moist, medium dense, with asphalt fragments. @ 2 ft. light yellowish brown with rounded gravel.										
5													
			@ 6 ft. same, with 4-inch cobble.										
			@ 9 ft. reddish brown.										
10													
			@10.5 ft. with asphalt fragments.										
		SC	@ 11 ft. some organic content.										
			@ 12 ft. grades to Sandy CLAY, dark reddish brown with gravel and organic content, moist to wet.										
			@ 13.5 ft. grades to Clayey SAND, reddish yellow, with gravel.										
15													
			@ 15.5 reddish brown, with organic content, brick and asphalt fragments.										
			@ 19 ft. wood and roots, black, oil odor, with gravel.										
20													
			@ 20 ft. dark gray to black, oil impregnated sand, some wood, asphalt concrete fragments and gravel, strong odor.										
		SM	@ 21.5 ft. gray silty SAND with gravel and cobbles to 4-inch size, oil odor.										
			@ 23.5 ft. cobbles to 8 inch size, difficult drilling.										
25													

(Continued Next Page)

BORING NUMBER B-9

PAGE 2 OF 2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
25		SM	**<u>ARTIFICIAL FILL - UNDOCUMENTED (Qafu)</u>** Silty SAND with cobbles, gray. @ 27 ft. dark gray Silty SAND, oil impregnated, wood, asphalt concrete fragments and gravel, damp.										
30			@ 30 ft. dark gray Silty SAND with cobble fragments. Refusal.										

Total Depth = 31 ft. (Refusal)
No groundwater.
No caving.
Backfilled in accordance with SDCDEH requirements.

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-10

PAGE 1 OF 4

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DATE STARTED 11/11/19 **COMPLETED** 11/11/19

GROUND ELEVATION 907 ft **HOLE SIZE** 6

DRILLING CONTRACTOR BC2 Environmental

GROUND WATER LEVELS:

DRILLING METHOD Sonic Drilling

AT TIME OF DRILLING ---

LOGGED BY AB **CHECKED BY** PJD

AT END OF DRILLING ---

NOTES

AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		SC	**CRUSHED ASPHALT CONCRETE** 3-inch thick layer.										
			ARTIFICIAL FILL - UNDOCUMENTED (Qafu) Clayey SAND with gravel, fine- to coarse-grained, reddish brown, moist. @ 0.75 ft. light gray. @ 1.5 ft. reddish brown. @2.25 ft. cobble layer, 6-inch size. @ 3 ft. dark reddish brown, with gravel and cobbles.										
5			@ 5 ft. Silty SAND with gravel, some asphalt concrete fragments. @ 6 ft. 12-inch gravel layer, gray. @ 7 ft. 6-inch cobble. @ 8 ft. Silty SAND with asphalt concrete fragments, reddish brown.										
10			@ 11 ft. concrete fragments to 4-inch size, steel bolt. @ 13 ft. Clayey SAND. @ 13.5 ft. concrete fragments to 6-inch size.										
15			@ 15 ft. brick fragments in clayey SAND with rounded gravel, yellowish brown, moist. @ 18.5 ft. concrete fragments to 6-inch size.										
20			@ 20.5 ft. asphalt concrete fragments to 4-inch size. @ 22 ft. concrete fragments to 6-inch size.										
25													

(Continued Next Page)

BORING NUMBER B-10

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT The Phair Company
PROJECT NAME Renzulli Estates
PROJECT NUMBER 1902-06
PROJECT LOCATION 11495 Cypress Canyon Road

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
25			**ARTIFICIAL FILL - UNDOCUMENTED (Qafu)** Clayey SAND with gravel, fine- to coarse-grained, reddish brown, moist. *(continued)* @ 25.5 ft. concrete fragments in clayey SAND.										
			@ 27 ft. clayey SAND, reddish brown, moist.										
			@ 28 ft. asphalt concrete fragments to 6-inch size in clayey SAND.										
30			@ 30 ft. concrete and asphalt fragments in silty SAND, some plastic debris.										
			@ 34 ft. clayey SAND with concrete fragments and rounded gravel, wet.										
35													
			@ 36 ft. concrete and asphalt fragments to 6-inch size.										
			@ 37 ft. brick fragments in clayey SAND.										
			@ 38 ft. clayey SAND with coarse rounded gravel, some asphalt fragments.										
40			@ 40 ft. concrete and asphalt fragments in clayey SAND, some plastic debris.										
45			@ 45 ft. cobbles and concrete fragments to 6-inch size in silty SAND.										
			@ 48 ft. clayey SAND, reddish brown.										
			@ 49 ft. concrete fragments, steel bolt.										
50			@ 50 ft. concrete, asphalt and brick fragments in silty SAND, gray brown. @ 51.5 ft. concrete fragments.										
			@ 52.5 ft. clayey SAND with rounded gravel and concrete fragments, reddish brown. @ 53 ft. cobbles to 8-inch size in silty SAND.										

(Continued Next Page)

CLIENT The Phair Company
PROJECT NAME Renzulli Estates
PROJECT NUMBER 1902-06
PROJECT LOCATION 11495 Cypress Canyon Road

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
55		SC	**ARTIFICIAL FILL - UNDOCUMENTED (Qafu)** Silty SAND with gravel and cobbles, fine- to coarse-grained, reddish brown, moist. *(continued)*										
			@ 56 ft. clayey SAND with rounded gravel, yellowish brown.										
		SC	@ 58 ft. clayey SAND, yellowish brown, organic content.										
60			@ 59 ft. Silty SAND with rounded gravel and cobbles, 4-inch steel plate										
			@ 61 ft. large concrete fragments (recovered 6-inch core).										
			@ 62 ft. clayey SAND, dark brown.										
			@ 62.5 ft. asphalt stabilized sand and gravel, dark brown to black, with clayey SAND.										
65			@ 64.5 ft. clayey SAND with gravel, gray.										
			@ 66 ft. clayey SAND with rounded gravel, brick and concrete fragments, slight hydrocarbon odor, dark gray.										
			@ 68 ft. clayey SAND with rounded gravel, brick, concrete and wood fragments, dark gray.										
70			@ 70 ft. sandy CLAY, with concrete and brick and wood fragments, wet, gray, organic content.										
75													
			@ 76.5 ft. concrete fragments.										
			@ 78 ft. clayey SAND with 6-inch cobbles and concrete fragments, gray.										
80			@ 80 ft. clayey SAND with coarse gravel, asphalt fragments, moist to wet, gray.										

(Continued Next Page)

BORING NUMBER B-10

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

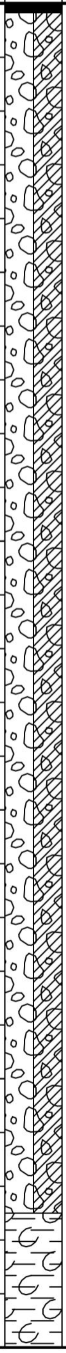
DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
		SC	**ARTIFICIAL FILL (Qafu)** Clayey SAND with coarse gravel, asphalt fragments, moist to wet, gray. *(continued)*										
85			@ 85 ft. asphalt fragments.										
			@ 87 ft. clayey SAND with rounded gravel and 4-inch cobbles, brick fragments, gray.										
			@ 89 ft. organic content.										
90													
95			@ 96 ft. clayey SAND with 6-inch cobbles and large concrete fragments, saturated.										
		GW-GC	**STADIUM CONGLOMERATE (Tst)** Gravel and cobble CONGLOMERATE in clayey sand matrix, reddish brown.										
100			@100 ft. difficult drilling. Refusal.										

Total Depth = 100 ft. (Refusal)
No groundwater in bailer lowered on 11/12/19.
No caving.
Backfilled in accordance with SDCDEH requirements.

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-11

CLIENT The Phair Company
PROJECT NAME Renzulli Estates
PROJECT NUMBER 1902-06
PROJECT LOCATION 11495 Cypress Canyon Road
DATE STARTED 11/12/19 **COMPLETED** 11/12/19
GROUND ELEVATION 912 ft **HOLE SIZE** 6
DRILLING CONTRACTOR BC2 Environmental
GROUND WATER LEVELS:
DRILLING METHOD Sonic Drilling
AT TIME OF DRILLING ---
LOGGED BY AB **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		SC	**CRUSHED ASPHALT CONCRETE** 2-inch thick layer.										
			ARTIFICIAL FILL - UNDOCUMENTED (Qafu) Silty SAND with gravel, fine- to coarse-grained, light yellowish brown, with rounded gravel and asphalt fragments, moist. @ 0.5 ft. reddish brown. @ 1.5 ft. with brick fragments. @ 2.5 ft. light tan, with cobbles up to 4-inch size. @ 4 ft. clayey SAND with gravel, gray brown, moist.										
5			@ 6 ft. light reddish brown. @ 7.5 ft. dark reddish brown, organic content, steel wires.										
10			@ 9.5 ft. light gray, with cobbles to 6-inch size, trace brick fragments. @ 10 ft. asphalt concrete fragments with gravel. @ 11 ft. light brown, with brick fragments and gravel. @ 11.5 ft. dark brown, abundant roots and organic content, decomposed odor, brick fragments. @ 13.5 ft. concrete fragments to 6-inch size.										
15			@ 15 ft. reddish brown, abundant roots. @ 16.5 ft. dark reddish brown, no roots. @ 17.3 ft. light gray, cobbles and concrete fragments to 6-inch size with silty sand. @ 18 ft. dark gray brown, clayey SAND with asphalt stabilized sand and rounded gravel.										
20			@ 20 ft. gray brown, silty SAND with rounded gravel, concrete and asphalt fragments, cobbles to 6-inch size.										
		SM	@ 22.5 ft. dark brown, silty SAND with asphalt concrete fragments and oil odor.										
		SC	@ 23 ft. dark brown, clayey SAND with asphalt concrete fragments and oil odor.										
25													

(Continued Next Page)

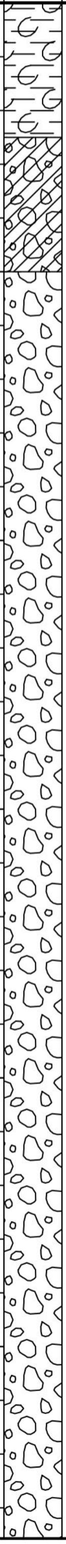
BORING NUMBER B-11

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road



DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
25		SC	**ARTIFICIAL FILL - UNDOCUMENTED (Qafu)** Clayey SAND, dark brown, with asphalt concrete fragments and oil odor, moist. @ 26 ft. concrete fragments up to 6-inch size, with wire mesh .										
		SC	@ 27.5 ft. dark reddish brown, clayey sand with concrete and asphalt fragments. @ 29 ft. gray, clayey SAND with concrete fragments, damp to moist.										
30		GP	@ 30 ft. to 40 ft. partial recovery (3 ft.), concrete fragment and cobbles to 6-inch size, in light brown silty sand.										
35													
40			@ 40 ft. to 50 ft. partial recovery (3 ft.), same. Switching to 4-inch core barrel.										
45													
50			@ 50 ft. to 60 ft. partial recovery (1 ft.), granite cobbles, core barrel hot.										

(Continued Next Page)

AGS

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-11

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
		GP	**ARTIFICIAL FILL - UNDOCUMENTED (Qafu)** Granite cobbles. *(continued)*										
55													
60			@ 60 ft. granite cobbles, core barrel melted. Refusal.										

Total Depth = 60 ft. (Refusal)
No groundwater.
No caving.
Backfilled in accordance with SDCDEH requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER B-12

PAGE 1 OF 1

CLIENT The Phair Company

PROJECT NAME Renzulli Estates

PROJECT NUMBER 1902-06

PROJECT LOCATION 11495 Cypress Canyon Road

DATE STARTED 11/13/19 **COMPLETED** 11/13/19

GROUND ELEVATION 758 ft **HOLE SIZE** 5

DRILLING CONTRACTOR Native Drilling

GROUND WATER LEVELS:

DRILLING METHOD Tri-Pod

AT TIME OF DRILLING ---

LOGGED BY AB **CHECKED BY** PJD

AT END OF DRILLING ---

NOTES

AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		SM	**ARTIFICIAL FILL - DOCUMENTED (Qafd)** Silty SAND, fine- to coarse-grained, reddish brown, moist, loose, with gravel and cobbles to 4-inch size.										
2.5		SC-SM	@ 2.5 ft. Silty to clayey SAND, light gray, iron oxide staining, with gravel and cobbles.										
5.0													
			@ 6 ft. Clayey SAND, reddish brown, with gravel and cobbles.										
7.5													
10.0			@ 10 ft. Clayey SAND, brown, wet, rock on bottom.	SPT	30-50/4"								
			@ 11 ft. grinding on rock. Refusal.										

Total Depth = 11 ft. (Refusal)
No groundwater.
No caving.
Backfilled in accordance with SDCDEH requirements.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER HA-1

PAGE 1 OF 1

CLIENT The Phair Company
PROJECT NAME Renzulli Estates
PROJECT NUMBER 1902-06
PROJECT LOCATION 11495 Cypress Canyon Road
DATE STARTED 9/4/20 **COMPLETED** 9/4/20
GROUND ELEVATION 883 ft **HOLE SIZE** 12
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD Hand Dug
AT TIME OF DRILLING ---
LOGGED BY PJD **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS			FINES CONTENT (%)
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		SM	**SLOPEWASH** Silty SAND, light brown, damp, loose.										
		SM	**MISSION VALLEY FORMATION (Tmv)** Silty SANDSTONE, light brown, damp, fine-grained, weakly cemented, highly weathered, trace clay.										
			@ 1.25 ft. becomes moderately hard, light yellow brown to light gray brown, with occasional brown clayey lenses.										
2.5			@ 2.5 ft. becomes hard, moderately cemented.	BU					MAX EI DSR				

Total Depth = 3 ft.
No groundwater.
No caving.
Backfilled in accordance with SDCDEH requirements.

FIELD INVESTIGATION

A total of 30 backhoe excavated test explorations and two test borings were placed on the site, specifically in areas where representative soil conditions were expected and/or where the proposed structures will be located. Our investigation also included a visual site reconnaissance included cut slopes and natural exposures. The excavations were visually inspected and logged by our field geologist, and samples were taken of the predominant soils throughout the field operation. Test excavation logs have been prepared on the basis of our inspection and the results have been summarized on Figures No. 3 (a through f). The predominant soils have been classified in conformance with the Unified Soil Classification System (refer to Appendix B).

LOG OF TEST BORING NO. 1

Surface Elevation: ± 759' **Date:** 12/16/04 **Logged By:** CMC
Drilling Method: 8" Dia. Hollow Stem Auger **Drive Weight:** 140# **Drop:** 30"
Sampling Methods: 2.5" I.D. California Sampler, 1.625" I.D Standard Penetration Test

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE DRIVEN	BLOWS per Foot	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	U.S.C.S.	Description of Subsurface Conditions
							FILL (Oafd)
							Light brown, medium dense, very moist, clayey sand with some gravel
5			36				Sample Disturbed
10	▨		29	111	13.5		
	▨						@13' to 14', abundant gravel and cobble
15			72				
20			90	112	12.6		
							Dark grayish brown, dense/stiff, very moist, clayey sand and sandy clay with some g avel
25			91				Sample Disturbed
							Dark grayish brown, dense/stiff, very moist, clayey sand and sandy clay with some gra el
30	▨		95	108	11.0		
	▨						@ 35' encountered gravel layer -possible subdrain Boring terminated.
35							Bottom of Boring

C.W. LA MONTE COMPANY
Soil and Foundation Engineers

PROJECT: Scripps-Cypress Canyon
San Diego, CA

JOB NO. 01-3034 **FIGURE NO.** 3AA

LOG OF TEST BORING NO. 2

Surface Elevation: ± 758' **Date:** 12/16/04 **Logged By:** CMC
Drilling Method: 8" Dia. Hollow Stem Auger **Drive Weight:** 140# **Drop:** 30"
Sampling Methods: 2.5" I.D. California Sampler, 1.625" I.D. Standard Penetration Test

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE DRIVEN	BLOW'S per Foot	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	U.S.C.S.	Description of Subsurface Conditions
							<u>FILL (Oafd)</u> Light brown, medium dense, very moist, clayey sand with some gravel
5		▨	36				Sample disturbed
10		▨	72				<u>STADIUM CONGLOMERATE (Tsf)</u> Light brown, medium dense, very moist, silty sandstone
							Bottom of Boring
15							
20							
25							
30							
35							

C.W. LA MONTE COMPANY
Soil and Foundation Engineers

PROJECT: Scripps-Cypress Canyon
San Diego, CA

JOB NO. 05-4744 **FIGURE NO. 3 BB**

TEST EXCAVATION NO. 1

Surface Elevation± 913' **Date:**12/06/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
5						SC CL	**FILL (Qaf(u))** Tan, very moist, loose to medium dense, clayey sand/sandy clay with with some gravel and cobble
10							Dark brown, moist to slightly moist, very loose to loose, silty sand and clayey sand with with some gravel and cobble. Some concrete and brick debris, most under 18", a few up to 36" in length. Abundant brush debris between 8' and 14'
15							Dark brown to brown, moist, very loose, clayey sand with with some gravel, cobble, and boulders, one to 36" in length. Practical refusal on nested boulders
20 25							EXCAVATION BOTTOM CAVING

C. W. LA MONTE COMPANY
Soil and Foundation Engineers

PROJECT: CYPRESS POINT CANYON
San Diego, California

JOB NO. 04-4744

FIGURE NO. 3a

TEST EXCAVATION NO. 2

Surface Elevation± 914' **Date:**12/ 06/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
5						SC	**FILL (Qaf(u))** Light brown to brown, very moist to moist, loose to medium dense, clayey sand with with some gravel and cobble
10							Dark brown, moist to slightly moist, very loose, silty sand and clayey sand with with some gravel and cobble. Some asphalt, concrete and rock debris, most under 12". Some scattered brush debris
15 20 25							EXCAVATION BOTTOM

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PROJECT: CYPRESS POINT
Cypress Canyon Road, San Diego, California

JOB NO. 04-4744

FIGURE NO. 3b

TEST EXCAVATION NO. 3

Surface Elevation: ± 900' **Date:** 12/03/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE DRIVEN	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE DENSITY (%)	U.S.C.S.	Description of Subsurface Conditions
						SC/ CL	**FILL (Qaf(u))** Brown to light brown, very moist to moist, loose, clayey sand / sandy clay, with some gravel and cobble.
						SC/ SM	Dark brown to brown, moist to dry, very loose, clayey sand and silty clay, with some concrete, brick, and minor amounts of trash debris including pieces of broken concrete columns, scattered metal pipe and rebar. Most debris less than 12" except concrete column debris.
5							
10							
15							
							EXCAVATION BOTTOM CAVING
20							
25							

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PROJECT: CYPRESS POINT
Cypress Canyon Road
San Diego, California

JOB NO. 04-4744 **FIGURE NO. 3c**

TEST EXCAVATION NO. 4

Surface Elevation: ± 763'   Date: 12/03/2004   Logged By: JBR

Excavation Method: Cat 325 Excavator

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE DRIVEN	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE DENSITY (%)	U.S.C.S.	Description of Subsurface Conditions
						SC	**FILL (Qaf(d))** Tan, very moist, medium dense, clayey sand, with small amounts of gravel and cobble
5							
10							
15							
						CL/SC	Dark gray, very moist sandy clay and clayey sand, with minor odiferous organic debris and some gravel and cobble.
20							Becoming wet to saturated at 21'.
							EXCAVATION BOTTOM
25							

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PROJECT: CYPRESS POINT
Cypress Canyon Road
San Diego, California

JOB NO. 04-4744   **FIGURE NO. 3d**

770'

TEST EXCAVATION NO. 5

Surface Elevation: ± 760' Date: 12/03/2004 Logged By: JBR
Excavation Method: Cat 325 Excavator

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE DRIVEN	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE DENSITY (%)	U.S.C.S.	Description of Subsurface Conditions
						SM/ SC	FILL (Qaf(d)) Tan, moist to slightly moist, loose to medium dense silty sand and clayey sand, with small amounts of gravel.
5							
							Brown, slightly moist silty sand and clayey sand, with concrete debris up to 36".
10							
15							Refusal on nested concrete and boulder debris EXCAVATION BOTTOM
20							
25							

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PROJECT: CYPRESS POINT
Cypress Canyon Road
San Diego, California

JOB NO. 04-4744

FIGURE NO. 3c

TEST EXCAVATION NO. 6

Surface Elevation: ± 760' **Date:** 12/03/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE DRIVEN	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE DENSITY (%)	U.S.C.S.	Description of Subsurface Conditions
						SC	FILL (Qaf(d)) Tan, very moist, medium dense, clayey sand, with small amounts of gravel.
5	▨						
10	▨						
							As above with some cobbles up to approximately 6".
15							
							Dark gray, very moist, dense, clayey sand with organic odor, intermixed with tan to gray, moist sand and cobble.
20							
							EXCAVATION BOTTOM
25							

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PROJECT: CYPRESS POINT
Cypress Canyon Road
San Diego, California

JOB NO. 04-4744 **FIGURE NO. 3f**

TEST EXCAVATION NO. 7

Surface Elevation:± 759' Date: 12/03/2004 Logged By:JBR

Excavation Method: Cat 325 Excavator

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE DRIVEN	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE DENSITY (%)	U.S.C.S.	Description of Subsurface Conditions
						SC	**FILL (Qaf(d))** Tan, very moist, medium dense, clayey sand, with small amounts of gravel and cobble.
							Boulder approximately 4' across @ 4'.
5		▨	111.6	15.5			
						CL CH	Dark gray, wet, firm, sandy clay with some gravel and cobble
10							
		▨	108	19.7			
15							
20							
							EXCAVATION BOTTOM
25							

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PROJECT: CYPRESS POINT
Cypress Canyon Road
San Diego, California

JOB NO. 04-4744

FIGURE NO. 3g

TEST EXCAVATION NO. 8

Surface Elevation: ± 780' **Date:** 12/03/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE DRIVEN	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE DENSITY (%)	U.S.C.S.	Description of Subsurface Conditions
						SM/ SC	**FILL Qaf(u)** Dark brown to brown, silty sand with clayey sand matrix Mostly concrete and rock debris with some asphalt and miscellaneous trash debris including sheet metal, metal pipes and roll of chain link fence
5							NOTE: North end of trench contacts documented fills.
10							
15							EXCAVATION BOTTOM
20							
25							

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PROJECT: CYPRESS POINT
Cypress Canyon Road
San Diego, California

JOB NO. 04-4744

FIGURE NO. 3h

TEST EXCAVATION NO. 9

Surface Elevation: ± 764' **Date:** 12/ 06/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES		MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
	BULK	UNDISTURBED					
1 2 3						SC	**Fill (Qaf(d))** Tan, very moist, medium dense, clayey sand.
4 5						SM	**Slope Wash (Qsw)** Dark brown, moist, loose, silty sand with some gravel and cobble.
6 7 8						CH	**Residual Soil** Dark reddish brown, very moist, stiff, sandy clay with some gravel and cobble.
9						GP	**Stadium Conglomerate (Tst)** Light brown, moist, very dense, conglomerate.
10 11 12							EXCAVATION BOTTOM

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PROJECT: CYPRESS POINT
Cypress Canyon Road, San Diego, California

JOB NO. 04-4744

FIGURE NO. 3i

TEST EXCAVATION NO. 10

Surface Elevation: ± 770' **Date:** 12/06/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
1						SM	**Slope Wash (Qsw)** Dark brown, moist, loose, silty sand with some gravel and cobble.
2 3 4 5						CH GC	**Residual Soil** Brown to dark red-brown, moist, stiff, sandy clay with some gravel and cobble.
6 7						GP	**Stadium Conglomerate (Tst)** Light brown, slightly moist, very dense, conglomerate with silty sand matrix.
8 9 10 11 12							EXCAVATION BOTTOM

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PROJECT: CYPRESS POINT
Cypress Canyon Road, San Diego, California

JOB NO. 04-4744

FIGURE NO. 3j

TEST EXCAVATION NO. 11

Surface Elevation: ± 759' **Date:** 12/06/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
						SC	**Fill (Qaf(d))** Tan, very moist, medium dense to dense, clayey sand with small amounts of gravel and cobble.
1							
2							
3							
4							
5							
6							
7							
8						SM	**Slope Wash (Qsw)** Dark brown, moist, loose, silty sand with some gravel and cobble.
9							EXCAVATION BOTTOM
10							
11							
12							

