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October 25, 2021
Project No. 1-0410

Attention: Mr. Adam Covington

Subject: ***UPDATED GEOTECHNICAL REPORT***
The Terraces Murrieta
City of Murrieta, California

References: See Appendix A

Dear Mr. Covington:

Presented herein is Alta California Geotechnical, Inc.'s (Alta) updated geotechnical report for Terraces Murrieta project, a proposed development located near Murrieta Hot Springs Road and Interstate 15, in the City of Murrieta. This report is based on Alta's recent subsurface investigation, laboratory testing, a review of the Grading and Drainage Concept plan by Psomas, and a review of the referenced reports.

Also included in this report are:

- Discussion of the site geotechnical conditions.
- Seismic hazards evaluation.
- Recommendations for remedial and site grading, including unsuitable soil removals.
- Geotechnical site construction recommendations.
- Foundation design parameters.

If you have any questions or should you require any additional information, please contact the undersigned at (951) 509-7090. Alta appreciates the opportunity to provide geotechnical consulting services for your project.

Sincerely,
Alta California Geotechnical, Inc.

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JBC: 1-0410, October 25, 2021 (Updated Geotechnical Report, The Terraces Murrieta)

1.0 INTRODUCTION

The following report presents Alta's findings, conclusions, and geotechnical recommendations for the Terraces Murrieta project, the proposed development located near Murrieta Hot Springs Road and Interstate 15, in the City of Murrieta, California

1.1 Purpose

The purpose of this report is to examine the existing onsite geotechnical conditions and assess the impacts that the geotechnical conditions may have on the proposed development as depicted on the enclosed Grading and Drainage Concept plan (Plate 1) provided by Psomas. This report is suitable for use in developing grading plans and engineer's cost estimates.

1.2 Scope of Work

Alta's *Scope of Work* for this geotechnical investigation included the following:

- Review of the referenced literature, maps, reports and aerial photos (Appendix A).
- Site geologic mapping.
- Excavating, logging, and sampling twenty (20) hollow-stem auger borings to a maximum depth of 46-feet below the existing ground surface (Appendix B).
- Conducting laboratory testing on samples obtained during our investigation (Appendix C).
- Compiling previous subsurface and laboratory data from the referenced reports (Appendices B-1 and C-1).
- Performing an infiltration study on one (1) additional boring to provide an assessment of the infiltration characteristics of the onsite soil and it's impact on storm water disposal.
- Evaluating engineering geologic and geotechnical engineering data, including laboratory data, to develop recommendations for site remedial grading, import soil, foundations and utilities.
- Preparing this report and accompanying exhibits.

1.3 Report Limitations

The conclusions and recommendations presented in this report are based on the field and laboratory information generated during this investigation, and a review of the referenced reports. The information contained in this report is intended to be used for the development of grading plans and preliminary construction cost estimates.

2.0 PROJECT DESCRIPTION

2.1 Site Location and Existing Conditions

The irregular-shaped, approximately 42.0-acre site consists of two northwest trending ridges and intervening valleys. The site is located north of Murrieta Hot Springs Road and east of Interstate 15 in the City of Murrieta. Drainage is generally to the southwest. The site is bounded to the southeast and southwest by Interstate 15 and Murrieta Hot Springs Road, respectively, to the northwest by Vista Murrieta Road, and to the northeast by Sparkman Court.

Historic aerial photographs (Historic Aerials, 2021) indicate that the site was vacant until 1978 when several structures were constructed on the western ridge and central valley. By 1996, five structures were present along the western ridge. By 2002, some grading activities cleared vegetation on the eastern ridge and artificial fill was placed in portions of the central valley. By 2012, the onsite structures were demolished with only the concrete pads remaining and the site has remained relatively unchanged since.

2.2 Proposed Development

Based on the Grading and Drainage Concept plan, it is our understanding that the site will be developed to support eleven (11) multi-family structures with associated parking lots and roads. Alta anticipates that conventional cut-and-fill grading techniques will be used to develop the site for the support of wood-frame

construction with shallow foundations and reinforced concrete slabs-on-grade, and associated improvements.

3.0 SITE INVESTIGATION

3.1 Current Subsurface Investigation

Alta conducted a subsurface investigation on September 27 through 29 of 2021, consisting of the excavation, logging and select sampling of twenty (20) hollow-stem auger borings up to a maximum depth of 46.0 feet below the existing ground surface. The locations of the exploratory excavations are shown on Plate 1 and the logs are presented in Appendix B.

Laboratory testing was performed on ring and bulk samples obtained during the field investigation. A brief description of the laboratory test procedures and the test results are presented in Appendix C.

3.2 Previous Subsurface Investigation

Alta reviewed the previous subsurface investigation reports prepared by Geocon, Inc. (Geocon, 2016). Geocon's investigation consisted of excavating, logging and select sampling of eight (8) hollow-stem auger borings and excavating six (6) additional borings for infiltration testing. Logs of their subsurface excavations are presented in Appendix B-1 of this report. The locations of their excavations are shown on Plate 1.

Laboratory testing was performed by Geocon on samples obtained during their field investigation. Their test results are presented in Appendix C-1 of this report.

3.3 Infiltration Testing

It is Alta's understanding that the project may utilize infiltration systems for storm water disposal. Details of the system are not known at this time.

Infiltration testing was undertaken using one (1) thirty-foot-deep boring (PH-1). The testing was performed in general accordance with the County of Riverside standards. The test well was presoaked at least 24 hours prior to testing. During testing, the water level readings were recorded every 30 minutes until the readings stabilized.

The data was then adjusted to provide an infiltration rate utilizing the Porchet Method. The resulting infiltration rate is presented in Table 3-1. The results do not include a factor of safety. Recommendations for infiltration BMP design are presented in Section 6.3.

Table 3-1-Summary of Infiltration Testing (No Factor of Safety)

Test Designation	PH-1
Approximate Depth of Test	30 ft
Time Interval	30 minutes
Radius of Test Hole	4 inches
Tested Infiltration Rate	0.11 (in/hr)

4.0 GEOLOGIC CONDITIONS

4.1 Geologic and Geomorphic Setting

Regionally, the subject site is located in the Peninsular Ranges geomorphic province, which characterizes the southwest portion of southern California where major right lateral active fault zones predominately trend northwest southeast. The Peninsular Ranges province is composed of plutonic and metamorphic rock, with lesser amounts of Tertiary volcanic and sedimentary rock, Quaternary drainage in-fills and sedimentary veneers.

4.2 Stratigraphy

Based on Alta's review of geologic literature, our subsurface investigation and the previous investigation, the project site is underlain by undocumented artificial fill, alluvium and the Pauba Formation. The geologic units are briefly described below.

4.2.1 Undocumented Artificial Fill (Map symbol afu)

The undocumented artificial fill observed at the site consists mainly of brown to grayish brown silty sand in a dry, medium dense to dense condition. The unit was logged to a depth of 6 feet below the ground surface.

4.2.2 Alluvium (Map symbol Qal)

Alluvium exists in the northwestern and eastern portions of the site and consists of tan to brown Sand, Silty Sand, and Clayey Sand in a dry to slightly moist and medium dense to dense condition. The unit was encountered to a depth of fifteen (15) feet below the surface.

4.2.3 Pauba Formation (Sandstone Member) (Map symbol Qps)

Underlying the site is the Pleistocene age Pauba Formation which consists of a brown to dark brown, reddish brown, gray, and tan to orange fine to coarse grained sandstone, silty sandstone, and clayey sandstone in a dry to slightly moist and dense to very dense condition. The unit was encountered to a depth of forty-six (46) feet below the existing ground surface.

4.3 Geologic Structure

4.3.1 Tectonic Framework

Jennings (1985) defined eight structural provinces within California that have been classified by predominant regional fault trends and similar fold structure. These provinces are in turn divided into blocks and sub-blocks

that are defined by "major Quaternary faults." These blocks and sub-blocks exhibit similar structural features. Within this framework the site is located within Structural Province I, which is controlled by the dominant northwest trend of the San Andreas Fault and is divided into two blocks, the Coast Range Block and the Peninsular Range Block. The Peninsular Range Block, on which the site is located, is characterized by a series of parallel, northwest trending faults that exhibit right lateral dip-slip movement. These faults are terminated by the Transverse Range block to the north and extend southward into the Baja Peninsula. These northwest trending faults divide the Peninsular Range block into eight sub-blocks. The site is located on the Riverside sub-block, which is bound on the west by the Elsinore-Whittier fault zone and on the east by San Jacinto fault zone.

4.3.2 Regionally Mapped Active Faults

Several large, active fault systems, including the Elsinore-Whittier, the San Jacinto, and the San Andreas, occur in the region surrounding the site. These fault systems have been studied extensively and in a large part control the geologic structure of southern California.

4.3.3 Geologic Structure

Based upon our site investigation and literature review, the onsite sediments and bedrock are not folded or faulted.

4.4 Groundwater

Geocon encountered groundwater in boring B-2 at approximately 15.9 feet below the existing ground surface. Alta did not encounter groundwater during our investigation up to a depth of 46.0 feet below the ground surface. Groundwater data from two nearby wells, State Well No. 07S03W16H001S and 07S03W15N002S, showed that groundwater was approximately 33 and 101 feet below the ground surface, respectively, in February of 1968.

4.5 Earthquake Hazards

The subject site is located in southern California, which is a tectonically active area. The type and magnitude of seismic hazards affecting a site are dependent on the distance to the causative fault and the intensity and magnitude of the seismic event. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction and/or ground lurching.

4.5.1 Local and Regional Faulting

The site is located on the northern portion of the Riverside sub-block, approximately 6.5 miles east of the Elsinore Fault, 13.4 miles west of the San Jacinto Fault, and approximately 29.2 miles southwest of the San Andreas fault zone.

A review of the Riverside County mapping portal (RCIT, 2021) indicates that the northern portion of the site is within a Riverside County fault zone related to the Murrieta Hot Springs Fault which is located 0.08 miles north of the site. The previous investigation by Geocon (Geocon, 2016) concluded that faulting was not present onsite. However, no trenching was accomplished to verify this conclusion.

4.5.2 Seismicity

Ground shaking hazards caused by earthquakes along other active regional faults do exist. The 2019 California Building Code requires use-modified spectral accelerations and velocities for most structural designs. Seismic design parameters using soil profile types identified in the 2019 California Building Code are presented in Section 7.3.

4.5.3 Surface Rupture

Active faults are not known to exist within the project and a review of Special Publication 42 indicates the site is not within a California State designated Earthquake Fault Zone. Accordingly, the potential for fault surface rupture on the subject site is very low.

4.5.4 Liquefaction

Seismic agitation of relatively loose saturated sands, silty sands, and some silts can result in a buildup of pore pressure. If the pore pressure exceeds the overburden stresses, a temporary quick condition known as liquefaction can occur. Liquefaction effects can manifest in several ways including: 1) loss of bearing; 2) lateral spread; 3) dynamic settlement; and 4) flow failure. Lateral spreading has typically been the most damaging mode of failure.

In general, the more recent that a sediment has been deposited, the more likely it will be susceptible to liquefaction. Other factors that must be considered are groundwater, confining stresses, relative density, and the intensity and duration of seismically-induced ground shaking.

Based on the dense nature of the Pauba Formaiton, the potential for liquefaction to occur below the proposed residential development is

considered nil upon the completion of the remedial grading recommended herein.

4.5.5 Dry Sand Settlement

Dry sand settlement is the process of settlement of the ground surface during a seismic event in sand layers. Based on our subsurface investigation, the previous subsurface investigation and our removal/recompaction recommendations, the potential for dry sand settlement is anticipated to be negligible.

4.6 Regional Subsidence

The southwestern portion of the site is located in an area designated as having active susceptibility to subsidence by the County of Riverside (RCIT, 2021). Upon implementation of the remedial grading recommendations presented herein, the effects of subsidence on the development are considered to be negligible.

5.0 ENGINEERING PROPERTIES AND ANALYSIS

5.1 Materials Properties

Presented herein is a general discussion of the engineering properties of the onsite materials that will be encountered during construction of the proposed project. Descriptions of the soil (Unified Soil Classification System) and in-place moisture/density results are presented on the boring logs in Appendix B.

5.1.1 Excavation Characteristics

Based on the data provided from the subsurface investigation, it is our opinion that a majority of the onsite materials possess favorable excavation characteristics such that conventional earth moving equipment can be utilized. However, given the density of the Pauba Formation, moderate to heavy ripping may be required, resulting in slower production rates.

5.1.2 Compressibility

The undocumented artificial fill, alluvium and the uppermost portions of the Pauba Formation are considered compressible and unsuitable to support the proposed improvements. Recommended removal depths are presented in Section 6.1.2.

5.1.3 Hydro-Consolidation

Hydro-consolidation is the effect of introducing water into soil that is prone to collapse. Upon loading and initial wetting, the soil structure and apparent strength are altered resulting in almost immediate settlement. That settlement can have adverse impacts on engineered structures, particularly in areas where it is manifested differentially. Differential settlements are typically associated with differential wetting, irregularities in the subsurface soil conditions, and/or irregular loading patterns.

Based on laboratory testing from our investigation and the previous investigation (Appendix C and C-1), there is potential for hydro-collapse in the uppermost portion of alluvium. As such, it is recommended to utilize the unsuitable soil removal recommendations presented in Section 6.1.2 to remove this condition.

