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Emad Yousif
1490 South Orange Avenue, #128
El Cajon, California 92020

July 30, 2021
P/W 2106-08
Report No. 2106-08-B-2

Attention: **Mr. Emad Yousif**

Subject: ***Preliminary Geotechnical Investigation and Design Recommendations, Sundale 6-Lot Subdivision, Sundale Road, El Cajon, County of San Diego, California***

Gentlepersons,

In accordance with your request, presented herein are the results of Advanced Geotechnical Solutions, Inc.'s (AGS) geotechnical investigation for the proposed 6-lot residential project to be constructed on Sundale Road in El Cajon, California. The recommendations presented in the following report are based on a subsurface investigation performed by AGS and associated laboratory testing.

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

Advanced Geotechnical Solutions, Inc., appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.

ANDRES BERNAL, Sr. Geotechnical Engineer
RCE 62366, RGE 2715, Reg. Exp. 9-30-21

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CEG 2536, Reg. Exp. 5-31-23

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PRELIMINARY GEOTECHNICAL INVESTIGATION
SUNDALE 6-LOT SUBDIVISION
SUNDALE ROAD, EL CAJON, COUNTY OF SAN DIEGO, CALIFORNIA

1.0 SCOPE OF SERVICES

This study is aimed at providing geotechnical design recommendations for the design and construction of the proposed residential development as they relate to: 1) existing site conditions; 2) geologic units onsite; 3) engineering characteristics of onsite soils; 4) limited seismic hazard analysis; 5) seismic design; and 6) foundation design parameters.

The scope of our study included the following tasks:

- Review of pertinent published and unpublished geologic and geotechnical literature, maps, and aerial photographs readily available to this firm.
- Excavating, logging, and sampling eight test pits using a rubber tire backhoe. The test pit logs are presented in Appendix B.
- Prepare a map showing the locations of exploratory excavations (Plate 1).
- Conducting laboratory testing on the collected soil samples to evaluate the engineering properties of the subsurface materials. Laboratory results are presented in Appendix C.
- Conducting a geotechnical engineering and geologic hazard analysis of the site.
- Evaluating groundwater conditions and the potential effects on construction.
- Conducting a limited seismic hazards evaluation including research of readily available published maps and reports.
- Evaluating the excavation characteristics of the bedrock.
- Determining design parameters for foundations.
- Providing a preliminary corrosivity evaluation of the onsite soils.
- Preparing this report with exhibits summarizing our findings. This report would be suitable for design, construction, and regulatory review.

2.0 GEOTECHNICAL STUDY LIMITATIONS

The conclusions and recommendations in this report are professional opinions based on our limited field investigation, associated laboratory testing, review of referenced geologic maps, and our experience in the area. The conclusions presented herein are based upon the current design concept. Changes to the design concept would necessitate further review.

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.

3.0 SITE LOCATION AND DESCRIPTION

The irregular shaped parcel (APN 498-192-09) encompasses approximately 3.7 acres and is bounded by Sundale Road to the north and west, and existing residential properties to the south and east (Figure 1, Site Location Map) in the city of El Cajon. Topography at the site is characterized by a subtle ridge that generally slopes down to the northeast. Elevations across the site range from approximately 670 feet above msl at the south to 580 feet above msl in the northeast. The site is undeveloped and appears to have been utilized for agricultural purposes.

4.0 PROPOSED DEVELOPMENT

Based on our review of the 30-scale grading plan (Sheet 2 of 4 dated June 8, 2021) prepared by Walsh Engineering & Surveying, the site will be graded to support 6 residential lots. Cut-fill grading techniques are anticipated to develop the site. The grading plans show cut slopes at 1.5:1 (horizontal:vertical) inclinations with heights up to approximately 23 feet. In addition, 2:1 (H:V) fill slopes up to 27 feet in height are planned. Conventional or mechanically stabilized earth (MSE) walls up to 8 feet in height are also proposed. Private driveways are proposed to access the lots from Sundale Road. It is anticipated that the new residential structures will be up to two-stories in height, wood framed, and supported by shallow slab-on-grade foundations.

5.0 FIELD AND LABORATORY INVESTIGATION

5.1. Field Investigation

AGS conducted subsurface exploration at the site on July 6, 2021 to evaluate onsite soil conditions. Eight test pits were excavated using a large backhoe to maximum depths ranging between 3 and 12 feet below ground surface (bgs). All test pits encountered refusal on granitic bedrock. The test pits were logged by a representative of AGS. The approximate locations of the test pits are shown on Plate 1, Exploration Location Plan which is based on the 30-scale grading plan. The test pits logs are presented in Appendix B.

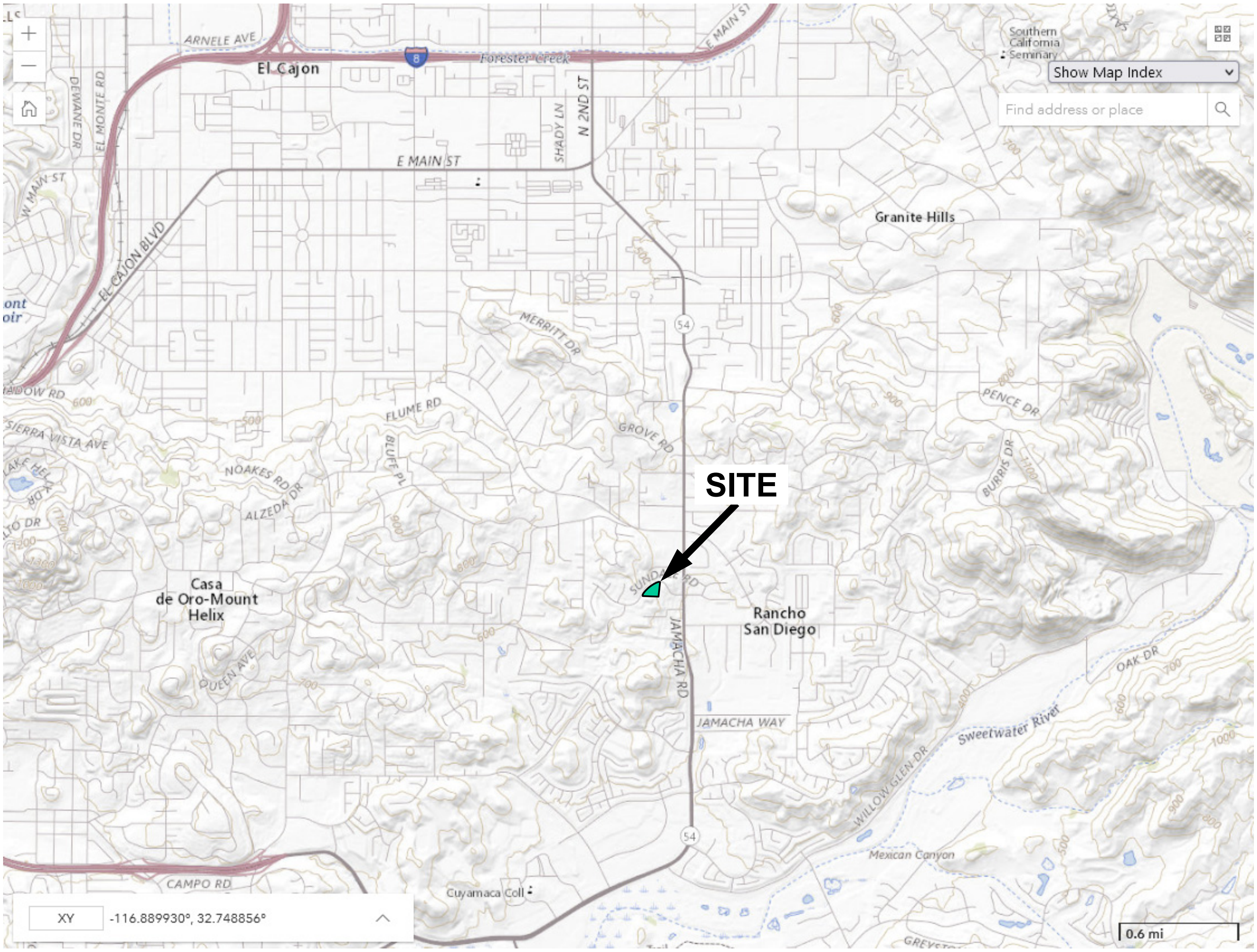
5.2. Laboratory Testing

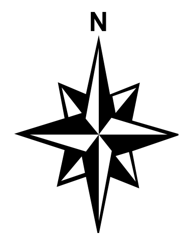
Bulk soil samples were obtained for laboratory testing at selected depths or where lithologic changes were encountered in the excavations. Samples were tested for gradation, expansion index, maximum density and optimum moisture content, remolded direct shear and chemical/resistivity analyses. Results of the associated laboratory testing are presented in Appendix C.

6.0 ENGINEERING GEOLOGY

6.1. 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 steeply sloped, northwest trending mountain ranges composed of metamorphosed Late Jurassic to Early Cretaceous-age volcanic rock and Cretaceous-age plutonic rock of the Peninsular Ranges Batholith. The westernmost portion of the province consists generally of Quaternary-age surficial deposits underlain by younger marine and non-marine sedimentary rocks. The Peninsular Ranges structural





SCALE 1":4,000'

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

SOURCE: USGS, THE NATIONAL MAP, 2021.

AGS

SITE LOCATION MAP

SUNDALE 6-LOT SUBDIVISION
SUNDALE ROAD
EL CAJON, COUNTY OF SAN DIEGO, CALIFORNIA

DATE:	PROJECT No.:	FIGURE
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feature is northwest-southeast trending crustal blocks bounded by active faults of the San Andreas transform system.

6.2. Subsurface Conditions

Based on our site reconnaissance, subsurface excavations, and review of the referenced geologic map (Todd, 2004), the site is mantled by a shallow layer of residual soil underlain by granitic bedrock (Figure 2, Regional Geologic Map). Although not encountered, localized undocumented fill soils associated with previous site agricultural activities are anticipated to exist onsite. A brief description of the earth materials encountered onsite is presented in the following sections. More detailed description of these materials is provided in the trench logs included in Appendix B. Geologic cross-sections presenting the approximate distribution of onsite geologic units are presented in Plate 2.

6.2.1. Residual Soil (No map symbol)

Residual soil extends to approximate depths ranging between 0.75 and 1.5 feet bgs and generally consists of red brown, dry, loose, silty sand with occasional roots.

6.2.2. Granitic Bedrock (Map symbol Kgr)

Cretaceous-age granitic bedrock underlies the entire project site and exhibits favorable geotechnical properties. As encountered, this geologic unit was observed to be completely to moderately weathered and moderately hard to very hard. Weathered portions of the unit break down upon excavation to fine- to coarse-grained sand with some silt. Boulders and large unweathered granitic blocks (floaters) were observed in our test pit excavations and are exposed at various locations on the parcel. Refusal to excavation was encountered in all of our exploratory trenches.

6.3. Groundwater

Groundwater was not encountered in the recent exploratory excavations by AGS. It should be noted that localized perched groundwater may develop at a later date, most likely at or near fill/bedrock contacts, due to fluctuations in precipitation, irrigation practices, or factors not evident at the time of our field explorations.

6.4. Non-seismic Geologic Hazards

6.4.1. Mass Wasting

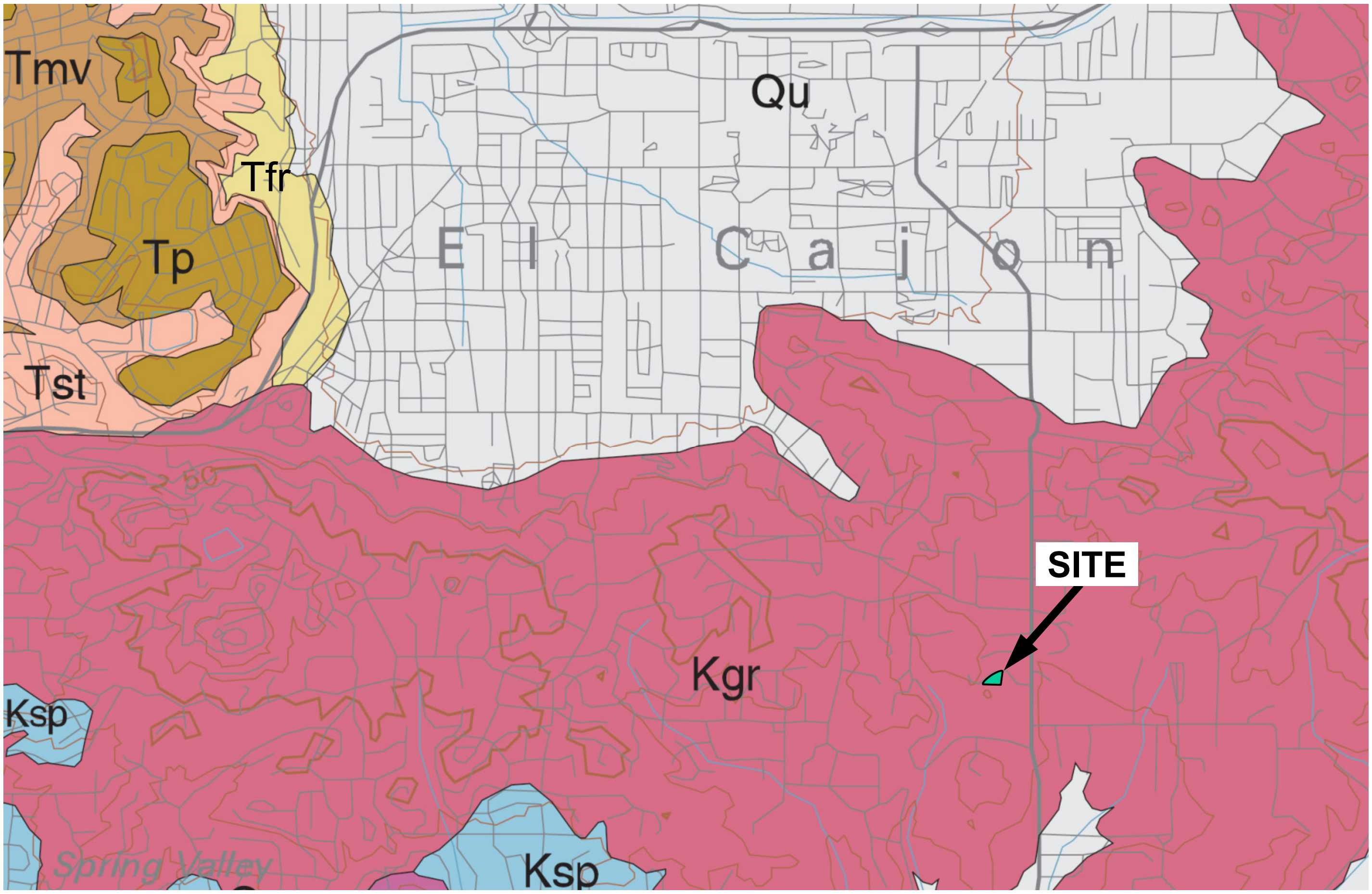
No evidence of mass wasting was observed onsite nor was any noted on the reviewed maps.

6.4.2. Flooding

According to FEMA flood mapping, the site is within Area X corresponding to areas of minimal flood hazard.

6.4.3. Subsidence/Ground Fissuring

Due to the presence of the shallow, dense granitic bedrock materials, the potential for subsidence and ground fissuring due to settlement is remote.



LEGEND

Qu	ALLUVIUM AND COLLUVIUM, UNDIVIDED
Tp	POMERADO CONGLOMERATE
Tmv	MISSION VALLEY FORMATION
Tst	STADIUM CONGLOMERATE
Tfr	FRIARS FORMATION
Kgr	GRANITOID ROCKS

N

SCALE 1":1 MILE

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

SOURCE: PRELIMINARY GEOLOGIC MAP OF THE EL CAJON 30'X 60' QUADRANGLE, VERSION 1.0, 2004.

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REGIONAL GEOLOGIC MAP

SUNDALE 6-LOT SUBDIVISION
SUNDALE ROAD
EL CAJON, COUNTY OF SAN DIEGO, CALIFORNIA

DATE:	PROJECT No.:	FIGURE
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6.5. Seismic Hazards

The site is located in the tectonically active Southern California area, and will therefore likely experience shaking effects from earthquakes. The type and severity of seismic hazards affecting the site are to a large degree dependent upon the distance to the causative fault, the intensity of the seismic event, and the underlying soil characteristics. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction or dynamic settlement. The following is a site-specific discussion of ground motion parameters, earthquake-induced landslide hazards, settlement, and liquefaction. The purpose of this analysis is to identify potential seismic hazards and propose mitigations, if necessary, to reduce the hazard to an acceptable level of risk. The following seismic hazards discussion is guided by the 2019 California Building Code, and CDMG (2008).

6.5.1. Seismic Design Parameters

Based on our subsurface exploration, the site may be classified as Seismic Site Class B consisting of a rock profile. Site coordinates of Latitude 32.7641°N and Longitude 116.9314°W were utilized in conjunction with the SEAOC/OSHPD Seismic Design Maps web-based ground motion calculator (https://seismicmaps.org/) to obtain the seismic design parameters presented in Table 6.5.1. Seismic design parameters are in accordance with 2019 CBC mapped spectral acceleration parameters.

TABLE 6.5.1
2019 CBC SEISMIC DESIGN PARAMETERS

Seismic Site Class	B
Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	0.746g
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.275g
Site Coefficient, F_a	0.9
Site Coefficient, F_v	0.8
Adjusted MCE_R[1] Spectral Response Acceleration Parameter at Short Period, S_{MS}	0.671g
1-Second Period Adjusted MCE_R[1] Spectral Response Acceleration Parameter, S_{M1}	0.220g
Short Period Design Spectral Response Acceleration Parameter, S_{DS}	0.447g
1-Second Period Design Spectral Response Acceleration Parameter, S_{D1}	0.147g
Peak Ground Acceleration, PGA_M[2]	0.288g
Seismic Design Category	C

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

6.5.2. Seismicity

The nearest active fault is the Newport-Inglewood-Rose Canyon fault zone located approximately 13.9 miles west from the site. The potential exists for strong ground motion that may affect future improvements.