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PROJECT: CYPRESS POINT
Cypress Canyon Road, San Diego, California

JOB NO. 04-4744

FIGURE NO. 3k

TEST EXCAVATION NO. 12

Surface Elevation: ± 759' **Date:** 12/07/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
						SC	**Fill (Qaf(d))** Tan, very moist, medium dense to dense, clayey sand with small amounts of gravel and cobble.
1							
2							
3							
4							
5							
6							
7						GP	**Stadium Conglomerate (Tst)** Light brown, slightly moist, very dense, conglomerate with silty sand matrix.
8							EXCAVATION BOTTOM
9							
10							
11							
12							

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PROJECT: CYPRESS POINT
Cypress Canyon Road, San Diego, California

JOB NO. 04-4744 **FIGURE NO. 31**

TEST EXCAVATION NO. 13

Surface Elevation: ± 775' **Date:** 12/07/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
1						SM	**Slope Wash (Qsw)** Dark brown, moist, loose, silty sand with some gravel and cobble.
2 3						CL CH GC	**Residual Soil** Brown to dark red brown, moist, stiff, sandy clay with some gravel and cobble.
4 5 6						GP	**Stadium Conglomerate (Tst)** Light brown, moist, very dense, conglomerate.
7 8 9 10 11 12							EXCAVATION BOTTOM

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PROJECT: CYPRESS POINT
Cypress Canyon Road, San Diego, California

JOB NO. 04-4744

FIGURE NO. 3m

TEST EXCAVATION NO. 14

Surface Elevation:± 820' Date: 12/07/2004 Logged By:JBR

Excavation Method: Cat 325 Excavator

DEPTH (FEET)	SAMPLE TYPE		DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE DENSITY (%)	U.S.C.S.	Description of Subsurface Conditions
	BULK	DRIVEN					
						SM	**FILL (Qaf(u))** Red-brown, very moist, loose, silty sand with some gravel.
						SM	**Slope Wash (Qsw)** Dark brown, slightly moist, loose, silty sand with some gravel and cobble.
5						GP	**Stadium Conglomerate (Tst)** Light brown, slightly moist, very dense conglomerate with silty sand matrix.
10							
15							EXCAVATION BOTTOM
20							
25							

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PROJECT: CYPRESS POINT
Cypress Canyon Road
San Diego, California

JOB NO. 04-4744

FIGURE NO. 3n

TEST EXCAVATION NO. 15

Surface Elevation: ± 820'   Date: 12/07/2004   Logged By:JBR

Excavation Method: Cat 325 Excavator

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE DRIVEN	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE DENSITY (%)	U.S.C.S.	Description of Subsurface Conditions
						SM	**Mission Valley Formation (Tmv(ss))** Tan, slightly moist, very dense, silty sandstone; massive.
5	▨	▨	121	8.7			
10							Gradational contact
							Stadium Conglomerate (Tst) Conglomerate
							EXCAVATION BOTTOM
15							
20							
25							

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PROJECT: CYPRESS POINT
Cypress Canyon Road
San Diego, California

JOB NO. 04-4744   FIGURE NO. 3o

TEST EXCAVATION NO. 16

Surface Elevation: ± 917' **Date:** 12/07/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE DRIVEN	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE DENSITY (%)	U.S.C.S.	Description of Subsurface Conditions
5						SM	**FILL (Qaf(u))** Dark brown, silty sand with some gravel, cobble, and concrete debris.
							Asphalt layer
10							Abundant rocks to 18"
						SM	**Slope Wash (Qsw)** Dark brown, moist, loose, silty sand with some gravel and cobble.
15						CL CH GC	**Residual Soil** Brown to dark red brown, moist, stiff, sandy clay with some gravel and cobble.
						GP	**Pomerado Fromation (Tp)** Light brown, slightly moist, very dense silty sand.
20 25							EXCAVATION BOTTOM

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Cypress Canyon Road
San Diego, California

JOB NO. 04-4744

FIGURE NO. 3p

TEST EXCAVATION NO. 17

Surface Elevation: ± 920' Date: 12/07/2004 Logged By: JBR

Excavation Method: Cat 325 Excavator

DEPTH (FEET)	SAMPLE TYPE		DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE DENSITY (%)	U.S.C.S.	Description of Subsurface Conditions
	BULK	DRIVEN					
5						SC	**Fill (Qaf(u))** Brown, moist, loose, clayey sand with some gravel and minor concrete debris
10						SM	**Slope Wash (Qsw)** Dark brown, moist, loose, silty sand with some gravel and cobble.
						GP	**Pomerado Conglomerate (Tp)** Yellow-brown, slightly moist, very dense, conglomerate
15 20 25							EXCAVATION BOTTOM

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PROJECT: CYPRESS POINT
Cypress Canyon Road
San Diego, California

JOB NO. 04-4744

FIGURE NO. 3q

TEST EXCAVATION NO. 18

Surface Elevation: ± 916'
Date: 12/07/2004
Logged By: JBR

Excavation Method: Cat 325 Excavator

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE DRIVEN	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE DENSITY (%)	U.S.C.S.	Description of Subsurface Conditions
						SC	**Fill (Qaf(u))** Brown, moist, loose, clayey sand with some gravel and minor concrete debris
5							
							Abundant rock debris
10							
15						CL CH GC	**Residual Soil** Red-brown, very moist, stiff, sandy clay with some gravel and cobble.
						GP	**Pomerado Conglomerate (Tp)** Yellow-brown, slightly moist, very dense, conglomerate.
							EXCAVATION BOTTOM
20							
25							

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PROJECT: CYPRESS POINT
Cypress Canyon Road
San Diego, California

JOB NO. 04-4744

FIGURE NO. 3r

TEST EXCAVATION NO. 19

Surface Elevation: ± 911' **Date:** 12/07/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
1						SC	**Slope Wash (Qsw)** Dark brown, moist, loose, silty sand with some gravel and cobble.
2						SM	**Top Soil** Dark red-brown, moist, loose, silty sand with some gravel and cobble.
	/					CH	**Residual Soil** Dark red-brown, very moist, stiff, sandy clay with some gravel and cobble.
3 4 5 6						GP	**Pomerado Conglomerate (Tp)** Tan, moist, very dense, conglomerate.
7 8 9 10 11 12							EXCAVATION BOTTOM

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Cypress Canyon Road, San Diego, California

JOB NO. 04-4744

FIGURE NO. 3s

TEST EXCAVATION NO. 20

Surface Elevation: ± 803' **Date:** 12/07/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	 UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
1 2 3 4 5 6						SC	**Fill (Qaf(u))** Brown to dark brown, wet to saturated, loose to medium dense, clayey sand. Seepage at the contact.
7 8						CH	**Residual Soil** Red-brown, wet, firm to stiff, sandy clay with some gravel and cobble.
9						GP	**Stadium Conglomerate (Tst)** Tan, moist, very dense, conglomerate.
10 11 12							EXCAVATION BOTTOM

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PROJECT: CYPRESS POINT CANYON
San Diego, California

JOB NO. 04-4744

FIGURE NO. 31

TEST EXCAVATION NO. 21

Surface Elevation: ± 818' **Date:** 12/09/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
						SC	**Fill** Brown, very moist to wet, loose clayey sand
1						CH	**Residual Soil** Dark red-brown, very moist, stiff, sandy clay with gravel and cobble.
2						GP	**Stadium Conglomerate (Tst)** Tan, moist, very dense, conglomerate. Gradiational contact
3						SM	Tan, moist, very dense, silty sandstone.
4							
							Excavation Bottom
5							

TEST EXCAVATION NO. 22

Surface Elevation: ± 803' **Date:** 12/09/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
						SC	**Fill** Brown, very moist to wet, loose clayey sand
1						CH	**Residual Soil** Dark red-brown, very moist, stiff, sandy clay with gravel and cobble.
2						GP	**Stadium Conglomerate (Tst)** Tan, moist, very dense, conglomerate. Gradiational contact
3						SM	Tan, moist, very dense, silty sandstone.
4							
5							Excavation Bottom

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PROJECT: CYPRESS POINT CANYON
San Diego, California

JOB NO. 04-4744

FIGURE NO. 3u

TEST EXCAVATION NO. 23

Surface Elevation: ± 811' **Date:** 12/09/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
						SC	**Fill** Brown, very moist to wet, loose clayey sand
1						CH	**Residual Soil** Dark red-brown, very moist, stiff, sandy clay with gravel and cobble.
2						GP	**Stadium Conglomerate (Tst)** Tan, moist, very dense, conglomerate. Gradational contact
3						SM	Tan, moist, very dense, silty sandstone.
4							
5							Excavation Bottom

TEST EXCAVATION NO. 24

Surface Elevation: ±814' **Date:** 12/09/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
						SM	**Top Soil** Dark red-brown, very moist to wet, stiff, silty sand with gravel and cobble.
1							
2							
3						CH	**Residual Soil** Red-brown, wet, firm to stiff, sandy clay with some gravel and cobble.
4						GP	**Stadium Conglomerate (Tst)** Tan, moist, very dense, conglomerate.
5							
6							Excavation Bottom

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PROJECT: CYPRESS POINT CANYON
San Diego, California

JOB NO. 04-4744 **FIGURE NO. 3v**

TEST EXCAVATION NO. 25

Surface Elevation: ± 840' **Date:** 12/09/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
						CH	**Residual Soil** Red-brown, wet, firm to stiff, sandy clay with some gravel and cobble.
1	▨						
2							
3	▨					GP	**Mission Valley Formation (Tmv)** Tan, moist, very dense, conglomerate.
4		▨	119	8.3			
5							
6							EXCAVATION BOTTOM
7							
8							
9							
10							
11							
12							

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PROJECT: CYPRESS POINT CANYON
San Diego, California

JOB NO. 04-4744

FIGURE NO. 3w

TEST EXCAVATION NO. 26

Surface Elevation: ± 855' **Date:** 12/09/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DESCRIPTION OF SUBSURFACE CONDITIONS

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
						SC	**Fill (Qaf(u))** Brown to dark brown, wet to saturated, loose to medium dense, clayey sand.
1						CH	**Residual Soil** Red-brown, wet, firm to stiff, sandy clay with some gravel and cobble.
2 3 4 5 6						SM	**Mission Valley Formation (Tmv)** Light brown, fine to medium, silty sandstone with clay inclusions. Gradiational contact
7 8						GP	**Mission Valley Formation (Tmv)** Conglomerate
9 10 11 12							EXCAVATION BOTTOM

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PROJECT: CYPRESS POINT CANYON
San Diego, California

JOB NO. 04-4744

FIGURE NO. 3x

TEST EXCAVATION NO. 27

Surface Elevation: ± 870' **Date:** 12/09/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
						SC	**Fill (Qaf(u))** Brown to dark brown, wet to saturated, loose to medium dense, clayey sand.
1 2						CH	**Residual Soil** Red-brown, wet, firm to stiff, sandy clay with some gravel and cobble.
3						GP	**Mission Valley Formation (Tmv(cg))** Tan, moist, very dense, conglomerate.
4 5							EXCAVATION BOTTOM

TEST EXCAVATION NO. 28

Surface Elevation: ± 849' **Date:** 12/09/2004 **Logged By:** JBR

Excavation Method: Cat 325 Excavator

DEPTH (feet)	SAMPLES BULK	SAMPLES UNDISTURBED	MOISTURE (%)	DRY DENSITY (PCF)	Relative Density (%)	CLASSIFICATION U.S.C.S	DESCRIPTION OF SUBSURFACE CONDITIONS
						SM	**Top Soil** Dark red-brown, very moist to wet, stiff, silty sand with gravel and cobble.
1 2 3						SM	**Mission Valley Formation (Tmv(ss))** Light tan to white, fine to medium, silty sandstone. Red-brown, wet, firm to stiff, sandy clay with some gravel and cobble.
4 5 6							EXCAVATION BOTTOM

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PROJECT: CYPRESS POINT CANYON
San Diego, California

JOB NO. 04-4744

FIGURE NO. 3y

TEST EXCAVATION NO. 29

Surface Elevation: ± 874'
Date: 12/09/2004
Logged By: JHR
Excavation Method: Cat 325 Excavator

DEPTH (FEET)	SAMPLE TYPE BULK	SAMPLE TYPE DRIVEN	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE DENSITY (%)	U.S.C.S.	Description of Subsurface Conditions
5 10						SM	**Mission Valley Formation (Tmv)** Tan, slightly moist, very dense, silty sandstone; massive. Gradiational contact
						SM	**Stadium Conglomerate (Tst)** Conglomerate
15 20 25							EXCAVATION BOTTOM

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PROJECT: CYPRESS POINT CANYON
San Diego, California

JOB NO. 04-4744
FIGURE NO. 3z

GEOPHYSICAL EVALUATION
11495 CYPRESS CANYON ROAD
SAN DIEGO, CALIFORNIA

PREPARED FOR:

Advanced Geotechnical Solutions, Inc.
485 Corporate Drive, Suite B
Escondido, California 92029

PREPARED BY:

Southwest Geophysics, LLC
6280 Riverdale Street, Suite 200
San Diego, CA 92120

March 28, 2019
Project No. 119139

SOUTHWEST GEOPHYSICS LLC
YOUR SUBSURFACE SOLUTION

March 28, 2019
Project No. 119139

Mr. Jeff Chaney
Advanced Geotechnical Solutions, Inc.
485 Corporate Drive, Suite B
Escondido, California 92029

Subject: Geophysical Evaluation
11495 Cypress Canyon Road
San Diego, California

Dear Mr. Chaney:

In accordance with your request, we have conducted geophysical services pertaining to the property located at 11495 Cypress Canyon Road in San Diego, California. The purpose of our study was to characterize the subsurface geologic conditions in the study area through the collection of high resolution electrical resistivity tomography (Sting) and seismic P-wave refraction data at preselected areas of the project site. This report presents the methodology, equipment used, analysis, and findings.

We appreciate the opportunity to be of service on this project. Should you have any questions related to this report, please contact the undersigned at your convenience.

Sincerely,
SOUTHWEST GEOPHYSICS, LLC

Patrick Lehrmann

Aaron T. Puente
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STATE OF CALIFORNIA

PFL/ATP/pfl
Distribution: Addressee (electronic)

TABLE OF CONTENTS

Figures

1. INTRODUCTION

In accordance with your request, we have conducted geophysical services pertaining to the property located at 11495 Cypress Canyon Road in San Diego, California (Figure 1). The purpose of our study was to characterize the subsurface geologic conditions in the study area through the collection of high-resolution electrical resistivity tomography (Sting) and seismic P-wave refraction data at preselected areas of the project site. This report presents the methodology, equipment used, analysis, and findings.

2. SCOPE OF SERVICES

Our scope of services included:

- Performance of two Sting profiles, STL-1 and STL-2.
- Performance of a seismic P-wave refraction profile, SL-1.
- Compilation and geophysical analysis of the data collected.
- Preparation of this report presenting our findings and conclusions.

3. SITE AND PROJECT DESCRIPTION

The project site is located at the northwest end of Cypress Canyon Road just west of Cypress Canyon Park in San Diego, California (Figure 1). In general, the study area is a vacant lot with mostly graded soil with a layer of unconsolidated crushed asphalt on the surface. Specifically, the Sting and seismic P-wave refraction lines were conducted in east to west and north to south directions across the site. Figures 2 and 3 illustrate the general site conditions and line locations.

Based on our discussions with you, it is our understanding that the site was once a landfill and that your office is conducting a geologic evaluation of the property. The results from our study are to aid in the characterization of the subsurface geologic conditions.

4. METHODOLOGY

Our evaluation included the performance of high resolution electrical resistivity (Sting) and seismic P-wave refraction surveys. The following is a brief description of the methods used.

4.1. Sting

An AGI Super Sting R8 resistivity meter was used to collect electrical resistivity measurements along two profiles, STL-1 and STL-2, at the project site. STL-1 crosses the site in an east-west direction and STL-2 crosses the site in a north-south direction (see Figure 2). The purpose of the Sting data collection was to characterize the electrical properties of the subsurface materials through the formulation of an apparent electrical resistivity model.

The Super Sting injects current into the ground through stainless steel electrodes and the electric potential difference between multiple electrodes is measured simultaneously. The spacing between the current and potential electrodes changes between readings to preprogrammed values. The measurements were collected using a Dipole-Dipole configuration.

Fifty-six electrodes were used for our study with electrode spacings of 8 feet for STL-1 and 5 feet for STL-2. This resulted in line lengths of 440 feet for STL-1 and 275 feet for STL-2, respectively. The locations of the lines and the general lengths (lineal coverage) were designated by you. The electrodes were driven into the soil approximately 6 to 12 inches, and the soil around the electrode was moistened with water.

Data processing and analysis was accomplished using EarthImager™, V2.4.4, a two-dimensional resistivity inversion software. The plot of the measured resistivity at each set of electrodes was recorded and displayed according to the dipole-dipole resistivity model. Resistivity values were calculated for the points beneath the Sting line and then integrated into a color resistivity model section.

4.2. Seismic P-Wave Refraction

A seismic P-wave (compression wave) refraction study was conducted in the study area along a traverse labeled SL-1 on Figure 2. The seismic line was generally parallel to and approximately 10 feet east of the Sting line STL-2. The purpose of the P-wave refraction study was to characterize the subsurface conditions through the development of a P-wave velocity model.

The seismic refraction method uses first-arrival times of refracted seismic waves to estimate the thicknesses and seismic velocities of subsurface layers. Seismic P-waves generated at the surface, using a 20-pound sledge hammer and plate, are refracted at boundaries separating materials of contrasting velocities. These refracted seismic waves are then detected by a series of surface vertical component 14-Hz geophones and recorded with a 24-channel Geometrics Geode seismograph. The travel times of the seismic P-waves are used in conjunction with the shot-to-geophone distances to obtain thickness and velocity information on the subsurface materials.

A geophone spacing of 12 feet was used for SL-1 resulting in a spread length of 288 feet (includes a 6-foot shot offset at each end of the spread). Shots were conducted at the ends, midpoint and intermediate points along the line.

The collected data were processed using SIPwin (Rimrock Geophysics, 2003), a seismic interpretation program, and analyzed using SIPwin and SeisOpt Pro (Optim, 2008). SeisOpt Pro uses first arrival picks and elevation data to produce subsurface velocity models through a nonlinear optimization technique called adaptive simulated annealing. The resulting velocity model provides a tomography image of the estimated geologic conditions. Both vertical and lateral velocity information is contained in the tomography model. Changes in layer velocity are revealed as gradients rather than discrete contacts, which typically are more representative of actual conditions.

5. FINDINGS AND CONCLUSIONS

As previously discussed, the purpose of our study was to characterize the subsurface conditions in the study area as part of your geologic evaluation of the property. Our evaluation included the collection of Sting and seismic P-wave refraction data. The Sting results are presented in Figures 4a and 4b and the P-wave refraction results are presented in Figure 5. In general, the quality of the Sting and P-wave data was very good.

The Sting results reveal the presence of a conductive layer near the surface overlying more resistive materials at depth. The contact between these two units is gradational with the most resistive material approximately 55 feet below the ground surface (bgs) and is illustrated on Figures 4a and 4b. The seismic P-wave results also reveal the presence of contacts or zones of significant changes in velocity (density). One of these contacts occurs roughly at 55 feet (bgs) and coincides with the more resistive contact detected in the Sting results. This electrical and density change could represent the landfill/native contact. As noted in the P-wave profiles a relatively substantial increase in P-wave velocity also occurs near the 4,000 feet per second contour line. It is possible this contact could be related to the presence of concrete or rock debris fill.

6. LIMITATIONS

The field evaluation and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, express or implied, is made regarding the conclusions and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be present. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Southwest Geophysics, LLC should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

7. SELECTED REFERENCES

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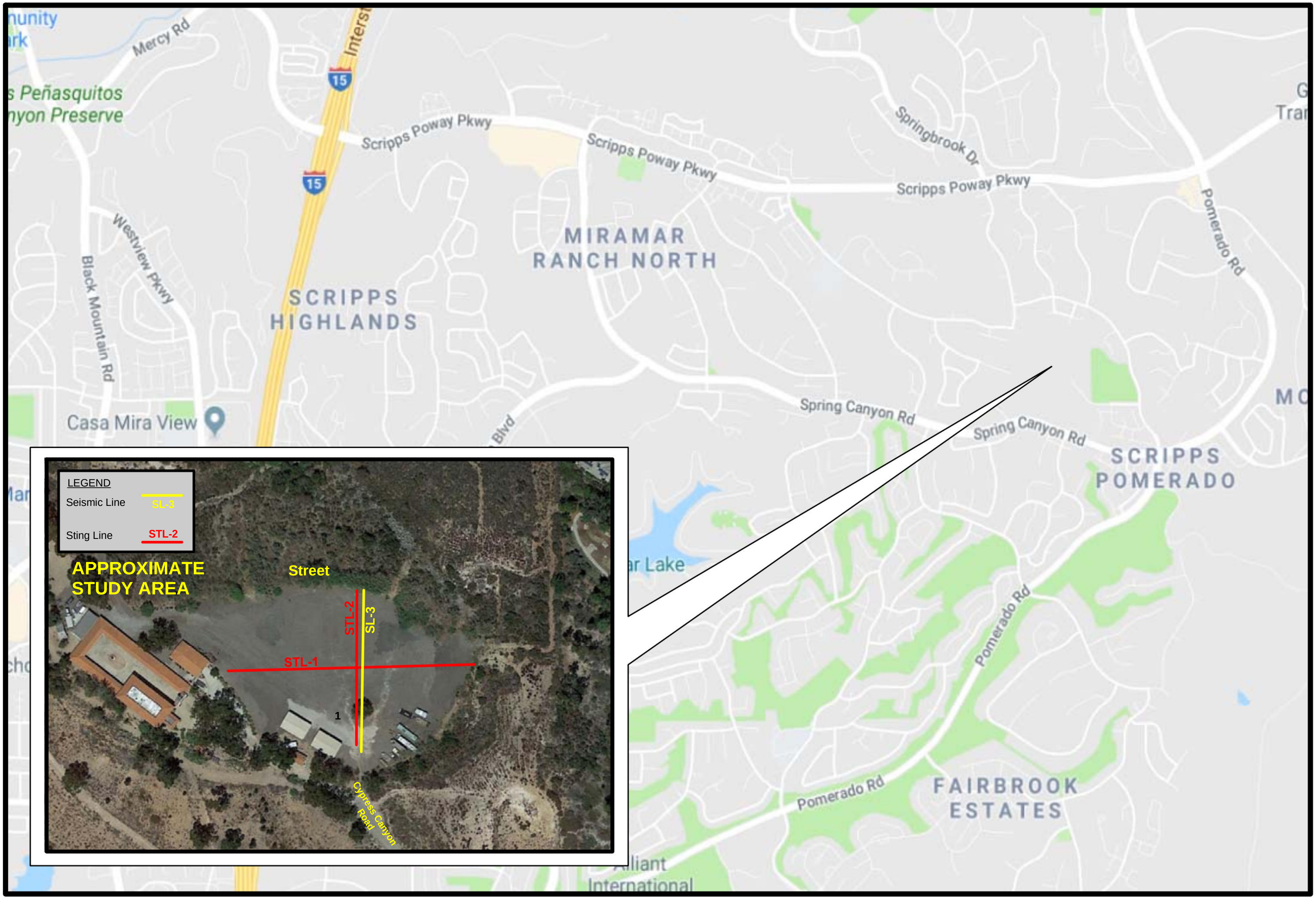


SITE LOCATION MAP	N	11495 Cypress Canyon Road San Diego, California Project No.: 119139 Date: 03/19	SOUTHWEST GEOPHYSICS LLC Figure 1