5.1.4 Expansion Potential

Expansion index testing was performed on samples taken during our subsurface investigation and the previous investigation (Appendix C and C-1). Based on the results and review of the logs, it is anticipated that the majority of materials onsite vary from “very low” to “low” in expansion potential (0≤EI≤50) when tested per ASTM D: 4829. However, there are silt and claystone layers with medium to highly expansive soils. Recommendations for this material are presented in Section 6.2.3.

5.1.5 Shear Strength Characteristics

Direct shear testing was performed to assist in the development of shear strength characteristics of the onsite soils. The values presented in Table 5-1 are based on our laboratory testing, the previous laboratory testing and our experience in the area.

TABLE 5-1
Shear Strength Characteristics

Geologic Unit	Cohesion, C (psf)	Friction Angle, ϕ (degrees)
Engineered Artificial Fill	150	30
Pauba Formation (Qps)	180	32

5.1.6 Earthwork Adjustments

The values presented in Table 5-2 are deemed appropriate for estimating purposes and may be used in an effort to balance earthwork quantities. As is the case with every project, contingencies should be made to adjust the earthwork balance when grading is in-progress and actual conditions are better defined.

TABLE 5-2
Earthwork Adjustment Factors

Geologic Unit	Adjustment Factor Range	Average
Artificial Fill – Undocumented/Alluvium	Shrink 2% to 6%	4%
Pauba Formation	Shrink 0% to 4%	2%

5.1.7 Chemical Analyses

Chemical testing was performed on samples of material collected during our investigation and the previous investigation. Soluble sulfate test results indicate that the soluble sulfate concentrations of the soils tested are classified as negligible (Class S0) per ACI 318-14.

Negligible chloride levels were detected in the onsite soils. Resistivity testing conducted as part of this investigation, indicates that the soils are "mildly corrosive to corrosive" to buried metals (per Romanoff, 1989). Additional discussions on corrosion are presented in Section 7.9. Corrosion tests results are presented in Appendix C and C-1.

5.2 Engineering Analysis

Presented below is a general discussion of the engineering analysis methods that were utilized to develop the conclusions and recommendations presented in this report.

5.2.1 Bearing Capacity and Lateral Earth Pressures

Ultimate bearing capacity values were obtained using the graphs and formula presented in NAVFAC DM-7.1. Allowable bearing was determined by applying a factor of safety of at least 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.

5.2.2 Slope Stability

Slope stability analyses were performed using STEDwin in conjunction with GSTABL7V2 computer code. Slope stability analyses have been conducted on anticipated cut slopes. Slope stability calculation results are presented in Appendix D.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on Alta's findings during our subsurface investigation, the laboratory test results, the previous investigation and our staff's experience in the area, it is Alta's opinion that the development of the site is feasible from a geotechnical perspective. Presented below are recommendations that should be incorporated into site development and construction plans.

6.1 Remedial Grading Recommendations

All grading shall be accomplished under the observation and testing of the project geotechnical consultant in accordance with the recommendations contained herein and the City of Murrieta criteria.

6.1.1 Site Preparation

Vegetation, construction debris, and other deleterious materials are unsuitable as structural fill material and should be disposed of off-site prior to commencing grading/construction. Any septic tanks, seepage pits or wells should be abandoned as per the County of Riverside Department of Health Services.

6.1.2 Unsuitable Soil Removals

Presented below are the unsuitable soil removal recommendations for the onsite geologic units below the proposed building pads. Removal bottoms should be observed by the Project Geotechnical Consultant to make a final determination that suitable, competent soils have been exposed. Removals should be completed as per Plate G-1 and G-2 (Appendix G). Anticipated removal depths are shown on the attached Plate 1. In general, removals shall expose competent alluvium or Pauba Formation.

6.1.2.1 Undocumented Artificial Fill (Map symbol afu)

The undocumented artificial onsite is compressible. As such, it is anticipated that this unit will require complete removal and recompaction to project specifications prior to fill placement. It is anticipated that removal depths will range from five (5) to seven (7) feet, with possible deeper localized areas.

6.1.2.2 Alluvium (Map Symbol Qal)

The uppermost portion of alluvium onsite is subject to hydro-collapse. As such, it is anticipated that this unit will require partial removal and recompaction to project specifications prior to fill placement. It is anticipated that removal depths in this unit will be three (3) to sixteen (16) feet.

6.1.2.3 Pauba Formation (Map Symbol Qps)

The highly weathered portions of the Pauba Formation are unsuitable to support the proposed fills and/or structures and should be removed and recompacted to project specifications. It is anticipated that the upper two (2) to three (3) feet will require removal and recompaction to project specifications prior to fill placement.

6.1.3 Over-Excavation of Building Pads

6.1.3.1 Cut/Fill Transition Pads

Where cut/fill transitions occur across building pads, Alta recommends that the cut and shallow fill portions be over-excavated and replaced with compacted fill in order to provide uniform bearing conditions.

The depth of the over-excavation should provide a minimum of three (3) feet of fill beneath the building and sufficiently deep to

provide a minimum thickness of 1/3 of the maximum fill thickness beneath the building envelop, as shown on Plate G-16 (Appendix G).

The undercuts should be extended at least five (5) feet outside of perimeter footings. The proposed undercuts should be graded such that a gradient of at least one (1) percent is maintained towards deeper fill areas or toward the front of the pad. The final extent of the undercut should be verified in the field during grading. Replacement fills should be compacted to project specifications as discussed in Section 6.2.1.

6.1.3.2 Cut Pads

Alta recommends that the cut pads underlain by Pauba Formation should be over-excavated and replaced with compacted fill in order to facilitate improvement construction. The depth of the over-excavation should provide a minimum of three (3) feet of fill beneath the building pad. The undercuts should be extended at least five (5) outside of perimeter footings. The proposed undercuts should be graded such that a gradient of at least one (1) percent is maintained towards the front of the pad or toward deeper fill areas if present. The final extent of the undercut should be verified in the field during grading. Replacement fills should be compacted to project specifications as discussed in Section 6.2.1.

6.1.4 Over-Excavation of Street Areas

Deeper excavations within the Pauba Formation may encounter slow production rates due to the density of the unit, although it is anticipated that conventional heavy equipment can excavate these deposits. These potential slower production rates should be taken into consideration in determining if over-excavation of streets is beneficial. Consideration should be given to undercutting underground utility and storm drain zones to at least one (1) foot below the deepest utility within Pauba Formation areas in order to facilitate the construction of these improvements.

6.2 General Earthwork Recommendations

6.2.1 Compaction Standards

All fill and processed natural ground shall be compacted to a minimum relative compaction of 90 percent, as determined by ASTM Test Method: D-1557. Fills below subdrains, should be compacted to a minimum relative compaction of 93 percent, as determined by ASTM Test Method: D-1557, as detailed on Plate G-16 (Appendix G).

Fill material should be moisture conditioned to optimum moisture or above, and as generally discussed in Alta's Earthwork Specification Section presented in Appendix F. Compaction shall be achieved with the use of sheepsfoot rollers or similar kneading type equipment. Mixing and moisture conditioning will be required in order to achieve the recommended moisture conditions.

6.2.2 Groundwater/Seepage

It is anticipated that groundwater will not be encountered during construction of the project. It is possible that perched water conditions could be encountered depending on the time of year construction occurs.

6.2.3 Expansive Soils

As noted in Section 5.1.5, there are medium to high expansive soils onsite, particularly in the claystone layers shown on the boring logs. It is recommended that medium expansive soil be placed at least five (5) feet below finished pad grade and highly expansive material be placed at least seven (7) feet below finished pad grade to reduce costs on foundation design. Alternately, the foundations may be designed for the expansive material.

Expansive material can also be placed as engineered fill outside the building footprints, provided the improvement design recommendations presented in Section 7.0 are implemented.

6.2.4 Documentation of Removals

All removal/over-excavation bottoms should be observed and approved by the project Geotechnical Consultant prior to fill placement. Consideration should be given to surveying the removal bottoms and undercuts after approval by the geotechnical consultant and prior to the placement of fill. Staking should be provided in order to verify undercut locations and depths.

6.2.5 Treatment of Removal Bottoms

At the completion of removals/over-excavation, the exposed removal bottom should be ripped to a minimum depth of eight (8) inches, moisture-conditioned to above optimum moisture content and compacted in-place to the project standards.

6.2.6 Fill Placement

After removals, scarification, and compaction of in-place materials are completed, additional fill may be placed. Fill should be placed in eight-inch bulk maximum lifts, moisture conditioned to optimum moisture content or above, compacted and tested as grading/construction progresses until final grades are attained.

6.2.7 Moisture Content

The moisture content of the upper in-situ soils varies, as shown on the boring logs presented in Appendix B and B-1. Moisture conditioning should be anticipated during grading to achieve optimum or above conditions. Most soils will require the addition of water and mixing prior to placement as compacted fill.

6.2.8 Mixing

Mixing of materials may be necessary to prevent layering of different soil types and/or different moisture contents. The mixing should be accomplished prior to and as part of compaction of each fill lift.

6.2.9 Import Soils

Import soils, if necessary, 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. The project Geotechnical Consultant should be notified not less than 72 hours in advance of the locations of any soils proposed for import. Import sources should be sampled, tested, and approved by the project Geotechnical Consultant at the source prior to the importation of the soils to the site. The project Civil Engineer should include these requirements on plans and specifications for the project.

6.2.10 Fill Slope Construction

Fill slopes should be overfilled to an extent determined by the contractor, but not less than two (2) feet measured perpendicular to the slope face, so that when trimmed back to the compacted core a minimum 90 percent relative compaction is achieved.

Compaction of each fill lift should extend out to the temporary slope face. Back-rolling during mass filling at intervals not exceeding four (4) feet in height is recommended, unless more extensive overfilling is undertaken.

As an alternative to overfilling, fill slopes may be built to the finish slope face in accordance with the following recommendations:

1. Compaction of each fill lift should extend to the face of the slopes.
2. Back-rolling during mass grading should be undertaken at intervals not exceeding four (4) feet in height. Back-rolling at more frequent intervals may be required.
3. Care should be taken to avoid spillage of loose materials down the face of any slopes during grading. Spill fill will require complete removal prior to compaction, shaping, and grid rolling.
4. At completion of mass filling, the slope surface should be watered, shaped, and compacted by track walking with a D-8 bulldozer, or equivalent, such that compaction to project standards is achieved to the slope face.

Proper seeding and planting of the slopes should follow as soon as practical to inhibit erosion and deterioration of the slope surfaces. Proper moisture control will enhance the long-term stability of the finish slope surface.

6.2.11 Utility Trenches

6.2.11.1 Excavation

Utility trenches should be supported, either by laying back excavations or shoring, in accordance with applicable OSHA standards. In general, existing site soils are classified as Soil Type "B" per OSHA standards. Upon completion of the recommended removals and re-compaction, the artificial fill will be classified as Soil Type "B". The Project Geotechnical Consultant should be consulted if geologic conditions vary from what is presented in this report.

6.2.11.2 Backfill

Trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D-1557. Onsite soils will not be suitable for use as bedding material but will be suitable for use as 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. Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

Under-slab trenches should also be compacted to project specifications. If select granular backfill (SE > 30) is used, compaction by flooding will be acceptable.

6.2.12 Backcut Stability

Temporary backcuts, if required during unsuitable soil removals, should be made no steeper than 1:1 without review and approval of the geotechnical consultant. Flatter backcuts may be necessary where geologic conditions dictate and where minimum width dimensions are to be maintained.

Care should be taken during remedial grading operations in order to minimize risk of failure. Should failure occur, complete removal of the disturbed material will be required.

In consideration of the inherent instability created by temporary construction backcuts for removals, it is imperative that grading schedules are coordinated to minimize the unsupported exposure time of these excavations. Once started, these excavations and subsequent fill operations should be maintained to completion without intervening delays imposed by avoidable circumstances. In cases where five-day workweeks comprise a normal schedule, grading should be planned to avoid exposing at-grade or near-grade excavations through a non-work weekend. Where improvements may be affected by temporary instability, either on or offsite, further restrictions such as slot cutting, extending workdays, implementing weekend schedules, and/or other requirements considered critical to serving specific circumstances may be imposed.

6.3 Slope Stability

The following is a preliminary discussion of slope stability onsite, based on the Grading and Drainage Concept plan.

6.3.1 Fill Slopes

It is anticipated that fill slopes on the project will be designed at a slope ratio of 2:1 (horizontal:vertical) or flatter to vertical heights of up to approximately 29-feet. Fill slopes, when properly constructed with onsite materials, are expected to be grossly stable as designed. Stability calculations supporting this conclusion are presented in On Plates D-1 and D-2. Surficial slope stability is presented on Plate D-3. Keys should be constructed at the toe of all fill slopes towing on existing or cut grade. Fill keys should have a minimum width equal to fifteen (15) feet or one-half (1/2) the height of the ascending slope, whichever is greater.

Skin-fill slope conditions should be avoided. If these conditions exist or are created during grading, they should be evaluated. Typical remediation for skin fill conditions are shown on Plate G-11 (Appendix G).

6.3.2 Cut Slopes

The grading and drainage concept plan depicts proposed cut slopes at the site at a 2:1 (horizontal:vertical) or flatter for vertical heights up to approximately 25-feet. Alta anticipates that cut slopes will be primarily excavated in the Pauba Formation. We have performed a slope stability analysis on cut slopes and the results are presented on Plates D-4 and D-5. The calculations indicate that the proposed cuts slopes will be grossly stable.

All cut slopes should be observed during grading by the Project Geotechnical Consultant. If adverse bedding, fracture or joint patterns,

or other unstable geological conditions are exposed, then cut slopes may need to be replaced with a drained stabilization fill, as generally depicted on Plates G-8, G-9 and G-10 in Appendix G.