6.5.3. Surface Fault Rupture

No known active faults have been mapped at or near the subject site. Accordingly, the potential for fault surface rupture on the subject site is very low.

6.5.4. Liquefaction and Dynamic Settlement

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. As the excess pore water pressure dissipates, the liquefied zones/lenses can consolidate causing settlement.

Due to dense nature of the granitic bedrock, the potential for seismically induced liquefaction and dynamic settlement is negligible.

6.5.5. Seismically Induced Landsliding

Evidence of landsliding at the site was not observed during our field explorations nor any geomorphic features indicative of landsliding noted during our review of aerial photos and published geologic maps.

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. Material Properties

7.1.1. Excavation Characteristics

It is anticipated that excavations within the surficial residual soil and highly weathered portions of the granitic bedrock can be accomplished with conventional grading equipment (D-9 or equivalent). It is likely that oversized "float" and/or hard bedrock will be encountered during site grading particularly near surface outcrops and will require special handling, rock breaking equipment and/or blasting.

7.1.2. Compressibility

Onsite materials that are significantly compressible in their current condition include undocumented fill (if encountered), residual soil and the highly weathered portion of the granitic bedrock unit on site. 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 and earthwork adjustment estimates are presented in Section 7.1.7.

7.1.3. Collapse Potential/Hydro-Consolidation

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

7.1.4. Expansion Potential

Based on the laboratory tests results (Appendix C) and our previous experience in the project vicinity with similar materials, the expansion potential of the onsite materials is anticipated range from "very low" to "low" when classified in accordance with ASTM D4829.

7.1.5. Shear Strength

Based upon our familiarity with similar projects and the onsite geologic units, AGS has summarized in Table 7.1.5 the recommended shear strengths for the various geologic units and compacted fill derived from onsite materials.

TABLE 7.1.5
SHEAR STRENGTH PARAMETERS

Material	Cohesion (psf)	Friction Angle (degrees)
Artificial Fill-Compacted (afc)	200	32
Unweathered Granitic Bedrock (Kgr)	500	35

7.1.6. Chemical and Resistivity Test Results

Based on the laboratory tests results (Appendix C), the onsite soils will exhibit Class S0 sulfate exposure when classified in accordance with ACI 318-14 Table 19.3.1.1 and are anticipated to be “mildly corrosive” to metals in direct contact with soil. Evaluation of actual chemical/resistivity parameters for foundation design will be performed at the conclusion of site grading and will be presented in the project grading report.

7.1.7. Earthwork Adjustment Factors

In consideration of the proposed grading to develop the project as currently shown on the 30-scale grading plan, the following average earthwork adjustment factors presented in Table 7.1.7 have been formulated for use in the earthwork design of the project.

TABLE 7.1.7
EARTHWORK ADJUSTMENT FACTORS

Geologic Unit (Map Symbol)		Adjustment Factor
Residual Soil		10% - 15% Shrink
Granitic Bedrock (Kgr):	Heavy Ripping	12% - 18% Bulk
	Blasting	18% - 25% Bulk

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.

7.1.8. 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.

7.1.9. Pavement Support Characteristics

It is anticipated that the onsite soils will have good to moderate support characteristics. Depending upon the final distribution of site soils, pavement support characteristics could vary. For preliminary design of pavements (Portland cement concrete or asphaltic concrete), an assumed "R"-value of 30 can be utilized as discussed in Section 9.2.3. Final design should be based upon representative sampling of the as-graded soils.

8.0 GRADING RECOMMENDATIONS

Development of the subject property 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 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 geotechnical engineer and engineering geologist or their authorized representative in accordance with the recommendations contained herein, the current grading ordinance of the County of San Diego and AGS's Earthwork Specifications (Appendix E). Residual soil and the highly weathered portion of bedrock should be removed in areas planned to receive compacted fill intended to support settlement-sensitive structures such as buildings, roads and underground improvements. As mentioned above, oversized "float" and/or hard bedrock will be encountered and will require special handling, rock breaking equipment and/or blasting.

The resulting undercuts should be replaced with engineered fill. Estimated depths of removals based upon the geologic unit are presented in Table 8.1. 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. The removal bottom should 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.

TABLE 8.1 ESTIMATED DEPTH OF REMOVALS	
Geologic Unit	**Estimated Removal Depth (ft.)**
Residual Soil	0.5 – 2.0
Weathered Granitic Bedrock	1.0 – 5.0

8.2. <u>Overexcavation of Building Pads and Streets</u>

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. The entire pad area of these lots should be undercut. Replacement fills should be compacted to project specifications as discussed in Section 8.7.

8.2.2. Cut Lots Underlain by Hard Rock

In order to facilitate foundation trenching and future homeowner improvements, it is recommended that all cut lots be overexcavated at least three (3) feet and capped with "select" material. Deeper undercuts are recommended in front yard areas in order to facilitate service utility construction.

This undercut should have a minimum one (1) percent gradient toward the front of the lots to allow for potential subsurface drainage. "Select" replacement material should be eight- (8) inch minus and should be compacted to as discussed in Section 8.7.

8.2.3. 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 fifteen (15) feet. As an alternative to overexcavation on steep cut and cut/fill transition lots founded in hard rock, foundation design combined with increased compaction criteria can be considered. By increasing the compaction of the fill, differential settlement can be reduced.

8.2.4. Overexcavation of Streets

It is suggested that the street areas with design cut or shallow fill located in the hard bedrock 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 ranging between 1.5:1 (horizontal to vertical) and 4:1 (H:V). The highest proposed cut slope at a 1.5:1 (H:V) slope ratio is approximately 23 feet, located south of Lot 1. It is anticipated that slopes excavated in hard rock 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).

All cut slopes should be observed by the engineering geologist during grading. Modifications to the recommendations presented herein will 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 County of San Diego Grading Ordinance. If used, stabilization fill slopes constructed at 1.5:1 (H:V) inclination will require geogrid reinforcement.

8.3.2. Fill Slopes

Fill slopes have been designed at a slope ratio of 2:1 (H:V). The highest design fill slope is approximately 27 feet and is located between Lots 2 and 4. Fill slopes constructed at 2:1 (H:V) ratio with onsite materials and maintained as described in Appendix F, are expected to be grossly and surficially stable as designed. Stability calculations are presented on Plates D-4 through D-6 (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 ascending slope, whichever is greater.

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 (H:V) or as recommended by the geotechnical engineer. Terrace drains and benches should be constructed on fill slopes in accordance with the County 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 required 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. 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).

8.5.2. Cut Slope Toe Drains and Subdrains

Due to the fractured nature of the bedrock, 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.

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 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. Competent granitic bedrock onsite can be considered a Type “A” soil. Residual soil and artificial fill are 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 D1557. 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 5:1 (H:V) 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] may be produced during the excavation of the 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.

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 may be extended to the slope face provided the following additional conditions are met: 1) no rocks greater than twelve (12) inches in diameter are allowed within six (6) horizontal feet of the slope face; 2) 50 percent (by volume) of the material is three-quarter- (3/4) inch minus; and 3) backrolling of the slope face is conducted at four- (4) foot vertical intervals and satisfies project compaction specifications.

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 D1557. 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

9.1. Structural Design – Residential

It is our understanding that the site will be graded to support approximately 6 single family residential lots and related streets and improvements. Loading conditions and locations are not currently available. It is expected that for typical one- to two-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 soils and shallow fill areas (<50 feet) and where the as-graded differential fill depth meets h/3 criteria (where h is the maximum depth of fill). If desired, post-tensioned slab/foundations may also be used for all residential lots.

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 "Very Low" to "Low" in expansion potential when tested in general accordance with ASTM D 4829. However, some isolated soils onsite could exhibit “Medium” 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 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	12 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 optimum moisture prior to placing concrete.	Minimum of 120% of optimum moisture 24 hours prior to placing concrete.

TABLE 9.1.2 CONVENTIONAL SLAB ON GRADE FOUNDATION DESIGN RECOMMENDATIONS
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.
Garages 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.
Isolated Spread Footings 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 the varying soils conditions. 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 foundation systems should be designed in accordance with Section 9.1.1 and Table 9.1.3:

TABLE 9.1.3
POST TENSIONED DESIGN PARAMETERS

Expansion Potential	Lot Category	Center Lift		Edge Lift	
		Em (ft)	Ym (in)	Em (ft)	Ym (in)
Very Low to Low	I	9	0.23	5.4	0.54
Medium	II	9	0.38	4.6	0.90

PRESATURATION

Very Low to Low Expansion Potential:
Minimum of 100 percent of optimum moisture prior to placing concrete to a depth of 12 inches

Medium Expansion Potential:
Minimum of 120 percent of optimum moisture 24 hours prior to placing concrete to a depth of 12 inches.

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. The minimum depth of the thickened edge could vary from 12-inches for "low" expansion to 18-inches for "medium" expansion potential.

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 CBC (2016), 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.

A vapor/moisture barrier is recommended below all moisture sensitive areas.

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.

Total = ¾ inch

Differential = ½ inch in 20 feet

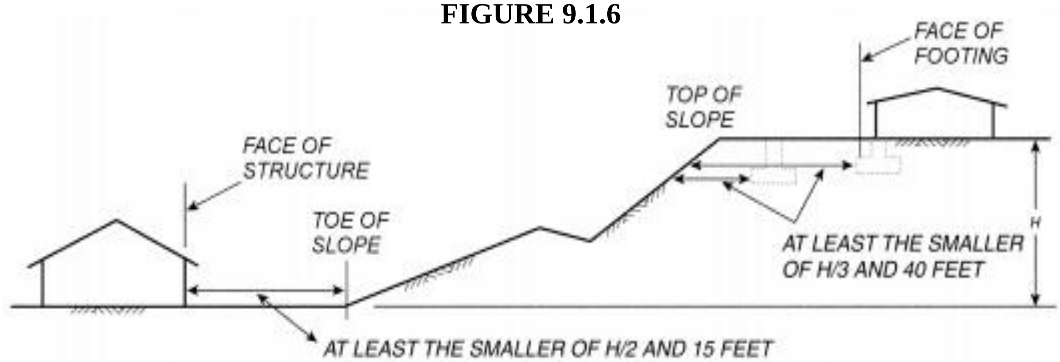
9.1.5. Moisture and Vapor Barrier

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. 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 California Building Code (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 9.1.6.

FIGURE 9.1.6



9.1.7. 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.

9.1.8. Earth Pressures for Retaining Wall Design and Buried Structures

The recommended active, passive and at rest earth Rankine earth pressures, which may be utilized for design of retaining walls and buried structures with level and 2:1 (H:V) backfill are as follows:

Level Backfill	Rankine Coefficients	Equivalent Fluid Pressure (psf/lin.ft.)
Coefficient of Active Pressure:	$K_a = 0.33$	42
Coefficient of Passive Pressure:	$K_p = 3.00$	375
Coefficient of At-Rest Pressure:	$K_o = 0.50$	63

2:1 Backfill	Rankine Coefficients	Equivalent Fluid Pressure (psf/lin.ft.)
Coefficient of Active Pressure:	$K_a = 0.54$	67
Coefficient of Passive Pressure:		
(Ascending)	$K_p = 7.46$	933
(Descending)	$K_p = 1.12$	141
Coefficient of At-Rest Pressure:	$K_o = 0.90$	113

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.

In addition to the above static pressures, unrestrained retaining walls should be designed to resist seismic loading as required by the 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. This seismic load (in pounds per lineal foot of wall) is represented by the following equation:

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

where: Pe = Seismic thrust load

H = Height of the wall (feet)

γ = soil density = 125 pounds per cubic foot (pcf)

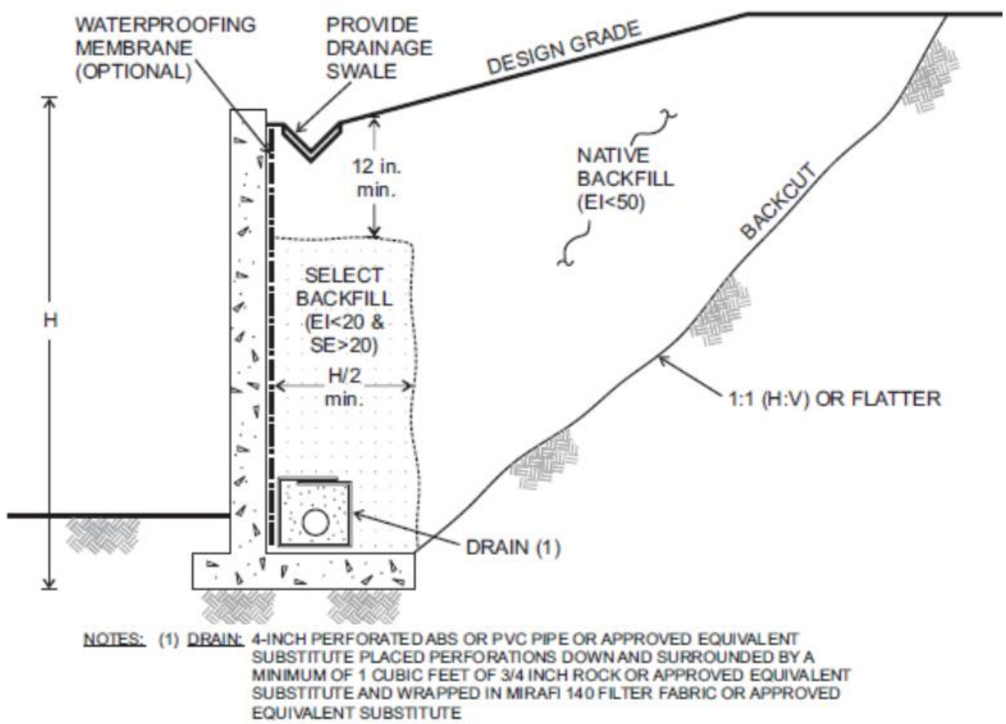
k_h = seismic pseudostatic coefficient = 0.5 * PGA_M

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

9.1.9. Retaining Wall Backfill and Drainage Recommendations

Retaining wall backfill should consist of free-draining granular soil with sand equivalent "SE" >20. Retaining walls should be provided with a drainage system adequate to prevent buildup of hydrostatic pressures. A heel drain should be placed at the heel of the wall (see Figure 9.1.8). and should consist of a 4-inch diameter perforated pipe (SDR35 or SCHD 40) surrounded by 1 cubic foot of crushed rock (3/4-inch) per lineal foot, wrapped in filter fabric (Mirafi® 140N or equivalent).

FIGURE 9.1.9
Retaining Wall Backfill and Drainage



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 rain water 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.

- 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 asphalt concrete 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

We suggest that Portland cement concrete rigid pavement be used in areas where dumpsters will be stored and where refuse trucks will stop and load. Experience indicates that refuse truck traffic can significantly shorten the useful life of other pavement sections. We recommend for these areas, 6 inches of 600 psi flexural strength Portland cement concrete placed over 4 inches of compacted Caltrans Class 2 base material.

Subgrade soils for pavement sections should be compacted to at least 95 percent of maximum density as determined by ASTM D1557. 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 will be based upon sampling and testing of the subgrade soils, in accordance with County of San Diego guidelines.

10.0 FUTURE STUDY NEEDS

This report represents a geotechnical review of the current 30-scale grading plans. 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 as follows:

- Review of precise 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. Some 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

APPENDIX A
REFERENCES

American Society for Testing and Materials, 2018, Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, Soil and Rock (I), ASTM International, West Conshohocken, Pennsylvania.

California Building Standards Commission, 2019, California Building Code, Title 24, Part 2, Volumes 1 and 2.

SEAOC/OSHPD, 2020, *ASCE 7-16 Seismic Design Maps*, https://seismicmaps.org/

Todd, V. R., 2004, Preliminary Geologic Map of the El Cajon 30x60 Quadrangle, California: California Geological Survey, Scale 1:100,000.