LINE LOCATION MAP

N

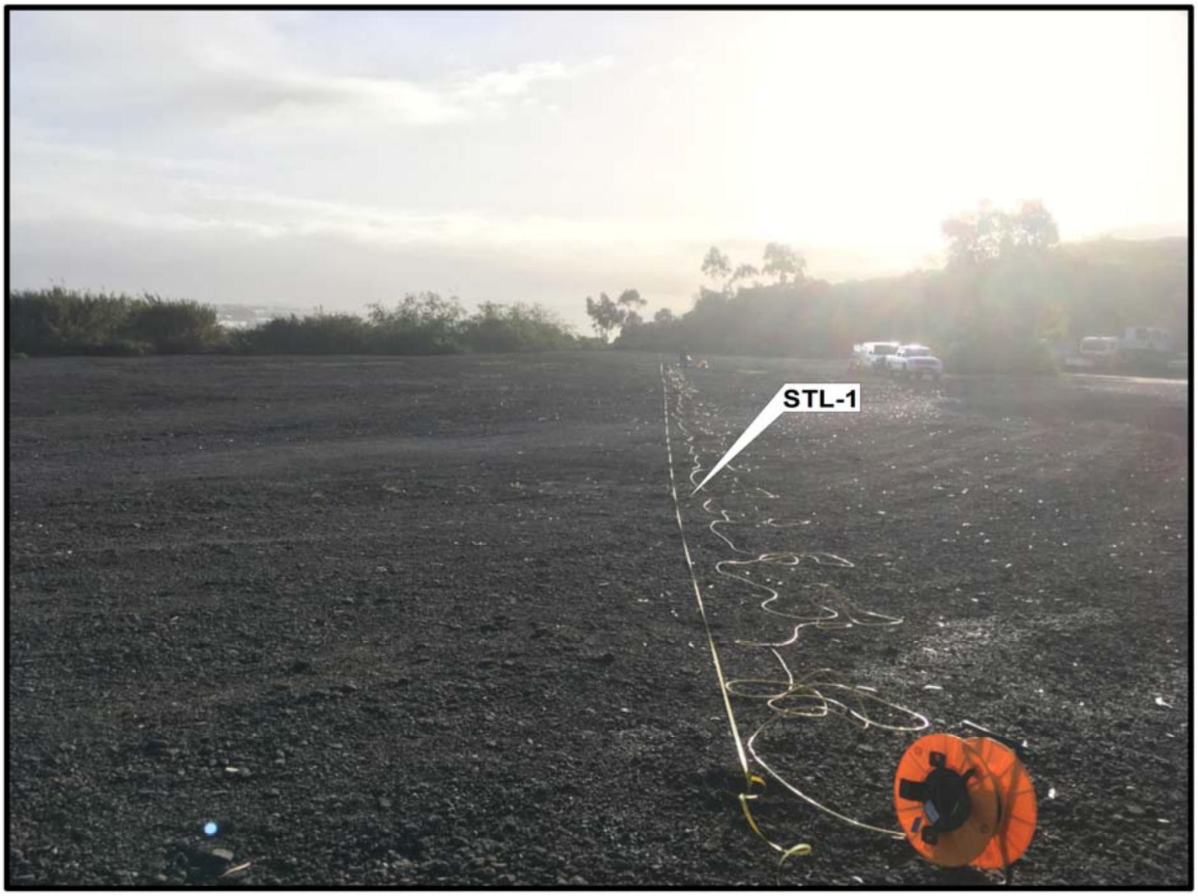
11495 Cypress Canyon Road
San Diego, California

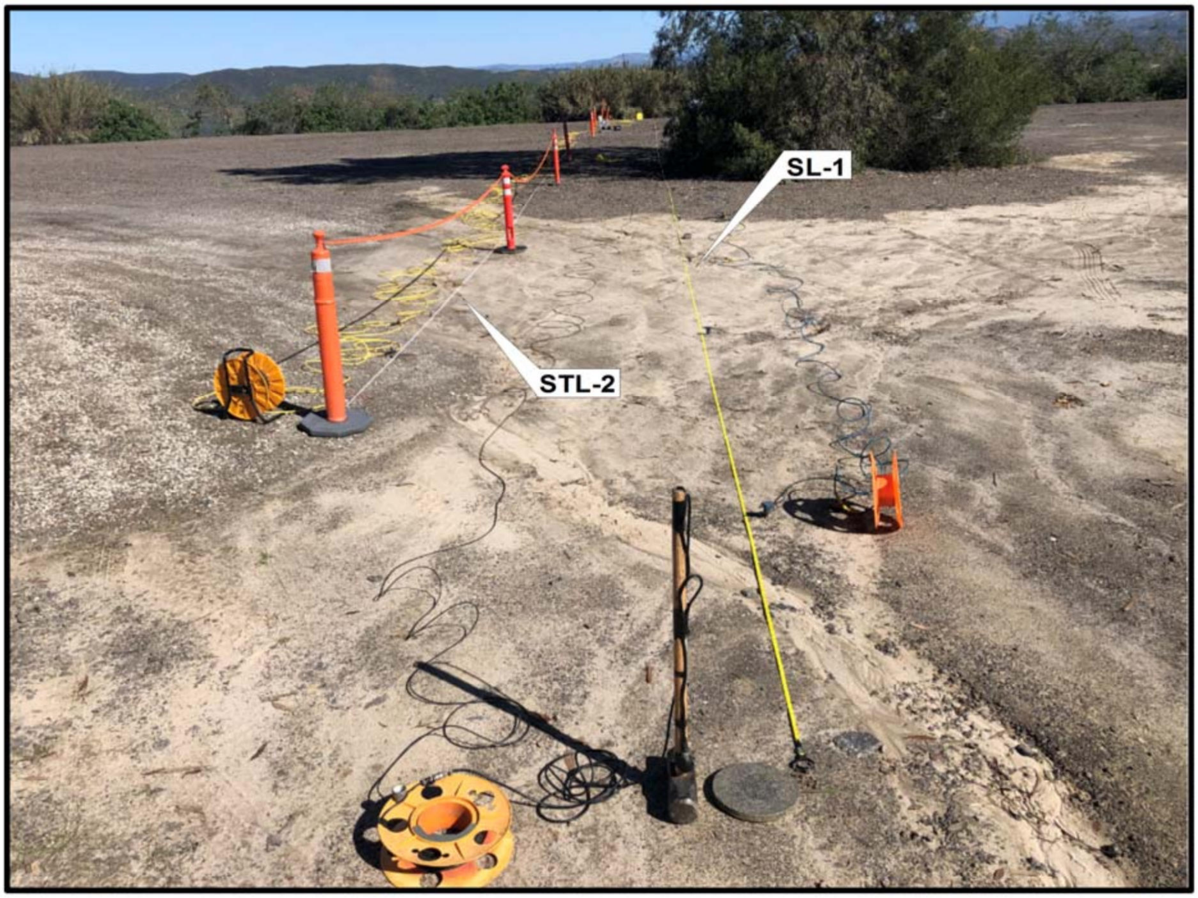
Project No.: 119139

Date: 03/19

SOUTHWEST GEOPHYSICS LLC

Figure 2





SITE PHOTOGRAPHS

11495 Cypress Canyon Road
San Diego, California

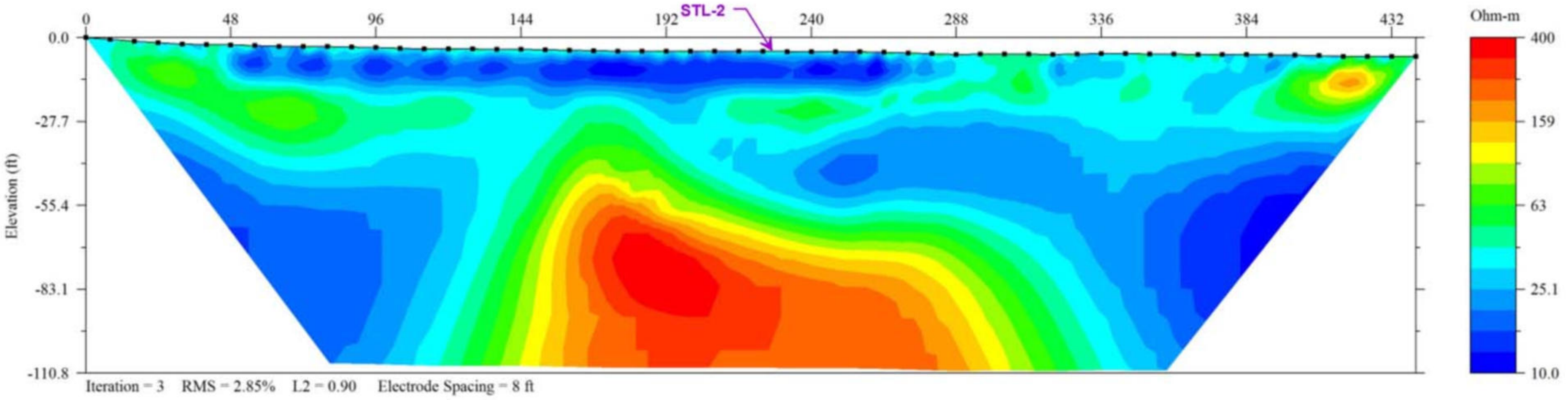
Project No.: 119139

Date: 03/19

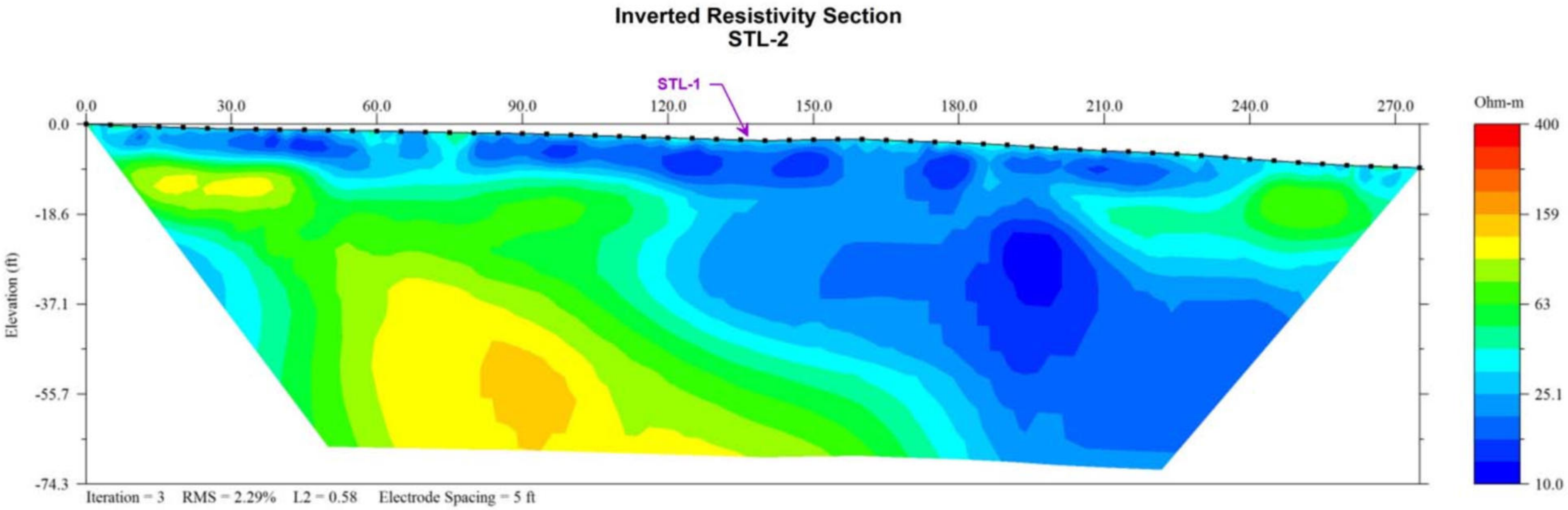
SOUTHWEST GEOPHYSICS LLC

Figure 3

Inverted Resistivity Section
STL-1



STING PROFILE **STL-1**	N	11495 Cypress Canyon Road San Diego, California	SOUTHWEST GEOPHYSICS LLC
		Project No.: 119139 Date: 03/19	Figure 4a



STING PROFILE
STL-2

N

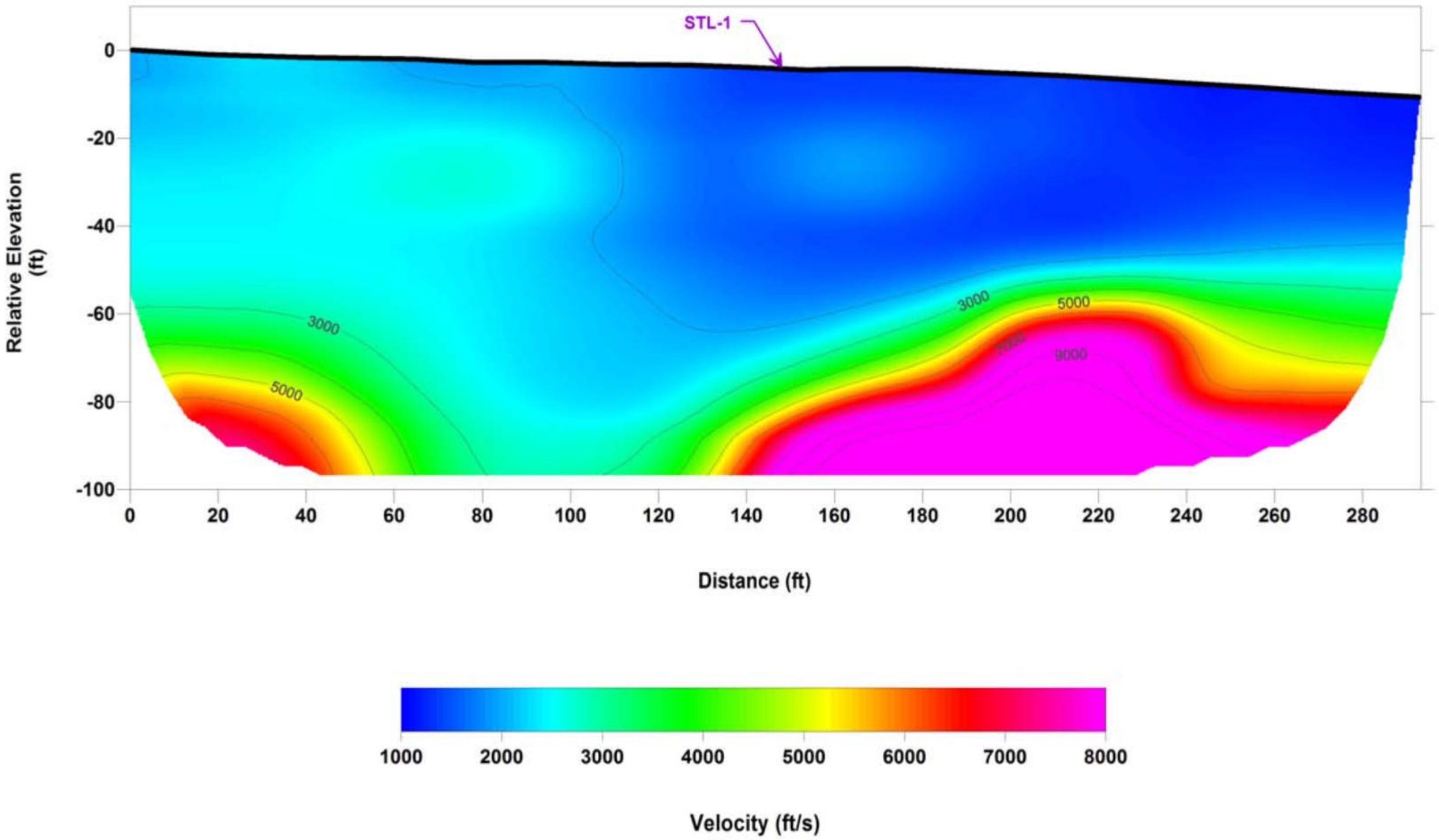
11495 Cypress Canyon Road
San Diego, California

Project No.: 119139 | Date: 03/19

SOUTHWEST GEOPHYSICS LLC

Figure 4b

TOMOGRAPHY MODEL



P-WAVE PROFILE
SL-1

11495 Cypress Canyon Road
San Diego, California

Project No.: 119139
Date: 03/19

SOUTHWEST GEOPHYSICS LLC

Figure 5

Note: Contour Interval = 1,000 feet per second

APPENDIX C

LABORATORY TEST RESULTS (AGS, CWLM)

APPENDIX C
LABORATORY TESTING

Classification

Soils were visually and texturally classified in accordance with the Unified Soil Classification System (USCS) in general accordance with ASTM D2488. Soil classifications are indicated on the boring logs in Appendix B.

Expansion Index

The expansion index of selected materials was evaluated in general accordance with ASTM D4829. Specimens were molded under a specified compactive energy at approximately 50 percent saturation (±1 percent). The prepared 1-inch thick by 4-inch diameter specimens were loaded with a surcharge of 144 pounds per square foot and were inundated with tap water. Readings of volumetric swell were made for a period of 24 hours. The results of these tests are presented on Figure C-1.

Modified Proctor Density

The maximum dry density and optimum moisture content of a selected representative soil sample was evaluated using the Modified Proctor method in general accordance with ASTM D1557. The results of these tests are summarized on Figure C-2.

Direct Shear

Direct shear tests were performed on remolded samples in general accordance with ASTM D3080 to evaluate the shear strength characteristics of selected materials. The samples were inundated during shearing to represent adverse field conditions. The results are shown on Figure C-3.

Soil Corrosivity

A soil pH, and resistivity test were performed on a representative sample in general accordance with California Test (CT)643. The chloride content of a selected sample was evaluated in general accordance with CT422. The sulfate content of a selected sample was evaluated in general accordance with CT417. The test results are presented on Figure C-4

Organic Content

The organic content of a representative sample was determined by the loss on ignition test in general accordance with ASTM C114. The test results are presented on Figure C-5

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

AGS FORM E-6

Project Name: Renzulli Estates
Location: 11495 Cypress Canyon
P/W: 1902-06
Date: 9/8/20

Excavation/Tract: HA-1
Depth/Lot: 0-2 ft
Description: SC
Tested by: FV
Checked by: AB

Expansion Index - ASTM D4829

Initial Dry Density (pcf):	94.6
Initial Moisture Content (%):	14.4
Initial Saturation (%):	49.7
Final Dry Density (pcf):	92.1
Final Moisture Content (%):	0.0
Final Saturation (%):	0.0
Expansion Index:	27
Potential Expansion:	Low

ASTM D4829 - Table 5.3

Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

FIGURE C-1

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

MAXIMUM DENSITY - ASTM D1557

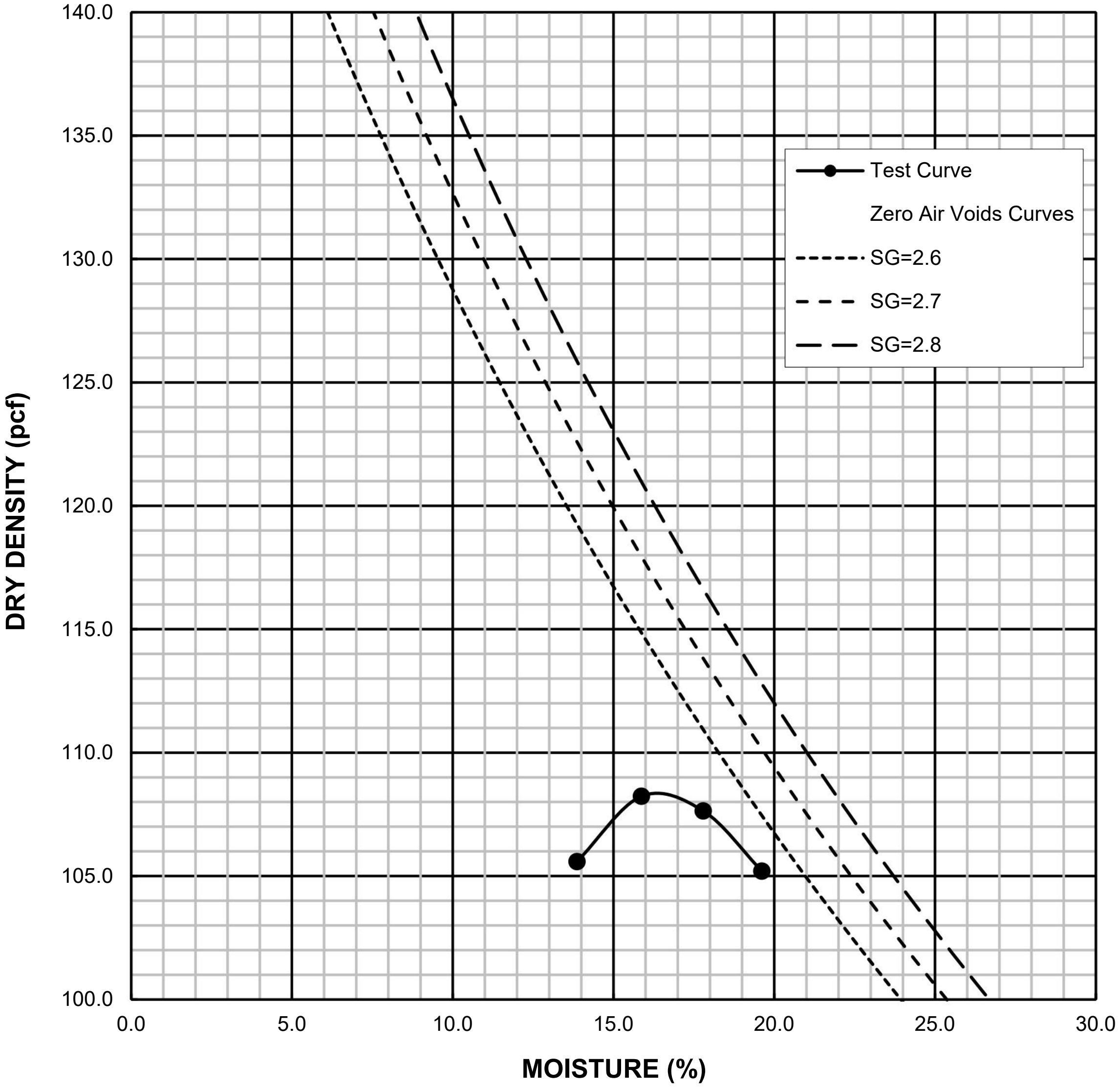
AGS FORM E-8

Project Name: Renzulli Estates
Location: 11495 Cypress Canyon RD San Diego
P/W No.: 1902-06
Date: 09-2020

Excavation: HA-1
Depth: 0-2.0 ft
Soil Type: SC
Tested by: FV
Checked by: AB

Method:	A	Oversize Retained: 1 %		
Point No.	1	2	3	4
Dry Density (pcf)	105.6	108.2	107.6	105.2
Moisture Content (%)	13.9	15.9	17.8	19.6

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density **108.7 pcf** Corrected Moisture **16.1** %
Max. Dry Density **108.3 pcf** Optimum Moisture **16.3** %

FIGURE C-2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

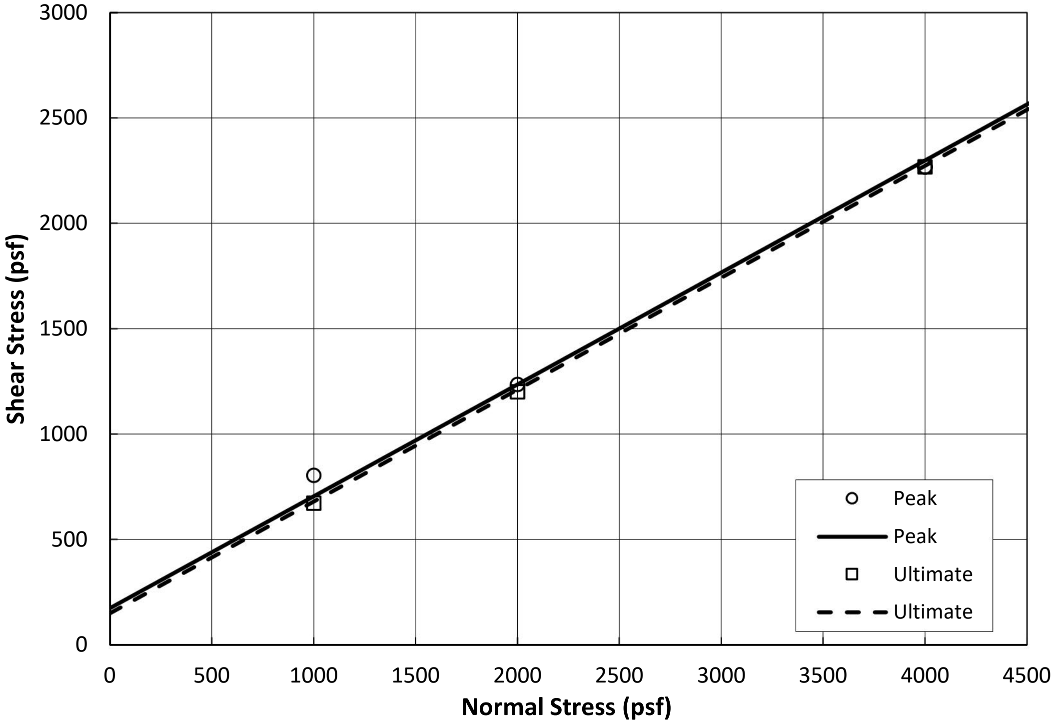
Project Name: Renzulli Estates
Location: San Diego
Project No.: 1902-06
Date: 9/9/20