6.4 Storm Water Infiltration Systems

From a geotechnical perspective, allowing storm water to infiltrate the onsite soil in concentrated areas increases the potential for settlement, liquefaction, and water-related damage to structures/improvements, such as wet slabs or pumping subgrade, and should be avoided where possible. If infiltration systems are required on this site, care should be taken in designing systems that control the storm water as much as possible.

Preliminary infiltration testing was conducted at the site as part of this investigation, and the methodology is discussed in 3.2. The resulting infiltration rate for PH-1 was calculated to be 0.11-inches per hour. The results do not include a factor of safety. Test PH-1 was conducted in sand lenses of the Pauba Formation at approximately 30 feet below the ground surface. Six (6) Infiltration tests were previously conducted by Geocon, ranging in depth from approximately 15 to 20 feet below the ground surface. The results generated by Geocon were between 0.76 inches per hour to 10.03 inches per hour (Geocon, 2016).

Groundwater was not encountered during our investigation to a depth of approximately 46 feet below the ground surface. Ground water was encountered during the previous investigation in B-2, at approximately 15.9 feet below the ground surface. Nearby groundwater wells indicate that groundwater was deeper than 30-feet below the ground surface in 1968.

Based on our infiltration rate of the underlying soil and the infiltration rates from the previous investigation, infiltration-type WQMP's may be feasible for the project depending on the layering of the Pauba Formation. Variable rates are

expected. The Project Geotechnical Consultant should review the final WQMP design prior to construction

7.0 DESIGN CONSIDERATIONS

7.1 Structural Design

It is anticipated that multi-story, wood-framed residential structures with slab on-grade and shallow foundations will be constructed. Upon the completion of rough grading, finish grade samples should be collected and tested in order to provide specific recommendations as they relate to individual building pads. These test results and corresponding design recommendations should be presented in a final rough grading report. Final slab and foundation design recommendations should be made based upon specific structure sitings, loading conditions, and as-graded soil conditions.

It is anticipated that the majority of onsite soils will possess “very low” to “low” expansion potential when tested in general accordance with ASTM Test Method D: 4829 (See Section 6.2.4 for discussion on expansive soils). For budgeting purposes, the following foundation design requirements for a range of potential expansion characteristics are presented. If the medium to highly expansive soils are placed at grade, then alternate foundation design recommendations can be provided.

7.1.1 Foundation Design

Foundations may be preliminary designed based on the values presented in Table 7-1 below.

Table 7-1 Foundation Design Parameters*	
Allowable Bearing	2000 lbs/ft^2 (assuming a minimum embedment depth and width of 12 inches)
Lateral Bearing	250 lbs/ft^2 at a depth of 12 inches plus 250 lbs/ft^2 for each additional 12 inches of embedment to a maximum of 2000 lbs/ft^2.
Sliding Coefficient	0.30
Settlement	Static Settlement - 0.5 inches in 40 feet Dynamic Settlement - 0.5 inches in 40 feet

*These 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.

7.1.2 Conventional Foundation Systems

Based on the onsite soils conditions and information supplied by the 2019 CBC, conventional foundation systems may be designed in accordance with Tables 7-1 and 7-2.

TABLE 7-2 CONVENTIONAL FOUNDATION DESIGN PARAMETERS	
Expansion Potential	***Very Low to Low***
Soil Category	I
Design Plasticity Index	12
Minimum Footing Embedment	18 inches
Minimum Footing Width	12-inches-The structural engineer should determine the minimum footing width based on loading and the latest California Building Code.
Footing Reinforcement	No. 4 rebar, two (2) on top, two (2) on bottom
Slab Thickness	4 inches (actual)
Slab Reinforcement**	No. 3 rebar spaced 18 inches on center, each way
Under-Slab Requirement	See Section 7.2
Slab Subgrade Moisture	Minimum of 110% of optimum moisture to a depth of 12 inches prior to placing concrete.
Footing Embedment Adjacent 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 at least five- (5) feet is 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 under-slab treatment should be the same as the structure.

7.1.3 Post-Tensioned Slabs/Foundation Design Recommendations

Post-tensioned slabs for the project may be designed utilizing the parameters presented in Tables 7-1 and 7-3. The parameters presented herein are based on methodology provided in the Design of Post-Tensioned Slabs-On-Ground, Third Edition, by the Post-Tensioning Institute, in accordance with the 2019 CBC.

TABLE 7-3
POST-TENSION SLAB DESIGN PARAMETERS

Category	Expansion Potential	Minimum Embedment*	Edge Lift		Center Lift	
			Em (ft)	Ym (inch)	Em (ft)	Ym (inch)
I	Very Low to Low	12 inches	5.4	0.61	9.0	0.26
Slab Subgrade Moisture						
Category I	Minimum 110% of optimum moisture to a depth of 12 inches prior to pouring concrete					
Embedment* The minimum outer footing embedment presented herein are based on expansion indexes. The structural engineer should verify the minimum embedment based on the number of floors supported by the footings, the structural loading, and the requirements of the latest California Building Code. If mat slabs are utilized, alternate embedment depths can be provided.						
Moisture Barrier A moisture barrier should be provided in accordance with the recommendations presented in Section 7.2						
The parameters presented herein are based on procedures presented in the Design of Post-Tensioned Slabs-On-Ground, Third Edition. No corrections for vertical barriers at the edge of the slab, or for adjacent vegetation have been assumed. The design parameters are based on a Constant Suction Value of 3.9 pF.						

7.2 Moisture Barrier

A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive and should be capable of effectively preventing the migration of water and reducing the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as Visqueen, placed between two to four inches of clean sand, has been used for this purpose. The use of this system or other systems can be considered, at the discretion of the designer, provided the system reduces the vapor transmission rates to acceptable levels.

7.3 Seismic

In accordance with the requirements in Section 11.4.8 of ASCE 7-16 for sites with Site Class D and S1 values greater than 0.2, Alta has performed a site-specific ground motion analysis for the subject project. The analysis was performed in accordance with Chapter 21 of ASCE 7-16, the 2019 CBC, and the 2014 USGS Ground Acceleration Maps. The USGS Unified Hazard Tool (https://earthquake.usgs.gov/hazards/interactive/index.php) and the USGS National Seismic Hazard Map source model was utilized to perform the analysis.

The site class was determined based on the referenced reports and published geologic maps in the area in general conformance with Chapter 20 of ASCE 7-16. Based on density of the underlying soil, a Site Class of D was selected (shear wave velocity of 259 m/s).

Probabilistic (MCER) ground motions were determined in accordance with Method 2 of Section 21.2.1 of ACE 7-16. The site specific MCER was taken as the lesser of the probabilistic and deterministic ground motions.

The design response spectrum was determined per Section 21.3 of ASCE 7-16. Design acceleration parameters were determined per Section 21.4 of ASCE 7-16 and the results are presented in Table 7-4. These parameters should be verified by the structural engineer. Additional parameters should be determined by the structural engineer based on the Occupancy Category of the proposed structures.

TABLE 7-4 Seismic Ground Motion Values 2019 CBC and ASCE 7-16	
Parameter	*Value*
Site Class	D
Site Latitude	33.5567
Site Longitude	-117.1906
Spectral Response Acceleration Parameter, S_S	1.6
Spectral Response Acceleration Parameter, S_1	0.6
Site Coefficient, F_a	1.0
Site Coefficient, F_v (Per Table 11.4-2 of ASCE 7-16. Site Specific Parameters Govern)	1.7
Site Specific Parameters Per Chapter 21 of ASCE 7-16	
MCE Spectral Response Acceleration Parameter, S_{MS}	1.770
MCE Spectral Response Acceleration Parameter, S_{M1}	1.734
Design Spectral Response Acceleration Parameter, S_{DS}	1.180
Design Spectral Response Acceleration Parameter, S_{D1}	1.156
Peak Ground Acceleration, PGA_M	0.78

7.4 Fence and Garden Walls

Block walls, if used, should be embedded a minimum of 2 feet below the lowest adjacent grade. Construction joints (not more than 20 feet apart) should be included in the block wall construction. Side yard walls should be structurally separated from the rear yard wall.

7.5 Footing Excavations

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. The Project Geotechnical Consultant should observe the footing

excavations prior to the placement of concrete to determine that the excavations are founded in suitably compacted material.

7.6 Retaining Wall Design

Retaining walls should be founded on engineered fill and should be backfilled with granular soils that allow for drainage behind the wall. Foundations may be designed in accordance with the recommendations presented in Table 7-1, above. Unrestrained walls, free to horizontally move 0.0005H (for dense cohesionless backfill), may be designed to resist lateral pressures imposed by a fluid with a unit weight determined in accordance with the Table 7-5 below. The table also presents design parameters for restrained (at-rest) retaining walls. These parameters may be used to design retaining walls that may be considered as restrained due to the method of construction or location (corner sections of unrestrained retaining walls).

TABLE 7-5
Equivalent Fluid Pressures for 90% Compacted Fill (Select Material)

Backfill	Active Pressure (psf/ft)	At-Rest Pressure (psf/ft)
Level	35	55

Per the requirements of the 2019 CBC, the seismic force acting on the retaining walls with backfill exceeding 6-feet in height may be resolved utilizing the formula $16H^2$ lb/lineal ft (H=height of the wall). This force acts at approximately 0.6H above the base of the wall. The seismic value can be converted as required by the retaining wall engineer. Retaining walls should be designed in general accordance with Section 1807A.2 of the 2019 CBC.

- Restrained retaining walls should be designed for “at-rest” conditions.
- The design loads presented in the above table are to be applied on the retaining wall in a horizontal fashion and as such friction between wall and retained soils should not be allowed in the retaining wall analyses.

- Additional allowances should be made in the retaining wall design to account for the influence of construction loads, temporary loads, and possible nearby structural footing loads.
- Select backfill should be granular, structural quality backfill with a Sand Equivalent of 20 or better and an ASCE Expansion Index of 20 or less. The backfill must encompass the full active wedge area. The upper one foot of backfill should be comprised of native on-site soils (see Plate A).
- The wall design should include waterproofing (where appropriate) and backdrains or weep holes for relieving possible hydrostatic pressures. The backdrain should be comprised of a 4-inch perforated PVC pipe in a 1 ft. by 1 ft., ¾-inch gravel matrix, wrapped with a geofabric. The backdrain should be installed with a minimum gradient of 2 percent and should be outletted to an appropriate location.
- No backfill should be placed against concrete until minimum design strengths are achieved.

It should be noted that the allowable bearing and lateral bearing values presented in Table 7-1 are based on level conditions at the toe. Modified design parameters can be presented for retaining walls with sloping condition at the toe. Other conditions should be evaluated on a case-by-case basis.

7.7 Exterior Slabs and Walkways

Exterior concrete slabs and walkways should be designed and constructed in consideration of the following recommendations.

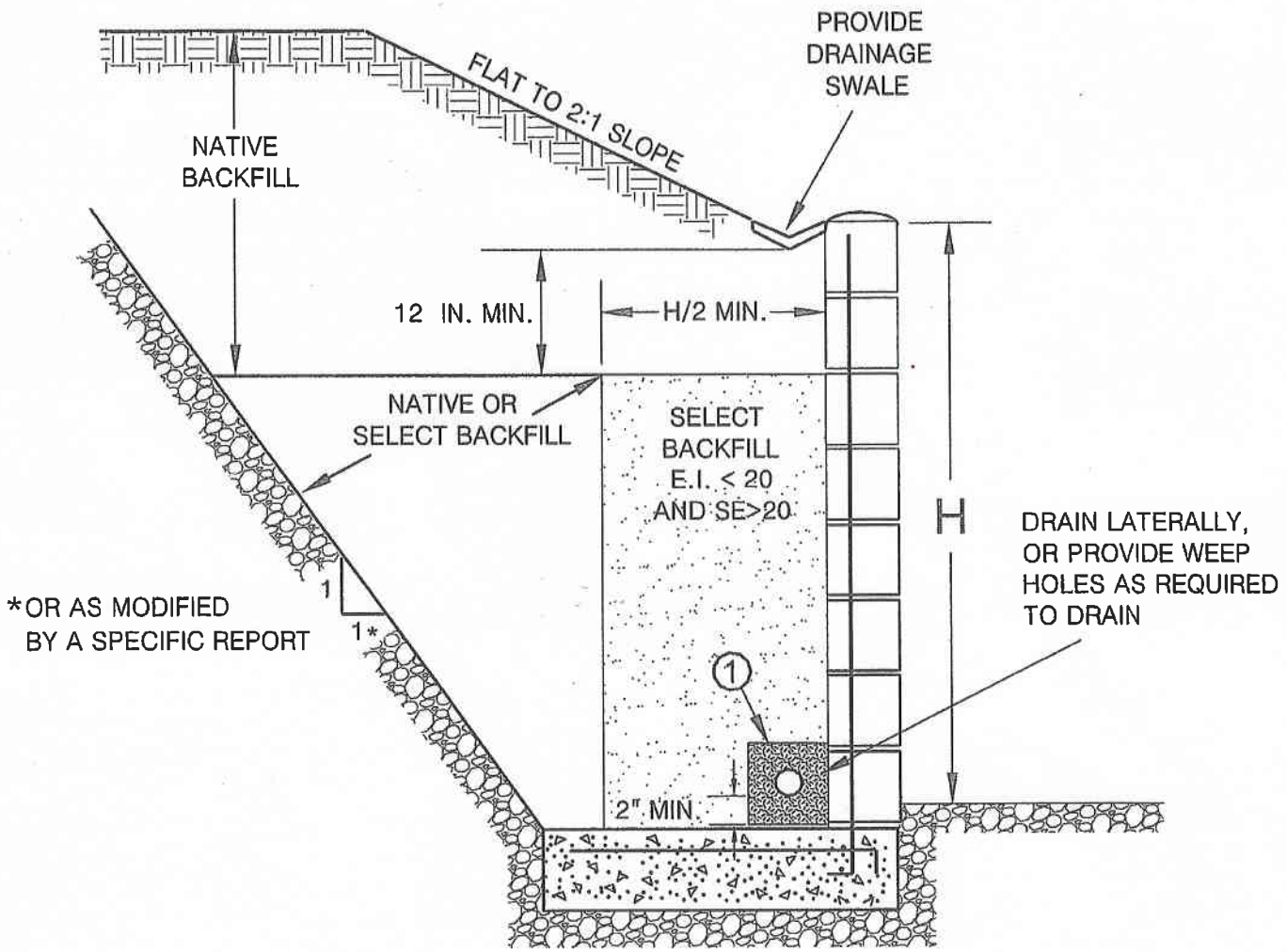
7.7.1 Subgrade Compaction

The subgrade below exterior concrete slabs should be compacted to a minimum of 90 percent relative compaction as determined by ASTM Test Method: D 1557.