United States Geological Survey, 2021, *Unified Hazards Tool*, https://earthquake.usgs.gov/hazards/interactive/

APPENDIX B

SUBSURFACE LOGS

Date Excavated: 7/6/2021
Logged by: WO
Equipment: Backhoe

LOG OF BORINGS

Excavation No.	Depth (ft.)	USCS	Description
TP-1	0.0 - 0.75	SM	**Residual Soil** Silty SAND, fine-grained, red brown, dry, loose; occasional roots.
	0.75 - 12.0	SP-SM	**Granitic Bedrock (Kgr)** Decomposed Granitic Bedrock, disaggregates to SAND, fine- to coarse-grained, red brown, moist, dense; friable, few silt. @4.0 ft., highly weathered, light gray, moist, moderately hard; friable, few silt. REFUSAL @ 12 ft. NO WATER, NO CAVING

Excavation No.	Depth (ft.)	USCS	Description
TP-2	0.0 - 1.0	SM	**Residual Soil** Silty SAND, fine-grained, red brown, dry, loose; occasional roots.
	1.0 - 3.0	SP-SM	**Granitic Bedrock (Kgr)** Decomposed Granitic Bedrock, disaggregates to SAND, fine- to coarse-grained, red brown, moist, dense; friable, few silt. @2.0 ft., highly weathered, disaggregates to SAND, fine- to coarse-grained, light gray, moist, moderately hard; friable, few silt. Difficult digging. REFUSAL @ 3 ft. NO WATER, NO CAVING

LOG OF TEST PITS

Excavation No.	Depth (ft.)	USCS	Description
TP-3	0.0 - 0.75	SM	**Residual Soil** Silty SAND, fine-grained, red brown, dry, loose; occasional roots.
	0.75 - 6.0	SP-SM	**Granitic Bedrock (Kgr)** Decomposed Granitic Bedrock, disaggregates to SAND, fine- to coarse-grained, red brown, moist, dense; friable, few silt. @1.5 ft., highly weathered, disaggregates to SAND, fine- to coarse-grained, light gray, moist, moderately hard to hard; friable, few silt. Difficult digging. REFUSAL @ 6 ft. NO WATER, NO CAVING

Excavation No.	Depth (ft.)	USCS	Description
TP-4	0.0 - 1.0	SM	**Residual Soil** Silty SAND, fine-grained, red brown, dry, loose; occasional roots.
	1.0 - 5.5	SP-SM	**Granitic Bedrock (Kgr)** Decomposed Granitic Bedrock, disaggregates to SAND, fine- to coarse-grained, light gray, moist, moderately hard; friable, few silt. Difficult digging. REFUSAL @ 5.5 ft. NO WATER, NO CAVING

LOG OF TEST PITS

Excavation No.	Depth (ft.)	USCS	Description
TP-5	0.0 - 0.75	SM	**Residual Soil** Silty SAND, fine-grained, red brown, dry, loose; occasional roots.
	0.75 - 4.5	SP-SM	**Granitic Bedrock (Kgr)** Decomposed Granitic Bedrock, disaggregates to SAND, fine- to coarse-grained, red brown, moist, dense; friable, few silt. Granitic boulder in side wall. @3.0 ft., highly weathered, disaggregates to SAND, fine- to coarse-grained, light gray, moist, moderately hard to hard; friable, few silt. Difficult digging. REFUSAL @ 4.5 ft. NO WATER, NO CAVING

Excavation No.	Depth (ft.)	USCS	Description
TP-6	0.0 - 0.75	SM	**Residual Soil** Silty SAND, fine-grained, red brown, dry, loose; occasional roots.
	0.75 - 4.5	SP-SM	**Granitic Bedrock (Kgr)** Decomposed Granitic Bedrock, disaggregates to SAND, fine- to coarse-grained, light gray, moist, moderately hard; friable, few silt. @2.0 ft., highly weathered, disaggregates to SAND, fine- to coarse-grained, light gray, moist, moderately hard to hard; friable, few silt. REFUSAL @ 4.5 ft. NO WATER, NO CAVING

LOG OF TEST PITS

Excavation No.	Depth (ft.)	USCS	Description
TP-7	0.0 - 1.0	SM	**Residual Soil** Silty SAND, fine-grained, red brown, dry, loose; occasional roots.
	1.0 - 10.5	SP-SM	**Granitic Bedrock (Kgr)** Decomposed Granitic Bedrock, disaggregates to SAND, fine- to coarse-grained, red brown, moist, dense; friable, few silt. @4.0 ft., highly weathered, light gray, moist, moderately hard; friable, few silt. REFUSAL @ 10.5 ft. NO WATER, NO CAVING

Excavation No.	Depth (ft.)	USCS	Description
TP-8	0.0 - 1.5	SM	**Residual Soil** Silty SAND, fine-grained, red brown, dry, loose; occasional roots.
	1.5 - 12.0	SP-SM	**Granitic Bedrock (Kgr)** Decomposed Granitic Bedrock, disaggregates to SAND, fine- to coarse-grained, red brown, moist, dense; friable, few silt. @3.0 ft., highly weathered, disaggregates to SAND, fine- to coarse-grained, light gray, moist, moderately hard; friable, few silt. REFUSAL @ 12 ft. NO WATER, NO CAVING

APPENDIX C

LABORATORY TEST RESULTS

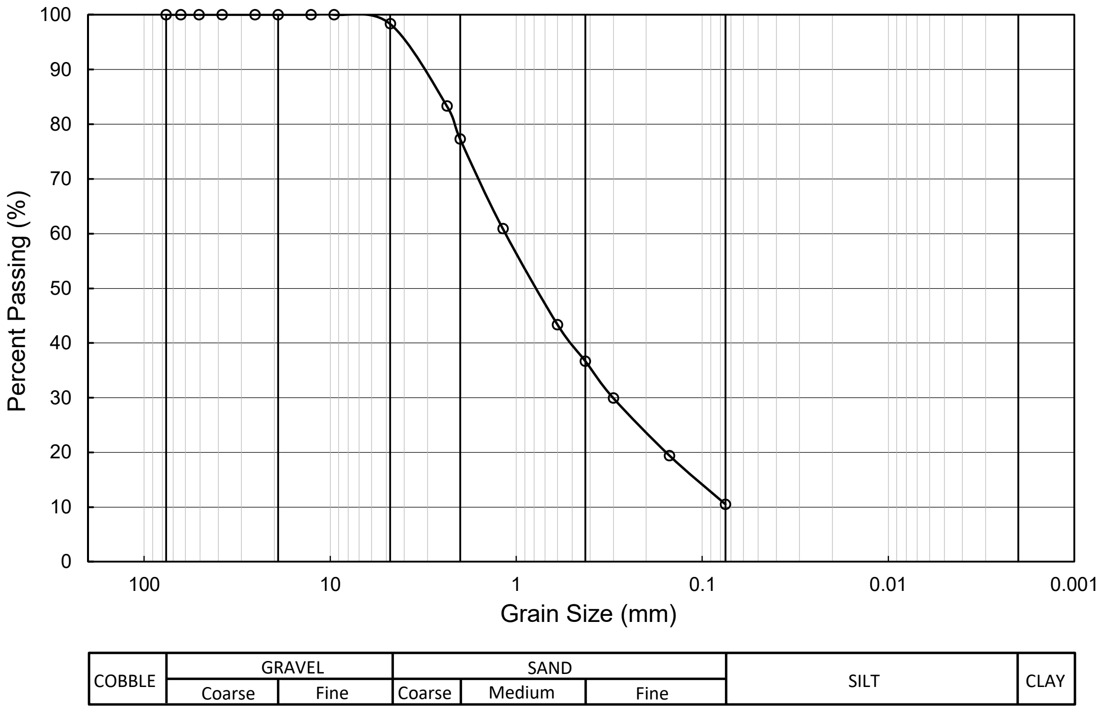
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

AGS FORM E-7

Project Name: Sundale
Location: El Cajon
Project No.: 2106-08
Date: 07-2021

Excavation: TP-4
Depth: 3-4 ft
Tested by: FV
Checked by: AB



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100
2 1/2 "	63.50	100
2 "	50.80	100
1 1/2 "	38.10	100
1 "	25.40	100
3/4 "	19.05	100
1/2 "	12.70	100
3/8 "	9.53	100
# 4	4.75	98.3
# 8	2.36	83.3
#10	2.00	77.3
#16	1.18	60.9
# 30	0.60	43.3
# 40	0.425	36.7
# 50	0.30	29.9
# 100	0.15	19.4
# 200	0.075	10.5

Summary	
% Gravel =	1.7
% Sand =	87.9
% Fines =	10.5
Sum =	100.0

LL= n/a
PL= n/a
PI = n/a

Soil Type: SP-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

AGS FORM E-6

Project Name:	Sundale	Excavation/Tract:	TP-2
Location:	El Cajon	Depth/Lot:	0-1 ft
P/W:	2106-08	Description:	SM
Date:	7/22/21	Tested by:	FV
		Checked by:	AB

Expansion Index - ASTM D4829

Initial Dry Density (pcf):	104.4
Initial Moisture Content (%):	11.4
Initial Saturation (%):	50.2
Final Dry Density (pcf):	104.1
Final Moisture Content (%):	21.4
Final Saturation (%):	93.2
Expansion Index:	3
Potential Expansion:	Very 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

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

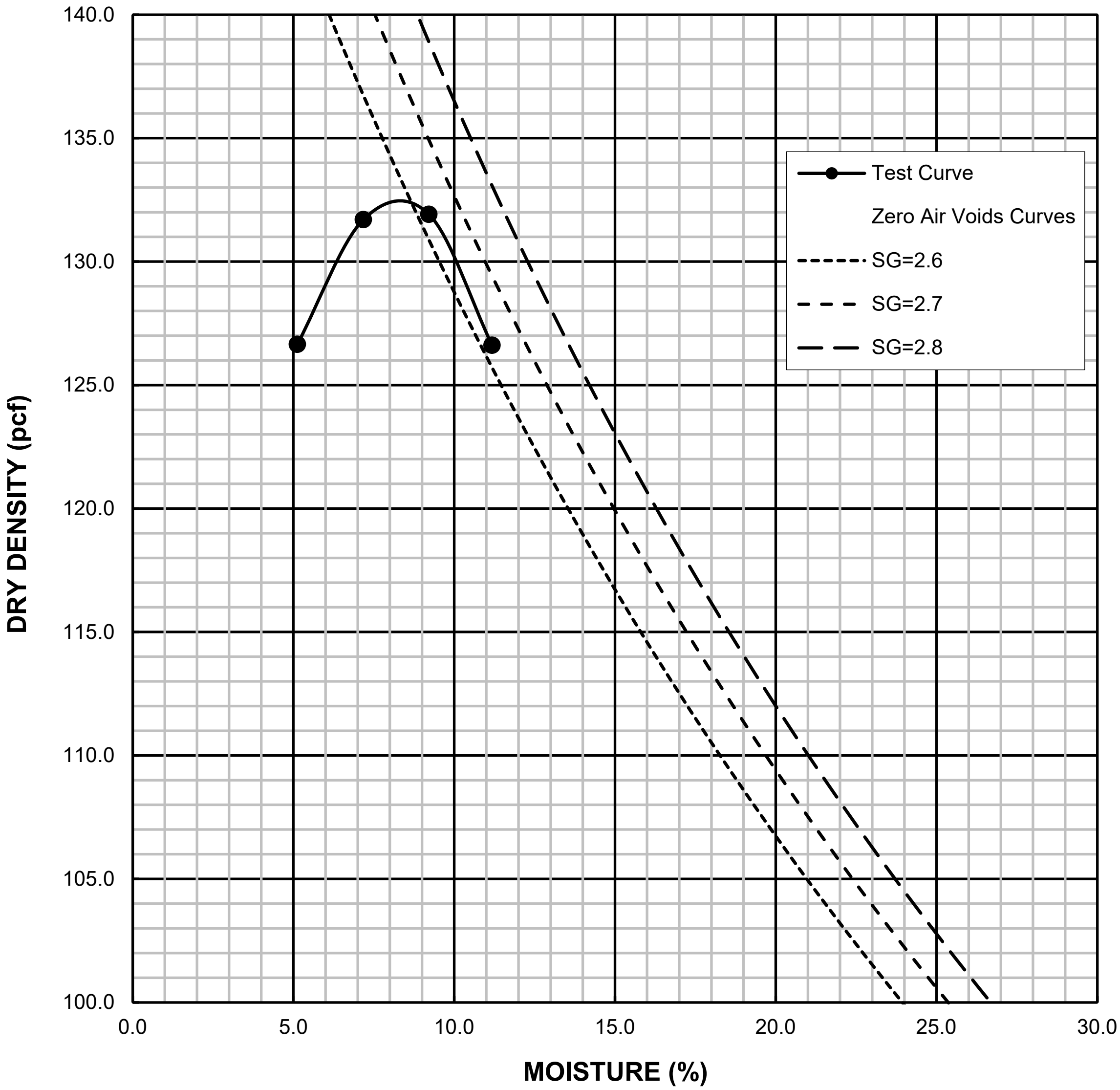
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Sundale		Excavation:	TP-3
Location:	El Cajon		Depth:	4-6 ft
P/W No.:	2106-08		Soil Type:	SP-SM
Date:	07-2021		Tested by:	FV
			Checked by:	PJ

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	126.7	131.7	131.9	126.6
Moisture Content (%)	5.1	7.2	9.2	11.2

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**135.2 pcf**	Corrected Moisture	**7.5**	%
Max. Dry Density	**132.4 pcf**	Optimum Moisture	**8.3**	%

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

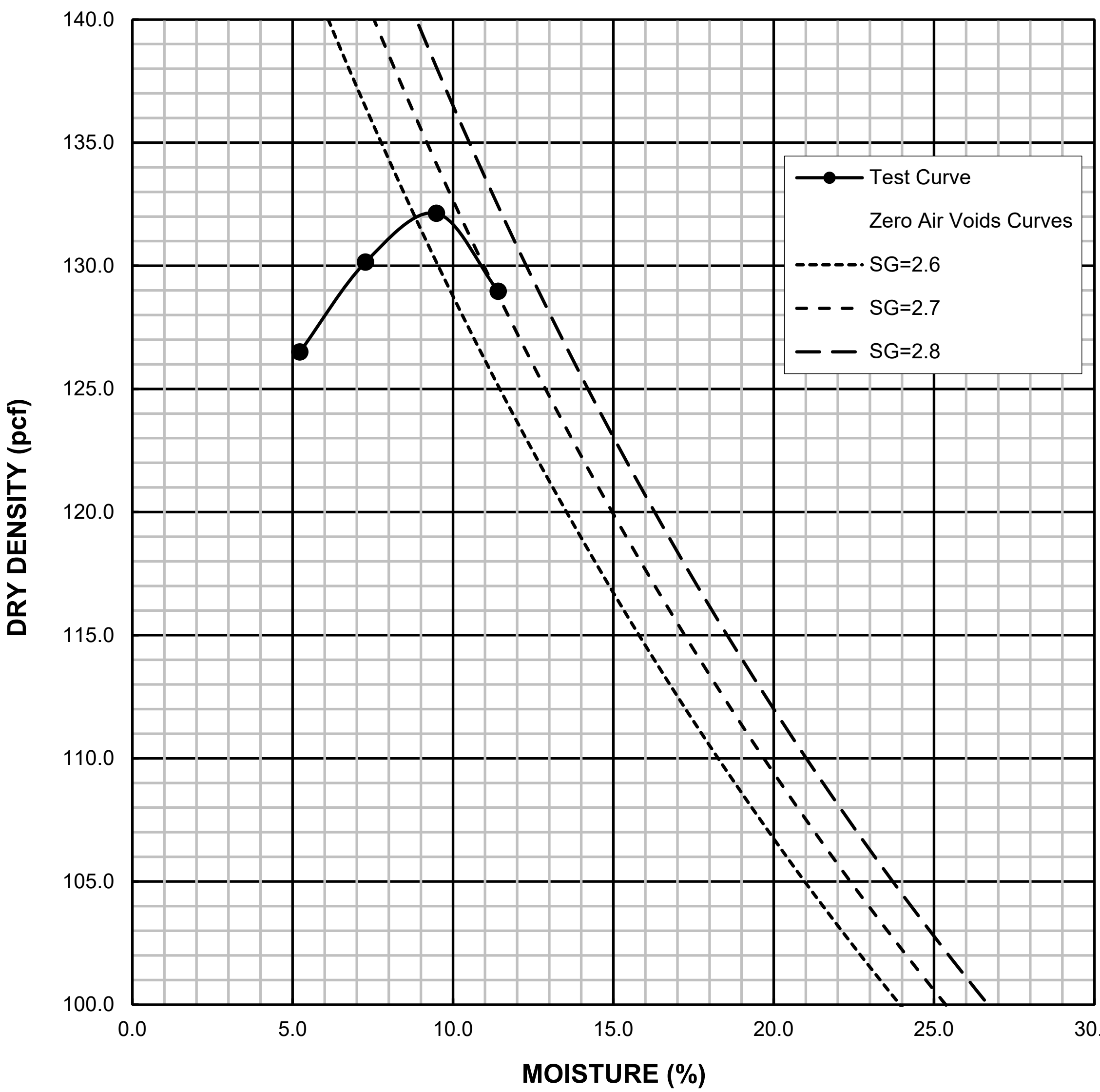
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	Sundale	Excavation:	TP-5
Location:	El Cajon	Depth:	2-3 ft
P/W No.:	2106-08	Soil Type:	SM
Date:	07-2021	Tested by:	FV
		Checked by:	PJ

Method:	A	Oversize Retained: 10 %		
Point No.	1	2	3	4
Dry Density (pcf)	126.5	130.2	132.1	129.0
Moisture Content (%)	5.2	7.3	9.5	11.4

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density **134.9 pcf** Corrected Moisture **8.6** %

Max. Dry Density **132.1 pcf** Optimum Moisture **9.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