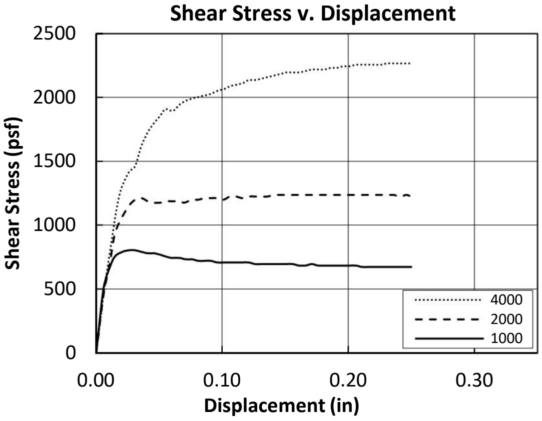
Excavation: HA-1
Depth: 0-2 ft
Tested by: FV
Reviewed by: AB

Samples Tested	1	2	3
Intial Moisture (%)	16.3	16.3	16.3
Initial Dry Density (pcf)	97.5	97.5	97.5
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	804	1236	2268
Ult. Shear Stress (psf)	672	1200	2268

Soil Type: SC
Test: Remolded 90%
Method: Drained
Consolidation: Yes
Saturation: Yes
Shear Rate ($^{in}/_{min}$): 0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	28	28
Cohesion (psf)	175	150





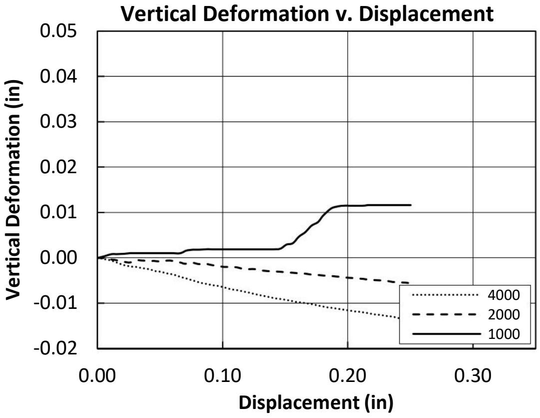


FIGURE C-3

ANAHEIM TEST LAB, INC

196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949)336-6544

Advanced Geotechnical Solutions, Inc.
485 Corporate Ave., Suite B
Escondido, CA 92029

DATE: 09/09/2020

P.O. NO.: Chain of Custody

LAB NO.: C-4071

SPECIFICATION: CTM-643/417/422

MATERIAL: Soil

Project No.: 1902-06
Project: Renzulli Estates
Date sampled: 09/04/2020
Sample ID: HA-1@ 1'-2'

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

pH	MIN. RESISTIVITY per CT. 643 ohm-cm	SOLUBLE SULFATES per CT. 417 ppm	SOLUBLE CHLORIDES per CT. 422 ppm
6.4	1,700	436	56

RESPECTFULLY SUBMITTED

WES BRIDGER, LAB MANAGER

FIGURE C-4

ANAHEIM TEST LAB, INC
196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949)336-6544

TO:

Advanced Geotechnical Solutions
485 Corporate Ave., Suite B
Escondido, CA 92029

DATE: 04/10/2019

P.O. NO.: Chain of Custody

LAB NO.: C-2782

SPECIFICATION: C-114

MATERIAL: Soil

Project No.: 1902-06
Project: Cypress Canyon
Location: On Site
Sampled: 03/22/2019
Sample ID: B-3 @ 27'-32'

Analytical Report

LOSS OF IGNITION TEST RESULTS

Moisture Content 100 ° C	Organic Content 440 ° C
7.87%	5.43%

RESPECTFULLY SUBMITTED

ANAHEIM TEST LAB

Wes Bridger LAB MANAGER

FIGURE C-5

LABORATORY TESTS AND SOIL INFORMATION

Laboratory tests and evaluations were performed on the disturbed and undisturbed soil samples in order to determine their physical and mechanical properties and their ability to support the proposed structure. The following evaluations were conducted on the sampled soils:

Classification

Field classifications were determined by visual examination. The final soil classifications are in accordance with the Unified Soil Classification System and are presented on the attached field logs, Figure No. 3.

Moisture-Density

In-place moisture contents and dry densities were determined for representative soil samples. This information was an aid to classification and permitted recognition of variations in material consistency with depth. The dry unit weight is determined in pounds per cubic foot, and the in-place moisture content is determined as a percentage of the soil's dry weight. The results of these tests are summarized in the test excavation logs.

Maximum Dry Density

Maximum dry density determinations were performed on representative samples of the soils used in the compacted fills according to A.S.T.M. Test 1557-91, Method A guideline. The results of these tests, as presented below.

Sample Location:	B-1, 10'-15'	T E 6, 3' - 7'	T E 15, 4'-8'
Description:	Light-brown, clayey sand	Tan, clayey sand	Tan, silty sand
Maximum Density:	122 pcf	121	124
Optimum Moisture Content:	11.0 %	11.9	10.0

Direct Shear Data

Conservative shear strength values are assigned to the typical bearing soils based on our past experience with the soil types in the area.

Sample Location:	T-3 @ 5’ to 7’
Description:	Light-brown,silty sand
Angle of Friction (Degrees)	31
Apparent Cohesion (psf)	150

EXPANSION INDEX: The expansion potential of clayey soils was determined utilizing the UBC Expansion Index Test. Expansive soils are classified as follows:

Expansion Index	**Potential Expansion**
0-20	Very Low (or considered "Non-expansive")
21-50	Low
51-90	Medium
91-130	High
130-Above	Very High

Sample Location:	T19, 2-3’ (Residuum)	T3, 5-8’ (Fill)
Initial Moisture Content:	17.7%	15.1%
Initial Dry Density (pcf):	101	100
Final Moisture Content:	28%	30%
Expansion Index:	85	95
UBC Classification:	Medium	High

APPENDIX D

SLOPE STABILITY ANALYSIS

1902-06 Renzulli Estates Cross Section C-C'

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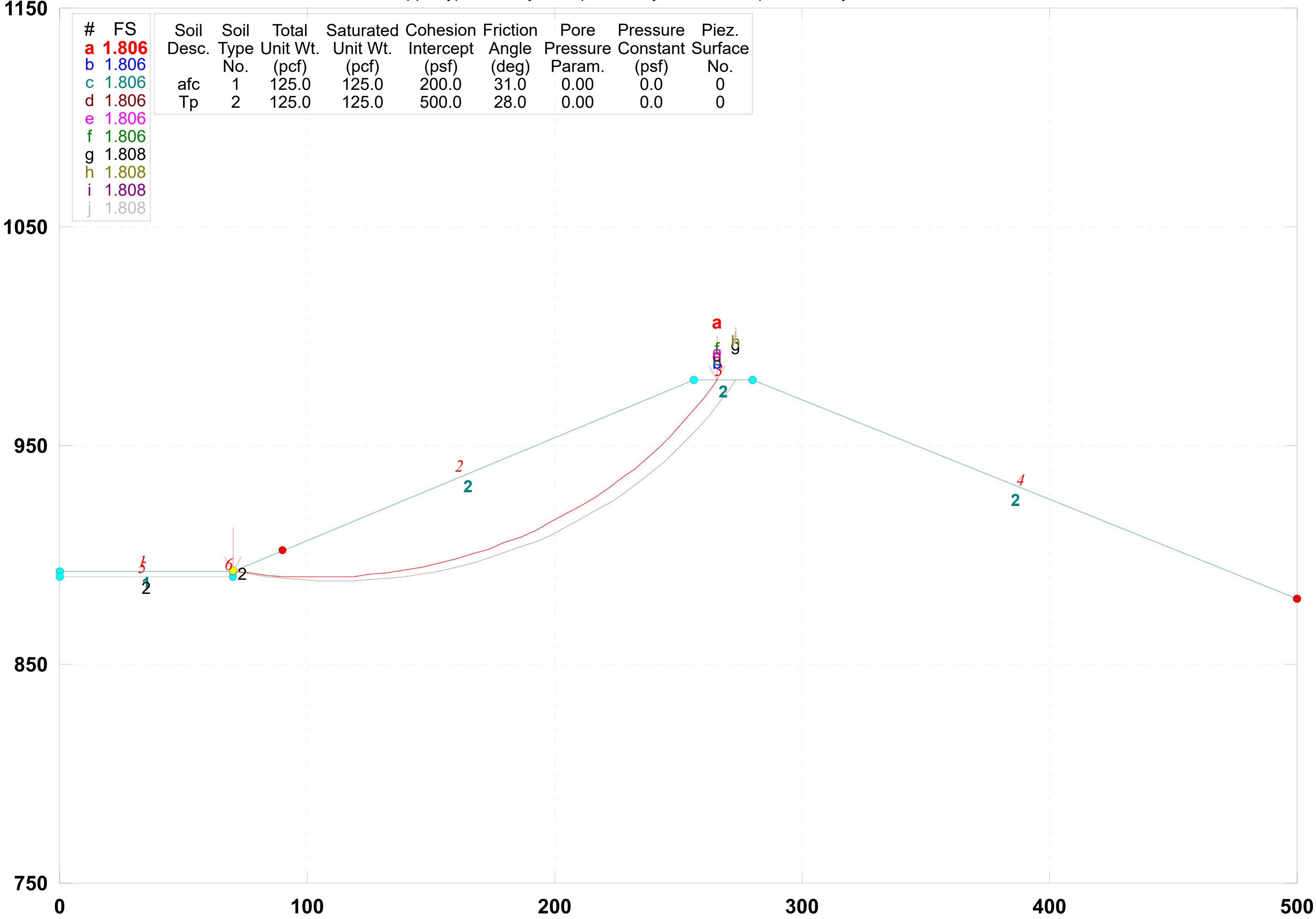


#	FS
a	1.806
b	1.806
c	1.806
d	1.806
e	1.806
f	1.806
g	1.808
h	1.808
i	1.808
j	1.808

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afc	1	125.0	125.0	200.0	31.0	0.00	0.0	0
Tp	2	125.0	125.0	500.0	28.0	0.00	0.0	0

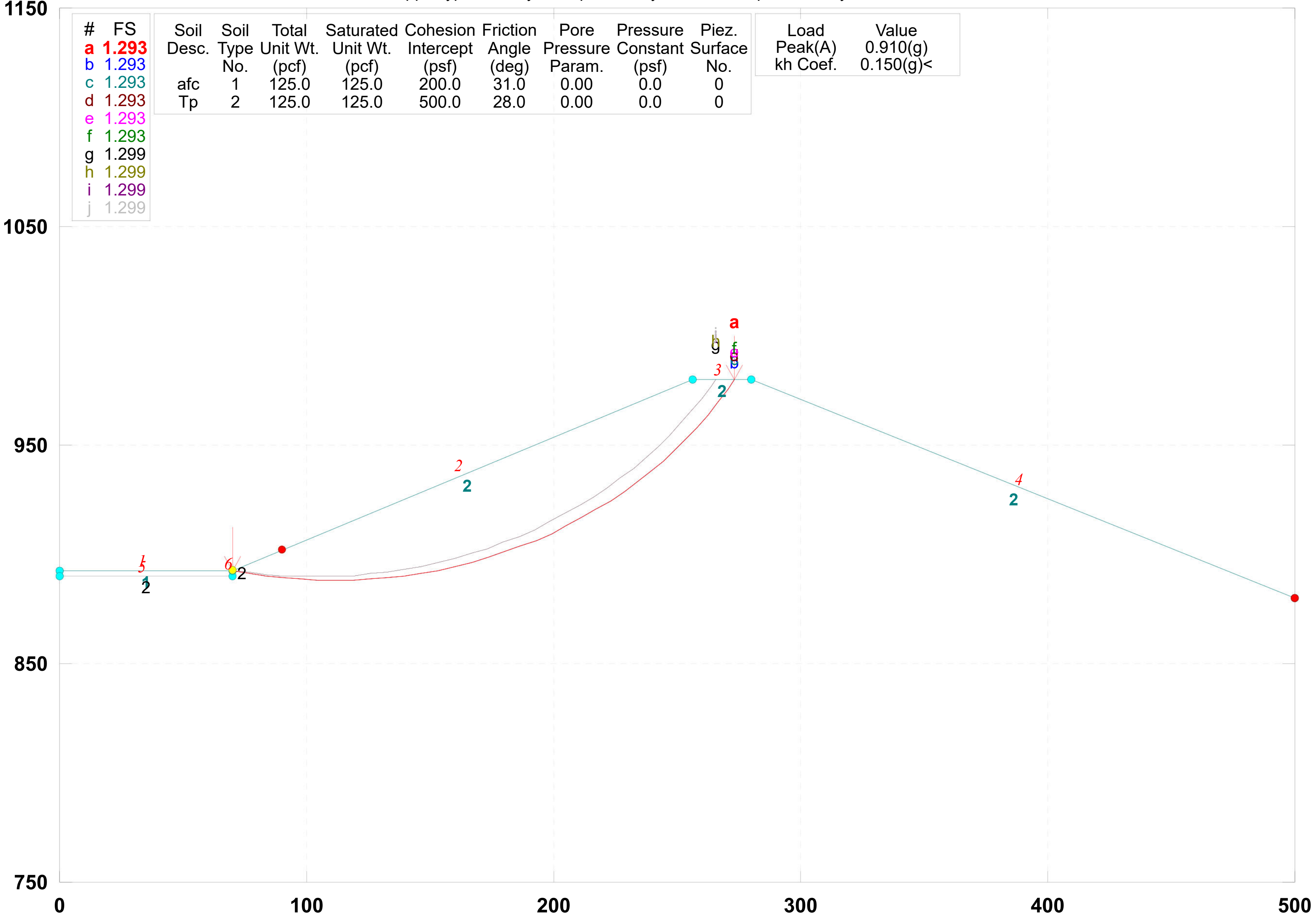
GSTABL7 v.2 FSmin=1.806

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

PLATE D-1

1902-06 Renzulli Estates Cross Section C-C'

k:\1902-06 scripps cypress canyon\slope stability\1902-06 c-c.pl2   Run By: AGS   9/11/2020   11:15AM



#	FS
a	1.293
b	1.293
c	1.293
d	1.293
e	1.293
f	1.293
g	1.299
h	1.299
i	1.299
j	1.299

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afc	1	125.0	125.0	200.0	31.0	0.00	0.0	0
Tp	2	125.0	125.0	500.0	28.0	0.00	0.0	0

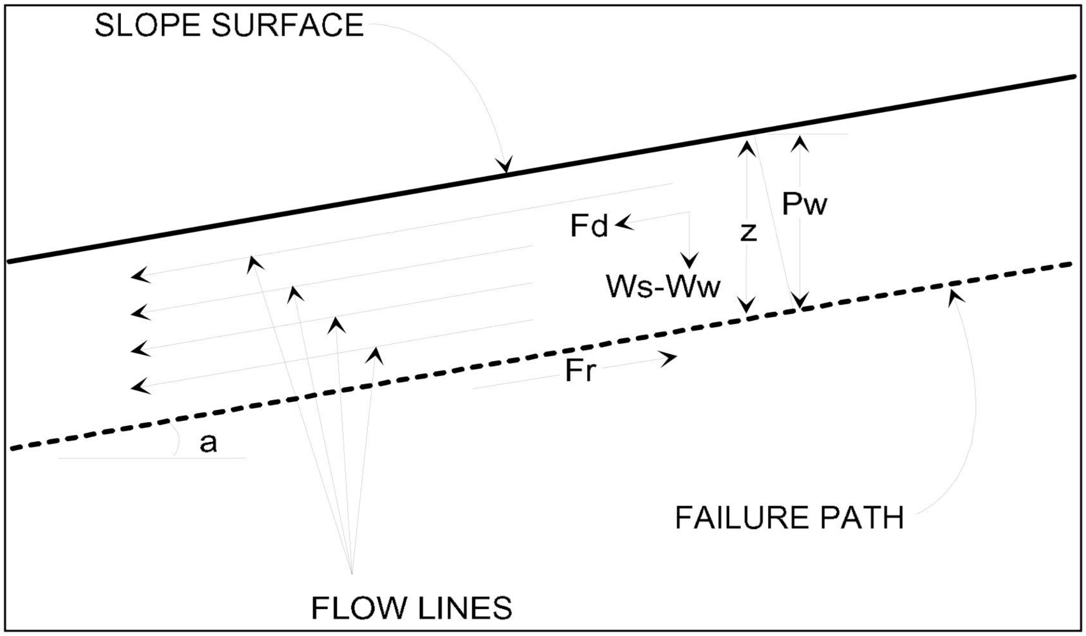
Load	Value
Peak(A)	0.910(g)
kh Coef.	0.150(g)<

GSTABL7 v.2 FSmin=1.293

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

PLATE D-2

SURFICIAL SLOPE STABILITY - CUT SLOPE



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

Given:

Ws (pcf)	z (ft)	a (degrees)	(radians)	phi (degrees)	(radians)	c (psf)
125	4	26.56505	0.4636476	28	0.4886922	400

Calculations:

Pw	u	Fd	Fr	**FS**
3.20	199.68	200.00	506.51	**2.53**

1902-06 Renzulli Estates Cross Section A-A'

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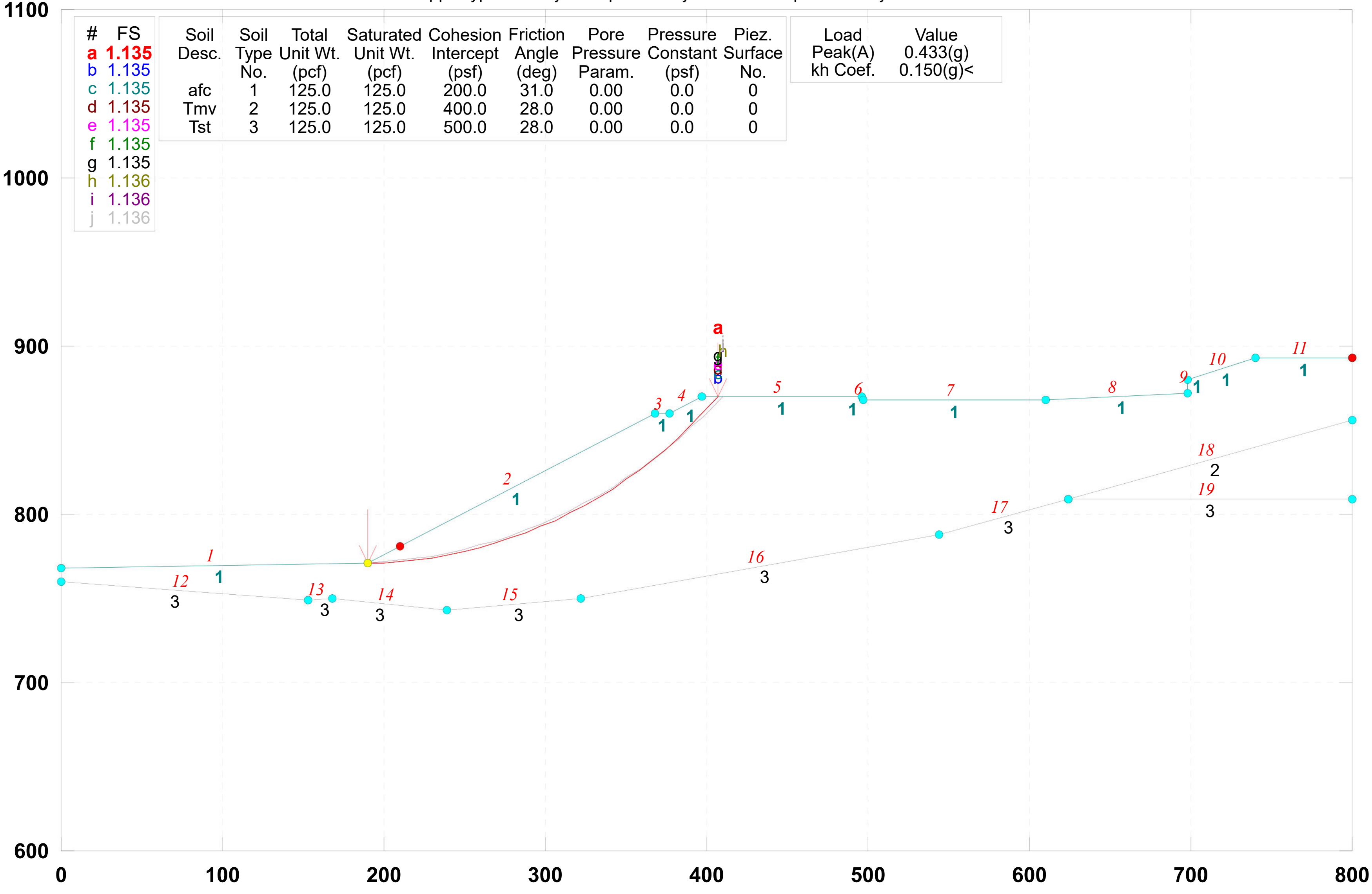

#	FS
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b	1.135
c	1.135
d	1.135
e	1.135
f	1.135
g	1.135
h	1.136
i	1.136
j	1.136

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afc	1	125.0	125.0	200.0	31.0	0.00	0.0	0
Tmv	2	125.0	125.0	400.0	28.0	0.00	0.0	0
Tst	3	125.0	125.0	500.0	28.0	0.00	0.0	0

Load	Value
Peak(A)	0.433(g)
kh Coef.	0.150(g)<

GSTABL7 v.2 FSmin=1.135

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

PLATE D-4

1902-06 Renzulli Estates Cross Section A-A'

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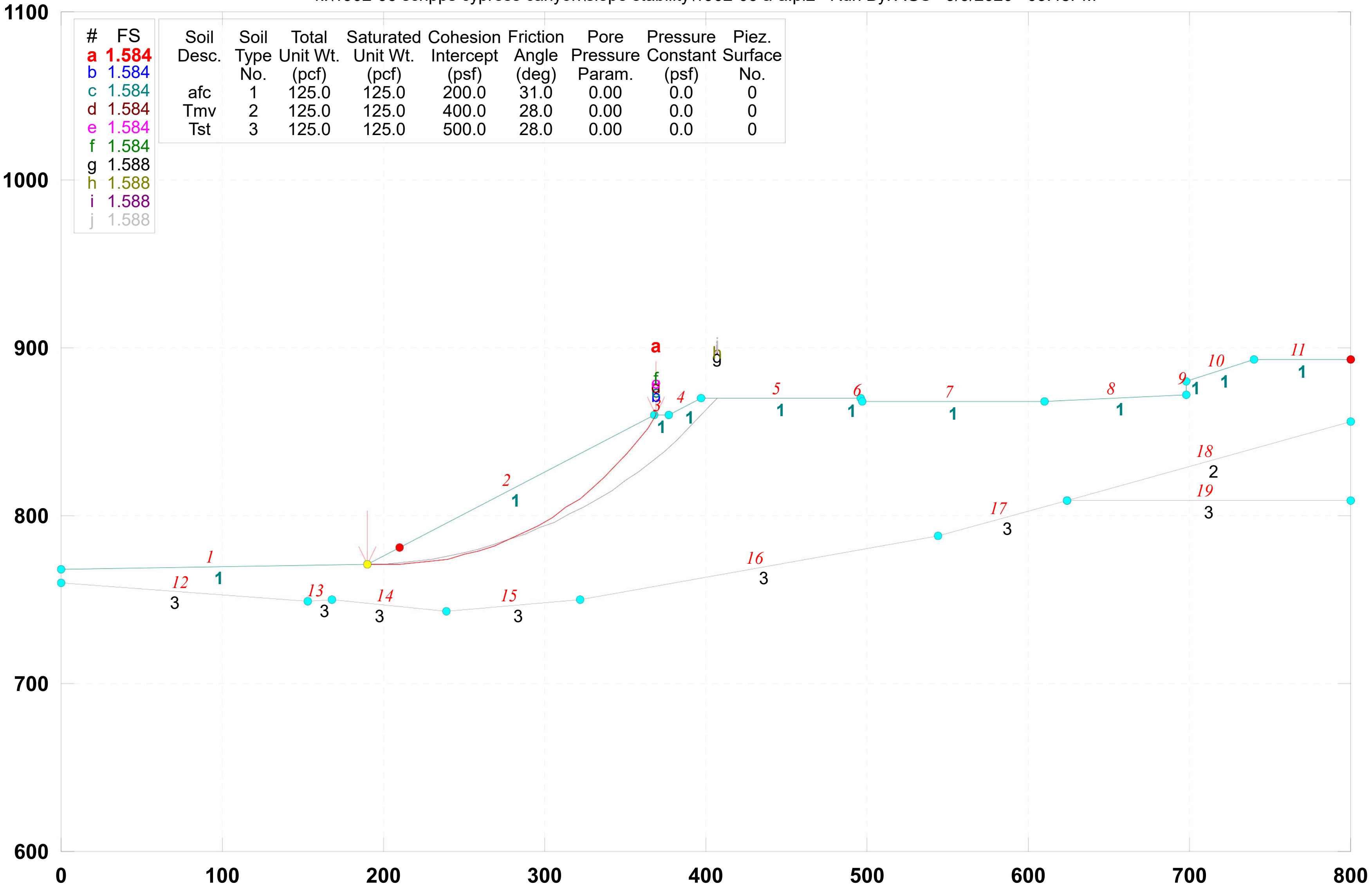