7.7.2 Subgrade Moisture

The subgrade below concrete slabs should be moisture conditioned to a minimum of 110 percent of optimum moisture (very low to low expansion) or 120 percent of optimum moisture (medium expansion) prior to concrete placement.

RETAINING WALL BACKFILL DETAIL



(1)

PIPE: 4-INCH PERFORATED PVC, SCHEDULE 40, SDR35 OR APPROVED ALTERNATE MINIMUM 8 PERFORATIONS (1/4-IN. DIA.) PER LINEAL FT. IN BOTTOM HALF OF PIPE

ROCK: MINIMUM VOLUME OF 1 CU. FT. OF 3/4-IN. MAX. ROCK PER. LINEAL FOOT OF PIPE, OR APPROVED ALTERNATE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT

7.7.3 Concrete Slab Thickness

Concrete flatwork and driveways should be designed utilizing four-inch minimum thickness.

7.7.4 Concrete Slab Reinforcement

Consideration should be given to reinforcing flatwork with 6x6 W.14/W1.4 welded wire mesh or and equivalent section of rebar.

7.7.5 Control Joints

Weakened plane joints should be installed on walkways at intervals of approximately eight feet (maximum) or less. Exterior slabs should be designed to withstand shrinkage of the concrete.

7.8 Concrete Design

As stated in Section 5.1.7, negligible concentrations of sulfates were detected in the onsite soils. Therefore, the use of sulfate resistant concrete is not required per ACI 318-14 at this time. Post-grading conditions should be evaluated, and final recommendations made at that time.

7.9 Corrosion

Based on preliminary testing, the onsite soils are mildly corrosive to corrosive to buried metal objects. Buried ferrous metals should be protected against the effects of corrosive soils in accordance with the manufacturer's recommendations. Typical measures may include using non-corrosive backfill, protective coatings, wrapping, plastic pipes, or a combination of these methods. A corrosion engineer should be consulted if specific design recommendations are required by the improvement designer.

Per ACI 318-14, an exposure class of C1 would be applicable to metals encased in concrete (rebar in footings) due to being exposed to moisture from surrounding soils. Per Table 19.3.2.1 of ACI 318-14, the requirements for concrete with an exposure class of C1 are a minimum compressive strength of 2500 psi and a

maximum water-soluble chloride ion content in concrete of 0.30 (percent by weight of cement).

7.10 Pavement Design

It is our understanding that the pavement sections onsite may be composed of asphalt, concrete or concrete vehicular and pedestrian pavers. Presented herein are recommendations for all pavement types.

For all pavement types, the underlying subgrade soil should be suitably moisture conditioned, processed and compacted to a minimum 95 percent of the laboratory maximum density (ASTM: D 1557) to at least twelve (12) inches below subgrade. After subgrade compaction, the exposed grade should then be "proof"-rolled with heavy equipment to ensure the grade does not "pump" and is verified as non-yielding.

For the concrete paver pavement types, per the technical specifications provided by ICPI, an edge restraint should be provided along the perimeter of the pavers. The edge restraint should be constructed utilizing either precast concrete cut stone or poured concrete. It is recommended that construction traffic not be allowed to drive over the paver section if possible. Loading from construction traffic may cause distress in the pavers and require repair.

Preparation for compaction operations and pavement construction operations should be accomplished in accordance with the current requirements of the City of Murrieta and under the observation and testing of the project geotechnical consultant.

7.10.1 AC Pavement

Pavement sections for the proposed streets shall be designed based on laboratory testing conducted on samples taken from the soil subgrade. Preliminarily, based on a tested R-Value of 21, from the previous

investigation, the pavement may be designed utilizing the sections presented in Table 7-6. These sections should be verified upon the completion of grading, based on R-Value testing.

Table 7-6
Preliminary Pavement Sections

Traffic Index	Pavement Section Options OR	
5.0	3-inch AC on 7-inch AB	4-inch AC on 5-inch AB
5.5	3-inch AC on 9-inch AB	4-inch AC on 6.5-inch AB
6.0	3.5-inch AC on 9.5-inch AB	4-inch AC on 8.5-inch AB
AC-Asphalt Concrete AB-Caltrans Class II Base		

Aggregate base material should be placed on the compacted subgrade and compacted in-place to a minimum 95 percent of the laboratory standard obtained per ASTM: D 1557.

7.10.2 Concrete Pavement

The following concrete pavement design recommendations are suitable to support typical loads from fire trucks, trash trucks, etc. The pavement section can consist of six (6) inches of Portland Cement Concrete (PCC) underlain by a minimum of four (4) inches of aggregate base (AB). The PCC should have a minimum compressive strength of 3000 psi and control/expansion joints should be provided at intervals of approximately 8 feet or less. Dowels with a minimum diameter of ½-inch should be provided at the joints and spaced at 12-inches on center. The base underlying the concrete should be moisture-conditioned and compacted to a minimum of 95% of the laboratory maximum density (ASTM Test Method D 1557).

7.10.3 Vehicular Pavers

ICPI Technical Specification Number 4 presents design tables that may be utilized to calculate the paver section. The gradation of the leveling sand should conform to the paver manufacturer's specifications. Per the ICPI's specifications, the vehicular pavers should be a minimum of 80-mm thick. Presented below are two alternative paver sections that may be considered:

- Alternative 1: The pavement section can consist of the concrete pavers overlying a minimum of one (1) inch of leveling sand, over eight (8) inches of Caltrans Class II base (AB). The base should be moisture-conditioned and compacted to a minimum of 95% of the laboratory maximum density (ASTM Test Method D 1557). A geofabric with characteristics similar to Mirafi 500x or Tensar TriAx should be placed between the subgrade and the base to assist in preserving the load bearing capacity of the base over a greater length of time. Additionally, a 12-inch wide geofabric with similar characteristics to Mirafi 500x should be placed between the leveling sand and the base along the perimeter of the pavers and turned up at the curb. Maintenance of the pavers may be required when they are underlain by Class II base due to the potential for saturated subgrade conditions to occur. This potential could be reduced by contour grading the subgrade to flow towards a drainage pipe.
- Alternative 2: The pavement section can consist of the concrete pavers overlying a minimum of one (1) inch of leveling sand, over four (4) inches of Portland cement concrete (PCC). The PCC should have a minimum compressive strength of 3000 psi and control/expansion joints should be provided at intervals of approximately 8 feet or less. Dowels with a minimum diameter of ½-inch should be provided at the joints and spaced at 12-inches on center. The base underlying the concrete should be moisture-conditioned and compacted to a minimum of 95% of the laboratory maximum density (ASTM Test Method D 1557). A geofabric with similar characteristics to Mirafi 500x should be placed between the leveling sand and the base/concrete, and turned up at the edges, to prevent migration of the sand within the concrete joints.

7.10.4 Pedestrian Pavers

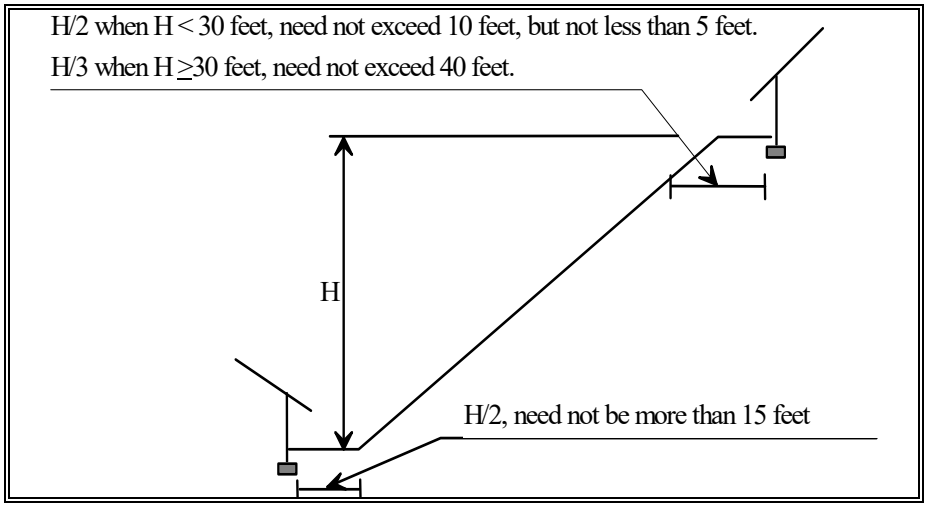
ICPI Technical Specification Number 4 presents design tables that may be utilized to calculate the paver section. The gradation of the leveling sand should conform to the paver manufacturer's specifications. Per the ICPI's specifications, the pedestrian pavers should be a minimum of 60-mm thick. The pavement section can consist of the concrete pavers overlying a minimum of one (1) inch of leveling sand, over four (4) inches of Caltrans Class II base (AB).

7.11 Site Drainage

Positive drainage away from the proposed structures should be provided and maintained. Roof, pad, and lot drainage should be collected and directed away from the structures toward approved disposal areas through drainage terraces, gutters, down drains, and other devices. Design fine grade elevations should be maintained through the life of the structure or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water, away from structures.

7.12 Deepened Footings and Setbacks

It is generally recognized that improvements constructed in proximity to properly constructed 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 setback 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 the following figure.



Consideration of these natural processes should be undertaken in the design and construction of other improvements. Homeowners are advised to consult with qualified geotechnical engineers, designers, and contractors in the design and construction of future improvements. Each lot and proposed improvement should be evaluated in relation to the specific site conditions, accounting for the specific soil conditions.

8.0 LOT MAINTENANCE

Ongoing maintenance of the improvements is essential to the long-term performance of structures. The following recommendations should be implemented.

8.1 Lot Drainage

Roof, pad and lot drainage should be collected and directed away from structures and slopes and toward approved disposal areas. Design fine grade elevations should be maintained through the life of the structure or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water, away from structures and slopes. Owners should be made aware that they are responsible for maintenance and cleaning of all drainage terraces, down drains, and other devices that have been installed to promote structure and slope stability.

8.2 Burrowing Animals

Owners should undertake a program for the elimination of burrowing animals.

9.0 FUTURE PLAN REVIEWS

This report represents a geotechnical review of the site. As the project design for the project progresses, site specific geologic and geotechnical issues should be considered in the design and construction of the project. Consequently, future plan reviews may be necessary. These reviews may include reviews of:

- Grading Plans
- Foundation Plans
- Utility Plans

These plans should be forwarded to the project Geotechnical Consultant for review.

10.0 CLOSURE

10.1 Geotechnical Review

For the purposes of this report, multiple working hypotheses were established for the project, utilizing the available data and the most probable model is used for the analysis. Future information collected during the proposed grading operations is intended to evaluate the hypothesis and as such, some of the assumptions summarized in this report may need to be changed. Some modifications of the grading recommendations may become necessary, should the conditions encountered in the field differ from the conditions hypothesized in this report.

Plans and sections of the project specifications should be reviewed by Alta 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 herein, Alta must be consulted regarding the applicability of the recommendations contained herein and whether any changes are required. Alta

accepts no liability for any use of its recommendations if the project description or final design varies and Alta is not consulted regarding the alterations.

10.2 Limitations

This report is based on the following: 1) the project as presented on the attached plans; 2) the information obtained from Alta's laboratory testing included herein; and 3) from the information presented in the referenced reports. The findings and recommendations are based on the results of the subsurface investigation, laboratory testing, and office analysis combined with an interpolation and extrapolation of conditions between and beyond the subsurface excavation locations. However, the materials adjacent to or beneath those observed may have different characteristics than those observed, and no precise representations are made as to the quality or extent of the materials not observed. The results reflect an interpretation of the direct evidence obtained. Work performed by Alta has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical 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 a geotechnical consultant who is 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.

The conclusions and recommendations included in 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 Alta.

Alta has no responsibility for construction means, methods, techniques, sequences, procedures, safety precautions, programs in connection with the construction, 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

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Riverside County Mapping Portal, https://gis.rivcoit.org/

APPENDIX B

Subsurface Investigation

APPENDIX B

Subsurface Investigation

Alta's subsurface investigation consisted of excavating, logging, and sampling twenty (20) hollow-stem auger borings. Details of the subsurface investigation are presented in Table B-1. The approximate locations of the exploratory excavations are shown on Plate 1 and the Geotechnical Logs are attached.