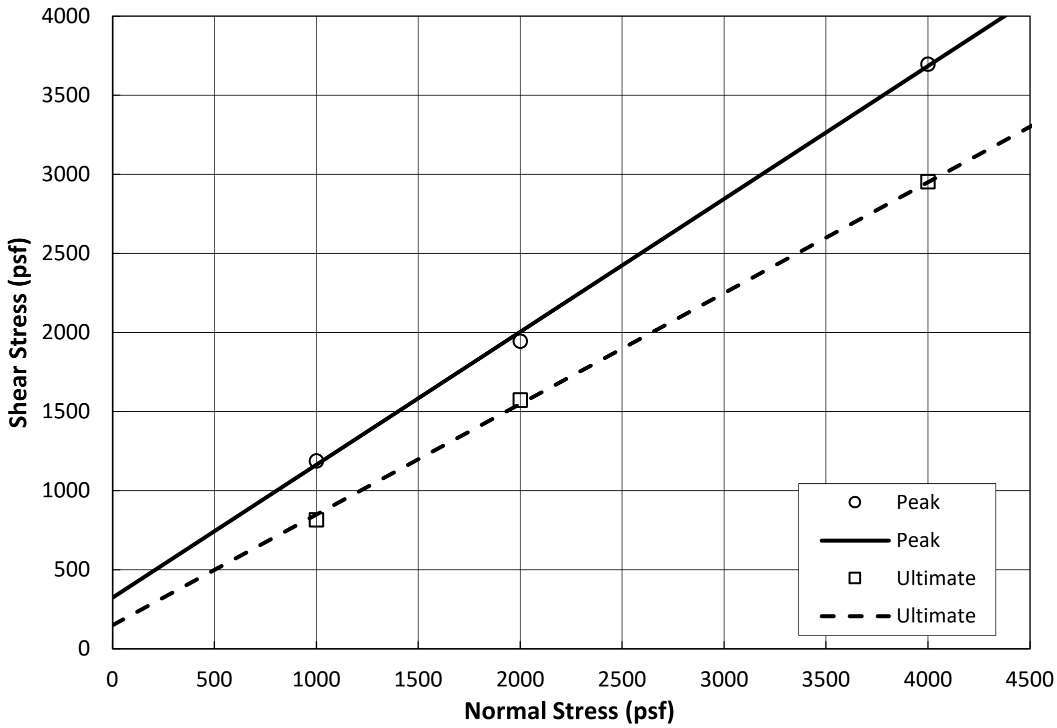
DIRECT SHEAR - ASTM D3080

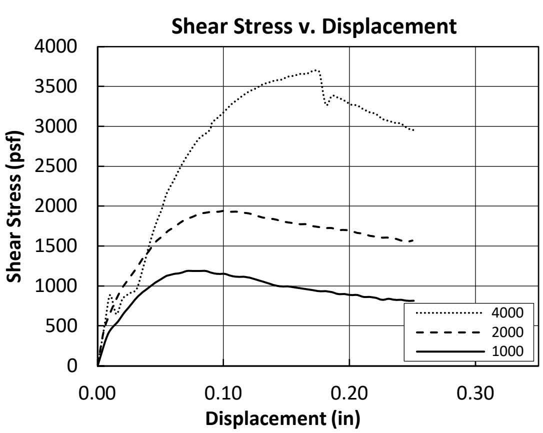
Project Name:	Sundale	Excavation:	TP-3
Location:	El Cajon	Depth:	4-5 ft
Project No.:	2106-08	Tested by:	FV
Date:	7/21/2021	Reviewed by:	AB

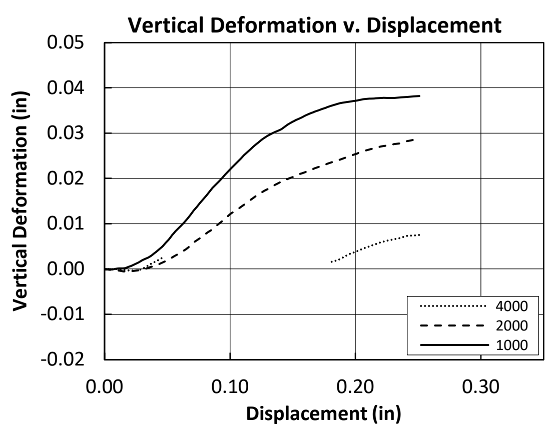
Samples Tested	1	2	3
Intial Moisture (%)	8.5	8.5	8.5
Initial Dry Density (pcf)	119.2	119.2	119.2
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1188	1944	3696
Ult. Shear Stress (psf)	816	1572	2952

Soil Type: SP-SM
Test: Remolded to 90%
Method: Drained
Consolidation: Yes
Saturation: Yes
Shear Rate (in/min): 0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	40	35
Cohesion (psf)	325	150







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

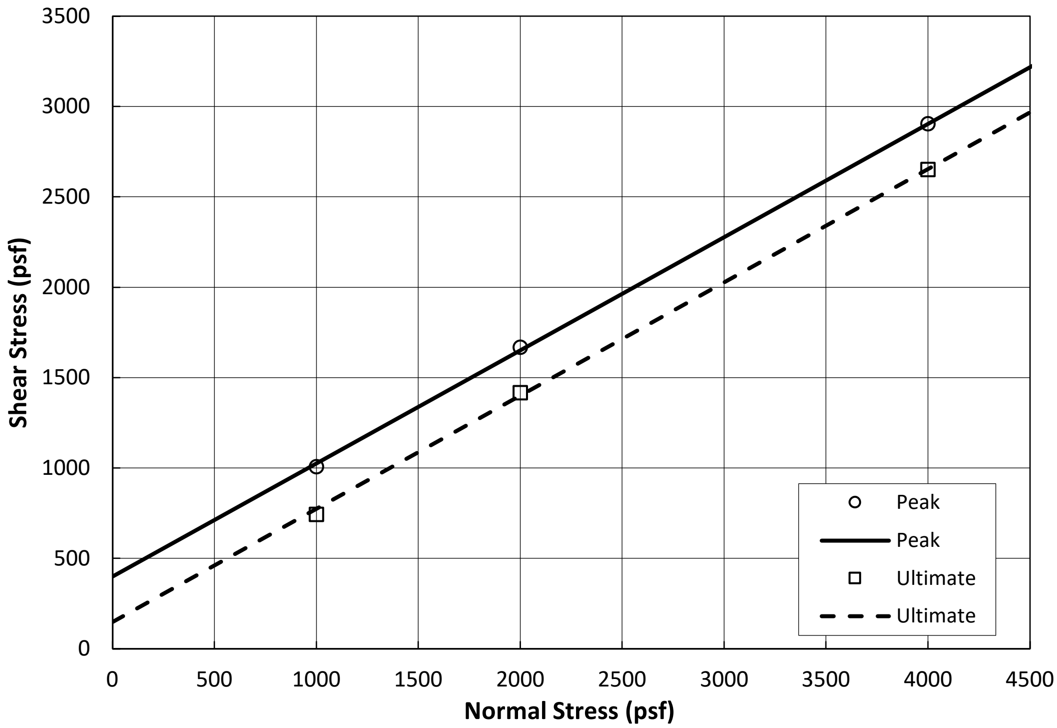
Project Name: Sundale
Location: El Cajon
Project No.: 2106-08
Date: 7/23/2021

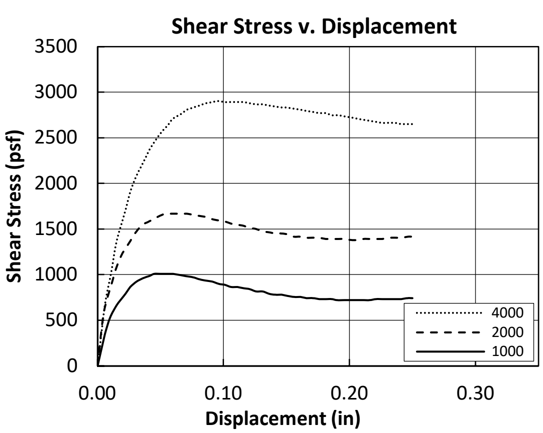
Excavation: TP-5
Depth: 2-3 ft
Tested by: FV
Reviewed by: AB

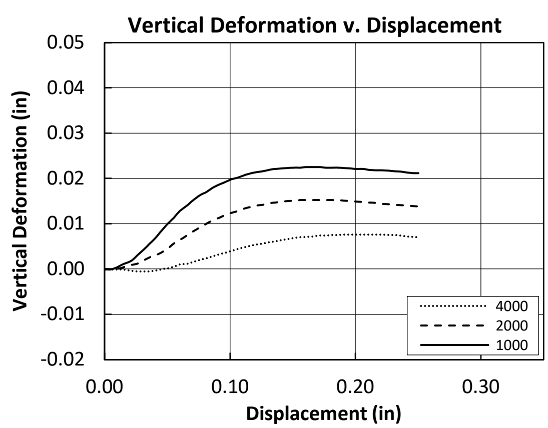
Samples Tested	1	2	3
Intial Moisture (%)	9.4	9.4	9.4
Initial Dry Density (pcf)	118.8	118.8	118.8
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	1008	1668	2904
Ult. Shear Stress (psf)	744	1416	2652

Soil Type: SM
Test: Remolded to 90%
Method: Drained
Consolidation: Yes
Saturation: Yes
Shear Rate (in/min): 0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	32	32
Cohesion (psf)	400	150





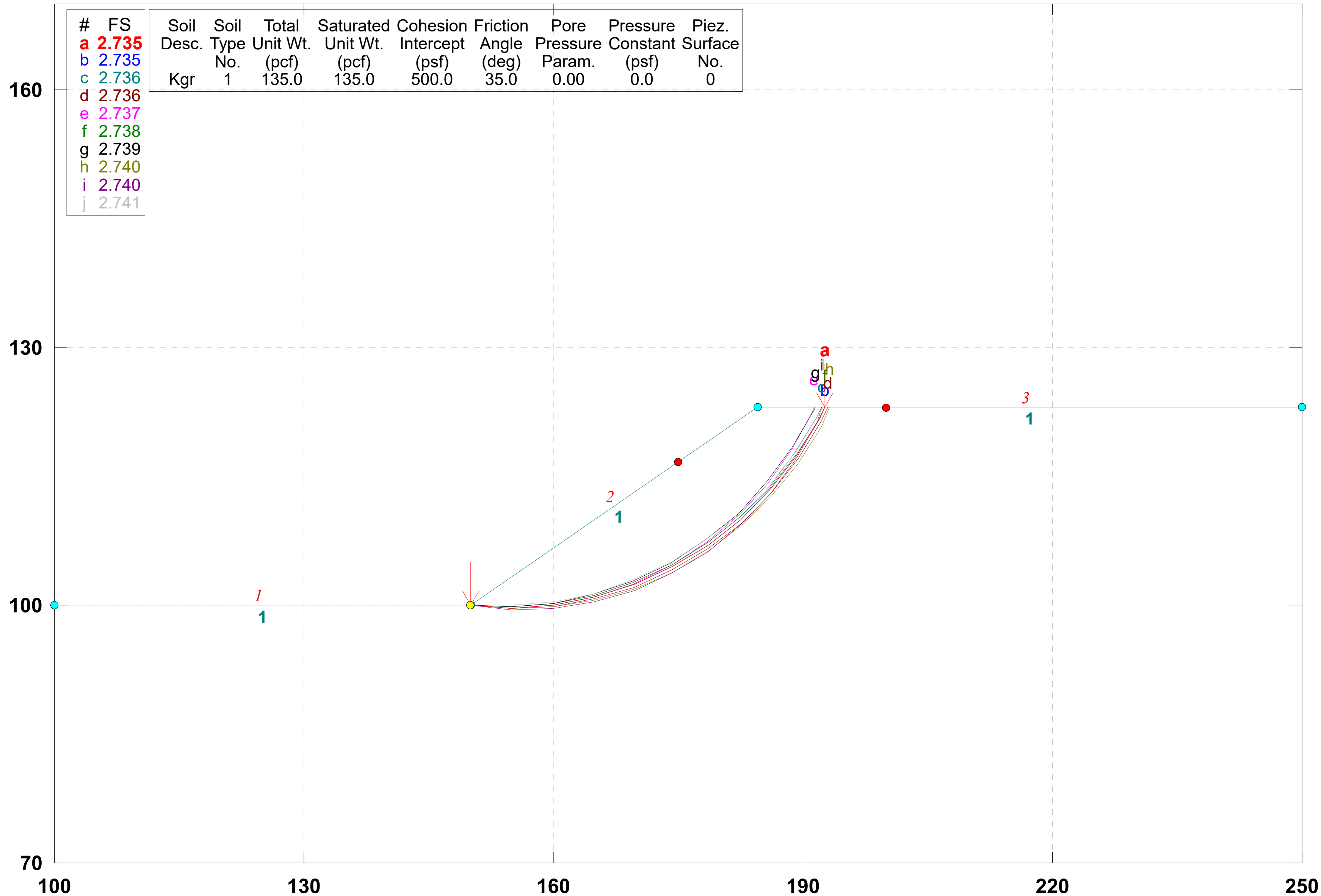


APPENDIX D

SLOPE STABILITY ANALYSES

2106-08 Sundale 23 ft 1.5:1 Cut Slope Static

k:\2106-08 sundale\slope stability\highest cut - psuedo static.pl2 Run By: AGS 7/29/2021 03:49PM



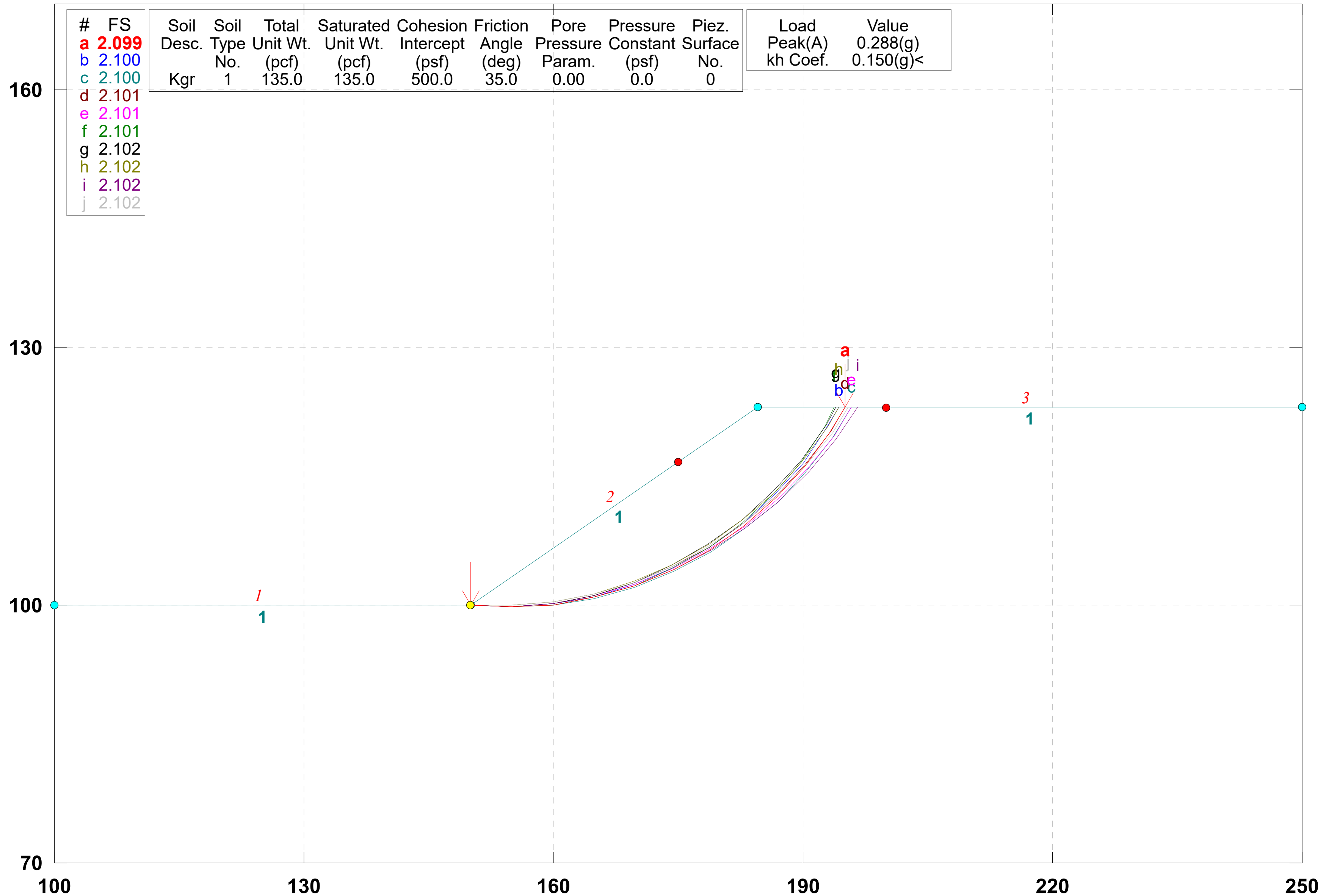
GSTABL7 v.2 FSmin=2.735

Safety Factors Are Calculated By The Modified Bishop Method

PLATE D-1

2106-08 Sundale 23 ft 1.5:1 Cut Slope Seismic (Pseudo-static)

k:\2106-08 sundale\slope stability\highest cut - pseudo static.pl2   Run By: AGS   7/29/2021   03:50PM

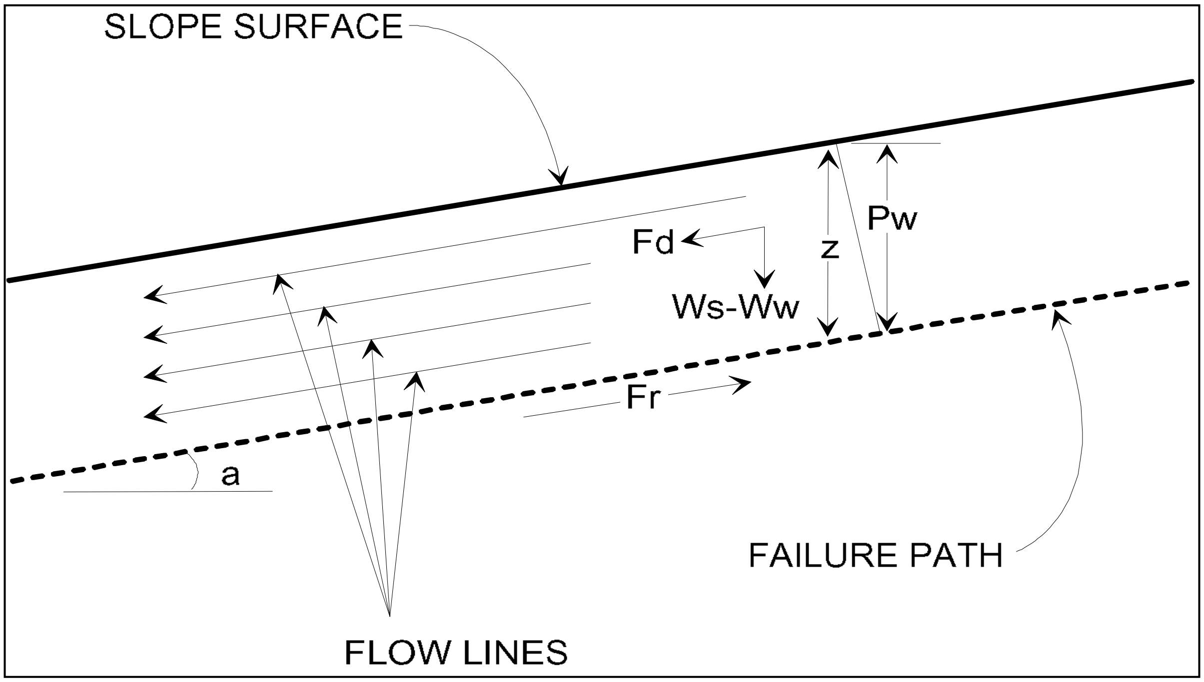


GSTABL7 v.2 FSmin=2.099

Safety Factors Are Calculated By The Modified Bishop Method

PLATE D-2

SURFICIAL SLOPE STABILITY



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

1.5:1 CUT SLOPE

Given:

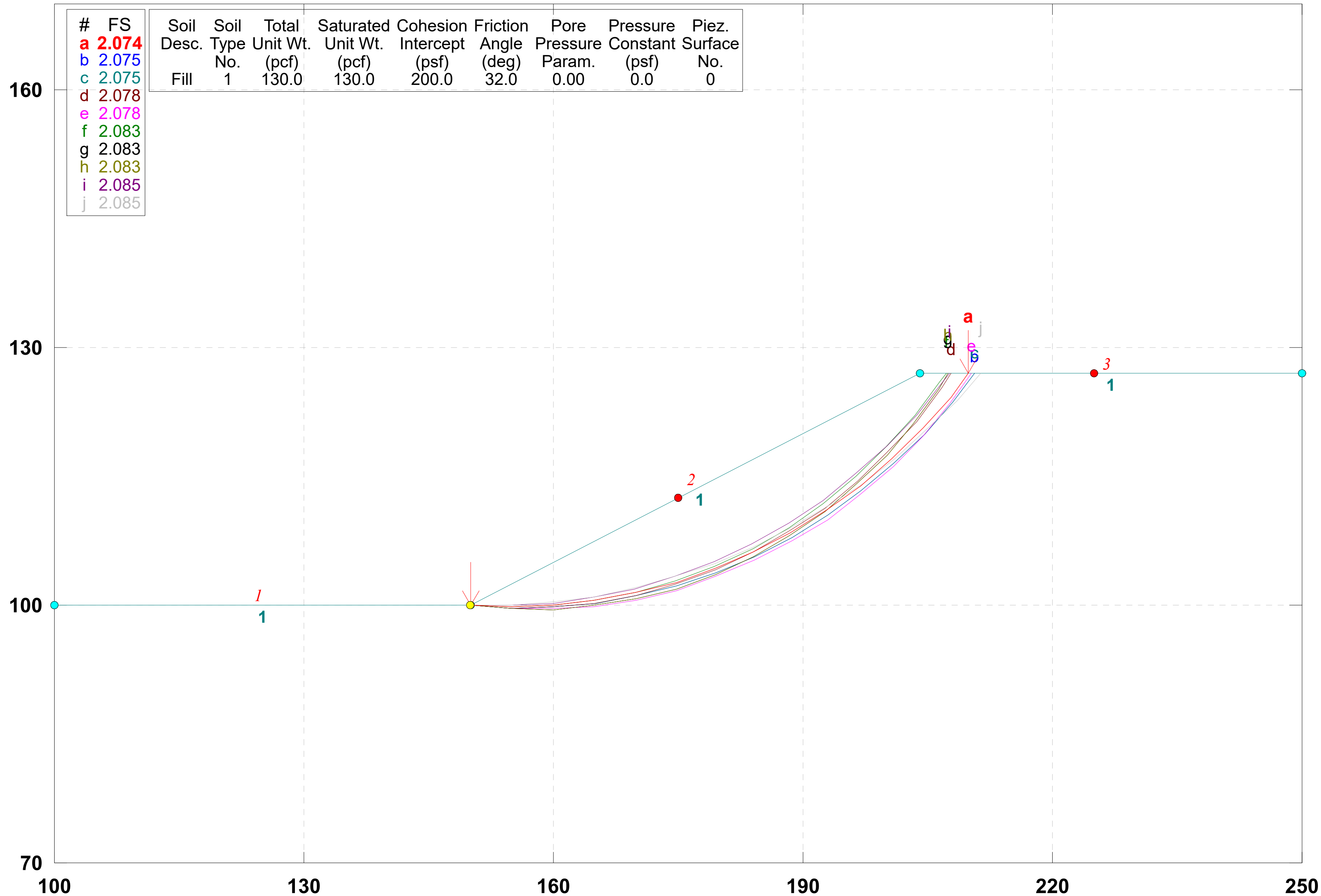
Ws	z	a		phi		c
(pcf)	(ft)	(degrees)	(radians)	(degrees)	(radians)	(psf)
135	4	33.6901	0.5880	35	0.6109	500

Calculations:

Pw	u	Fd	Fr	**FS**
2.77	172.80	249.23	640.77	**2.57**

2106-08 Sundale 27 ft 2:1 Fill Slope Static

k:\2106-08 sundale\slope stability\highest fill updated - static.pl2 Run By: AGS 7/29/2021 03:57PM



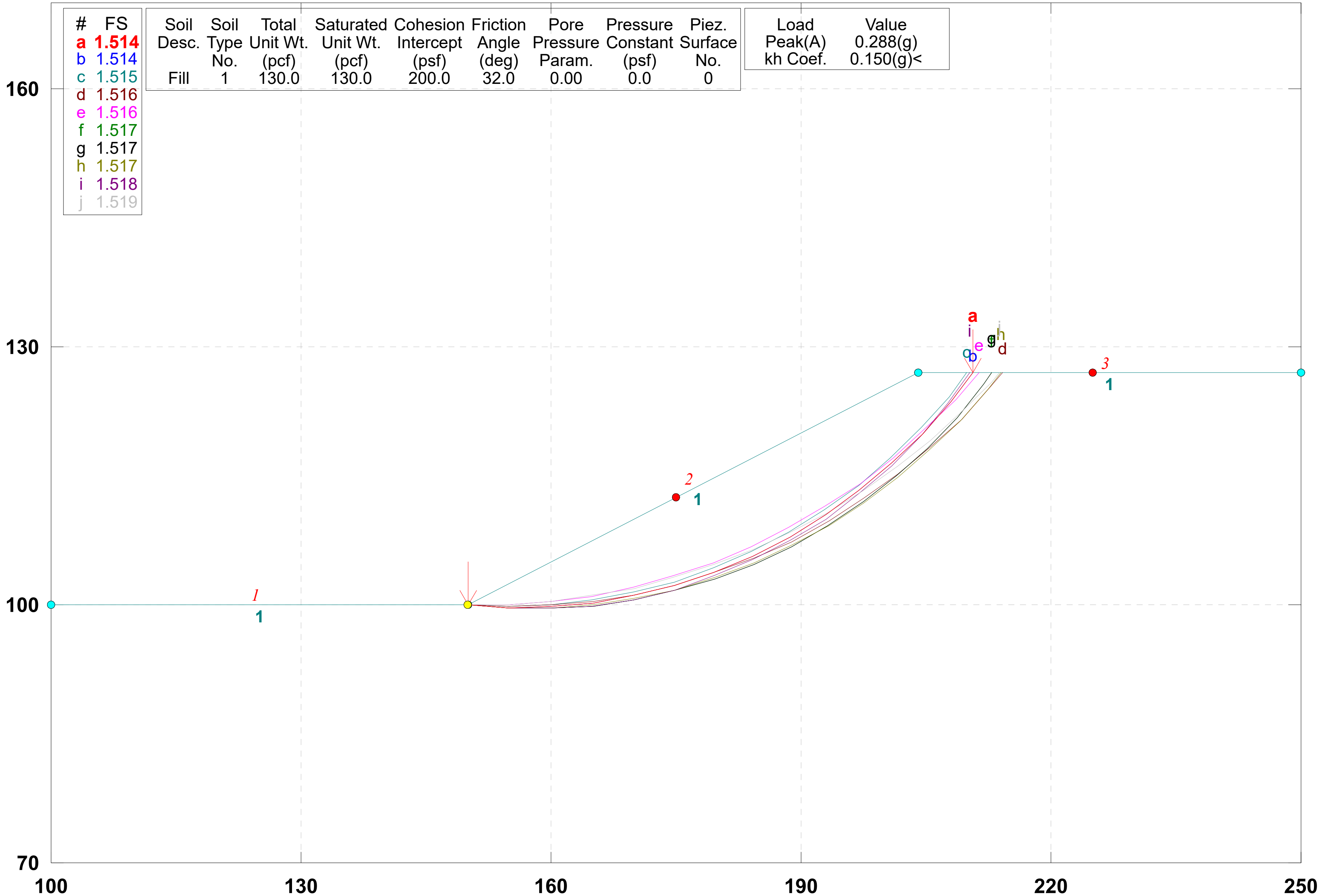
GSTABL7 v.2 FSmin=2.074

Safety Factors Are Calculated By The Modified Bishop Method

PLATE D-4

2106-08 Sundale 27 ft 2:1 Fill Slope Seismic (Pseudo-static)

k:\2106-08 sundale\slope stability\highest fill - pseudo static.pl2   Run By: AGS   7/29/2021   03:59PM

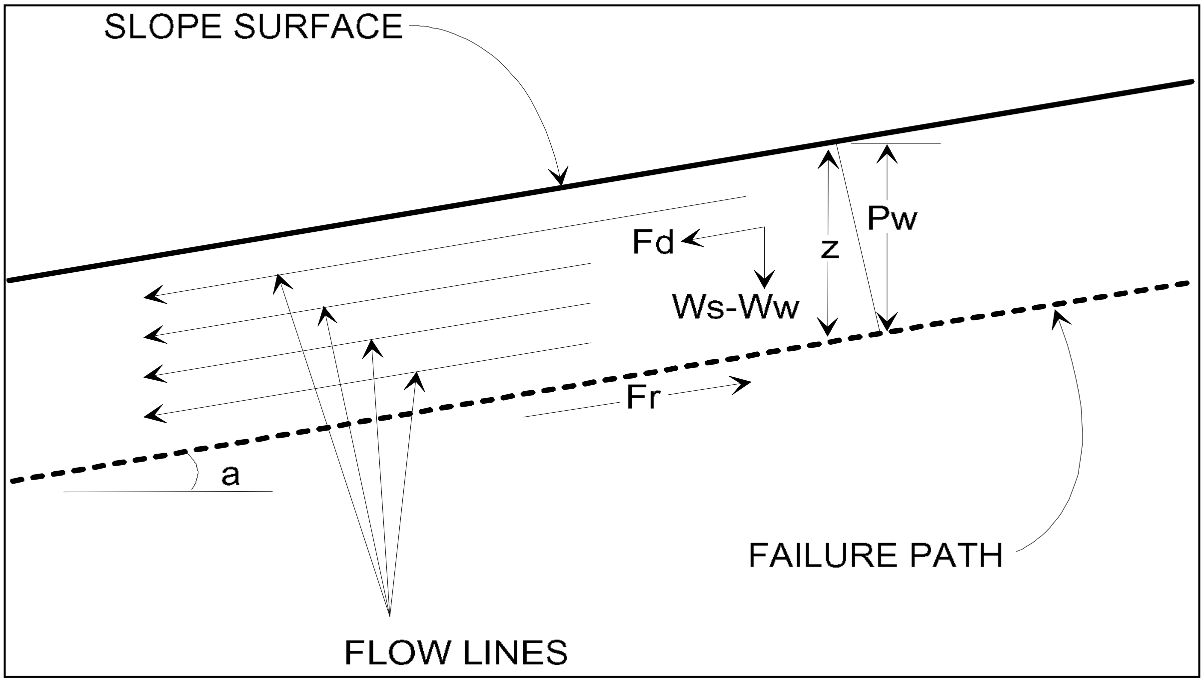


GSTABL7 v.2 FSmin=1.514

Safety Factors Are Calculated By The Modified Bishop Method

PLATE D-5

SURFICIAL SLOPE STABILITY



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

2:1 FILL SLOPE

Given:

Ws	z	a		phi		c
(pcf)	(ft)	(degrees)	(radians)	(degrees)	(radians)	(psf)
130	4	26.5651	0.4636	32	0.5585	200

Calculations:

Pw	u	Fd	Fr	**FS**
3.20	199.68	208.00	335.17	**1.61**

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 approved 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.

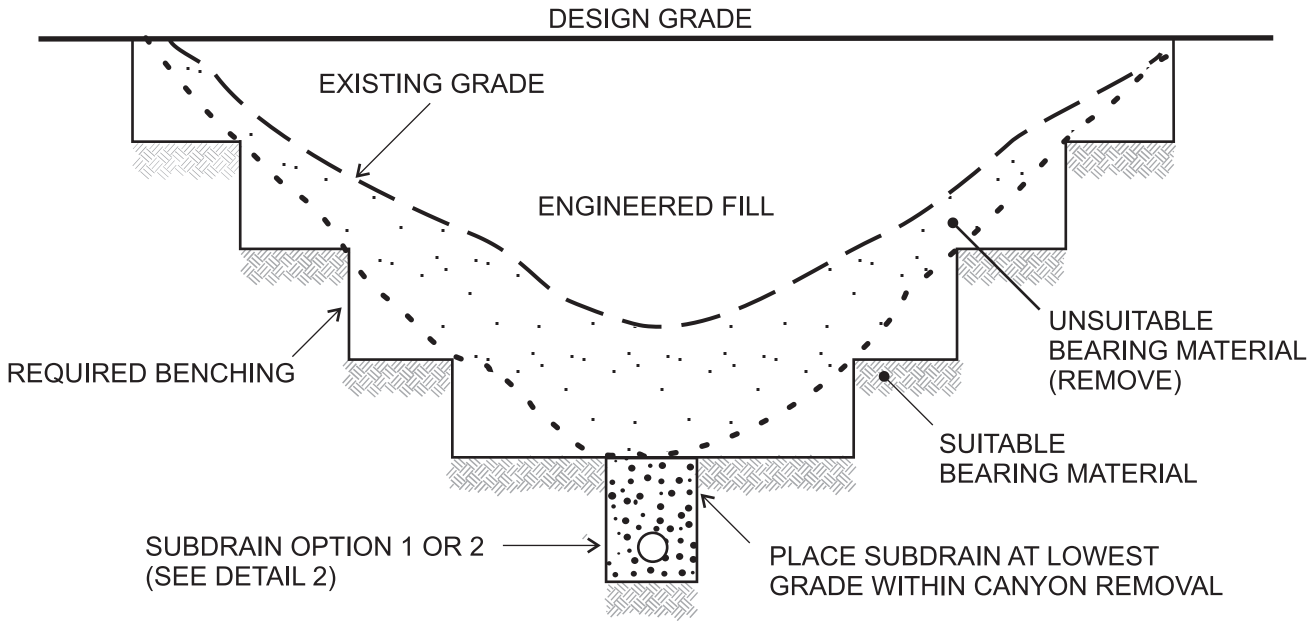
D. Frequency of Compaction Testing: The location and frequency of tests shall be at the Geotechnical Consultant's discretion. Generally, compaction tests shall be taken at intervals not exceeding two feet in fill height and 1,000 cubic yards of fill materials placed.

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.

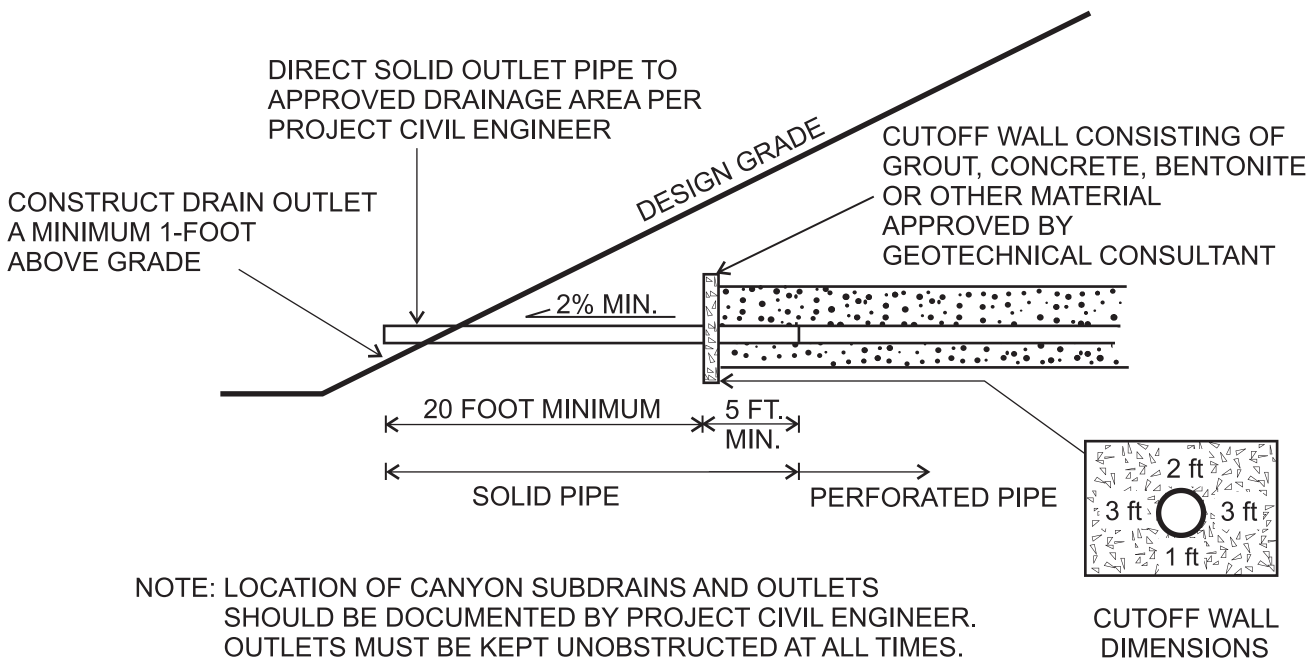
F. Areas of fill that have not been observed or tested by the Geotechnical Consultant may have to be removed and recompacted at the contractor's expense. The depth and extent of removals will be determined by the Geotechnical Consultant.