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a	1.584
b	1.584
c	1.584
d	1.584
e	1.584
f	1.584
g	1.588
h	1.588
i	1.588
j	1.588

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afc	1	125.0	125.0	200.0	31.0	0.00	0.0	0
Tmv	2	125.0	125.0	400.0	28.0	0.00	0.0	0
Tst	3	125.0	125.0	500.0	28.0	0.00	0.0	0

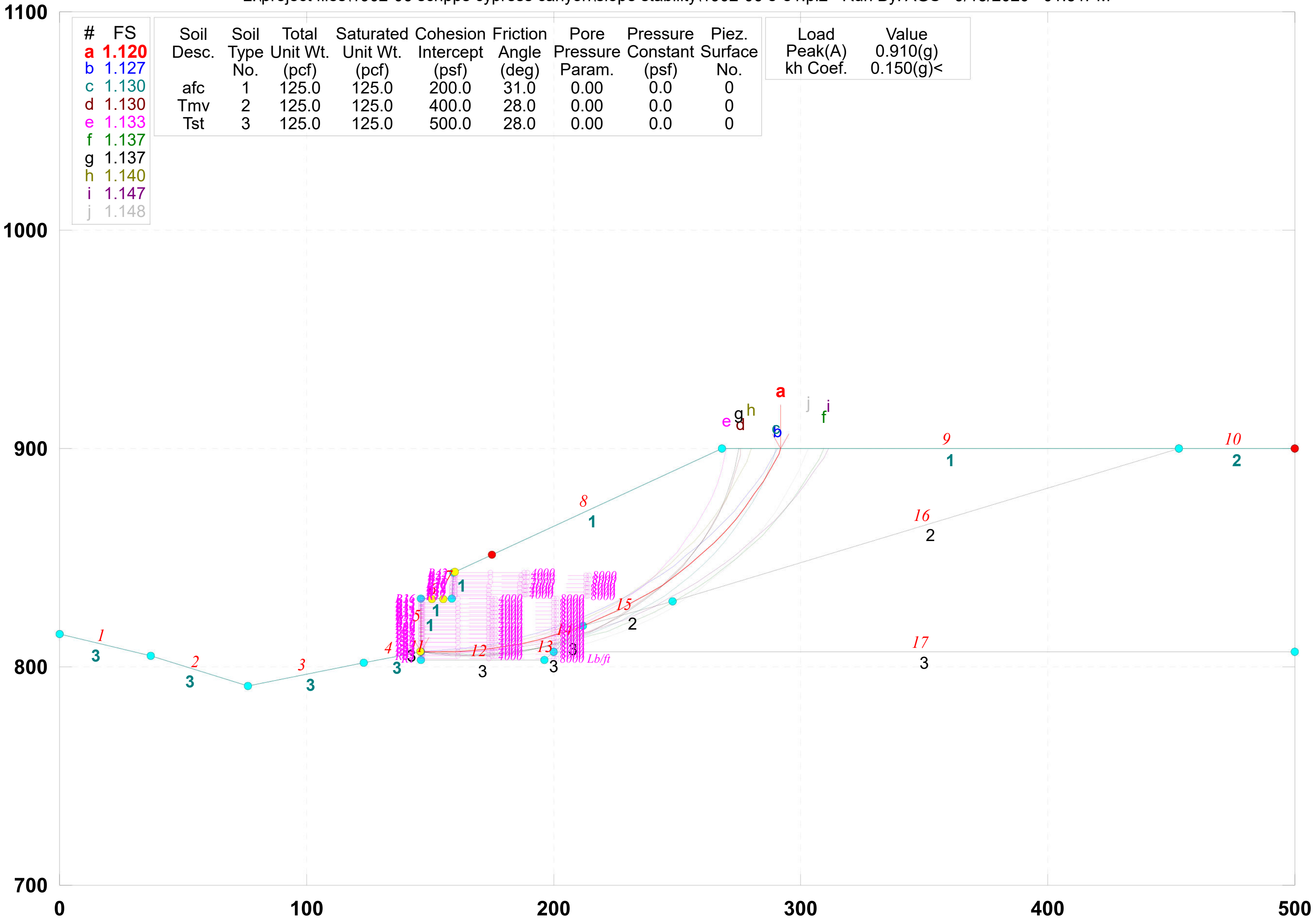
GSTABL7 v.2 FSmin=1.584

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

PLATE D-5

1902-06 Renzulli Estates MSE Wall Cross Section E-E'

z:\project files\1902-06 scripps cypress canyon\slope stability\1902-06 e-e1.pl2   Run By: AGS   9/15/2020   01:51PM



#	FS
a	1.120
b	1.127
c	1.130
d	1.130
e	1.133
f	1.137
g	1.137
h	1.140
i	1.147
j	1.148

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afc	1	125.0	125.0	200.0	31.0	0.00	0.0	0
Tmv	2	125.0	125.0	400.0	28.0	0.00	0.0	0
Tst	3	125.0	125.0	500.0	28.0	0.00	0.0	0

Load	Value
Peak(A)	0.910(g)
kh Coef.	0.150(g)<

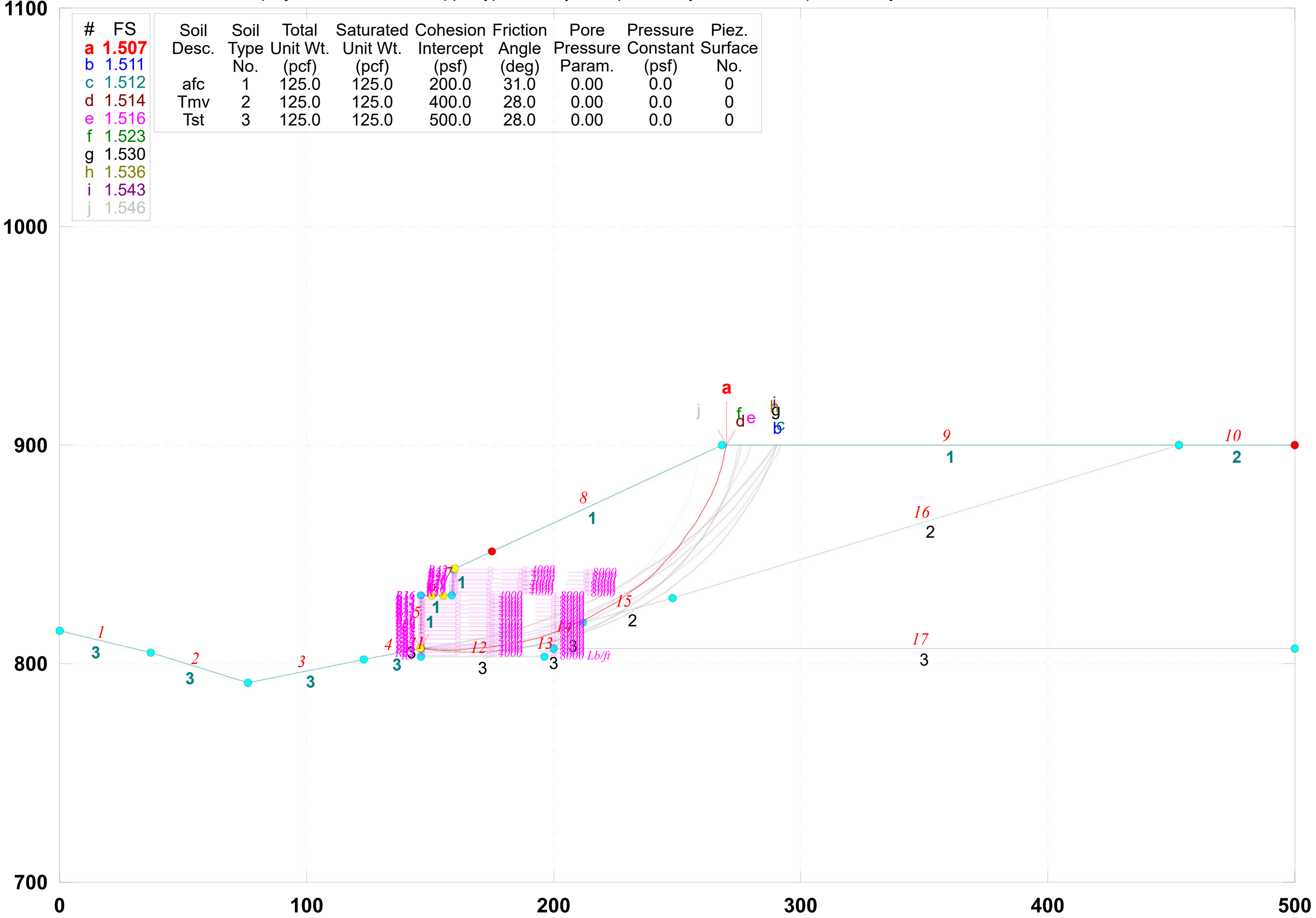
GSTABL7 v.2 FSmin=1.120

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

PLATE D-6

1902-06 Renzulli Estates MSE Wall Cross Section E-E'

z:\project files\1902-06 scripps cypress canyon\slope stability\1902-06 e-e1.pl2   Run By: AGS   9/15/2020   01:50PM



#	FS
a	**1.507**
b	1.511
c	1.512
d	1.514
e	1.516
f	1.523
g	1.530
h	1.536
i	1.543
j	1.546

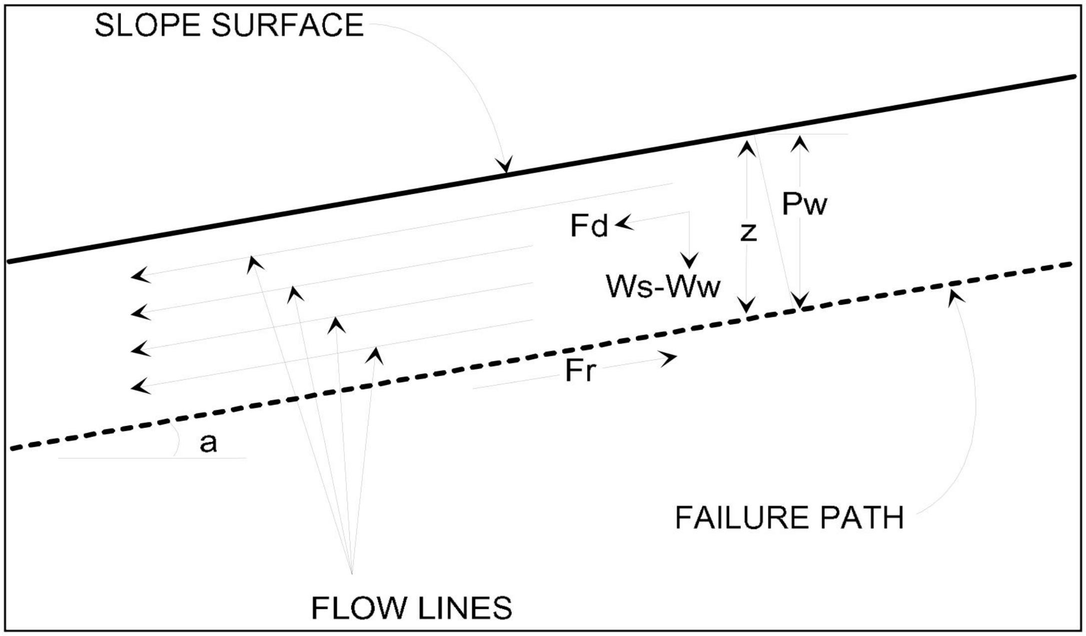
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
afc	1	125.0	125.0	200.0	31.0	0.00	0.0	0
Tmv	2	125.0	125.0	400.0	28.0	0.00	0.0	0
Tst	3	125.0	125.0	500.0	28.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.507

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

PLATE D-7

SURFICIAL SLOPE STABILITY - FILL SLOPE



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

Given:

Ws (pcf)	z (ft)	a (degrees)	(radians)	phi (degrees)	(radians)	c (psf)
125	4	26.56505	0.4636476	31	0.5410521	200

Calculations:

Pw	u	Fd	Fr	**FS**
3.20	199.68	200.00	320.36	**1.60**

APPENDIX E

GENERAL EARTHWORK SPECIFICATIONS AND GRADING DETAILS

GENERAL EARTHWORK SPECIFICATIONS

I. General

A. General procedures and requirements for earthwork and grading are presented herein. The earthwork and grading recommendations provided in the geotechnical report are considered part of these specifications, and where the general specifications provided herein conflict with those provided in the geotechnical report, the recommendations in the geotechnical report shall govern. Recommendations provided herein and in the geotechnical report may need to be modified depending on the conditions encountered during grading.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with the project plans, specifications, applicable building codes, and local governing agency requirements. Where these requirements conflict, the stricter requirements shall govern.

C. It is the contractor’s responsibility to read and understand the guidelines presented herein and in the geotechnical report as well as the project plans and specifications. Information presented in the geotechnical report is subject to verification during grading. The information presented on the exploration logs depicts conditions at the particular time of excavation and at the location of the excavation. Subsurface conditions present at other locations may differ, and the passage of time may result in different subsurface conditions being encountered at the locations of the exploratory excavations. The contractor shall perform an independent investigation and evaluate the nature of the surface and subsurface conditions to be encountered and the procedures and equipment to be used in performing his work.

D. The contractor shall have the responsibility to provide adequate equipment and procedures to accomplish the earthwork in accordance with applicable requirements. When the quality of work is less than that required, the Geotechnical Consultant may reject the work and may recommend that the operations be suspended until the conditions are corrected.

E. Prior to the start of grading, a qualified Geotechnical Consultant should be employed to observe grading procedures and provide testing of the fills for conformance with the project specifications, approved grading plan, and guidelines presented herein. All remedial removals, clean-outs, removal bottoms, keyways, and subdrain installations should be observed and documented by the Geotechnical Consultant prior to placing fill. It is the contractor’s responsibility to apprise the Geotechnical Consultant of their schedules and notify the Geotechnical Consultant when those areas are ready for observation.

F. The contractor is responsible for providing a safe environment for the Geotechnical Consultant to observe grading and conduct tests.

II. Site Preparation

A. Clearing and Grubbing: Excessive vegetation and other deleterious material shall be sufficiently removed as required by the Geotechnical Consultant, and such materials shall be properly disposed of offsite in a method acceptable to the owner and governing agencies. Where applicable, the contractor may obtain permission from the Geotechnical Consultant, owner, and governing agencies to dispose of vegetation and other deleterious materials in designated areas onsite.

B. Unsuitable Soils Removals: Earth materials that are deemed unsuitable for the support of fill shall be removed as necessary to the satisfaction of the Geotechnical Consultant.

C. Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, other utilities, or other structures located within the limits of grading shall be removed and/or abandoned in accordance with the requirements of the governing agency and to the satisfaction of the Geotechnical Consultant.

D. Preparation of Areas to Receive Fill: After removals are completed, the exposed surfaces shall be scarified to a depth of approximately 8 inches, watered or dried, as needed, to achieve a generally uniform moisture content that is at or near optimum moisture content. The scarified materials shall then be compacted to the project requirements and tested as specified.

E. All areas receiving fill shall be observed and approved by the Geotechnical Consultant prior to the placement of fill. A licensed surveyor shall provide survey control for determining elevations of processed areas and keyways.

III. Placement of Fill

A. Suitability of fill materials: Any materials, derived onsite or imported, may be utilized as fill provided that the materials have been determined to be suitable by the Geotechnical Consultant. Such materials shall be essentially free of organic matter and other deleterious materials, and be of a gradation, expansion potential, and/or strength that is acceptable to the Geotechnical Consultant. Fill materials shall be tested in a laboratory approved by the Geotechnical Consultant, and import materials shall be tested and approved prior to being imported.

B. Generally, different fill materials shall be thoroughly mixed to provide a relatively uniform blend of materials and prevent abrupt changes in material type. Fill materials derived from benching should be dispersed throughout the fill area instead of placing the materials within only an equipment-width from the cut/fill contact.

C. Oversize Materials: Rocks greater than 8 inches in largest dimension shall be disposed of offsite or be placed in accordance with the recommendations by the Geotechnical Consultant in the areas that are designated as suitable for oversize rock placement. Rocks that are smaller than 8 inches in largest dimension may be utilized in the fill provided that they are not nested and are their quantity and distribution are acceptable to the Geotechnical Consultant.

D. The fill materials shall be placed in thin, horizontal layers such that, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and shall be thoroughly mixed to obtain near uniform moisture content and uniform blend of materials.

E. Moisture Content: Fill materials shall be placed at or above the optimum moisture content or as recommended by the geotechnical report. Where the moisture content of the engineered fill is less than recommended, water shall be added, and the fill materials shall be blended so that near uniform moisture content is achieved. If the moisture content is above the limits specified by the Geotechnical Consultant, the fill materials shall be aerated by discing, blading, or other methods until the moisture content is acceptable.

F. Each layer of fill shall be compacted to the project standards in accordance to the project specifications and recommendations of the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, the fill shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method: D1557-09.

G. Benching: Where placing fill on a slope exceeding a ratio of 5 to 1 (horizontal to vertical), the ground should be keyed or benched. The keyways and benches shall extend through all unsuitable materials into suitable materials such as firm materials or sound bedrock or as recommended by the Geotechnical Consultant. The minimum keyway width shall be 15 feet and extend into suitable materials, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. The minimum keyway width for fill over cut slopes is also 15 feet, or as recommended by the geotechnical report and by the Geotechnical Consultant. As a general rule, unless otherwise recommended by the Geotechnical Consultant, the minimum width of the keyway shall be equal to 1/2 the height of the fill slope.

H. Slope Face: The specified minimum relative compaction shall be maintained out to the finish face of fill and stabilization fill slopes. Generally, this may be achieved by overbuilding the slope and cutting back to the compacted core. The actual amount of overbuilding may vary as field conditions dictate. Alternately, this may be achieved by back rolling the slope face with suitable equipment or other methods that produce the designated result. Loose soil should not be allowed to build up on the slope face. If present, loose soils shall be trimmed to expose the compacted slope face.

I. Slope Ratio: Unless otherwise approved by the Geotechnical Consultant and governing agencies, permanent fill slopes shall be designed and constructed no steeper than 2 to 1 (horizontal to vertical).

J. Natural Ground and Cut Areas: Design grades that are in natural ground or in cuts should be evaluated by the Geotechnical Consultant to determine whether scarification and processing of the ground and/or overexcavation is needed.

K. Fill materials shall not be placed, spread, or compacted during unfavorable weather conditions. When grading is interrupted by rain, filing operations shall not resume until the Geotechnical Consultant approves the moisture and density of the previously placed compacted fill.

IV. Cut Slopes

A. The Geotechnical Consultant shall inspect all cut slopes, including fill over cut slopes, and shall be notified by the contractor when cut slopes are started.

B. If adverse or potentially adverse conditions are encountered during grading; the Geotechnical Consultant shall investigate, evaluate, and make recommendations to mitigate the adverse conditions.

C. Unless otherwise stated in the geotechnical report, cut slopes shall not be excavated higher or steeper than the requirements of the local governing agencies. Short-term stability of the cut slopes and other excavations is the contractor's responsibility.

V. Drainage

A. Back drains and Subdrains: Back drains and subdrains shall be provided in fill as recommended by the Geotechnical Consultant and shall be constructed in accordance with the governing agency and/or recommendations of the Geotechnical Consultant. The location of subdrains, especially outlets, shall be surveyed and recorded by the Civil Engineer.

B. Top-of-slope Drainage: Positive drainage shall be established away from the top of slope. Site drainage shall not be permitted to flow over the tops of slopes.

C. Drainage terraces shall be constructed in compliance with the governing agency requirements and/or in accordance with the recommendations of the Geotechnical Consultant.

D. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

VI. Erosion Control

A. All finish cut and fill slopes shall be protected from erosion and/or planted in accordance with the project specifications and/or landscape architect's recommendations. Such measures to protect the slope face shall be undertaken as soon as practical after completion of grading.

B. During construction, the contractor shall maintain proper drainage and prevent the ponding of water. The contractor shall take remedial measures to prevent the erosion of graded areas until permanent drainage and erosion control measures have been installed.

VII. Trench Excavation and Backfill

A. Safety: The contractor shall follow all OSHA requirements for safety of trench excavations. Knowing and following these requirements is the contractor's responsibility. All trench excavations or open cuts in excess of 5 feet in depth shall be shored or laid back. Trench excavations and open cuts exposing adverse geologic conditions may require further evaluation by the Geotechnical Consultant. If a contractor fails to provide safe access for compaction testing, backfill not tested due to safety concerns may be subject to removal.

B. Bedding: Bedding materials shall be non-expansive and have a Sand Equivalent greater than 30. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting.

C. Backfill: Jetting of backfill materials is generally not acceptable. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting provided the backfill materials are granular, free-draining and have a Sand Equivalent greater than 30.

VIII. Geotechnical Observation and Testing During Grading

A. Compaction Testing: Fill shall be tested by the Geotechnical Consultant for evaluation of general compliance with the recommended compaction and moisture conditions. The tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed. The contractor shall assist the Geotechnical Consultant by excavating suitable test pits for testing of compacted fill.

B. Where tests indicate that the density of a layer of fill is less than required, or the moisture content not within specifications, the Geotechnical Consultant shall notify the contractor of the unsatisfactory conditions of the fill. The portions of the fill that are not within specifications shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed until the last lift of fill is tested and found to meet the project specifications and approved by the Geotechnical Consultant.

C. If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as adverse weather, excessive rock or deleterious materials being placed in the fill, insufficient equipment, excessive rate of fill placement, results in a quality of work that is unacceptable, the consultant shall notify the contractor, and the contractor shall rectify the conditions, and if necessary, stop work until conditions are satisfactory.