TABLE B-1
SURFACE INVESTIGATION DETAILS

Equipment	Range of Depths	Sampling Methods	Sample Locations
Hollow Stem Auger	Up to 46 feet	1. Bulk 2. Ring Samples	1. Bulk-Select Depth 2. Rings-Every 2.5 or 5 feet

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		grf	ltr	Description
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravel and Gravelly Soils: More than 50% of coarse fraction retained on No. 4 sieve		GW	Well-graded gravels or gravel sand mixtures, little or no fines
			GP	Poorly-graded gravels or gravel sand mixture, little or no fines
			GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sand and Sandy Soils: More than 50% of coarse fraction passes on No. 4 sieve		SW	Well-graded sands or gravelly sands, little or no fines
			SP	Poorly-graded sands or gravelly sands, little or no fines
			SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, and-clay mixtures

Major Divisions		grf	ltr	
Fine Grained Soils: More than 50% passes on No. 200 sieve	Silts And Clays LL,<50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silt-clays of low plasticity
	Silts And Clays LL,<50		MH	Inorganic silts, micaceous or diatomaceous fine or silty soils, elastic silts
			VH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat and other highly organic soils

BOUNDARY CLASSIFICATION: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENINGS			
200	40	10	4	3/4"	3"	12"	
Silts and Clays	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

RELATIVE DENSITY

Sands and Gravels	Blows/Foot (SPT)
Very Loose	<4
Loose	4-10
Medium Dense	11-30
Dense	31-50
Very Dense	>50

CONSISTENCY CLASSIFICATION

Silts and Clays	Criteria
Very Soft	Thumb penetrates soil >1 in.
Soft	Thumb penetrates soil 1 in.
Firm	Thumb penetrates soil 1/4 in.
Stiff	Readily indented with thumbnail
Very Stiff	Thumbnail will not indent soil

HARDNESS

Bedrock
Soft
Moderately Hard
Hard
Very Hard

LABORATORY TESTS

Symbol	Test
DS	Direct Shear
DSR	Direct Shear (Remolded)
CON	Consolidation
SA	Sieve Analysis
MAX	Maximum Density
RV	Resistance (R) Value
EI	Expansion Index
SE	Sand Equivalent
AL	Atterberg Limits
CHEM	Chemical Analysis
HY	Hydrometer Analysis

SOIL MOISTURE

Increasing Visual Moisture Content

Dry - Dry to touch

Moist - Damp, but no visible free water

wet - Visible free water

SIZE PROPORTIONS

Trace - <5%

Few - 5 to 10%

Some - 15 to 25%

KEY TO EXPLORATORY BORING LOGS

ALTA CALIFORNIA GEOTECHNICAL INC.

PLATE B

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/27/21	GROUND ELEV.	1151	BORING DESIG.	BH-01
DATE FINISHED	9/27/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	1150					**PAUBA FORMATION**(Qps): SILTY SANDSTONE, very fine to fine grained, tannish brown, dry, medium dense.				
5	1145	R	77 for 11"			@5.0ft. very dense.	3.5	122	26	
10	1140	R	86 for 10"			@ 10.0ft. moist.	7.5	126	64	
15	1135	R	90 for 9"			@15.0ft. very fine to medium grained, slightly moist.	5.0	122	37	
20	1130	R	126 for 17"			@20.0ft. SANDSTONE, very fine to coarse grained, grayish brown, dry, very dense.	5.0	110	26	
25	1125	R	92 for 9"			@25.0ft. SANDY SILTSTONE, very fine, brown, dry, very stiff. @25.5ft. SANDSTONE, fine to coarse grained, gray, dry, dense.	4.5	109	23	
						TOTAL DEPTH 26.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-1

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/27/21	GROUND ELEV.	1144	BORING DESIG.	BH-02
DATE FINISHED	9/27/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
						PAUBA FORMATION(Qps): SILTY SANDSTONE, very fine to fine grained, tannish brown, dry, medium dense.				
	1140									
5		R	40			@5.0ft. SANDSTONE, fine to coarse grained, grayish brown, dry, dense.	2.1	113	12	
						@6.0ft. medium to coarse grained.				
	1135									
10		R	61			@10.0ft. tannish gray, very dense, few fine gravel <3/4".	2.7	109	14	
	1130									
15		R	47			@15.0ft. CLAYEY SANDSTONE, very fine grained, brown with orange mottling, moist, dense.	12.8	122	94	
	1125									
20		R	46			@20.0ft. very fine to fine grained.	14.8	115	90	
	1120									
25		R	82			@25.0ft. SANDSTONE, coarse grained, tannish gray, dry, very dense, few fine gravel <3/4".	3.9	109	20	
						TOTAL DEPTH 26.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-2

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/27/21	GROUND ELEV.	1144	BORING DESIG.	BH-03
DATE FINISHED	9/27/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
						PAUBA FORMATION(Qps): SILTY SANDSTONE, very fine to medium grained, tannish brown, dry, medium dense.				
						@2.0ft. SANDSTONE, medium to coarse grained, tannish gray, dry, dense.				
	1140									
5		R	74			@5.0ft. SILTY SANDSTONE, very fine grained, brownish tan, moist, very dense.	11.0	119	75	
	1135									
10		R	47			@10.0ft. SANDSTONE, fine grained, grayish tan, moist, dense.	7.1	105	32	
	1130									
15		R	84			@15.0ft. very fine to fine grained, brown with trace orange mottling, dry, very dense.	2.1	114	12	
	1125									
20		R	85			@20.0ft. fine to coarse grained.	2.6	113	15	
	1120									
25		R	97 for 11"			@25.0ft. very fine to fine grained, grayish tan.	3.7	105	17	
						TOTAL DEPTH 26.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-3

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/27/21	GROUND ELEV.	1180	BORING DESIG.	BH-04
DATE FINISHED	9/27/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	1180					**PAUBA FORMATION**(Qps): SILTY SANDSTONE, very fine to fine grained, tannish brown, dry, dense.				
5	1175									
10	1170	R	46			@10.0ft. very fine grained, slightly moist.	6.1	118	40	
15	1165									
20	1160	R	50 for 5"			@20.0ft. SANDSTONE, fine to coarse grained, gray, moist, very dense, few fine gravel <3/4".	22.4	94	79	
25	1155									
30	1150	R	76 for 11"			@30.0ft. fine grained, tan.	9.3	119	63	
35	1145	R	50 for 5"				6.1	103	27	
	1140					Continued.				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-4

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/27/21	GROUND ELEV.	1180	BORING DESIG.	BH-04
DATE FINISHED	9/27/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	1140	R	65			**PAUBA FORMATION**(Qps): Continued; NO RECOVERY.				
						TOTAL DEPTH 42.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-4

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/27/21	GROUND ELEV.	1176	BORING DESIG.	BH-05
DATE FINISHED	9/27/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
0	1175					**PAUBA FORMATION**(Qps): SANDSTONE, very fine to coarse grained, tan, dry, dense.				
						@2.0ft. brown, moist.				
5	1170					@5.0ft. CLAYSTONE, brown, moist, hard.				
						@8.0ft. SANDSTONE, very fine grained, brown, moist, very dense.				
10	1165	R	75 for 11"			@10.0ft. fine to coarse grained, tan, slightly moist, very dense.	9.4	116	59	
15	1160									
20	1155	R	32			@20.0ft. CLAYEY SANDSTONE, fine to coarse grained, brown, moist, dense.	17.3	110	91	
25	1150	R	36				14.6	119	98	
30	1145	R	57			@30.0ft. yellow brown, very dense.	13.0	123	99	
35	1140	R	82 for 11"			@35.0ft. SANDSTONE, coarse grained, gray, dry, very dense, few fine gravel <3/4".	7.6	112	43	
						TOTAL DEPTH 36.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-5

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/27/21	GROUND ELEV.	1187	BORING DESIG.	BH-06
DATE FINISHED	9/27/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
0	1187					**PAUBA FORMATION**(Qps): SILTY SANDSTONE, very fine to fine grained, tan brown, dry, dense, few fine to coarse gravel <3".				
	1185					@1.0ft. SANDSTONE, very fine grained, yellow tan, dry, dense.				
5		R	79 for 11"			@5.0ft. very dense, moist.	14.6	110	76	
	1180									
10										
	1175									
15		R	80 for 11"				5.7	118	38	
	1170									
20										
	1165									
25		R	79 for 10"			@25.0ft. very fine to fine grained.	12.9	120	89	
	1160									
30		R	92			@30.0ft. GRAVELLY SANDSTONE, coarse grained, gray, dry, very dense, fine gravel <3/4".	1.7	104	8	
	1155									
35		R	71			@35.0ft. SANDSTONE, coarse grained, orange gray, dry, very dense.	4.2	101	18	
						TOTAL DEPTH 36.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-6

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/27/21	GROUND ELEV.	1177	BORING DESIG.	BH-07
DATE FINISHED	9/27/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
						PAUBA FORMATION(Qps): SILTY SANDSTONE, very fine to medium grained, reddish brown, dry, dense, some coarse gravel <3".				
	1175									
5		R	35			@5.0ft. SANDSTONE, fine to coarse grained, orange brown, moist, dense.	6.8	119	47	
	1170									
10										
	1165									
15		R	82 for 11"				12.8	108	64	
	1160					@16.0ft. very fine to fine grained, yellow brown.				
20						@20.0ft. brown.				
	1155									
25		R	79 for 11"			@25.0ft. fine grained, brown with orange mottling, moist, some silt.	9.6	127	83	
	1150									
30		R	69			@30.0ft. CLAYEY SANDSTONE, very fine to fine grained, brown, moist, very dense.	11.0	112	62	
	1145									
35		R	27			@35.0ft. SILTY CLAYSTONE, brown, moist, very stiff.	32.4	85	91	
						TOTAL DEPTH 36.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-7

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/27/21	GROUND ELEV.	1182	BORING DESIG.	BH-08
DATE FINISHED	9/27/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
0	1180					**PAUBA FORMATION**(Qps): SANDSTONE, fine to coarse grained, slightly reddish brown, dry, dense, some fine gravel <3/4", trace silt.				
5	1175					@8.0ft. reddish brown.				
10		R	60			@10.0ft. reddish brown and gray, very dense.	4.9	123	38	
15	1170					@14.0ft. dark reddish brown.				
20	1165					@19.0ft. some coarse gravel <3".				
		R	54			@20.0ft. medium to coarse grained, light orange gray, very dense.	3.4	106	16	
25	1160	R	32			@25.0ft. SILTY SANDSTONE, very fine grained, brown, moist, dense.	14.2	116	88	
30	1155	R	36			@30.0ft. SANDY CLAYSTONE, very fine grained, brown, moist, very stiff	23.2	101	96	
35	1150	R	20				24.9	95	90	
	1145					Continued.				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-8

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/27/21	GROUND ELEV.	1182	BORING DESIG.	BH-08
DATE FINISHED	9/27/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
		R	34			**PAUBA FORMATION**(Qps): Continued; tannish brown with orange mottling.	19.4	107	95	
						TOTAL DEPTH 41.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-8

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/28/21	GROUND ELEV.	1186	BORING DESIG.	BH-09
DATE FINISHED	9/28/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
0	1185					**PAUBA FORMATION**(Qps): SANDSTONE, fine to coarse grained, slightly reddish brown, dry, dense, some fine gravel <3/4", trace silt.				
5	1180					@7.0ft. reddish brown.				
10	1175									
15	1170					@14.0ft. medium to coarse grained.				
20	1165					@19.0ft. coarse grained.				
25	1160					@22.0ft. SILTY CLAYSTONE, brown, slightly moist, stiff.				
30	1155	R	30			@26.0ft. SILTY SANDSTONE, very fine to fine grained, tan, dry, dense.				
35	1150	R	74 for 11"			@30.0ft. SANDY SILTSTONE, brownish tan with orange mottling, moist, stiff, few clay.	17.0	113	97	DS, HY
						@35.0ft. fine grained, grayish brown, very dense.	12.1	117	78	
						Continued.				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOONG) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-9

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/28/21	GROUND ELEV.	1186	BORING DESIG.	BH-09
DATE FINISHED	9/28/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	1145	R	59			**PAUBA FORMATION**(Qps): Continued; SANDSTONE, coarse grained, tannish gray, dry, very dense, trace fine gravel <3/4", NO RECOVERY	3.1	104	14	
45	1140	R	64							
						TOTAL DEPTH 46.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-9

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/28/21	GROUND ELEV.	1150	BORING DESIG.	BH-10
DATE FINISHED	9/28/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	1150				SM	**ARTIFICIAL FILL-UNDOCUMENTED**(afu): SILTY SAND, very fine to fine grained, grayish brown, dry, medium dense, few roots.				
		R	82 for 11"			**PAUBA FORMATION**(Qps): SILTY SANDSTONE, very fine to medium grained, brown, slightly moist, very dense.	6.8	125	57	
		B								
5	1145	R	59			@5.0ft. moderately porous.	5.5	112	31	
10	1140	R	31			@10.0ft. SANDSTONE, very fine to medium grained, tannish brown, slightly moist, dense some silt.	6.4	117	41	
						@13.0ft. SILTY SANDSTONE, very fine to fine grained, reddish brown, slightly moist, medium dense.				
15	1135	R	27			@15.5ft. CLAYEY SANDSTONE, medium to coarse grained, grayish brown, moist, medium dense.	20.9	104	94	
20	1130	R	67			@20.0ft. SANDSTONE, coarse grained, tan, slightly moist, very dense.	7.3	106	35	
25	1125	R	72				7.0	112	39	
						TOTAL DEPTH 26.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-10