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

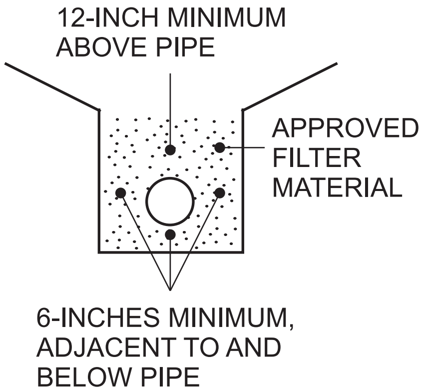


CANYON SUBDRAIN TERMINUS

VER 1.0

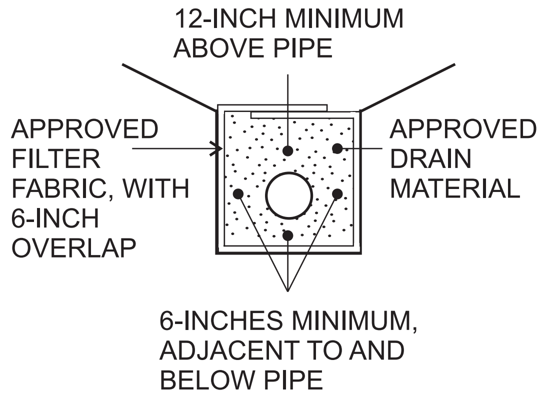
NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CANYON SUBDRAIN	DETAIL 1



OPTION 1

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



OPTION 2

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

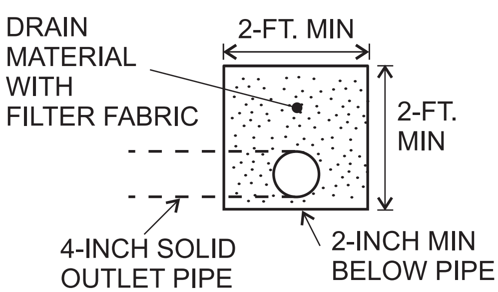
<u>FILTER FABRIC:</u> MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

<u>PIPE:</u> 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

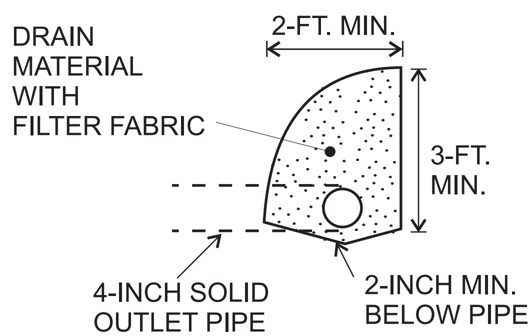
(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

<u>NOTE:</u> 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

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

<u>FILTER FABRIC:</u> MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

<u>PIPE:</u> 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

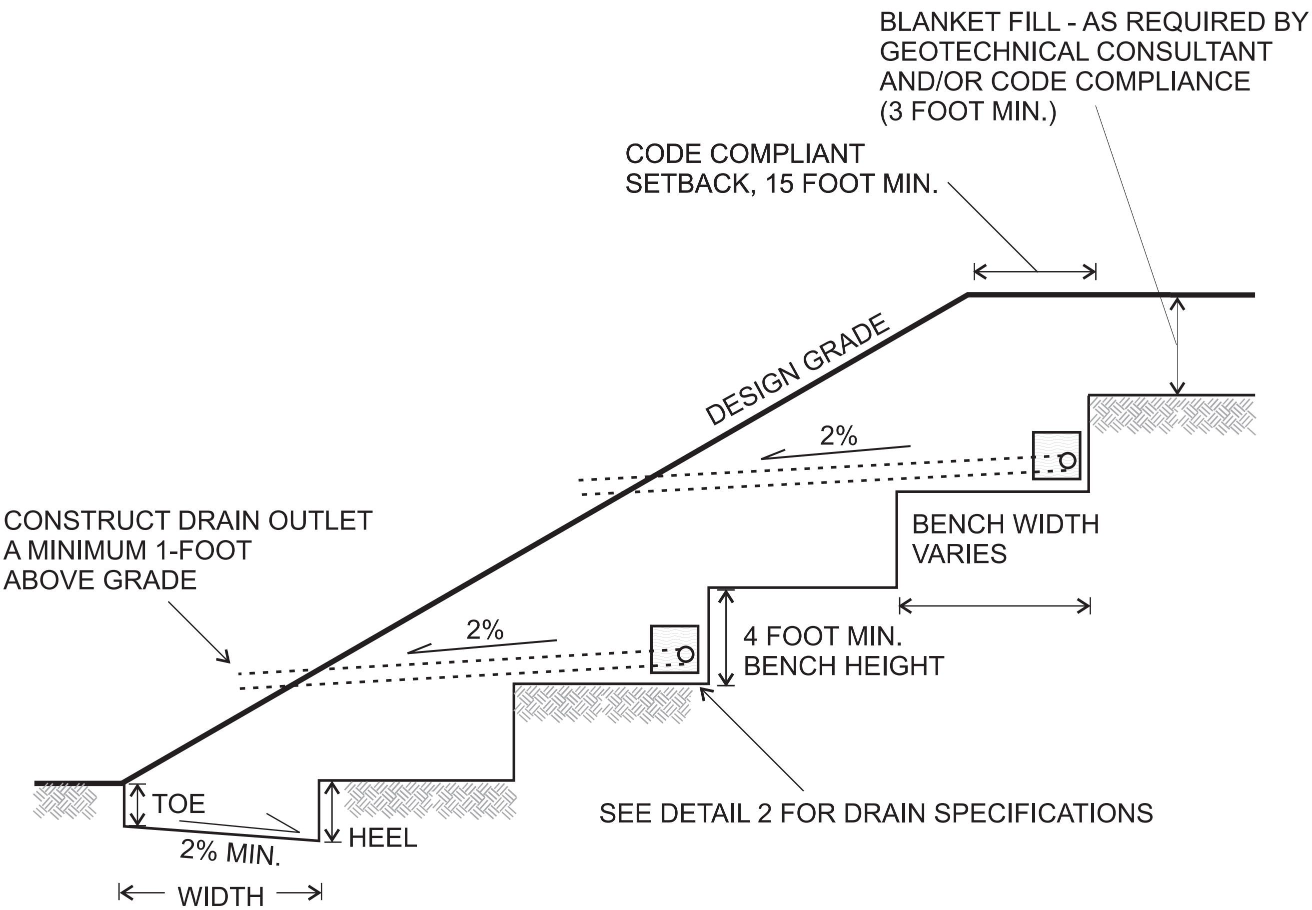
(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

VER 1.0

NTS

AGS 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.

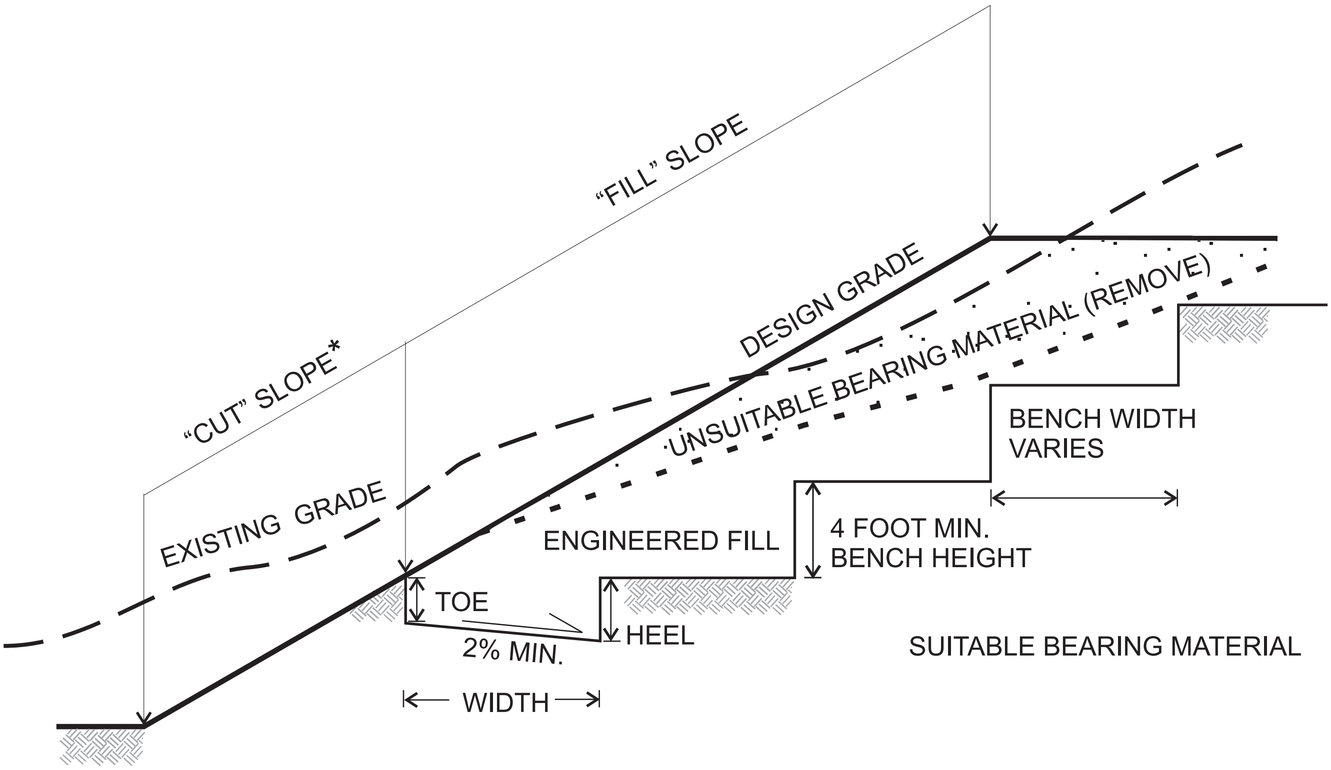
3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.

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

VER 1.0 NTS

AGS 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



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

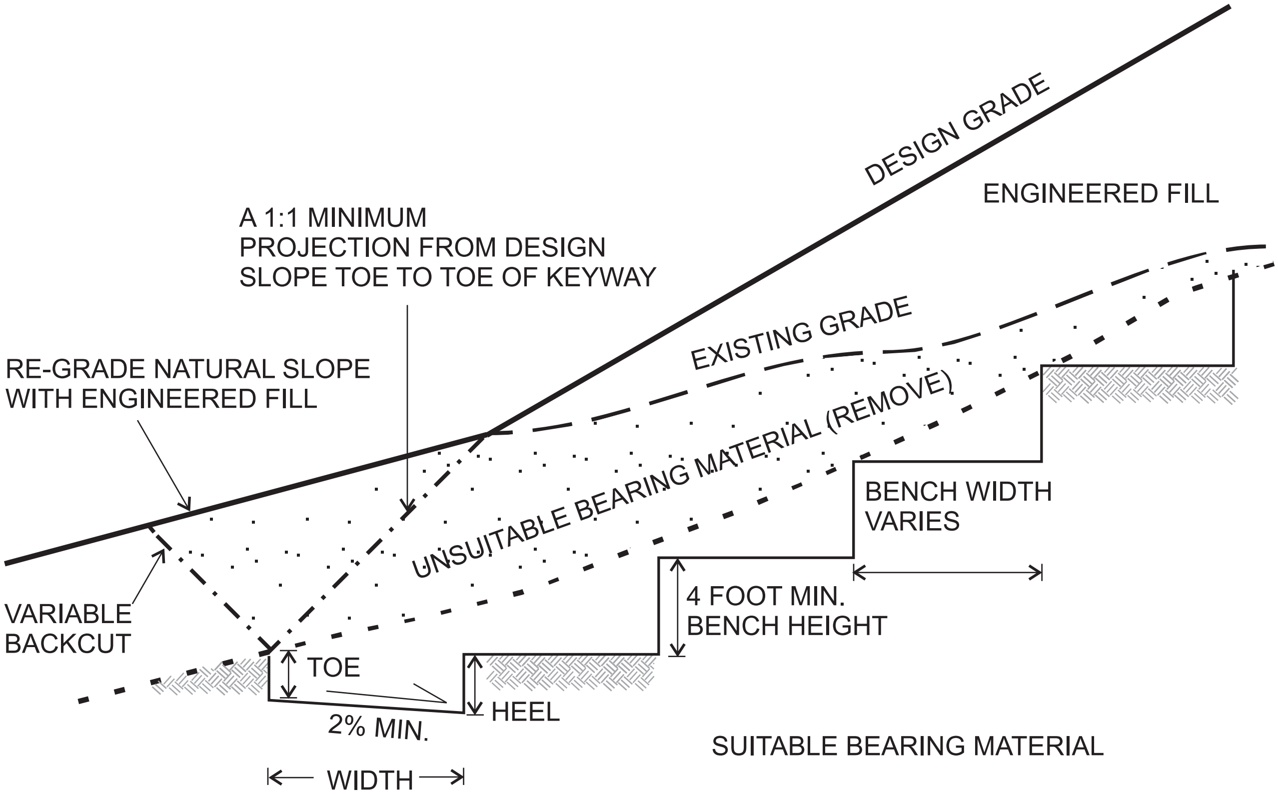
VER 1.0

NTS

AGS
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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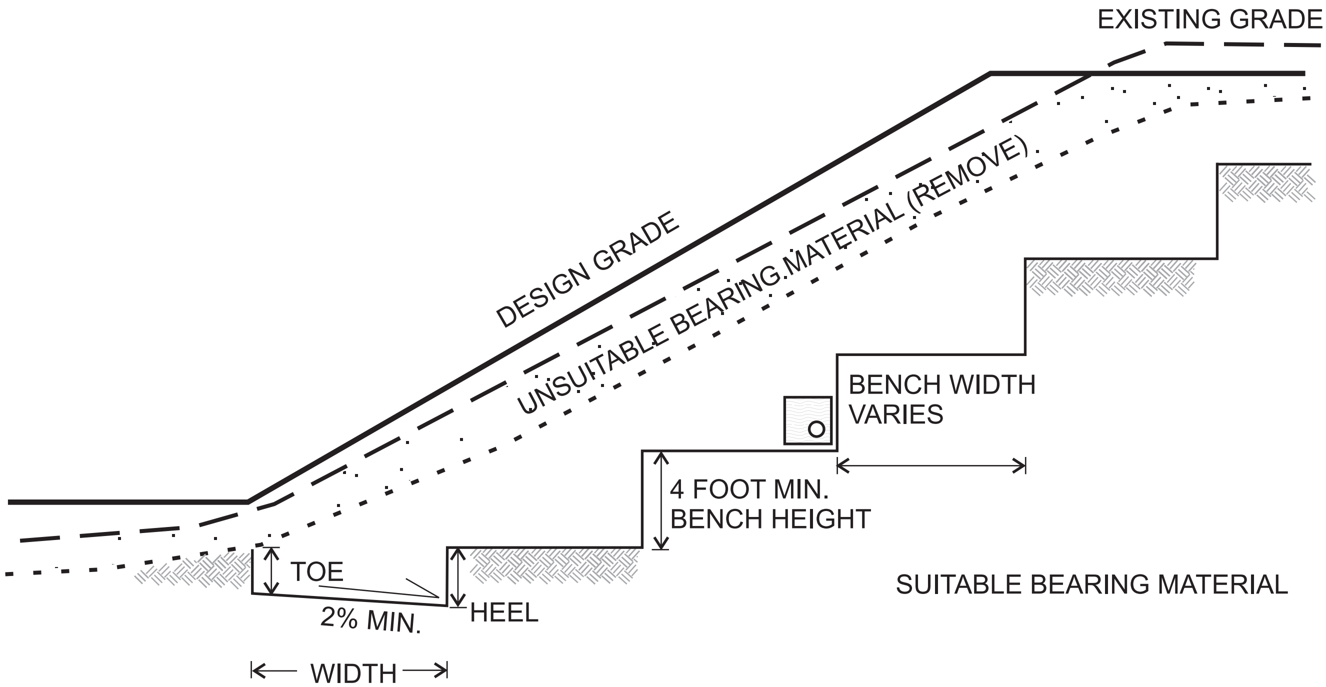
AGS
ADVANCED GEOTECHNICAL SOLUTIONS