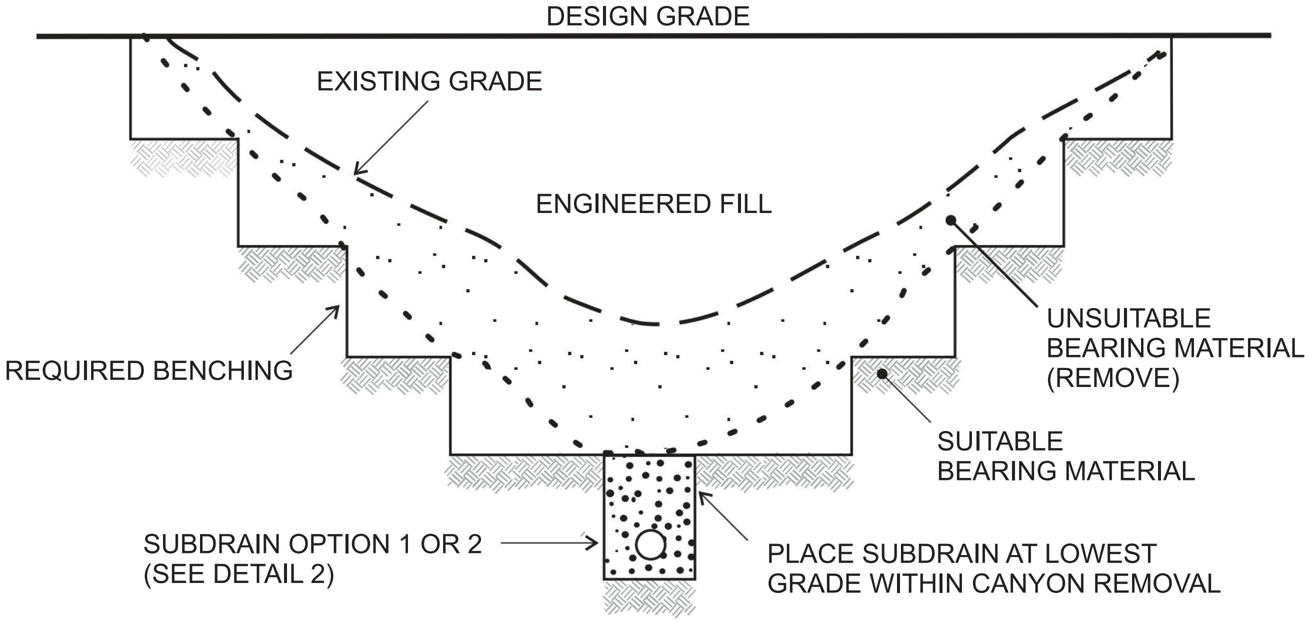
D. Frequency of Compaction Testing: The location and frequency of tests shall be at the Geotechnical Consultant's discretion. Generally, compaction tests shall be taken at intervals not exceeding two feet in fill height and 1,000 cubic yards of fill materials placed.

E. Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of the compaction test locations. The contractor shall coordinate with the surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations. Alternately, the test locations can be surveyed and the results provided to the Geotechnical Consultant.

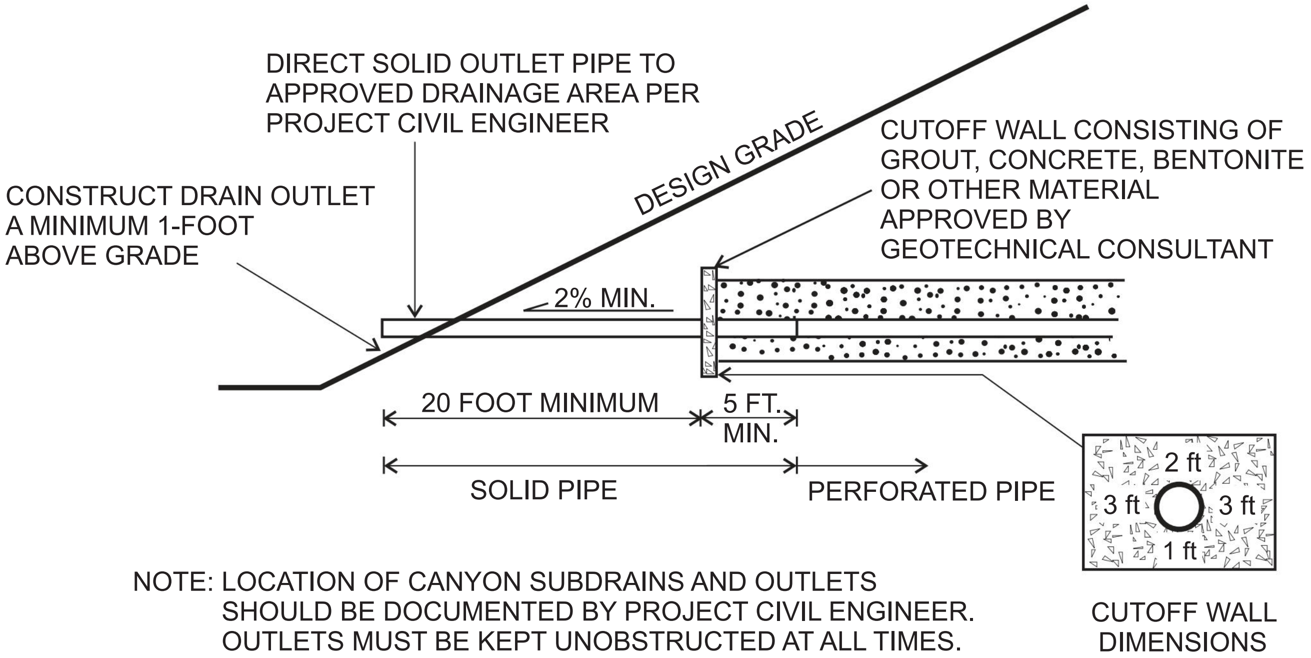
F. Areas of fill that have not been observed or tested by the Geotechnical Consultant may have to be removed and recompacted at the contractor's expense. The depth and extent of removals will be determined by the Geotechnical Consultant.

G. Observation and testing by the Geotechnical Consultant shall be conducted during grading in order for the Geotechnical Consultant to state that, in his opinion, grading has been completed in accordance with the approved geotechnical report and project specifications.

H. Reporting of Test Results: After completion of grading operations, the Geotechnical Consultant shall submit reports documenting their observations during construction and test results. These reports may be subject to review by the local governing agencies.



CANYON SUBDRAIN PROFILE



NOTE: LOCATION OF CANYON SUBDRAINS AND OUTLETS
SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER.
OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

CANYON SUBDRAIN TERMINUS

VER 1.0

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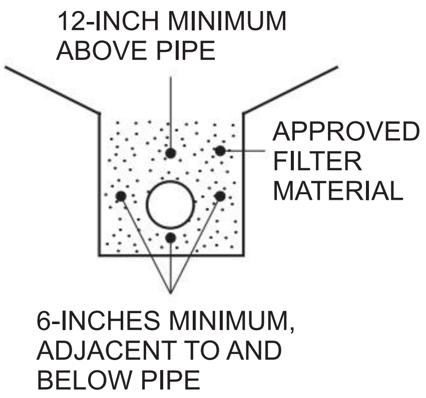
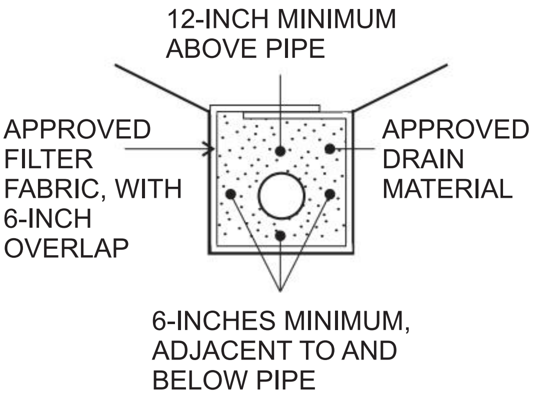
CANYON SUBDRAIN

DETAIL 1





OPTION 1

FILTER MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF CALTRANS CLASS 2 PERMEABLE MATERIAL

OPTION 2

DRAIN MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

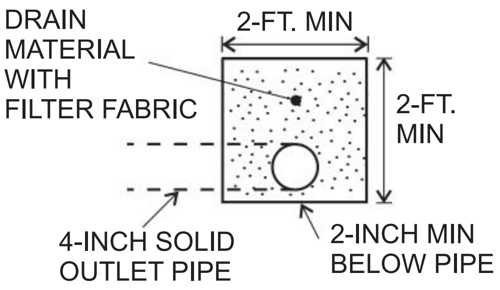
FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

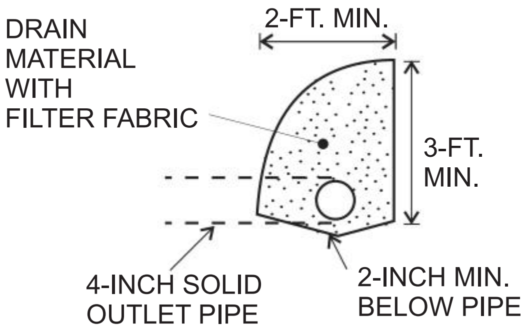
PIPE: 6 OR 8-INCH ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

NOTE: CONTINUOUS RUN IN EXCESS OF 5OO FEET REQUIRES 8-INCH DIAMETER PIPE (ASTM D3034, SDR-35, OR ASTM D1785, SCHD. 40)

CANYON SUBDRAIN





OPTION 1

OPTION 2

DRAIN MATERIAL: GRAVEL TRENCH TO BE FILLED WITH 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

PIPE: 4-INCH ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

VER 1.0

NTS

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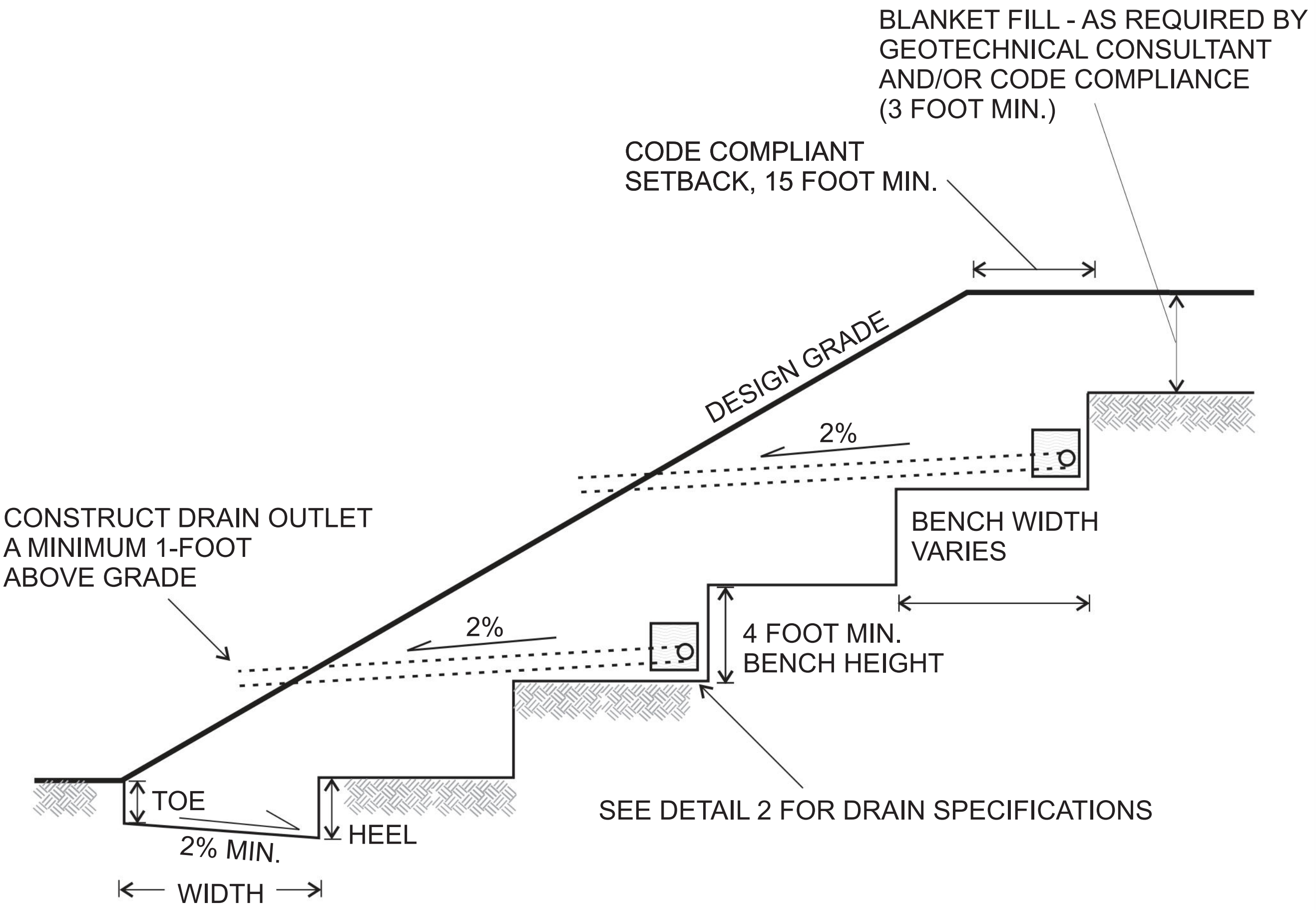
ADVANCED GEOTECHNICAL SOLUTIONS

DRAIN SPECIFICATIONS

DETAIL 2



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE	2 FOOT MIN.
HEEL	3 FOOT MIN.
WIDTH	15 FOOT MIN.

NOTES:

1. DRAIN OUTLETS TO BE PROVIDED EVERY 100 FEET CONNECT TO PERFORATED DRAIN PIPE BY “L” OR “T” AT A MINIMUM 2% GRADIENT.

2. THE NECESSITY AND LOCATION OF ADDITIONAL DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT. UPPER STAGE OUTLETS SHOULD BE EMPTIED ONTO CONCRETE TERRACE DRAINS.

3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.

4. LOCATION OF DRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

VER 1.0

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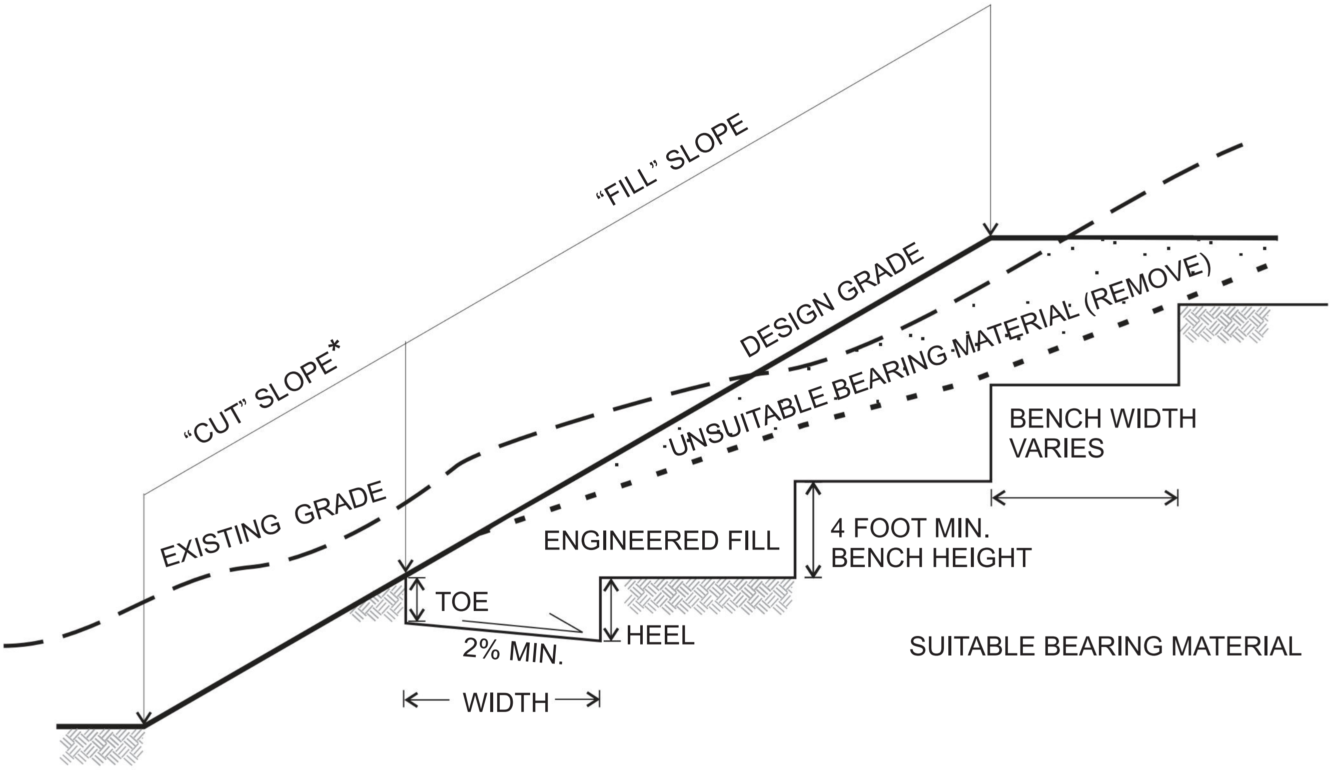
ADVANCED GEOTECHNICAL SOLUTIONS

STABILIZATION/BUTTRESS FILL

DETAIL 3

* THE “CUT” PORTION OF THE SLOPE SHALL BE EXCAVATED AND EVALUATED BY THE GEOTECHNICAL CONSULTANT PRIOR TO CONSTRUCTING THE “FILL” PORTION



SUITABLE
BEARING MATERIAL

CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. THE NECESSITY AND LOCATION OF DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

VER 1.0

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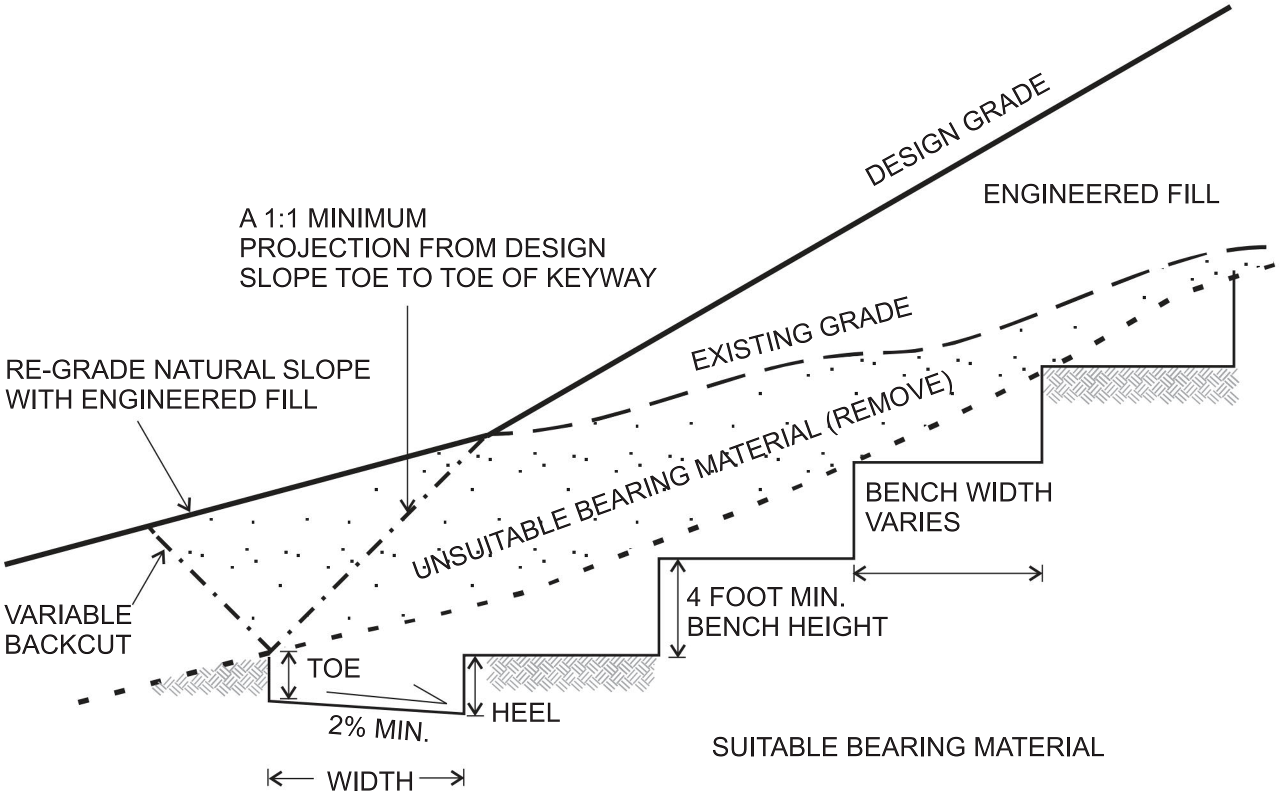
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER CUT SLOPE

DETAIL 4



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. WHEN THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN GRADE SLOPE RATIO, SPECIAL RECOMMENDATIONS ARE NECESSARY BY THE GEOTECHNICAL CONSULTANT
2. THE GEOTECHNICAL CONSULTANT WILL DETERMINE THE REQUIREMENT FOR AND LOCATION OF SUBSURFACE DRAINAGE SYSTEMS.
3. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

VER 1.0

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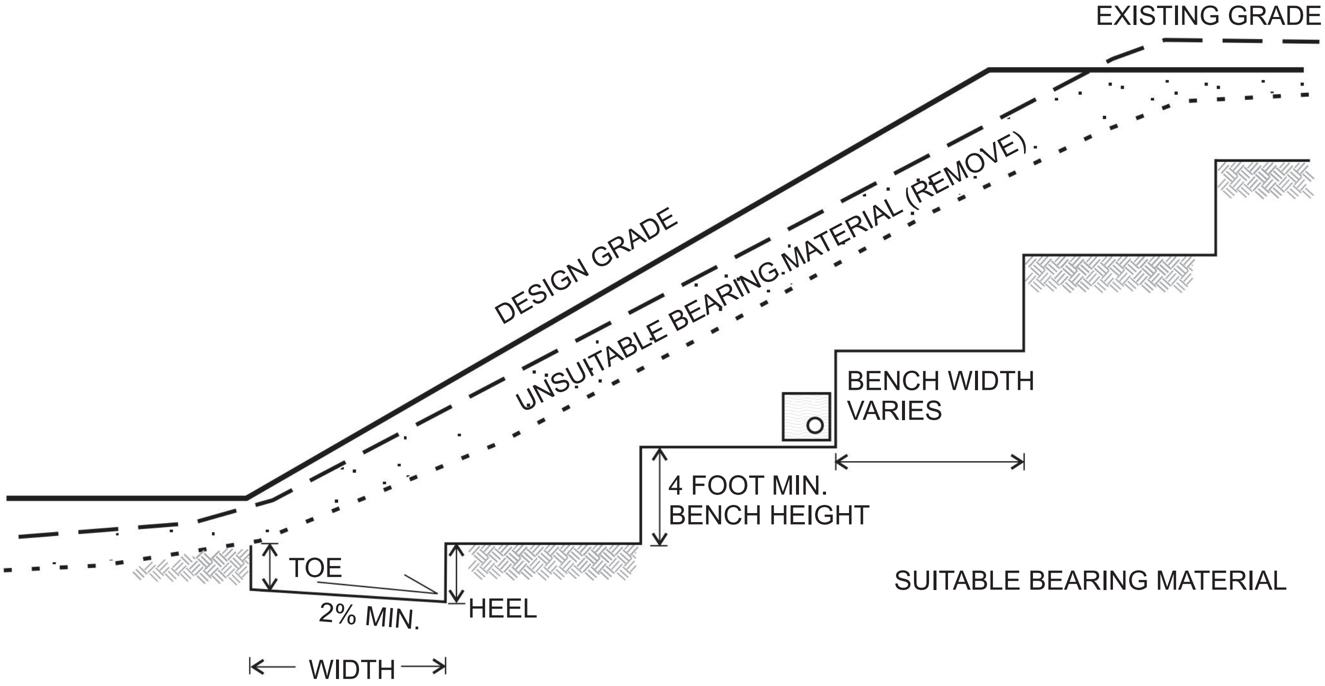
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER NATURAL SLOPE

DETAIL 5



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT
2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