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/28/21	GROUND ELEV.	1140	BORING DESIG.	BH-11
DATE FINISHED	9/28/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	1140				SM	**ARTIFICIAL FILL-UNDOCUMENTED**(afu): SILTY SAND, very fine to fine grained, brown, dry, medium dense, few fine to coarse gravel <3", few roots.				
		R	63			**PAUBA FORMATION**(Qps): SILTY SANDSTONE, very fine to medium grained, brown, slightly moist, very dense.	5.2	113	29	
5	1135	R	49			@5.0ft. trace clay.	7.3	130	70	
10	1130	R	38			@10.0ft. CLAYEY SANDSTONE, very fine to medium grained, orange brown, moist, dense.	15.8	115	96	
15	1125	R	58			@15.0ft. SILTY SANDSTONE, very fine to fine grained, orange brown, moist, very dense.	12.7	121	93	
20	1120	R	79 for 11"			@20.0ft. SANDSTONE, fine to coarse grained, tan, slightly moist, very dense.	6.9	104	31	
25	1115	R	80			@25.0ft. some fine gravel <3/4", NO RECOVERY.				
						TOTAL DEPTH 26.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-11

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/28/21	GROUND ELEV.	1122	BORING DESIG.	BH-12
DATE FINISHED	9/28/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
0	1120	B			ML	**ARTIFICIAL FILL-UNDOCUMENTED**(afu): SANDY SILT, tan, dry, firm to stiff. @1.0ft. very fine grained, medium dense.				MAX, EI, HY, CHEM, DSR CON, HY
5		R	82 for 11"			**PAUBA FORMATION**(Qps): SANDY SILTSTONE, very fine grained, tan, slightly moist, very stiff, few calcium carbonates.	8.8	122	66	
10	1115	R	90 for 10"				7.3	129	69	
15	1110	R	30			@15.0ft. CLAYEY SANDSTONE, very fine grained, gray and brown, moist, dense.	10.2	117	66	
20	1105	R	75 for 11"			@20.0ft. SILTY SANDSTONE, very fine grained, brown, moist, very dense.	11.3	123	87	
25	1100	R	29			@25.0ft. SANDSTONE, fine grained, orange, slightly moist, medium dense.	6.7	108	34	
						TOTAL DEPTH 26.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-12

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/28/21	GROUND ELEV.	1152	BORING DESIG.	BH-13
DATE FINISHED	9/28/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
0					SM	**ARTIFICIAL FILL-UNDOCUMENTED**(afu): SILTY SAND, very fine to fine grained, tannish brown, dry, medium dense , with roots.				
	1150					@1.0ft. very fine grained, tan.				
5		R	31				7.4	111	40	
						PAUBA FORMATION(Qps): SILTY SANDSTONE, very fine to medium grained, gray brown, slightly, dense.				
	1145									
10		R	34			@10.0ft. very fine to fine grained, dark brown.	6.9	117	45	
	1140									
15		R	13			@15.0ft. CLAYEY SANDSTONE, very fine to medium grained, dark brown, moist, medium dense, few pores.	9.0	123	69	
	1135									
20		R	36			@20.0ft. SANDSTONE, very fine to medium grained, tan and brown, moist, dense, some silt.	6.7	117	43	
	1130					@21.0ft. fine to coarse grained, gray.				
						@23.0ft. SILTY SANDSTONE, very fine to medium grained, orange brown, slightly moist, dense, few pores.				
25		R	45			@25.5ft. SANDSTONE, fine to coarse grained, orange tan, slightly moist, dense.	6.7	114	39	
						TOTAL DEPTH 26.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-13

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/28/21	GROUND ELEV.	1160	BORING DESIG.	BH-14
DATE FINISHED	9/28/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	1160					**PAUBA FORMATION**(Qps): SANDSTONE, very fine to medium grained, grayish tan, dry, dense, few fine gravel <3/4", few roots.				
		R	36			@2.5ft. brown, slightly moist, moderately porous.	6.6	114	38	
5	1155	R	42				6.6	123	51	
10	1150	R	69			@10.0ft. coarse grained, tannish gray, dry, very dense.	2.7	113	15	
15	1145	R	57			@15.0ft. fine grained, yellow.	4.8	112	26	
20	1140	R	80 for 11"			@20.0ft. fine to coarse grained, gray.	2.6	102	11	
25	1135	R	79 for 11"			@25.0ft. NO RECOVERY.				
						TOTAL DEPTH 26.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-14

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/28/21	GROUND ELEV.	1159	BORING DESIG.	BH-15
DATE FINISHED	9/28/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	**ARTIFICIAL FILL-UNDOCUMENTED**(afu): SILTY SAND, very fine to medium grained, tannish brown, dry, medium dense, few roots.				
	1155									
5		R	19			**PAUBA FORMATION**(Qps): SILTY SANDSTONE, fine to medium grained, brown, dry, medium dense, moderately porous.	4.0	110	21	
	1150									
10		R	32			@10.0ft. SANDY SILTSTONE w/CLAY, dark brown, moist, stiff, trace fine gravel <3/4".	11.2	129	104	CON, HY
	1145									
15		R	76			@15.0ft. SANDSTONE, fine to medium grained, orange tan, slightly moist, very dense.	5.0	116	31	
						TOTAL DEPTH 16.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-15

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/28/21	GROUND ELEV.	1166	BORING DESIG.	BH-16
DATE FINISHED	9/28/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	1165					**PAUBA FORMATION**(Qps): SILTY SANDSTONE, very fine to coarse grained, brown, dry, dense.				
		R	50			@2.5ft. NO RECOVERY.				
5		R	40			@ 5.0ft. slightly moist.	7.2	123	55	
	1160									
10		R	26			@10.0ft. very fine to fine grained, moist, medium dense, some clay.	11.8	118	78	
	1155									
15		R	52			@15.0ft. very dense.	9.6	125	79	
	1150					TOTAL DEPTH 16.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-16

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/29/21	GROUND ELEV.	1148	BORING DESIG.	BH-17
DATE FINISHED	9/29/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	**ALLUVIUM**(Qal): SILTY SAND, very fine to medium grained, tan, dry, dense.				
	1145	R B	38				3.4	114	20	MAX, EI, HY, CHEM, DSR
5		R	16			@5.0ft. very fine to medium grained, brown, dry, medium dense, moderately porous.	3.8	109	19	
	1140									
10		R	23		SP	@10.0ft. SAND, very fine to medium grained, brown, slightly moist, medium dense, trace fine gravel <3/4".	6.0	119	41	
	1135									
15		R	33			**PAUBA FORMATION**(Qps): SANDSTONE, very fine to medium grained, brown, slightly moist, dense.	6.3	125	52	
	1130									
20		R	80 for 11"			@20.0ft. very fine to fine grained, tan, very dense, trace silt.	5.7	117	37	
						TOTAL DEPTH 21.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-17

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/29/21	GROUND ELEV.	1124	BORING DESIG.	BH-18
DATE FINISHED	9/29/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
						PAUBA FORMATION(Qps): SANDSTONE, fine to coarse grained, tan, dry, dense, trace debris.				
		R	45			@2.5ft. very fine to fine grained, brown, some silt.	4.1	118	27	
	1120									
5		R	76			@5.0ft. very dense, some silt, trace pores.	5.5	132	58	
	1115									
10		R	84 for 11"			@10.0ft. SILTY SANDSTONE, very fine grained, tan, slightly moist, very dense, few calcium carbonates.	6.7	121	49	
	1110									
15		R	80 for 11"			@ 15.0ft. moist.	14.2	111	76	
						TOTAL DEPTH 16.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-18

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/29/21	GROUND ELEV.	1122	BORING DESIG.	BH-19
DATE FINISHED	9/29/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SP	**ARTIFICIAL FILL-UNDOCUMENTED**(afu): SAND, very fine to coarse grained, tan, dry, medium dense.				
	1120	R	49			**PAUBA FORMATION**(Qps): SANDSTONE, coarse grained, gray, dry, dense.	1.5	112	8	
5		R	75 for 10"			@5.0ft. very fine to medium grained, slightly moist.	5.4	118	36	
	1115									
10		R	80 for 11"			@10.0ft. some orange mottling, moist.	8.0	122	59	
	1110									
15		R	98 for 11"			@15.0ft. medium to coarse grained, dry.	3.3	110	17	
	1105									
20		R	89 for 11"				2.8	106	13	
						TOTAL DEPTH 21.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-19

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/29/21	GROUND ELEV.	1131	BORING DESIG.	BH-20
DATE FINISHED	9/29/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
	1130					**PAUBA FORMATION**(Qps): SANDSTONE, very fine to coarse grained, brown, dry, dense, some silt, roots.				
		R	69			@2.5ft. very fine to medium grained, slightly moist, trace pores.	4.7			
5		R	72			@5.0ft. fine to coarse grained, brown with orange mottling.	5.9	116	37	
	1125									
10		R	79			@10.0ft. gray with orange mottling, dry.	2.8	108	14	
	1120									
15		R	90 for 11"			@15.0ft. gray.	1.8	104	8	
	1115									
20		R	63			@20.0ft. coarse grained, some fine gravel <3/4".	0.9	108	4	
	1110					TOTAL DEPTH 21.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-20

GEOTECHNICAL BORING LOG

PROJECT NO.	1-0410	PROJECT NAME	The Terraces		
DATE STARTED	9/29/21	GROUND ELEV.	1140	BORING DESIG.	PH-01
DATE FINISHED	9/29/21	GW DEPTH (FT)		LOGGED BY	JC
DRILLER	2R Drillng Inc.	DRIVE WT.	140lbs.	NOTE	
TYPE OF DRILL RIG	8" Hollow Stem Auger	DROP	30 in.		

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
0	1140					**PAUBA FORMATION**(Qps): SILTY SANDSTONE, very fine to fine grained, tannish brown, dry, medium dense.				
						@4.0ft. very dense.				
5	1135									
						@13.0ft. very fine to medium grained.				
10	1130									
						@17.0ft. SANDSTONE, very fine to coarse grained, grayish brown, dry, dense.				
15	1125									
						@21.0ft. medium to coarse grained, some silt, few calcium carbonates.				
20	1120									
						TOTAL DEPTH 30.0 FEET NO GROUNDWATER ENCOUNTERED NO CAVING OBSERVED				
25	1115									
30	1110									

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER
SEEPAGE
J: JOINTING C: CONTACT
B: BEDDING F: FAULT
S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0410 PLATE B-21

APPENDIX B-1

Previous Subsurface Investigation

(Geocon, 2016)

PROJECT NO. T2673-22-01

BORING B-1

ELEV. (MSL.) **1116** DATE COMPLETED **10/24/15**

EQUIPMENT **HOLLOW STEM AUGER** BY: **L.BATTIATO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B-1@0-5'			SM	**Undocumented Fill (afu)** Silty SAND, loose to medium dense, dry, strong brown; fine to medium sand			
2								
4	B-1@2.5'			SP-SM	SAND, dense, slightly moist, strong brown; fine to coarse sand; poorly graded; cohessionless; interlayered with yellow silty SAND	50/5"	108.8	4.8
6	B-1@5'				- Becomes moist, orange brown; locally massive	50/6"	116.3	6.7
8	B-1@7.5'				- Becomes strong brown; thin layered	72		
10	B-1@10'				- Becomes laminated	50/6"		
12				SM	**Pauba Formation (Qps)** Silty SANDSTONE, moist, strong brown; locally massive; fine-to medium-grained			
14								
16	B-1@15'				- Becomes yellow brown	22	117.3	5.6
18								
20	B-1@20'			SP-SM	SANDSTONE with silt, very dense, moist, strong brown; low cohession; medium-to coarse-grained	70		
					Total depth: 21.5' Groundwater not encountered Penetration resistance for 140 lb hammer falling 30" by drop Backfilled with native cuttings			

Figure A-1,
Log of Boring B-1, Page 1 of 1

T2673-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2673-22-01

BORING B-2

ELEV. (MSL.) **1124** DATE COMPLETED **10/24/15**

EQUIPMENT **HOLLOW STEM AUGER** BY: **L.BATTIATO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B-2@0-5'			SM	**Alluvium (Qal)** Silty SAND, dense (cemented), dry, strong brown; fine to medium sand			
2	B-2@2.5'				-Becomes medium dense	45	118.1	4.8
4								
6	B-2@5'					35	115.1	3.6
8	B-2@7.5'					19	115.2	4.0
10	B-2@10'			SW	**Pauba Formation (Qps)** Well graded SANDSTONE, moist, light yellow brown; fine-to coarse-grained; cuttings become olive brown; cohesionless	22	107.1	2.5
12								
14				SP	Poorly graded SANDSTONE, dense, wet, olive brown; coarse-grained			
16	B-2@15'		▽		-Saturated	33	110.0	16.6
18								
20	B-2@20'			SP-SM	Poorly graded SANDSTONE with silt, very dense, moist, yellow brown; locally massive; fine-to medium-grained	50/5"		
22								
24								
26	B-2@25'					50/5.5"		
28								