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

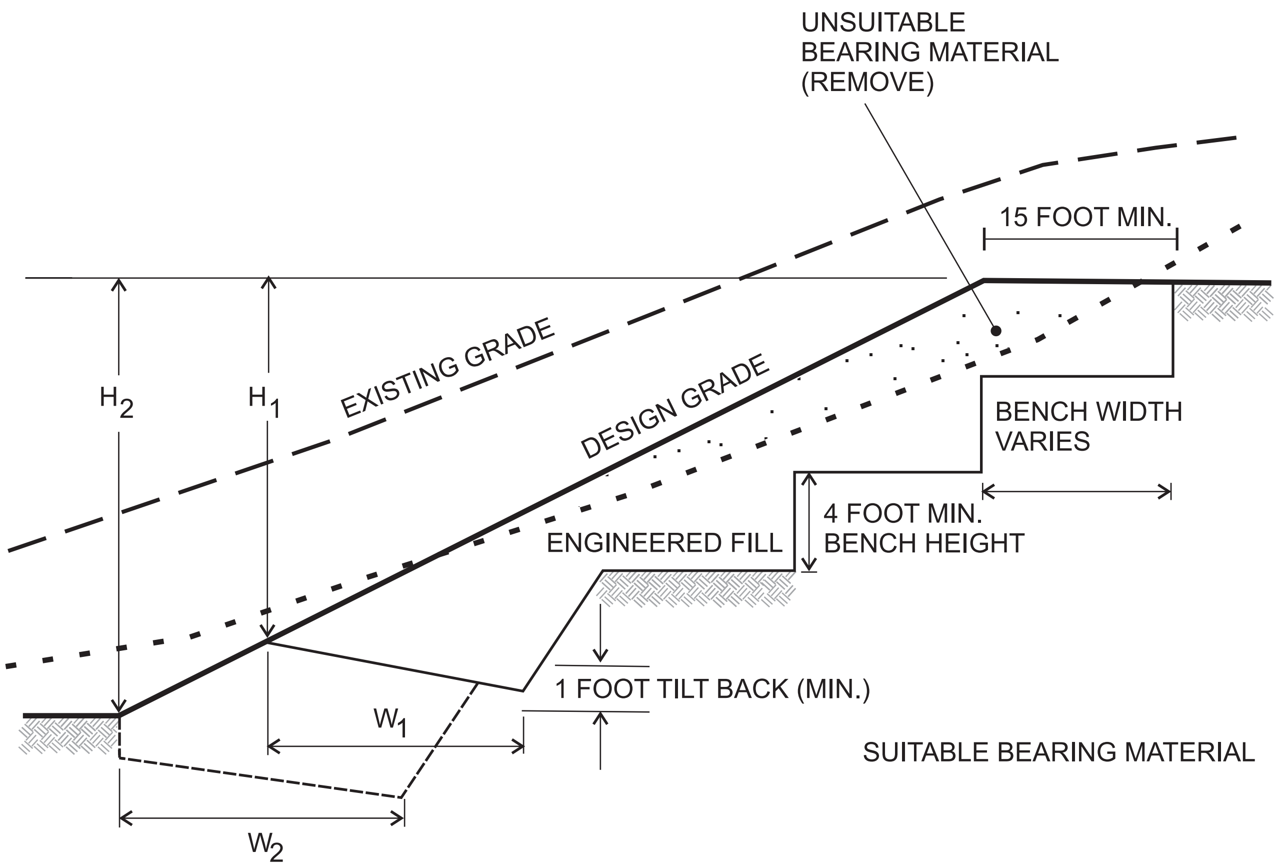
VER 1.0

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

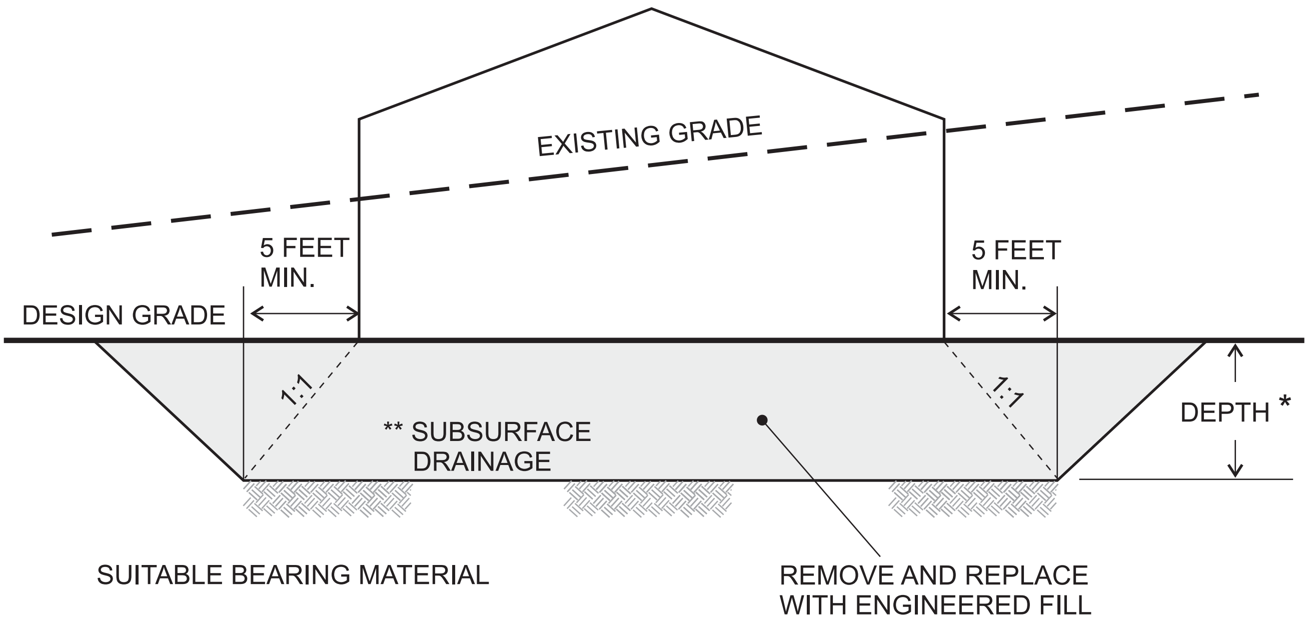
2. “W” SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, “W” SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL “W” BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

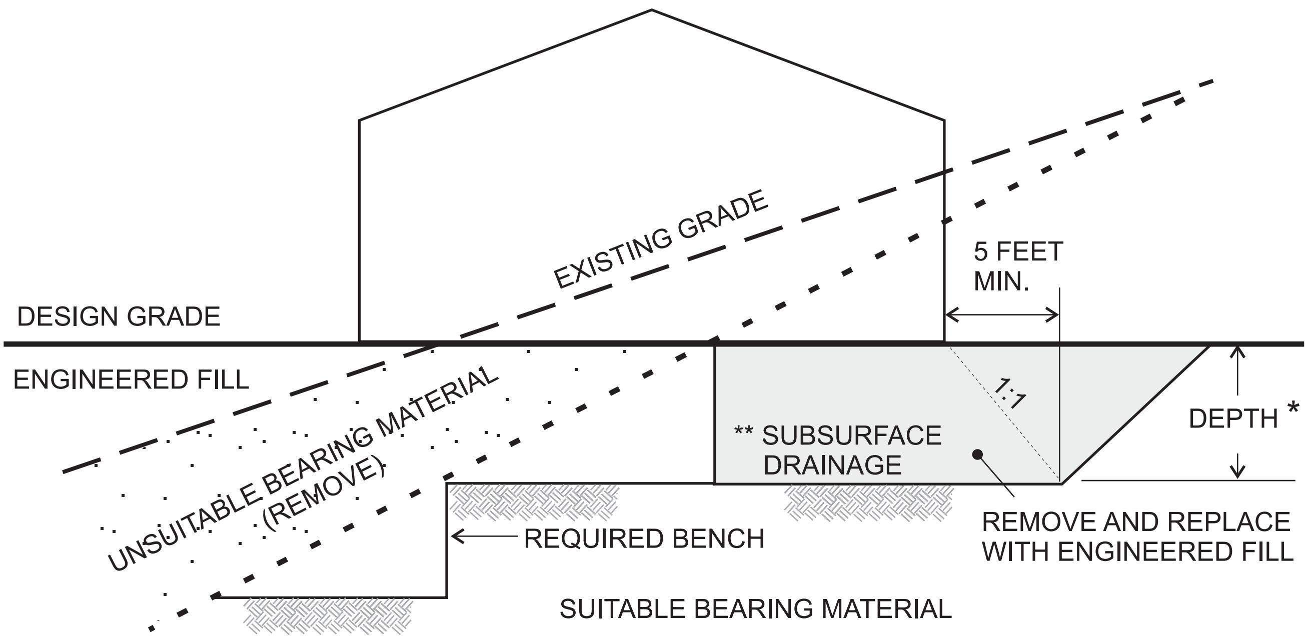
VER 1.0

NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	PARTIAL CUT SLOPE STABILIZATION	DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

NOTES:

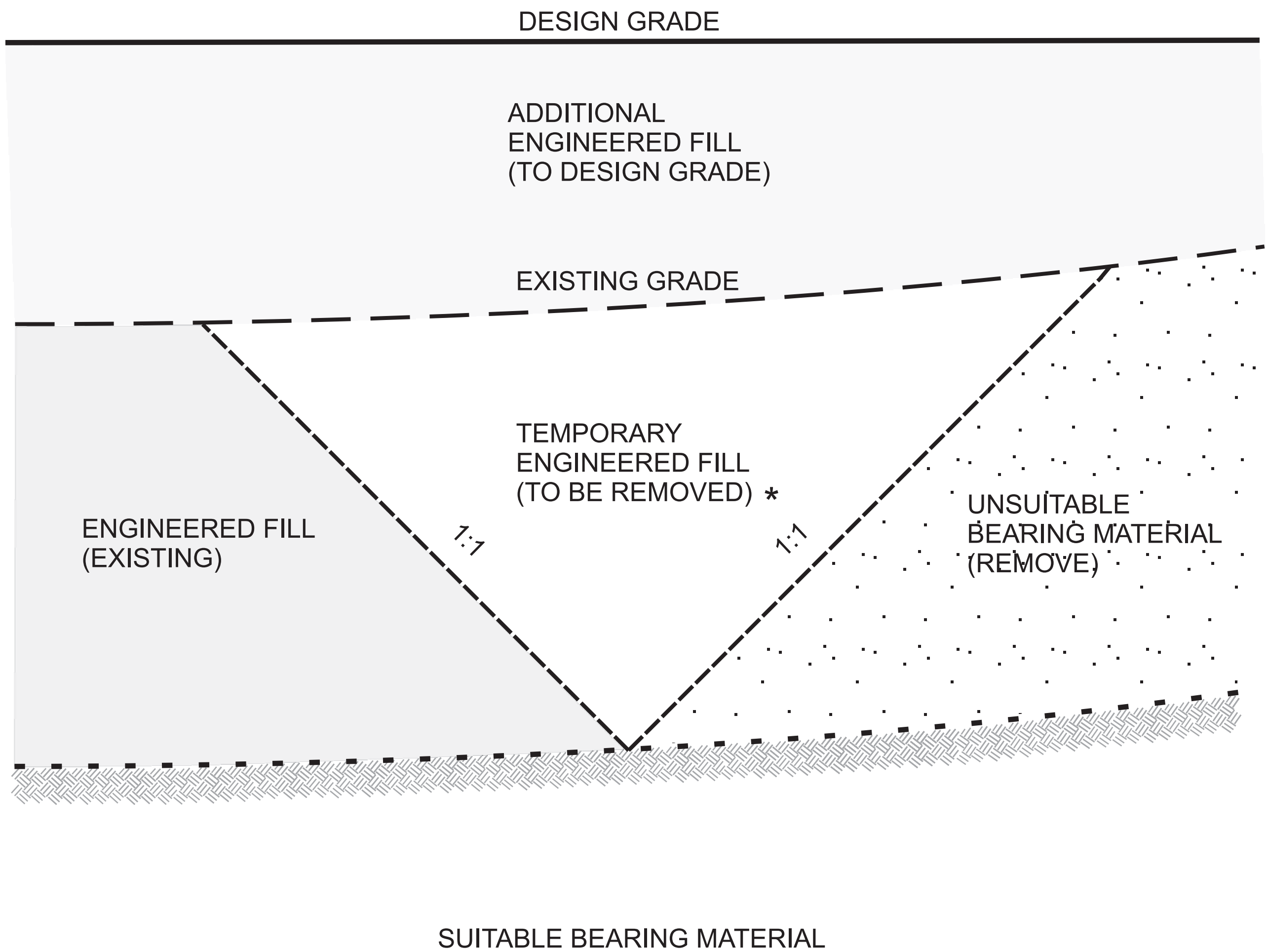
* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** 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



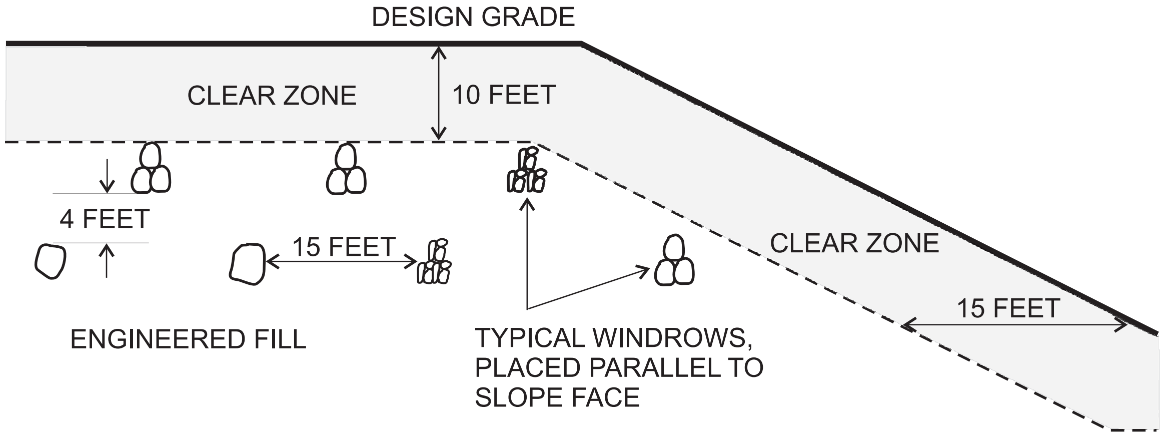
* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

VER 1.0

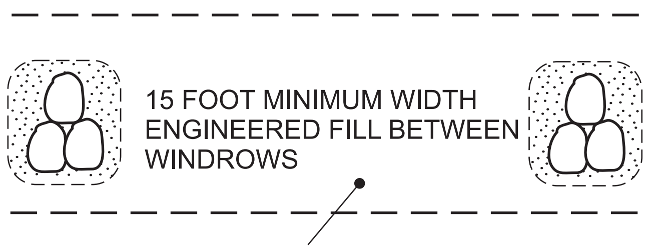
NTS

AGS 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

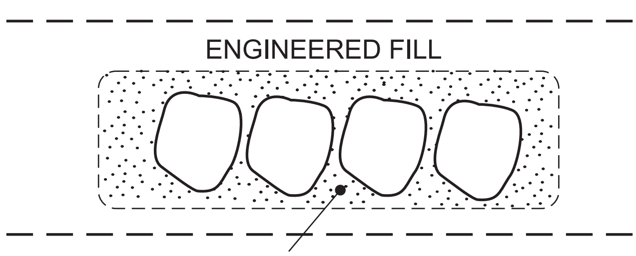
OVERSIZED MATERIAL DISPOSAL PROFILE



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



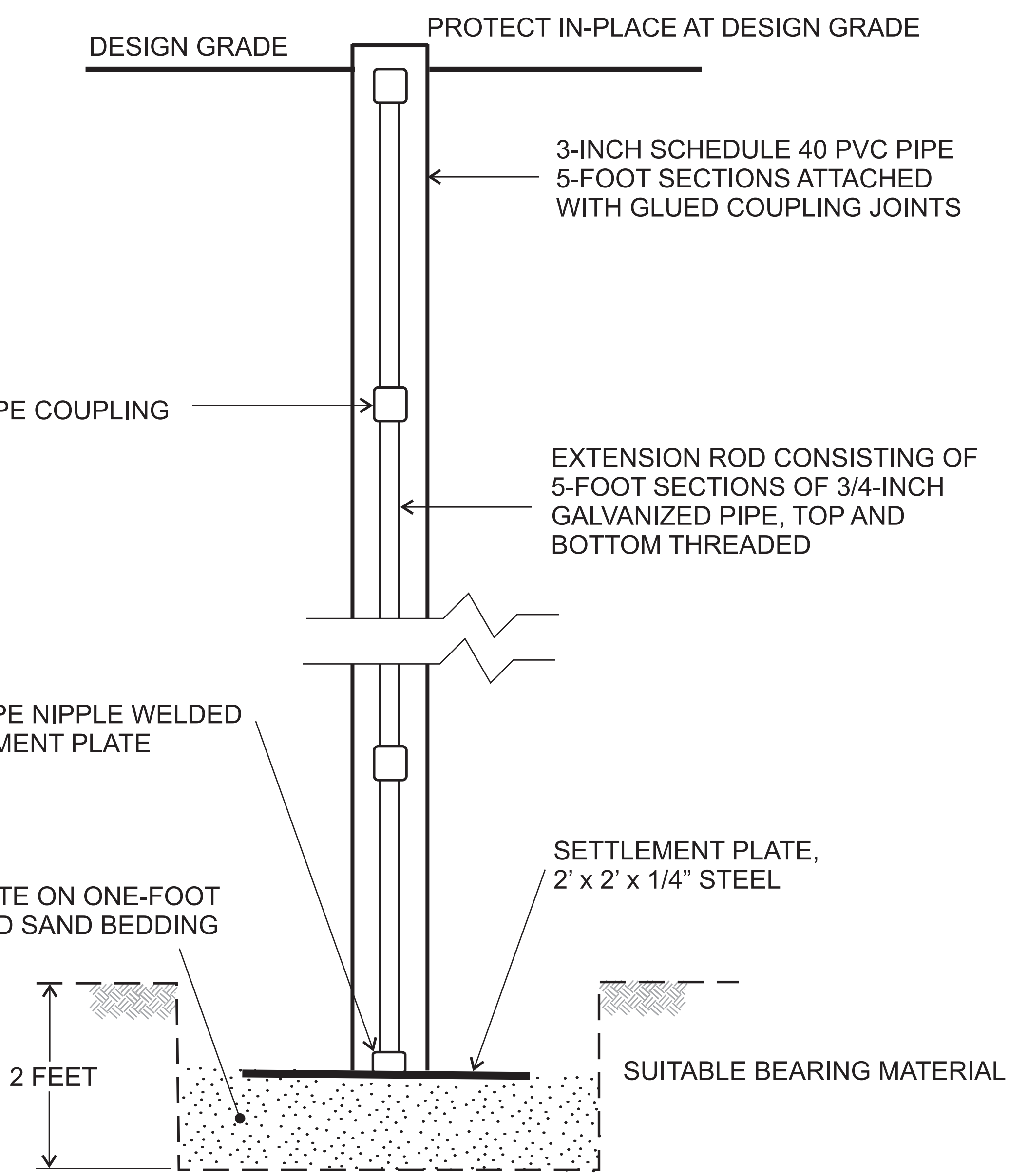
GRANULAR MATERIAL APPROVED BY THE GEOTECHNICAL CONSULTANT AND CONSOLIDATED IN-PLACE BY FLOODING