VER 1.0

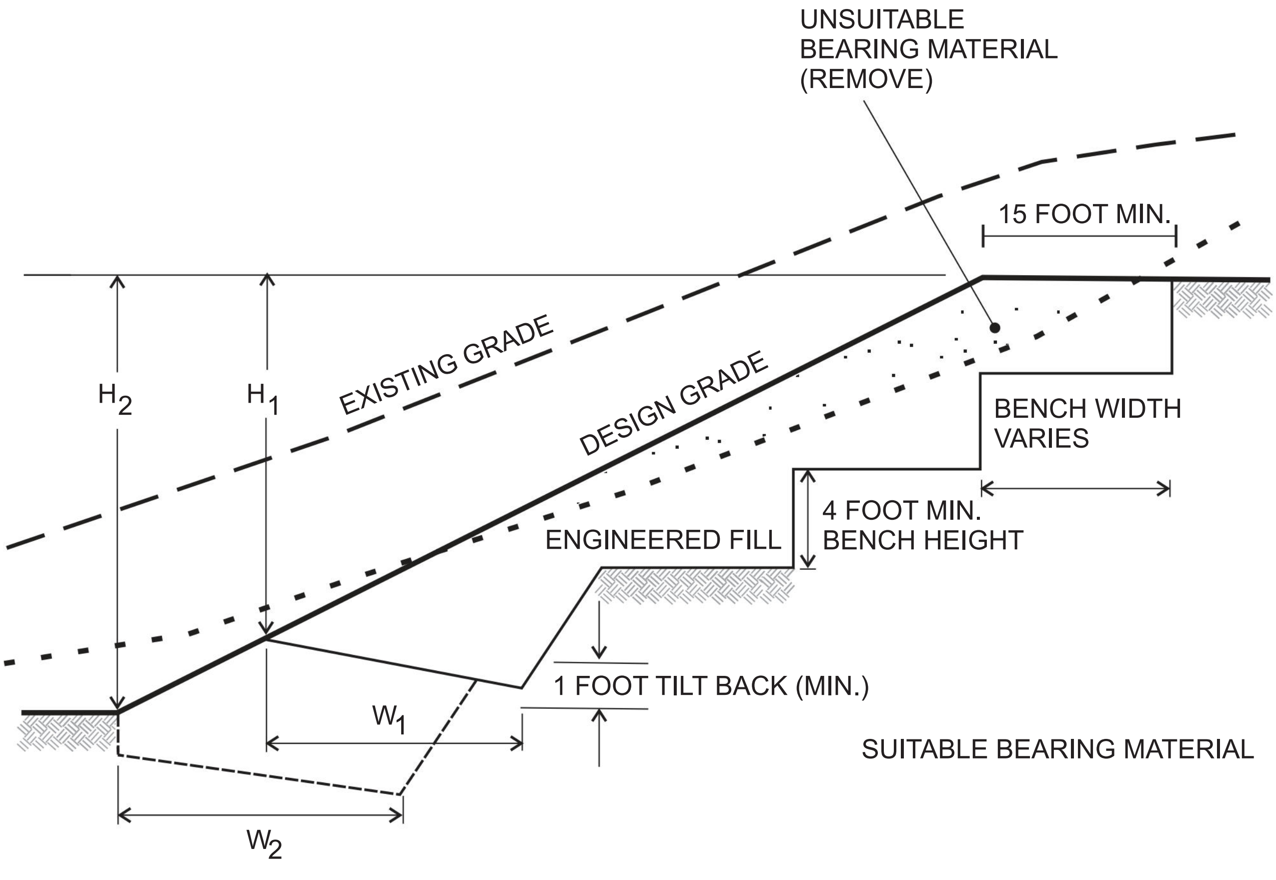
NTS

AGS

ADVANCED GEOTECHNICAL SOLUTIONS

SKIN FILL CONDITION

DETAIL 6



NOTES:

1. IF RECOMMENDED BY THE GEOTECHNICAL CONSULTANT, THE REMAINING CUT PORTION OF THE SLOPE MAY REQUIRE REMOVAL AND REPLACEMENT WITH AN ENGINEERED FILL

2. “W” SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, “W” SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL “W” BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

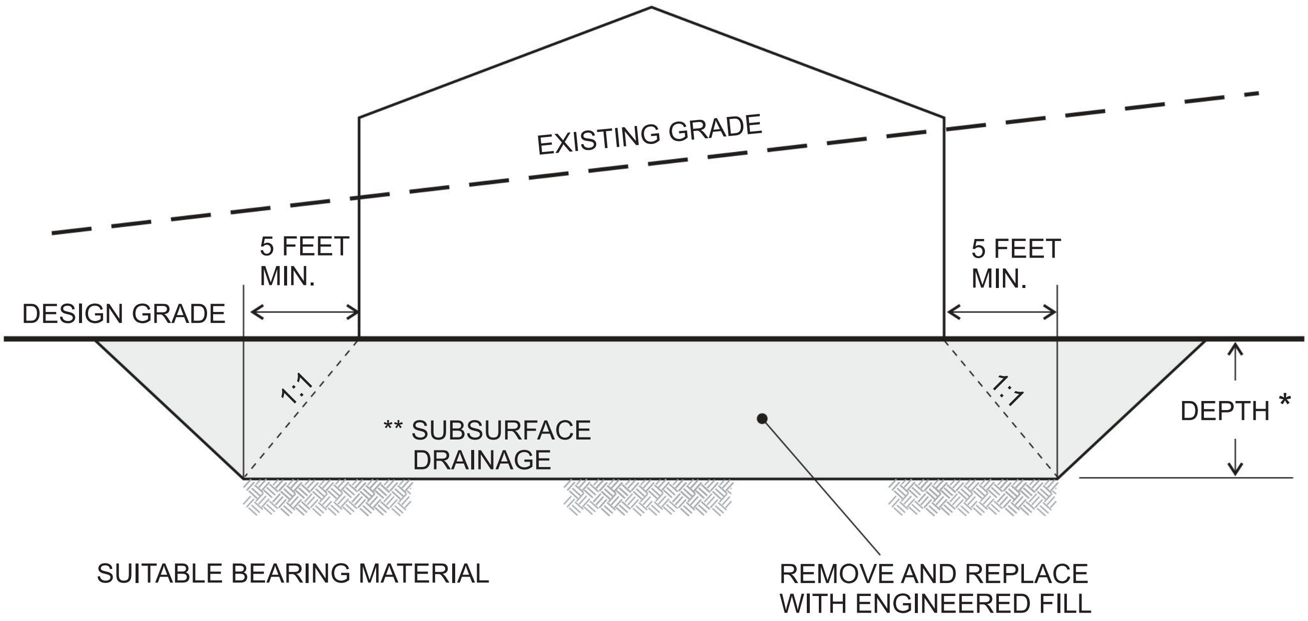
VER 1.0

NTS

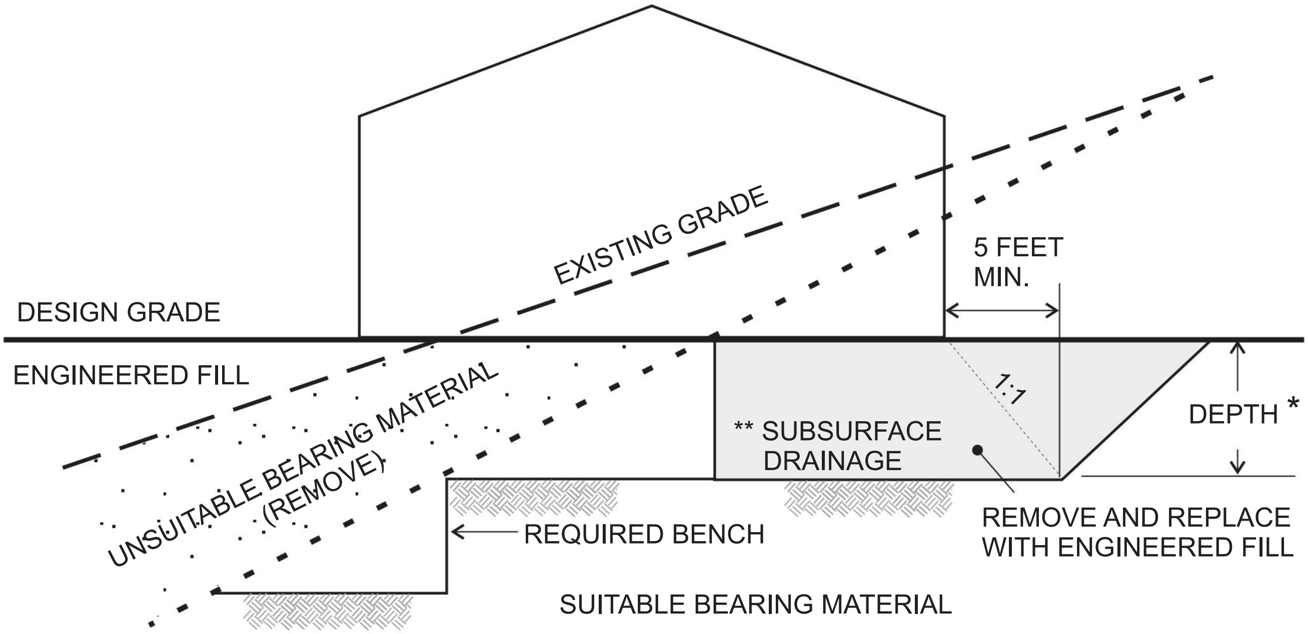
AGS
ADVANCED GEOTECHNICAL SOLUTIONS

PARTIAL CUT SLOPE
STABILIZATION

DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

NOTES:

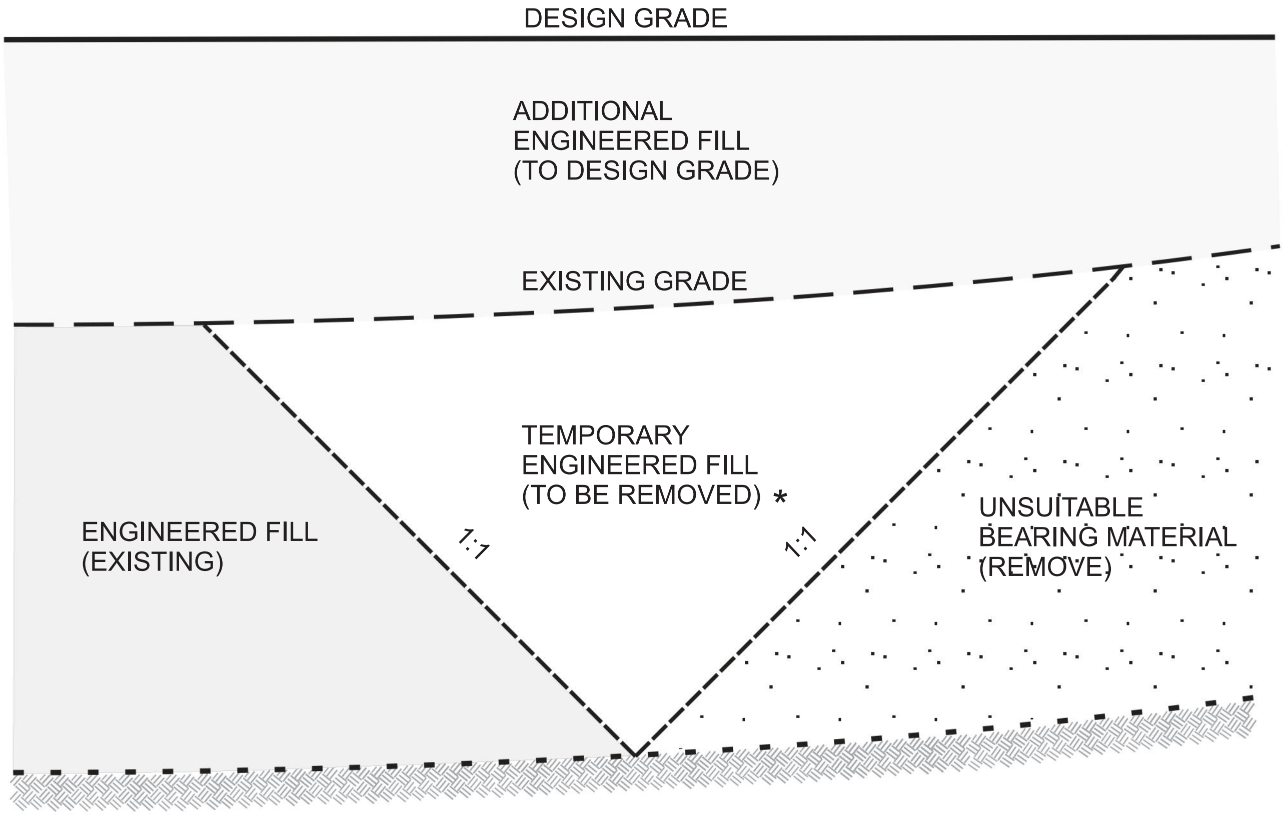
* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** CONSTRUCT EXCAVATION TO PROVIDE FOR POSITIVE DRAINAGE TOWARDS STREETS, DEEPER FILL AREAS OR APPROVED DRAINAGE DEVICES BASED ON FIELD CONDITIONS

VER 1.0

NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CUT & CUT-FILL LOT OVEREXCAVATION	DETAIL 8



SUITABLE BEARING MATERIAL

* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

VER 1.0

NTS

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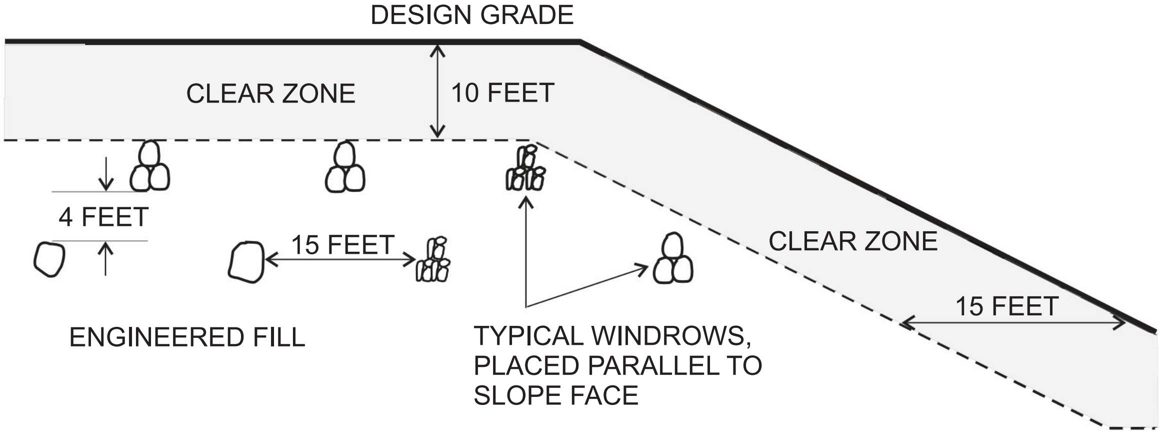
ADVANCED GEOTECHNICAL SOLUTIONS

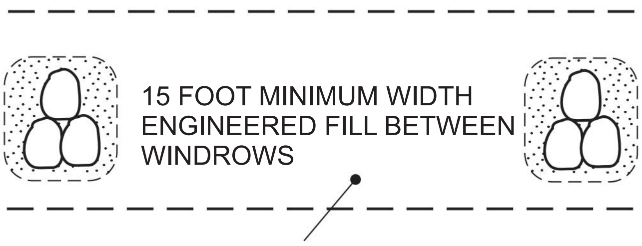
REMOVAL ADJACENT TO EXISTING FILL

DETAIL 9



CLEAR ZONE DIMENSIONS FOR REFERENCE ONLY, ACTUAL DEPTH, WIDTH, WINDROW LENGTH, ETC. TO BE BASED ON ELEVATIONS OF FOUNDATIONS, UTILITIES OR OTHER STRUCTURES PER THE GEOTECHNICAL CONSULTANT OR GOVERNING AGENCY APPROVAL

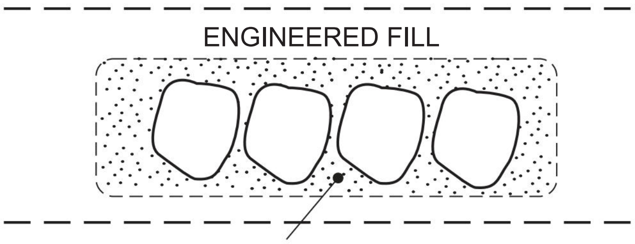
OVERSIZED MATERIAL DISPOSAL PROFILE



HORIZONTALLY PLACED ENGINEERED FILL, FREE OF OVERSIZED MATERIALS AND COMPACTED TO MINIMUM PROJECT STANDARDS

COMPACT ENGINEERED FILL ABOVE OVERSIZED MATERIALS TO FACILITATE "TRENCH" CONDITION PRIOR TO FLOODING GRANULAR MATERIALS

WINDROW CROSS-SECTION



GRANULAR MATERIAL APPROVED BY THE GEOTECHNICAL CONSULTANT AND CONSOLIDATED IN-PLACE BY FLOODING

WINDROW PROFILE

VER 1.0

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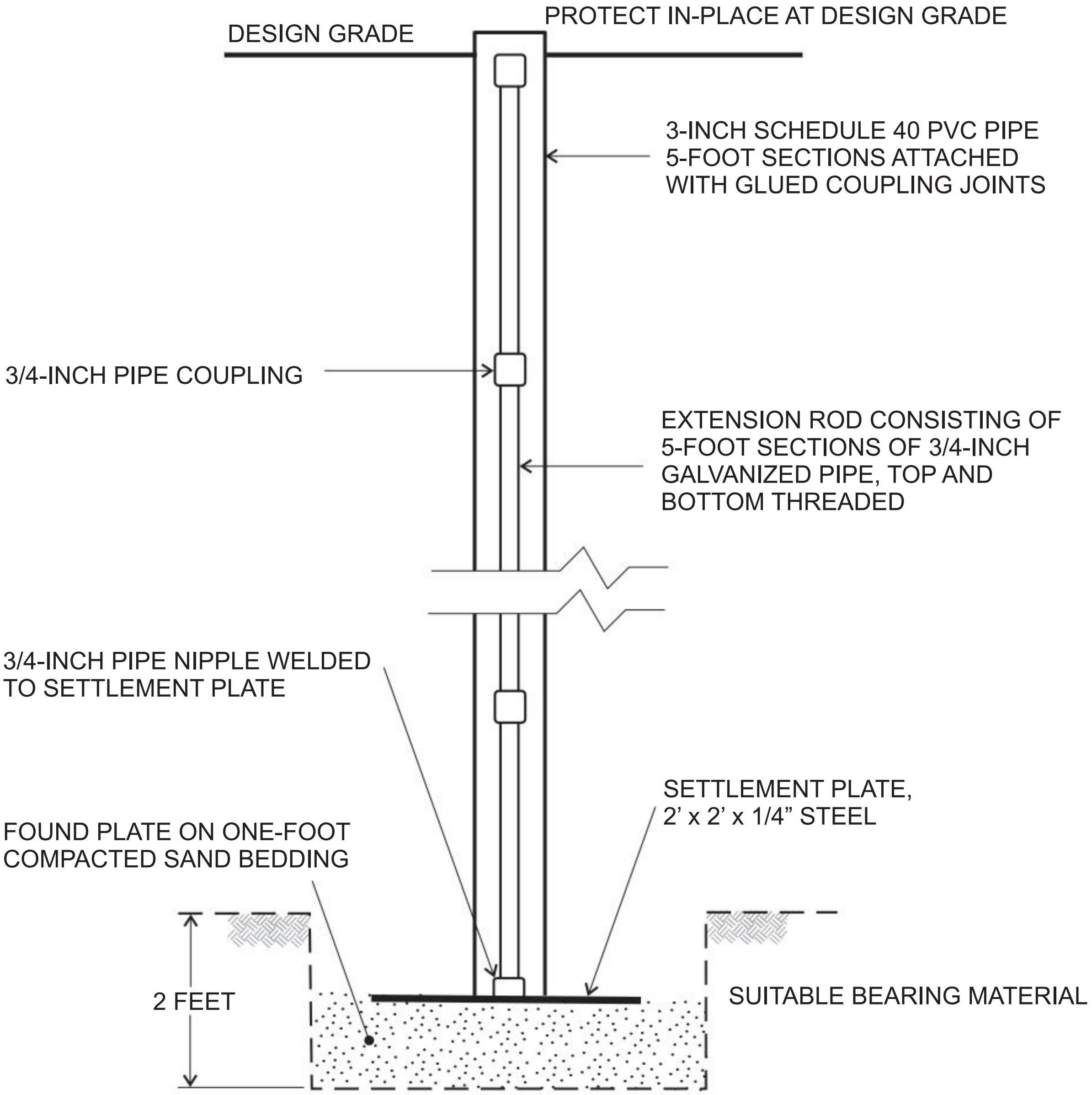
ADVANCED GEOTECHNICAL SOLUTIONS

OVERSIZED MATERIAL DISPOSAL CRITERIA

DETAIL 10



NOTES:

1. SETTLEMENT PLATE LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED BY THE CONTRACTOR AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. CONTRACTOR SHALL MAINTAIN ADEQUATE HORIZONTAL CLEARANCE FOR EQUIPMENT OPERATION AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO SETTLEMENT PLATE DURING SITE CONSTRUCTION.

3. A MINIMUM 5-FOOT ZONE ADJACENT TO SETTLEMENT PLATE/EXTENSION RODS SHALL BE ESTABLISHED FOR HAND-HELD MECHANICAL COMPACTION OF ENGINEERED FILL. ENGINEERED FILL SHALL BE COMPACTED TO MINIMUM PROJECT STANDARD.

4. ELEVATIONS OF SETTLEMENT PLATE AND ALL EXTENSION ROD PLACEMENT SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

VER 1.0

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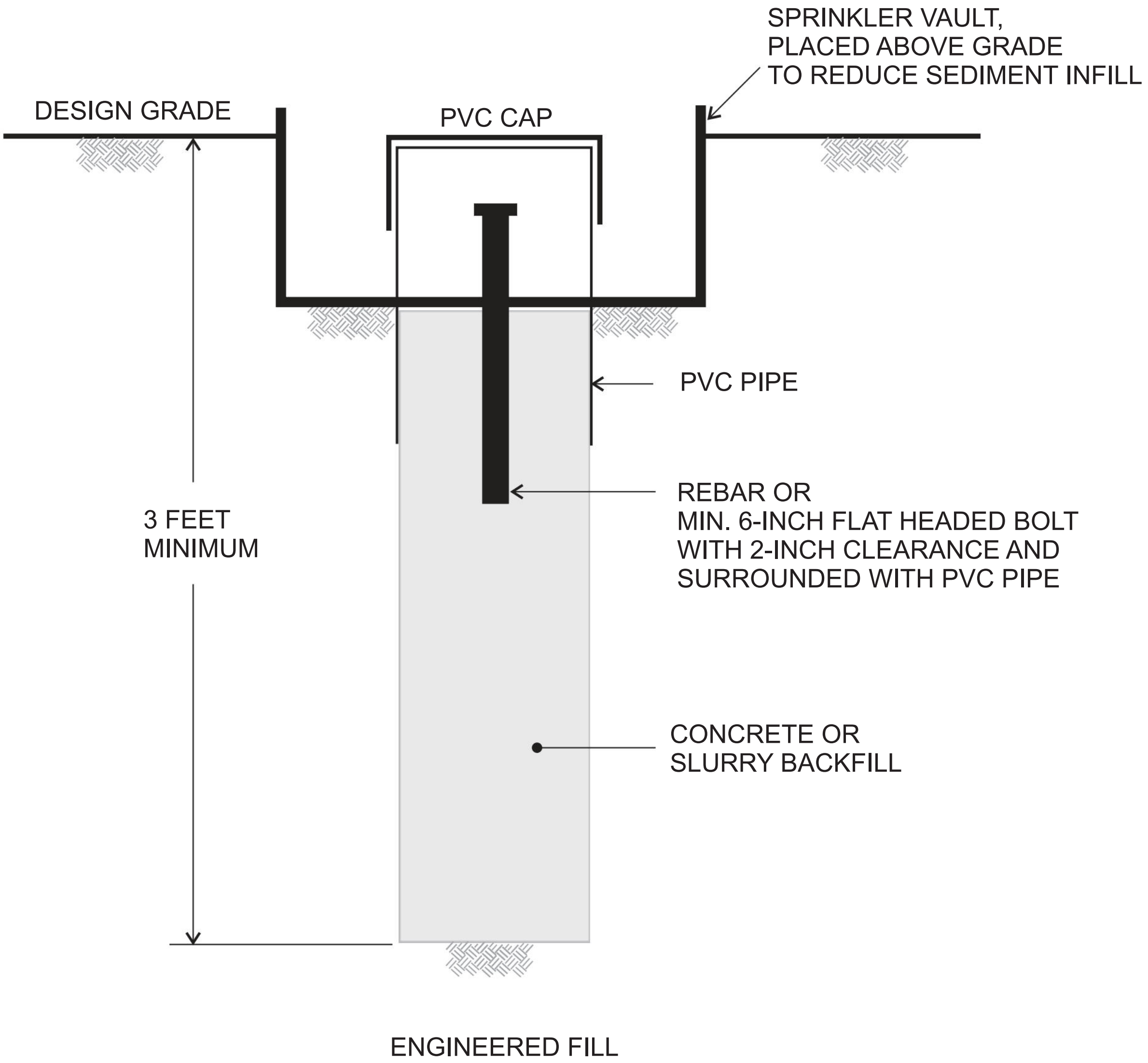
SETTLEMENT PLATE

DETAIL 11



NOTES:

1. SETTLEMENT MONUMENT LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. ELEVATIONS OF SURFACE MONUMENTS SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

VER 1.0

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SETTLEMENT MONUMENT

DETAIL 12

APPENDIX F

HOMEOWNERS MAINTENANCE GUIDELINES

HOMEOWNER MAINTENANCE AND IMPROVEMENT CONSIDERATIONS

Homeowners are accustomed to maintaining their homes. They expect to paint their houses periodically, replace wiring, clean out clogged plumbing, and repair roofs. Maintenance of the home site, particularly on hillsides, should be considered on the same basis or even on a more serious basis because neglect can result in serious consequences. In most cases, lot and site maintenance can be taken care of along with landscaping, and can be carried out more economically than repair after neglect.