T2673-22-01.GPJ

Figure A-2,
Log of Boring B-2, Page 1 of 2

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. T2673-22-01

BORING B-2

ELEV. (MSL.) **1124** DATE COMPLETED **10/24/15**

EQUIPMENT **HOLLOW STEM AUGER** BY: **L.BATTIATO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B-2@30'			ML	**Pauba Formation (Qps)** SILTSTONE, hard, wet, olive; some iron staining; some carbonate nodules	45		
32								
34								
36	B-2@35'			SP	SANDSTONE, very dense, moist, light olive; fine-grained; iron staining	61		
38								
40	B-2@40'			SP	Poorly graded SANDSTONE, very dense, moist, light gray (granitic derived); coarse-grained; cohesionless	50/4.5"		
42								
44								
46	B-2@45'			ML	SILTSTONE, very hard, moist, olive	50/6"		
48								
50	B-2@50'			SP	Poorly graded SANDSTONE, very dense, moist, yellow brown; coarse-grained; cohesionless	50/6"		
					Total depth: 50.5' Groundwater encountered at 18.5' during drilling. When encountered, rose to 15.9' in 5 minutes. Penetration resistance for 140 lb hammer falling 30" by drop Backfilled with native cuttings			

Figure A-2,
Log of Boring B-2, Page 2 of 2

T2673-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2673-22-01

BORING B-3

ELEV. (MSL.) **1162** DATE COMPLETED **10/24/15**

EQUIPMENT **HOLLOW STEM AUGER** BY: **L.BATTIATO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B-3@0-5'			SM	**Pauba Formation (Qps)** SILTSTONE, hard, dry, yellow brown; indurated			
2								
4								
6	B-3@5'				-Becomes moist	50/5"	102.9	12.9
8				SP	Poorly graded SANDSTONE (granitic derived), very dense, dry, gray to buff; coarse; cohesionless			
10	B-3@10'					71	102.4	3.3
12								
14								
16	B-3@15'					50/6"		
					Total depth: 16' Groundwater not encountered Converted to P-5 Caved to 11.5' when installing pipe Penetration resistance for 140 lb hammer falling 30" by drop Backfilled with native cuttings			

Figure A-3,
Log of Boring B-3, Page 1 of 1

T2673-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2673-22-01

BORING B-4

ELEV. (MSL.) **1150** DATE COMPLETED **10/24/15**

EQUIPMENT **HOLLOW STEM AUGER** BY: **L.BATTIATO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**Undocumented Fill (afu)** Silty SAND, very dense, dry, strong brown; fine to medium sand; some coarse sand			
2	B-4@2.5'					50/6"	123.6	0.4
4								
6	B-4@5'			ML	SILT with abundant carbonate, hard, slightly moist, olive	75	118.6	7.6
				SM	Silty SAND, very dense, moist, strong brown; fine to coarse sand; mottled texture			
8	B-4@7.5'					50/4"	103.6	18.6
10	B-4@10'			ML	SILT, hard, damp, olive; abundant carbonate	80/11.5"		
12								
14								
16	B-4@15'			SM	Silty SAND, very dense, moist, strong brown; fine to coarse sand; mottled texture	90/11.5"	121.6	13.3
18					- organic staining			
20	B-4@20'			SP	**Pauba Formation (Qps)** Poorly graded SANDSTONE, very dense, moist, yellow brown; fine-grained; micaceous	50/6"	113.4	10.3
22								
24								
26	B-4@25'			ML	SILTSTONE, hard, moist, dark olive; laminated	82/11.5"		
					Total depth: 26' 5.5" Groundwater not encountered Penetration resistance for 140 lb hammer falling 30" by drop Backfilled with native cuttings			

Figure A-4,
Log of Boring B-4, Page 1 of 1

T2673-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

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GEOCON

PROJECT NO. T2673-22-01

BORING B-5

ELEV. (MSL.) **1152** DATE COMPLETED **10/24/15**

EQUIPMENT **HOLLOW STEM AUGER** BY: **L.BATTIATO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**Undocumented Fill (afu)** Silty SAND, very dense, dry, strong brown; fine to medium sand; mottled texture			
2	B-5@2.5'				-Becomes slightly moist	88	123.5	5.6
4								
6	B-5@5'			SM	Silty SAND, very dense (cemented), slightly moist, strong brown; organic stain	82	114.8	7.1
8	B-5@7.5'			ML	**Pauba Formation (Qps)** SILTSTONE, hard, moist, olive; fine-to medium-grained; trace carbonates	60	115.5	15.8
10	B-5@10'			SP-SM	Poorly graded SANDSTONE with silt, very dense, slightly moist, olive brown; coarse-grained	81/10"	122.5	7.7
12								
14								
16	B-5@15'			SP	Poorly graded SANDSTONE, very dense, moist, yellow brown; cohessionless; fine-to medium-grained; trace coarse-grained sand	90/11"		
18								
20	B-5@20'				- Becomes very coarse, light orange	95/11"		
					Total depth: 20.9' Groundwater not encountered Penetration resistance for 140 lb hammer falling 30" by drop Backfilled with native cuttings			

Figure A-5,
Log of Boring B-5, Page 1 of 1

T2673-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

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GEOCON

PROJECT NO. T2673-22-01

BORING B-6

ELEV. (MSL.) **1120** DATE COMPLETED **10/24/15**

EQUIPMENT **HOLLOW STEM AUGER** BY: **L.BATTIATO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B-6@0-5'			SM	**Undocumented Fill (afu)** Silty SAND, very dense (cemented), dry, strong brown; mottled texture			
2	B-6@2.5'				-Becomes slightly moist	50/4"	116.8	3.8
4	B-6@5'				-Clay development on parting surfaces (soil development)	83	115.4	7.6
6	B-6@7.5'				-Becomes moist, yellow brown; fine to coarse sand (older generation undocumented fill)	59	119.7	6.2
8	B-6@10'				-Becomes fine sand; laminated	67	116.4	7.9
10	B-6@15'				-Becomes dense, dark brown; organic stained; bits of charcoal; mottled texture	56	124.0	9.4
12	B-6@20'				-Becomes very dense; mottled coloring	50/5"	123.9	8.9
14				SM	**Pauba Formation (Qps)** Silty SANDSTONE, very dense, moist, yellow brown; fine-to coarse-grained			
16	B-6@25'			ML	SILTSTONE, hard, moist, olive; micaceous	68		
18					Total depth: 26.5' Groundwater not encountered Penetration resistance for 140 lb hammer falling 30" by drop Backfilled with native cuttings			
20								
22								
24								
26								

Figure A-6,
Log of Boring B-6, Page 1 of 1

T2673-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

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GEOCON

PROJECT NO. T2673-22-01

BORING B-7

ELEV. (MSL.) **1153** DATE COMPLETED **10/24/15**

EQUIPMENT **HOLLOW STEM AUGER** BY: **L.BATTIATO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SC-SM	**Alluvium (Qal)** Silty, clayey SAND, dense (cemented), dry, strong brown; secondary porosity			
2	B-7@2.5'				-Becomes slightly moist	73/11"	118.6	4.2
4								
6	B-7@5'			SC	Clayey SAND, dense, slightly moist, strong brown; fine to medium sand; cemented; some secondary porosity	66	123.8	6.9
8	B-7@7.5'				-Becomes medium dense, moist, strong brown; abundant secondary porosity	31	124.3	9.3
10	B-7@10'			SC/CL	Clayey SAND to SANDY CLAY, medium dense to stiff, moist, strong brown; less porosity	36	119.3	12.6
12								
14								
16	B-7@15'			SM	**Pauba Formation (Qps)** Silty SANDSTONE, medium dense, moist, yellow brown; medium-to coarse-grained	31	119.7	11.1
18								
20	B-7@20'					50/6"		
					Total depth: 21' Groundwater not encountered Penetration resistance for 140 lb hammer falling 30" by drop Backfilled with native cuttings			

Figure A-7,
Log of Boring B-7, Page 1 of 1

T2673-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

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GEOCON

PROJECT NO. T2673-22-01

BORING B-8

ELEV. (MSL.) **1188** DATE COMPLETED **10/24/15**

EQUIPMENT **HOLLOW STEM AUGER** BY: **L.BATTIATO**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**Pauba Formation (Qps)** Silty SANDSTONE, medium dense, dry, brown			
2								
4								
6	B-8@5'			SP	Poorly graded SANDSTONE, medium dense, slightly moist, yellow; fine-grained; in near vertical contact with medium silty SAND; fine silty sand is indurated and laminated; medium silty sand is cohessionless	43	105.8	5.4
8								
10	B-8@10'			SP-SM	Poorly graded SANDSTONE with silt, very dense, slightly moist, yellow brown; laminated; very fine-grained	77	120.4	7.0
12								
14				SM	Silty SANDSTONE, medium dense, dry, brown			
	B-8@15'					72	119.7	1.8
16				SP	Poorly graded SANDSTONE, very dense, dry, buff; cohessionless; coarse grained			
18								
20	B-8@20'			SP-SM	Poorly graded silty SANDSTONE, hard, slightly moist, yellow; laminated	77	122.6	6.7
					Total depth: 21.5' Groundwater not encountered Converted to perc P-1 Penetration resistance for 140 lb hammer falling 30" by drop Backfilled with native cuttings			

Figure A-8,
Log of Boring B-8, Page 1 of 1

T2673-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

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GEOCON

Leach Line Percolation Data Sheet

Project	Terraces				**Job No.**	T2673-22-01	
Test Hole No.		P-1			**Date Excavated**		10/23/2015
Depth of Test Hole:		20.2' (top of pipe)			**Soil Classification**		
Check for Sandy Soil Criteria Tested by:				PDT	**Presoak**		10/28/2015
Actual Percolation Tested by:			PDT		**Date**		10/29/2015

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:48 10:13	0:25	0:25	31.2	4.8	26.4	0.95
2	10:13 10:38	0:25	0:50	21.6	3.6	18.0	1.39

Soil Criteria: Sandy

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	10:40 10:50	0:10	0:10	14.4	10.8	3.6	2.8
2	10:51 11:01	0:10	0:20	37.2	32.4	4.8	2.1
3	11:02 11:12	0:10	0:30	38.4	33.6	4.8	2.1
4	11:13 11:23	0:10	0:40	39.6	36.0	3.6	2.8
5	11:24 11:34	0:10	0:50	39.6	36.0	3.6	2.8
6	11:35 11:45	0:10	1:00	38.4	34.8	3.6	2.8
7							
8							
9							
10							
11							
12							

FIGURE A-9

Leach Line Percolation Data Sheet

Project	Terraces				**Job No.**	T2673-22-01	
Test Hole No.		P-2			**Date Excavated**		10/23/2015
Depth of Test Hole:		20.2' (top of pipe)			**Soil Classification**		
Check for Sandy Soil Criteria Tested by:				PDT	**Presoak**		10/28/2015
Actual Percolation Tested by:			PDT		**Date**		10/29/2015

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:50 10:15	0:25	0:25	50.4	8.4	42.0	0.05
2	10:16 10:41	0:25	0:50	40.8	18.0	22.8	0.09

Soil Criteria: Sandy

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	10:44 10:54	0:10	0:10	25.2	21.6	3.6	2.8
2	10:55 11:05	0:10	0:20	27.6	24.0	3.6	2.8
3	11:06 11:16	0:10	0:30	33.6	30.0	3.6	2.8
4	11:17 11:27	0:10	0:40	39.6	36.0	3.6	2.8
5	11:28 11:38	0:10	0:50	38.4	34.8	3.6	2.8
6	11:39 11:49	0:10	1:00	37.2	34.8	2.4	4.2
7							
8							
9							
10							
11							
12							

FIGURE A-10

Leach Line Percolation Data Sheet

Project	Terraces				**Job No.**	T2673-22-01	
Test Hole No.		P-3			**Date Excavated**		10/23/2015
Depth of Test Hole:		20.2' (top of pipe)			**Soil Classification**		
Check for Sandy Soil Criteria Tested by:				PDT	**Presoak**		10/28/2015
Actual Percolation Tested by:			PDT		**Date**		10/29/2015

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:59 10:24	0:25	0:25	38.4	14.4	24.0	1.04
2	10:25 10:50	0:25	0:50	26.4	8.4	18.0	1.39

Soil Criteria: Sandy

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	11:55 12:05	0:10	0:10	37.8	33.0	4.8	2.1
2	12:06 12:16	0:10	0:20	32.4	28.2	4.2	2.4
3	12:17 12:27	0:10	0:30	33.0	28.8	4.2	2.4
4	12:28 12:38	0:10	0:40	34.8	31.2	3.6	2.8
5	12:39 12:49	0:10	0:50	34.2	31.2	3.0	3.3
6	12:50 13:00	0:10	1:00	37.8	34.8	3.0	3.3
7							
8							
9							
10							
11							
12							

FIGURE A-11

Leach Line Percolation Data Sheet

Project	Terraces				**Job No.**	T2673-22-01	
Test Hole No.		P-4			**Date Excavated**		10/23/2015
Depth of Test Hole:		20.0' (top of pipe)			**Soil Classification**		
Check for Sandy Soil Criteria Tested by:				AO	**Presoak**		10/28/2015
Actual Percolation Tested by:			CER		**Date**		10/29/2015

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	10:03 10:28	0:25	0:25	38.8	12.0	26.8	0.93
2	10:29 10:54	0:25	0:50	37.8	1.8	36.0	0.69

Soil Criteria: Sandy

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	11:58 12:08	0:10	0:10	10.2	5.4	4.8	2.1
2	12:09 12:19	0:10	0:20	14.4	13.2	1.2	8.3
3	12:20 12:30	0:10	0:30	26.4	22.8	3.6	2.8
4	12:31 12:41	0:10	0:40	39.6	19.8	19.8	0.5
5	12:42 12:52	0:10	0:50	87.6	42.6	45.0	0.2
6	12:52 13:02	0:10	1:00	42.6	30.0	12.6	0.8
7							
8							
9							
10							
11							
12							

* Low infiltration rate due to caving around bottom of percolation pipe.