WINDROW PROFILE

VER 1.0

NTS

AGS 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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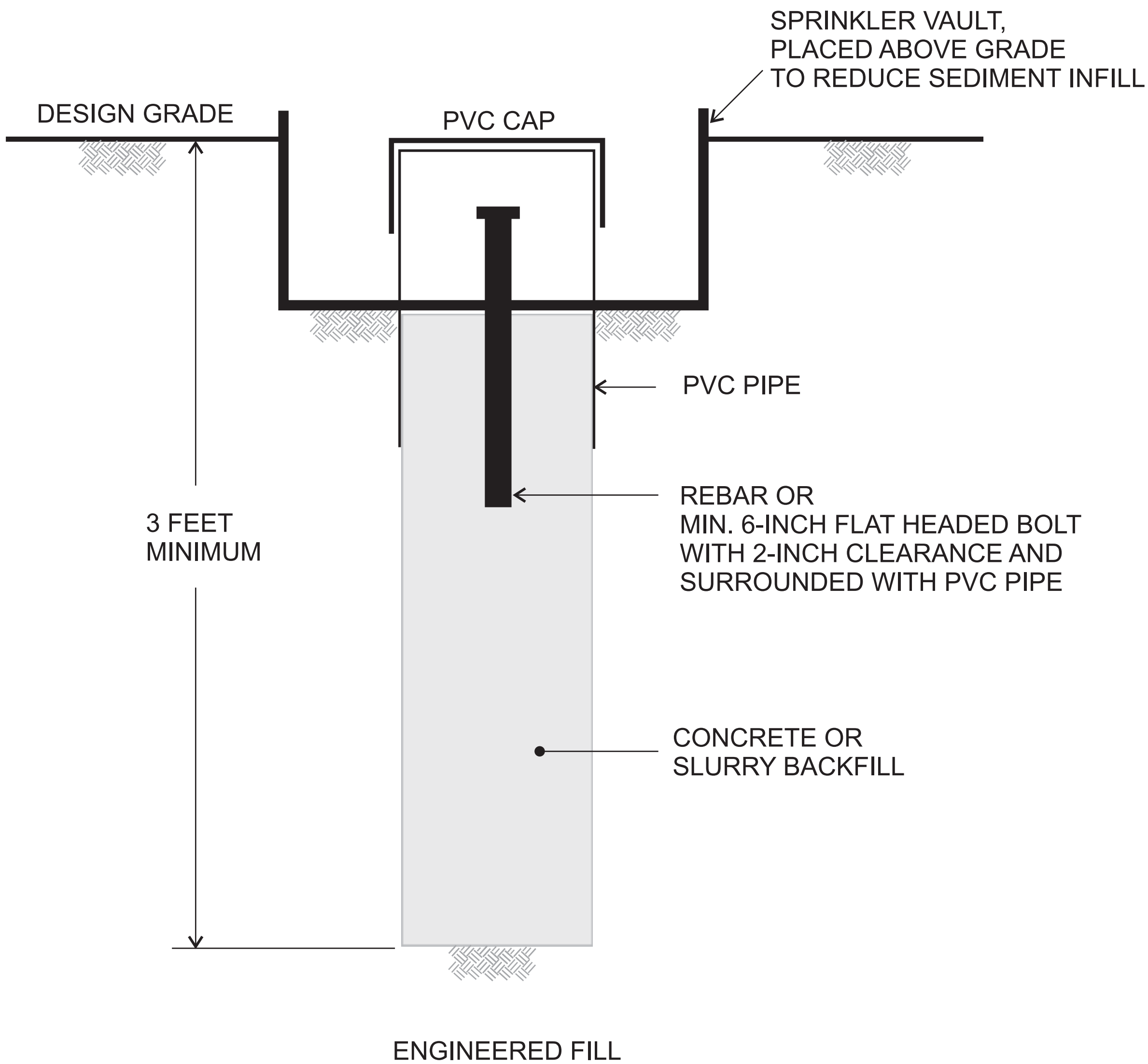
AGS
ADVANCED GEOTECHNICAL SOLUTIONS

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

NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	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.

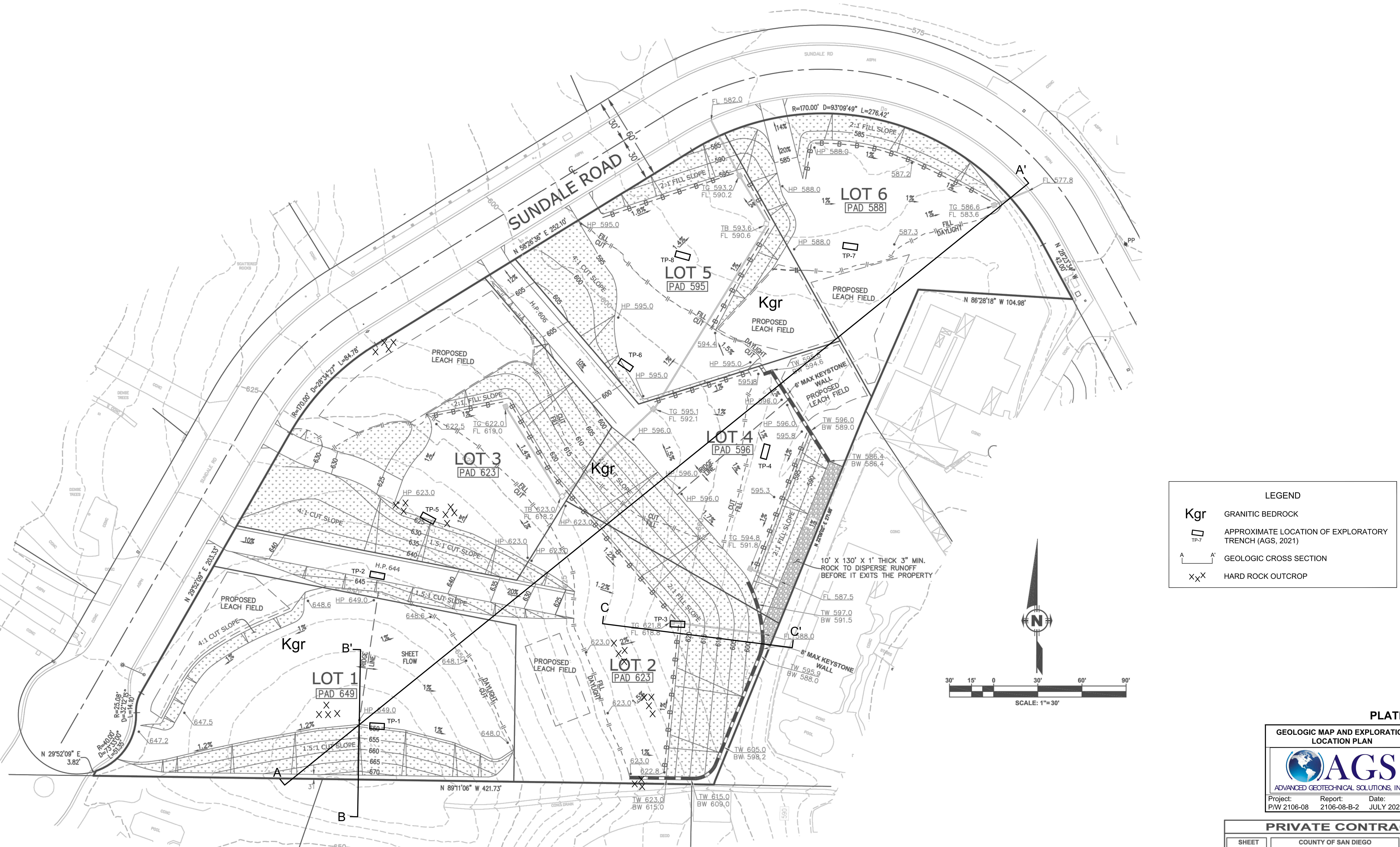
- ❖ Do not let water gather against foundations, retaining walls, and basement walls. These walls are built to withstand the ordinary moisture in the ground and are, where necessary, accompanied by subdrains to carry off the excess. If water is permitted to pond against them, it may seep through the 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

Kgr	GRANITIC BEDROCK
TP-7	APPROXIMATE LOCATION OF EXPLORATORY TRENCH (AGS, 2021)
A — A'	GEOLOGIC CROSS SECTION
xxx	HARD ROCK OUTCROP

PLATE 1

GEOLOGIC MAP AND EXPLORATION LOCATION PLAN

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

Project:	Report:	Date:
P/W 2106-08	2106-08-B-2	JULY 2021

LOCAL BENCHMARK: CENTERLINE WELL MONUMENT WITH 3" BRASS DISC STAMPED "RCE 18136" AT CENTER OF BULB IN SUNDALE ROAD APPROXIMATELY 31' NORTHWESTERLY FROM THE SOUTHWESTERLY CORNER OF SUBJECT PROPERTY AS SHOWN HEREON. EL: 647.07 (NAVD88)

NOTE:

PRIVATE CONTRACT

SHEET 2 — COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS — OF 4 SHEETS

GRADING PLANS FOR:

SUNDALE ROAD PROPERTY

CALIFORNIA COORDINATE INDEX:

RECOMMENDED FOR APPROVAL:	APPROVED FOR WILLIAM P. MORGAN, COUNTY ENGINEER
SUBDIVISION ENGINEER	BY: DATE:
ENGINEER OF WORK: LAWRENCE W. WALSH	CHECKED BY:
RCE 46316 EXP 12-31-22	

COUNTY APPROVED CHANGES

NO.	DESCRIPTION	APPROVED BY	DATE

BENCH MARK

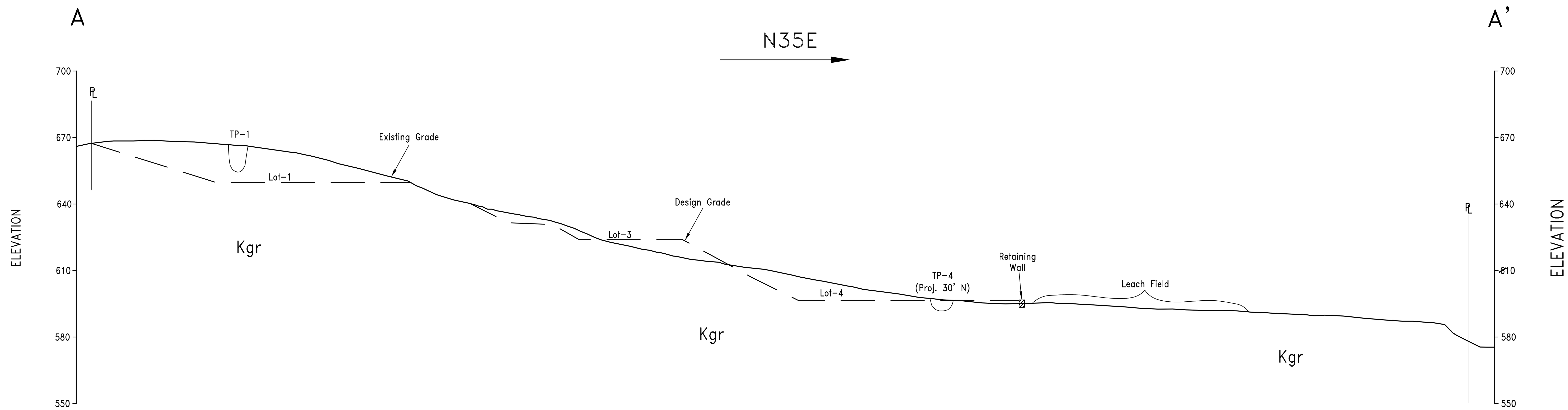
DESCRIPTION: CENTERLINE WELL MONUMENT WITH 1" PIPE AND DISC STAMPED "SAN DIEGO SURVEYOR".
LOCATION: CENTERLINE OF JAMACHA ROAD 15' NORTHERLY OF INTERSECTION WITH FALDA DEL CERRO.
RECORD FROM: SAN DIEGO COUNTY BENCHBOOK AND ROS 17454
ELEVATION: 562.84 DATUM: NAVD88

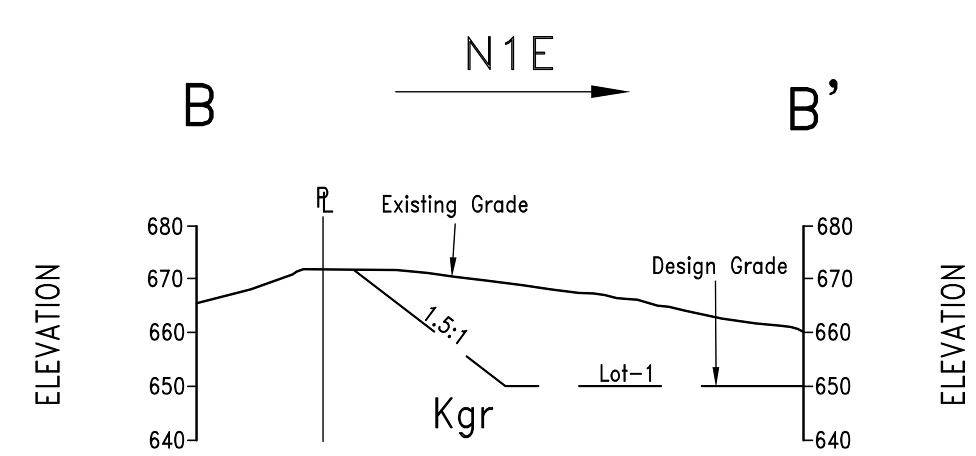
REGISTERED PROFESSIONAL ENGINEER LAWRENCE W. WALSH 46316 CIVIL STATE OF CALIFORNIA

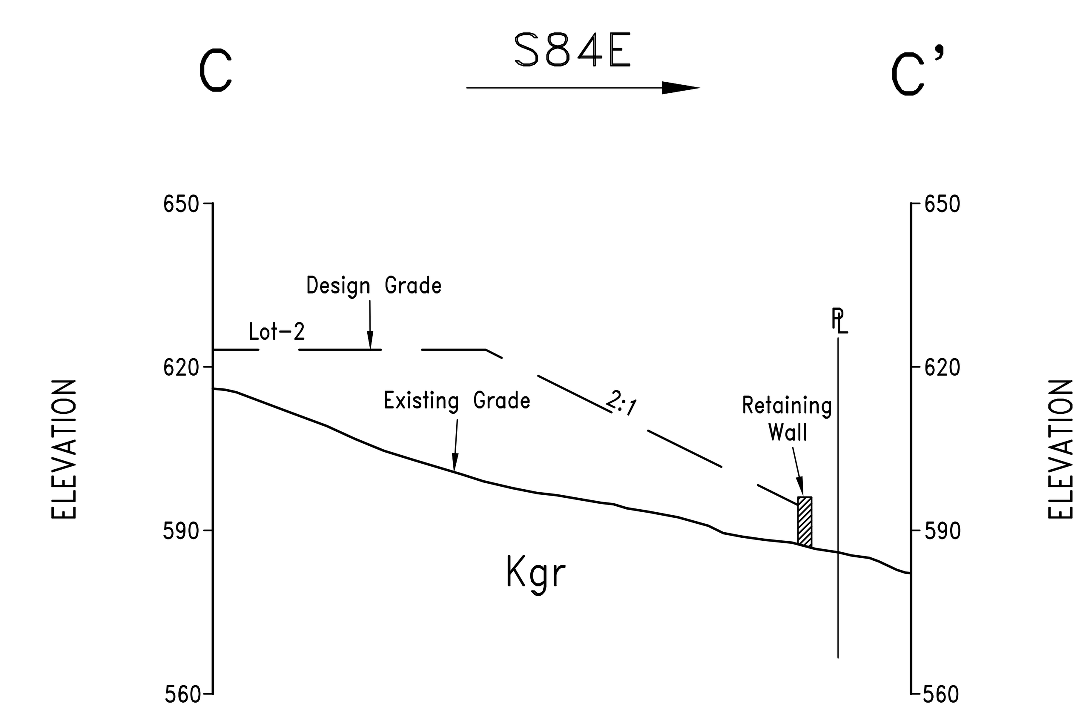
LAWRENCE W. WALSH R.C.E. 46316 EXP 12-31-22 DATE

Walsh Engineering & Surveying, Inc.
607 Aldwych Road, El Cajon, CA 92020
(619) 588-6747 (619) 792-1232 Fax

FOR CONSTRUCTION WITHIN THE PUBLIC RIGHT-OF-WAY SEE PERMIT #___________







SCALE 1" = 30'
(HORIZONTAL AND VERTICAL)

PLATE 2

GEOLOGIC CROSS-SECTIONS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

Project:	Report:	Date:
P/W 2106-08	2106-08-B-2	JULY 2021