Most slope and hillside lot problems are associated with water. Uncontrolled water from a broken pipe, cesspool, or wet weather causes most damage. Wet weather is the largest cause of slope problems, particularly in California where rain is intermittent, but may be torrential. Therefore, drainage and erosion control are the most important aspects of home site stability; these provisions must not be altered without competent professional advice. Further, maintenance must be carried out to assure their continued operation.

As geotechnical engineers concerned with the problems of building sites in hillside developments, we offer the following list of recommended home protection measures as a guide to homeowners.

Expansive Soils

Some of the earth materials on site have been identified as being expansive in nature. As such, these materials are susceptible to volume changes with variations in their moisture content. These soils will swell upon the introduction of water and shrink upon drying. The forces associated with these volume changes can have significant negative impacts (in the form of differential movement) on foundations, walkways, patios, and other lot improvements. In recognition of this, the project developer has constructed homes on these lots on post-tensioned or mat slabs with pier and grade beam foundation systems, intended to help reduce the potential adverse effects of these expansive materials on the residential structures within the project. Such foundation systems are not intended to offset the forces (and associated movement) related to expansive soil, but are intended to help soften their effects on the structures constructed thereon.

Homeowners purchasing property and living in an area containing expansive soils must assume a certain degree of responsibility for homeowner improvements as well as for maintaining conditions around their home. Provisions should be incorporated into the design and construction of homeowner improvements to account for the expansive nature of the onsite soils material. Lot maintenance and landscaping should also be conducted in consideration of the expansive soil characteristics. Of primary importance is minimizing the moisture variation below all lot improvements. Such design, construction and homeowner maintenance provisions should include:

- Employing contractors for homeowner improvements who design and build in recognition of local building code and site specific soils conditions.
- Establishing and maintaining positive drainage away from all foundations, walkways, driveways, patios, and other hardscape improvements.
- Avoiding the construction of planters adjacent to structural improvements. Alternatively, planter sides/bottoms can be sealed with an impermeable membrane and drained away from the improvements via subdrains into approved disposal areas.
- Sealing and maintaining construction/control joints within concrete slabs and walkways to reduce the potential for moisture infiltration into the subgrade soils.

- Utilizing landscaping schemes with vegetation that requires minimal watering. Alternatively, watering should be done in a uniform manner as equally as possible on all sides of the foundation, keeping the soil "moist" but not allowing the soil to become saturated.
- Maintaining positive drainage away from structures and providing roof gutters on all structures with downspouts installed to carry roof runoff directly into area drains or discharged well away from the structures.
- Avoiding the placement of trees closer to the proposed structures than a distance of one-half the mature height of the tree.
- Observation of the soil conditions around the perimeter of the structure during extremely hot/dry or unusually wet weather conditions so that modifications can be made in irrigation programs to maintain relatively constant moisture conditions.

Sulfates

Homeowners should be cautioned against the import and use of certain fertilizers, soil amendments, and/or other soils from offsite sources in the absence of specific information relating to their chemical composition. Some fertilizers have been known to leach sulfate compounds into soils otherwise containing "negligible" sulfate concentrations and increase the sulfate concentrations in near-surface soils to "moderate" or "severe" levels. In some cases, concrete improvements constructed in soils containing high levels of soluble sulfates may be affected by deterioration and loss of strength.

Water - Natural and Man Induced

Water in concert with the reaction of various natural and man-made elements, can cause detrimental effects to your structure and surrounding property. Rain water and flowing water erodes and saturates the ground and changes the engineering characteristics of the underlying earth materials upon saturation. Excessive irrigation in concert with a rainy period is commonly associated with shallow slope failures and deep seated landslides, saturation of near structure soils, local ponding of water, and transportation of water soluble substances that are deleterious to building materials including concrete, steel, wood, and stucco.

Water interacting with the near surface and subsurface soils can initiate several other potentially detrimental phenomena other than slope stability issues. These may include expansion/contraction cycles, liquefaction potential increase, hydro-collapse of soils, ground surface settlement, earth material consolidation, and introduction of deleterious substances.

The homeowners should be made aware of the potential problems which may develop when drainage is altered through construction of retaining walls, swimming pools, paved walkways and patios. Ponded water, drainage over the slope face, leaking irrigation systems, over-watering or other conditions which could lead to ground saturation must be avoided.

- Before the rainy season arrives, check and clear roof drains, gutters and down spouts of all accumulated debris. Roof gutters are an important element in your arsenal against rain damage. If you do not have roof gutters and down spouts, you may elect to install them. Roofs, with their, wide, flat area can shed tremendous quantities of water. Without gutters or other adequate drainage, water falling from the eaves collects against foundation and basement walls.
- Make sure to clear surface and terrace drainage ditches, and check them frequently during the rainy season. This task is a community responsibility.
- Test all drainage ditches for functioning outlet drains. This should be tested with a hose and done before the rainy season. All blockages should be removed.
- Check all drains at top of slopes to be sure they are clear and that water will not overflow the slope itself, causing erosion.

- Keep subsurface drain openings (weep-holes) clear of debris and other material which could block them in a storm.
- Check for loose fill above and below your property if you live on a slope or terrace.
- Monitor hoses and sprinklers. During the rainy season, little, if any, irrigation is required. Oversaturation of the ground is unnecessary, increases watering costs, and can cause subsurface drainage.
- Watch for water backup of drains inside the house and toilets during the rainy season, as this may indicate drain or sewer blockage.
- Never block terrace drains and brow ditches on slopes or at the tops of cut or fill slopes. These are designed to carry away runoff to a place where it can be safely distributed.
- Maintain the ground surface upslope of lined ditches to ensure that surface water is collected in the ditch and is not permitted to be trapped behind or under the lining.
- Do not permit water to collect or pond on your home site. Water gathering here will tend to either seep into the ground (loosening or expanding fill or natural ground), or will overflow into the slope and begin erosion. Once erosion is started, it is difficult to control and severe damage may result rather quickly.
- Never connect roof drains, gutters, or down spouts to subsurface drains. Rather, arrange them so that water either flows off your property in a specially designed pipe or flows out into a paved driveway or street. The water then may be dissipated over a wide surface or, preferably, may be carried away in a paved gutter or storm drain. Subdrains are constructed to take care of ordinary subsurface water and cannot handle the overload from roofs during a heavy rain.
- Never permit water to spill over slopes, even where this may seem to be a good way to prevent ponding. This tends to cause erosion and, in the case of fill slopes, can eat away carefully designed and constructed sites.
- Do not cast loose soil or debris over slopes. Loose soil soaks up water more readily than compacted fill. It is not compacted to the same strength as the slope itself and will tend to slide when laden with water; this may even affect the soil beneath the loose soil. The sliding may clog terrace drains below or may cause additional damage in weakening the slope. If you live below a slope, try to be sure that loose fill is not dumped above your property.
- Never discharge water into subsurface blanket drains close to slopes. Trench drains are sometimes used to get rid of excess water when other means of disposing of water are not readily available. Overloading these drains saturates the ground and, if located close to slopes, may cause slope failure in their vicinity.
- Do not discharge surface water into septic tanks or leaching fields. Not only are septic tanks constructed for a different purpose, but they will tend, because of their construction, to naturally accumulate additional water from the ground during a heavy rain. Overloading them artificially during the rainy season is bad for the same reason as subsurface subdrains, and is doubly dangerous since their overflow can pose a serious health hazard. In many areas, the use of septic tanks should be discontinued as soon as sewers are made available.
- Practice responsible irrigation practices and do not over-irrigate slopes. Naturally, ground cover of ice plant and other vegetation will require some moisture during the hot summer months, but during the wet season, irrigation can cause ice plant and other heavy ground cover to pull loose. This not only destroys the cover, but also starts serious erosion. In some areas, ice plant and other heavy cover can cause surface sloughing when saturated due to the increase in weight and weakening of the near-surface soil. Planted slopes should be planned where possible to acquire sufficient moisture when it rains.
- Do not let water gather against foundations, retaining walls, and basement walls. These walls are built to withstand the ordinary moisture in the ground and are, where necessary, accompanied by subdrains to carry off the excess. If water is permitted to pond against them, it may seep through the wall, causing dampness and leakage inside the basement. Further, it may cause the foundation to swell up, or the water pressure could cause structural damage to walls.

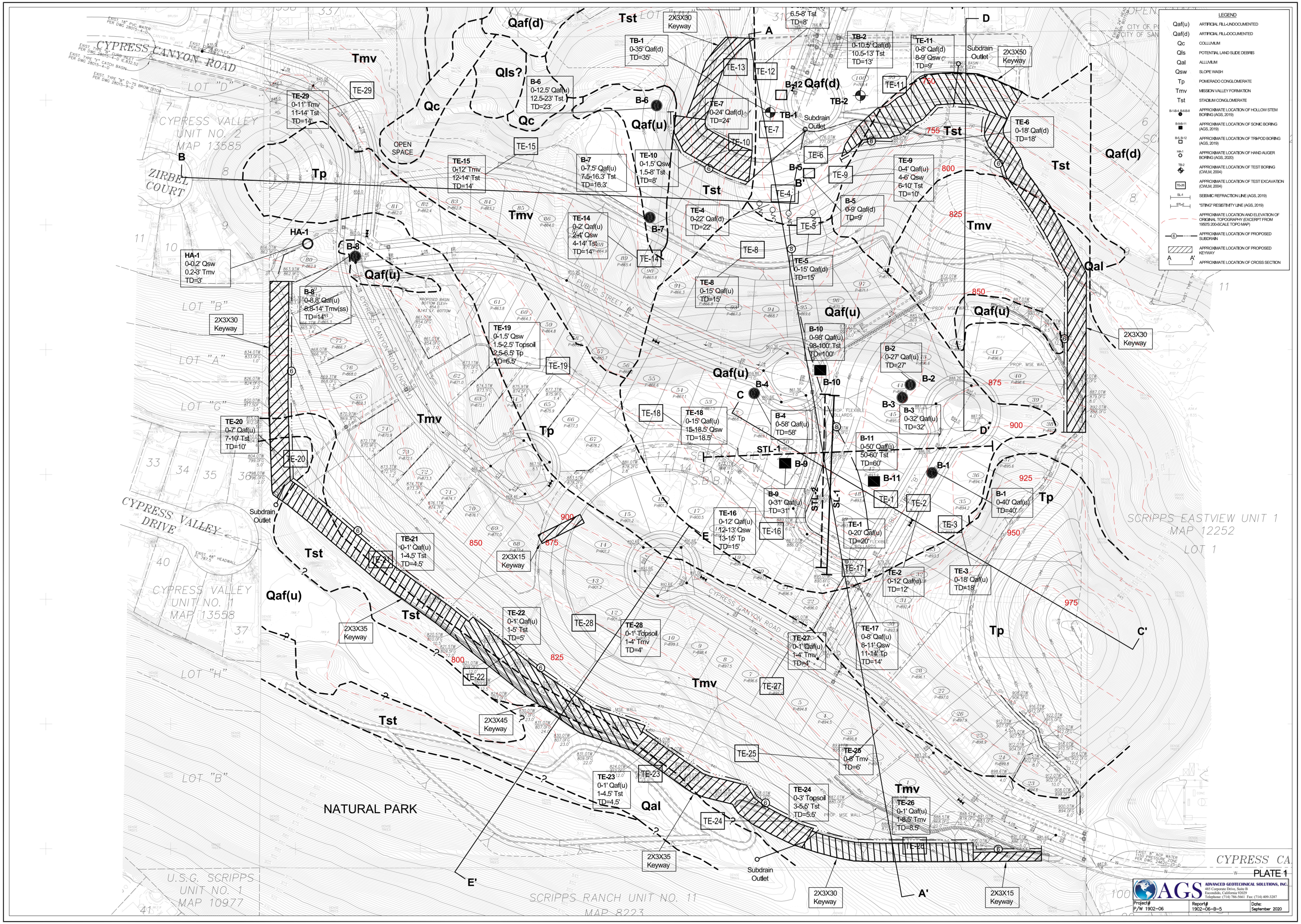
- Do not try to compact soil behind walls or in trenches by flooding with water. Not only is flooding the least efficient way of compacting fine-grained soil, but it could damage the wall foundation or saturate the subsoil.
- Never leave a hose and sprinkler running on or near a slope, particularly during the rainy season. This will enhance ground saturation which may cause damage.
- Never block ditches which have been graded around your house or the lot pad. These shallow ditches have been put there for the purpose of quickly removing water toward the driveway, street or other positive outlet. By all means, do not let water become ponded above slopes by blocked ditches.
- Seeding and planting of the slopes should be planned to achieve, as rapidly as possible, a well-established and deep-rooted vegetal cover requiring minimal watering.
- It should be the responsibility of the landscape architect to provide such plants initially and of the residents to maintain such planting. Alteration of such a planting scheme is at the resident's risk.
- The resident is responsible for proper irrigation and for maintenance and repair of properly installed irrigation systems. Leaks should be fixed immediately. Residents must undertake a program to eliminate burrowing animals. This must be an ongoing program in order to promote slope stability. The burrowing animal control program should be conducted by a licensed exterminator and/or landscape professional with expertise in hill side maintenance.

Geotechnical Review

Due to the fact that soil types may vary with depth, it is recommended that plans for the construction of rear yard improvements (swimming pools, spas, barbecue pits, patios, etc.), be reviewed by a geotechnical engineer who is familiar with local conditions and the current standard of practice in the vicinity of your home.

In conclusion, your neighbor’s slope, above or below your property, is as important to you as the slope that is within your property lines. For this reason, it is desirable to develop a cooperative attitude regarding hillside maintenance, and we recommend developing a “good neighbor” policy. Should conditions develop off your property, which are undesirable from indications given above, necessary action should be taken by you to insure that prompt remedial measures are taken. Landscaping of your property is important to enhance slope and foundation stability and to prevent erosion of the near surface soils. In addition, landscape improvements should provide for efficient drainage to a controlled discharge location downhill of residential improvements and soil slopes.

Additionally, recommendations contained in the Geotechnical Engineering Study report apply to all future residential site improvements, and we advise that you include consultation with a qualified professional in planning, design, and construction of any improvements. Such improvements include patios, swimming pools, decks, etc., as well as building structures and all changes in the site configuration requiring earth cut or fill construction.



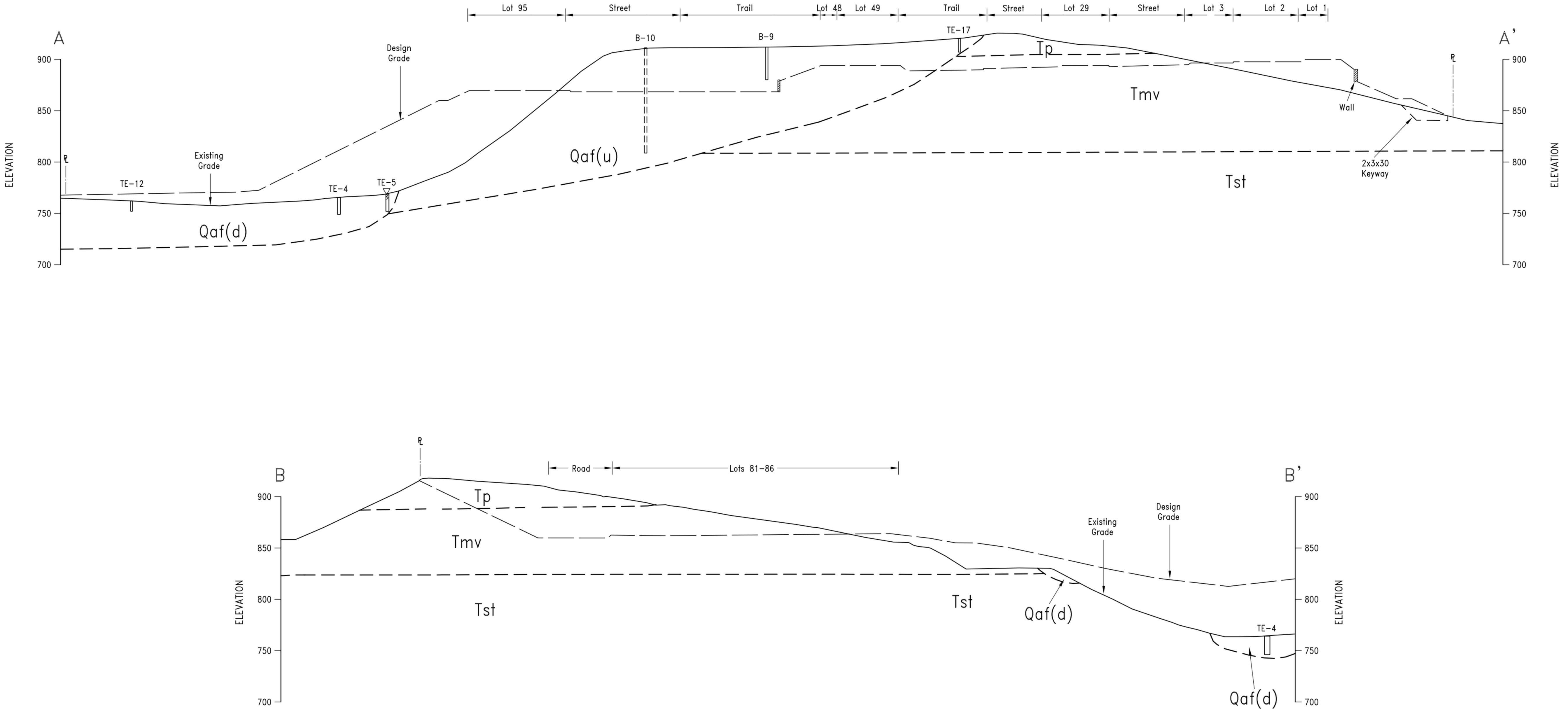
	LEGEND
Qaf(u)	ARTIFICIAL FILL-UNDOCUMENTED
Qaf(d)	ARTIFICIAL FILL-DOCUMENTED
Qc	COLLUVIUM
Qls	POTENTIAL LAND SLIDE DEBRIS
Qal	ALLUVIUM
Qsw	SLOPE WASH
Tp	POMERADO CONGLOMERATE
Tmv	MISSION VALLEY FORMATION
Tst	STADIUM CONGLOMERATE
B-1-B-4, B-6-B-8 ●	APPROXIMATE LOCATION OF HOLLOW STEM BORING (AGS, 2019)
B-9-B-11 ■	APPROXIMATE LOCATION OF SONIC BORING (AGS, 2019)
B-5, B-12 □	APPROXIMATE LOCATION OF TRI-POD BORING (AGS, 2019)
HA-1 ○	APPROXIMATE LOCATION OF HAND AUGER BORING (AGS, 2020)
TB-2 ⊕	APPROXIMATE LOCATION OF TEST BORING (CWLM, 2004)
TE-26	APPROXIMATE LOCATION OF TEST EXCAVATION (CWLM, 2004)
SL-1	SEISMIC REFRACTION LINE (AGS, 2019)
STL-2	"STING" RESISTIVITY LINE (AGS, 2019)
	APPROXIMATE LOCATION AND ELEVATION OF ORIGINAL TOPOGRAPHY (EXCERPT FROM 1950'S 200-SCALE TOPO MAP)
⑥	APPROXIMATE LOCATION OF PROPOSED SUBDRAIN
▨	APPROXIMATE LOCATION OF PROPOSED KEYWAY
A A'	APPROXIMATE LOCATION OF CROSS SECTION

CYPRESS CA

PLATE 1

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 1902-06	1902-06-B-5	September 2020



CROSS-SECTIONS A-A', AND B-B'

PLATE 2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
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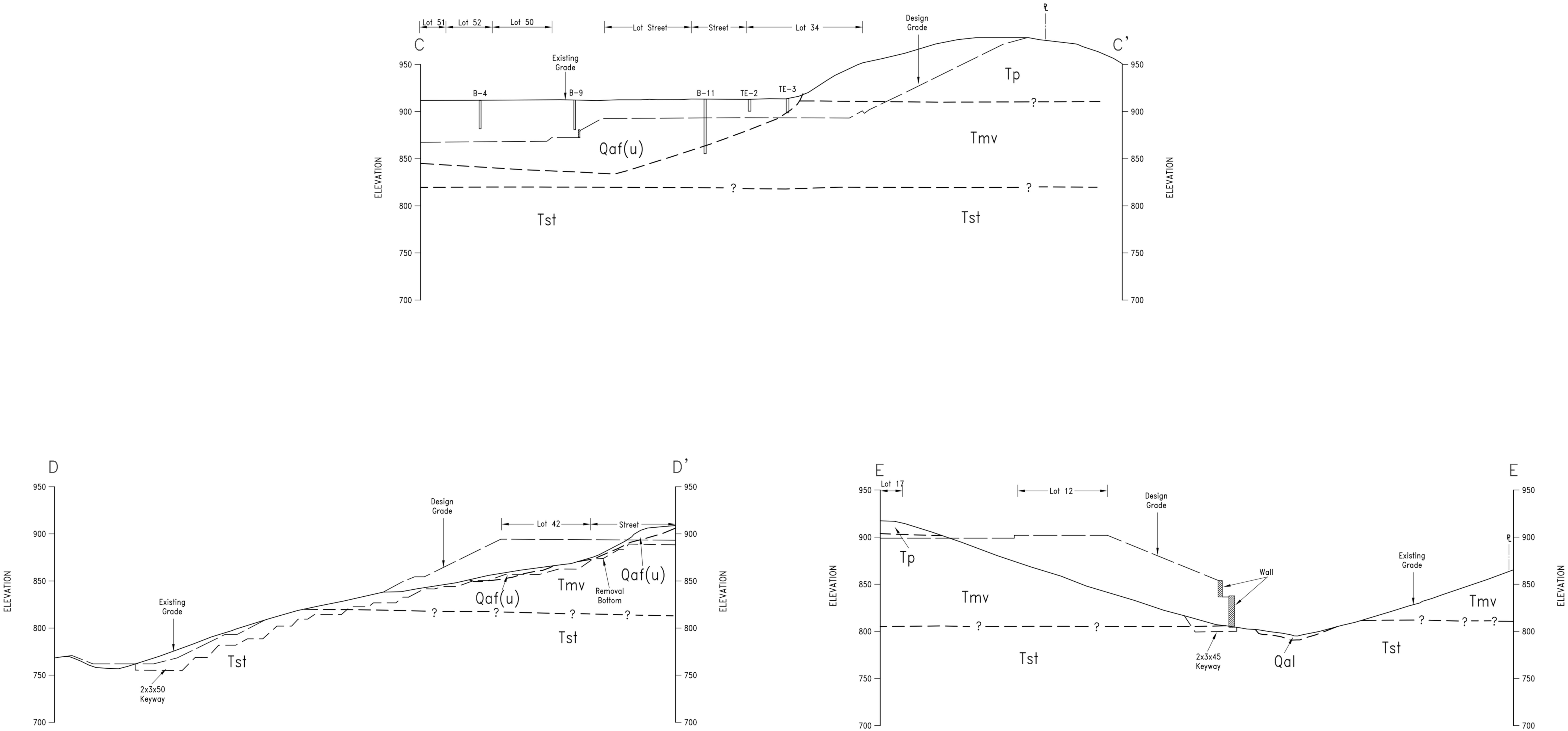
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project# P/W 1902-06	Report# 1902-06-B-5	Date: September 2020



CROSS-SECTIONS C-C', D-D, AND E-E'

PLATE 3

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
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Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 1902-06	1902-06-B-5	September 2020