FIGURE A-12

Leach Line Percolation Data Sheet

Project	Terraces				**Job No.**	T2673-22-01	
Test Hole No.		P-5			**Date Excavated**		10/23/2015
Depth of Test Hole:		15.4' (top of pipe)			**Soil Classification**		
Check for Sandy Soil Criteria Tested by:				PDT	**Presoak**		10/28/2015
Actual Percolation Tested by:			PDT		**Date**		10/29/2015

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	13:45 14:10	0:25	0:25	34.8	2.4	32.4	0.77
2	14:11 14:36	0:25	0:50	20.4	1.8	18.6	1.34

Soil Criteria: Sandy

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	14:37 14:47	0:10	0:10	28.2	0.0	28.2	0.4
2	14:48 14:58	0:10	0:20	34.8	18.6	16.2	0.6
3	14:59 15:09	0:10	0:30	36.0	20.4	15.6	0.6
4	15:10 15:20	0:10	0:40	38.4	24.6	13.8	0.7
5	15:21 15:31	0:10	0:50	30.0	17.4	12.6	0.8
6	15:32 15:42	0:10	1:00	36.0	23.4	12.6	0.8
7							
8							
9							
10							
11							
12							

FIGURE A-13

Leach Line Percolation Data Sheet

Project	Terraces				**Job No.**	T2673-22-01	
Test Hole No.		P-6			**Date Excavated**		10/23/2015
Depth of Test Hole:		15.7' (top of pipe)			**Soil Classification**		
Check for Sandy Soil Criteria Tested by:				PDT	**Presoak**		10/28/2015
Actual Percolation Tested by:			PDT		**Date**		10/29/2015

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	13:50 14:15	0:25	0:25	13.2	3.6	9.6	2.60
2	14:16 14:41	0:25	0:50	22.8	5.4	17.4	1.44

Soil Criteria: Sandy

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	14:42 14:52	0:10	0:10	29.4	16.2	13.2	0.8
2	14:53 15:03	0:10	0:20	42.0	29.4	12.6	0.8
3	15:04 15:14	0:10	0:30	39.6	5.4	34.2	0.3
4	15:15 15:25	0:10	0:40	89.4	62.4	27.0	0.4
5	15:26 15:36	0:10	0:50	62.4	25.8	36.6	0.3
6	15:37 15:47	0:10	1:00	54.0	21.0	33.0	0.3
7							
8							
9							
10							
11							
12							

FIGURE A-14

APPENDIX C

Laboratory Testing

LABORATORY TESTING

The following laboratory tests were performed on a representative sample in accordance with the applicable latest standards or methods from the ASTM, California Building Code (CBC) and California Department of Transportation.

Classification

Soils were classified with respect to the Unified Soil Classification System (USCS) in accordance with ASTM D-2487 and D-2488.

Particle Size Analysis

Modified hydrometer testing was conducted to aid in classification of the soil. The results of the particle size analysis are presented in Table C.

Maximum Density/Optimum Moisture

The maximum dry density and optimum moisture content of two representative bulk samples were evaluated in accordance with ASTM D-1557. The results are summarized in Table C.

Expansion Index Tests

Two (2) expansion index tests were performed to evaluate the expansion potential of typical on-site soil. Testing was carried out in general conformance with ASTM Test Method D-4829. The results are presented in Table C.

Consolidation Tests

Consolidation testing was performed on two (2) relatively "undisturbed" soil samples at their natural moisture content in accordance with procedures outlined in ASTM D-2435. The samples were placed in a consolidometer and loads were applied incrementally in geometric progression. The samples (2.42-inches in diameter and 1-inch in height) were permitted to consolidate under each load increment until the slope of the characteristic linear secondary compression portion of the thickness versus log of time plot was apparent. The percent consolidation for each load cycle was recorded as the ratio of the amount of vertical compression to the original 1-inch height. The consolidation test results are shown on Plates C-1 and C-2.

Direct Shear Testing

Direct shear testing was performed on three select samples. The testing was performed by Alta and the results are presented on Plates C-3 through 5.

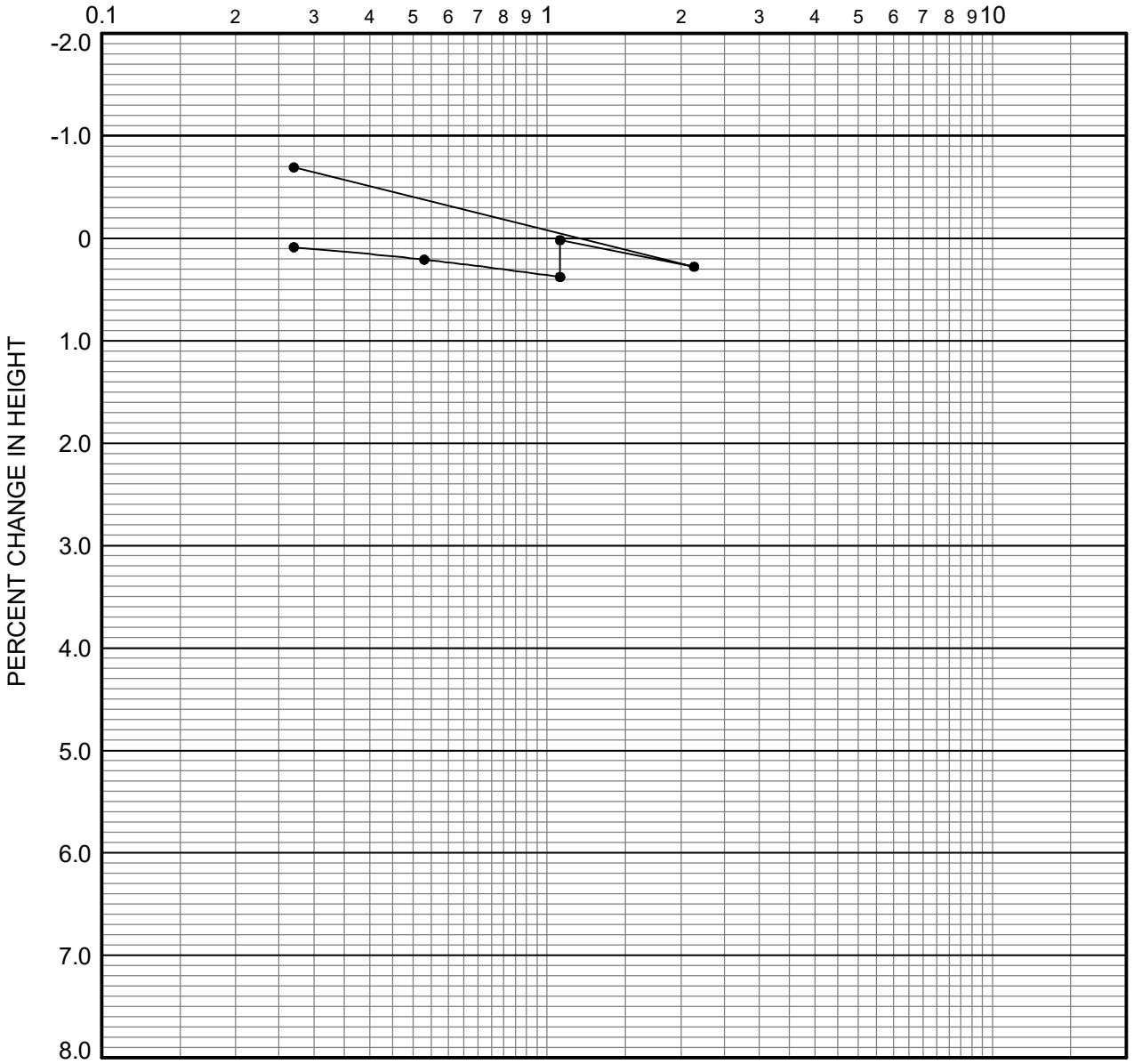
Chemical Analyses

Chemical testing was performed on two select samples by Alta. The results of these tests (sulfate content, resistivity, chloride content and pH) are presented on Table C.

TABLE C
SUMMARY OF LABORATORY TEST DATA
P.N. 1-0410

Boring/Pit No.	Depth (Feet)	Soil Description	Group Symbol - Unified Soil Classification System	Maximum Dry Density		Direct Shear	Grain Size Analysis				Expansion Index	Sulfate Content (%)	Consolidation	Other Tests Remarks
				Maximum Density (pcf)	Optimum Moisture (%)		Gravel (% + No. 4 Screen)	% Sand	%Silt (0.074 to 0.005mm)	% Clay (-0.005 mm)				
B-9	30	Sandy Siltstone (Qps)	-	-	-	See Plate C-3	0	44	37	19	-	-	-	-
B-12	2-4	Sandy Silt (afu)	ML	115.7	14.0	See Plate C-4	0	25	56	19	114	ND	-	Min. Resistivity: 18,000 OHM-CM Chloride: 60ppm PH: 7.50
B-12	5	Sandy Siltstone (Qps)	-	-	-	-	0	41	46	13	-	-	See Plate C-1	-
B-15	10	Sandy Siltstone w/Clay (Qps)	-	-	-	-	0	50	25	25	-	-	See Plate C-2	-
B-17	3-5	Silty Sand (Qal)	SM	131.0	8.0	See Plate C-5	1	71	18	10	0	ND	-	Min. Resistivity: 1,800 OHM-CM Chloride: 0ppm PH: 6.78

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
BH-12	5.0	122	8.8	66	59		Sandy Siltstone (Qps)

REMARKS: WATER ADDED AT 1.07 TSF

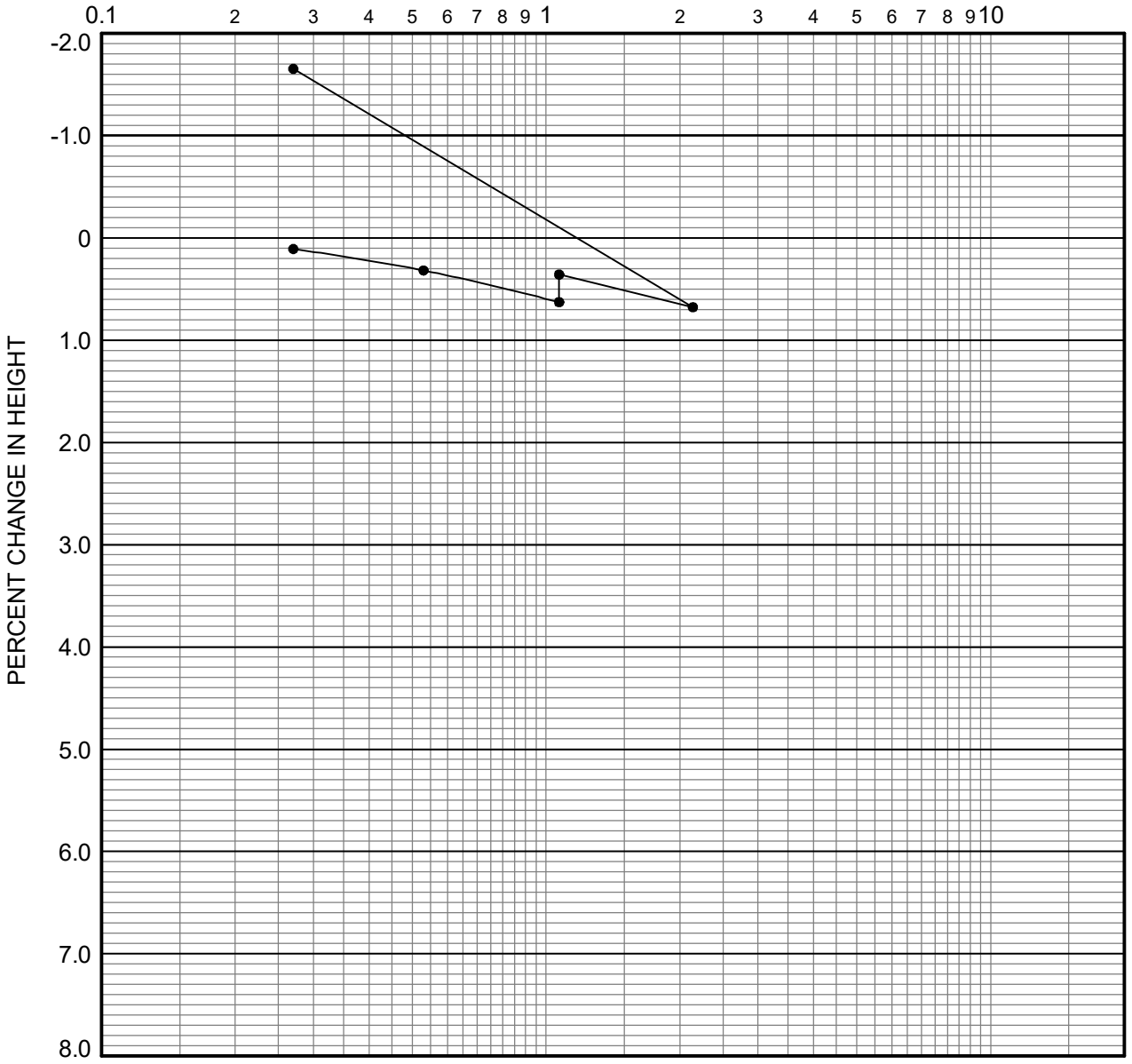
CONSOLIDATION CURVE

Alta California Geotechnical, Inc.

P.N. 1-0410

PLATE C-1

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
BH-15	10.0	129	11.2	104			Sandy Siltstone w/Clay (Qps)

REMARKS: WATER ADDED AT 1.07 TSF

CONSOLIDATION CURVE

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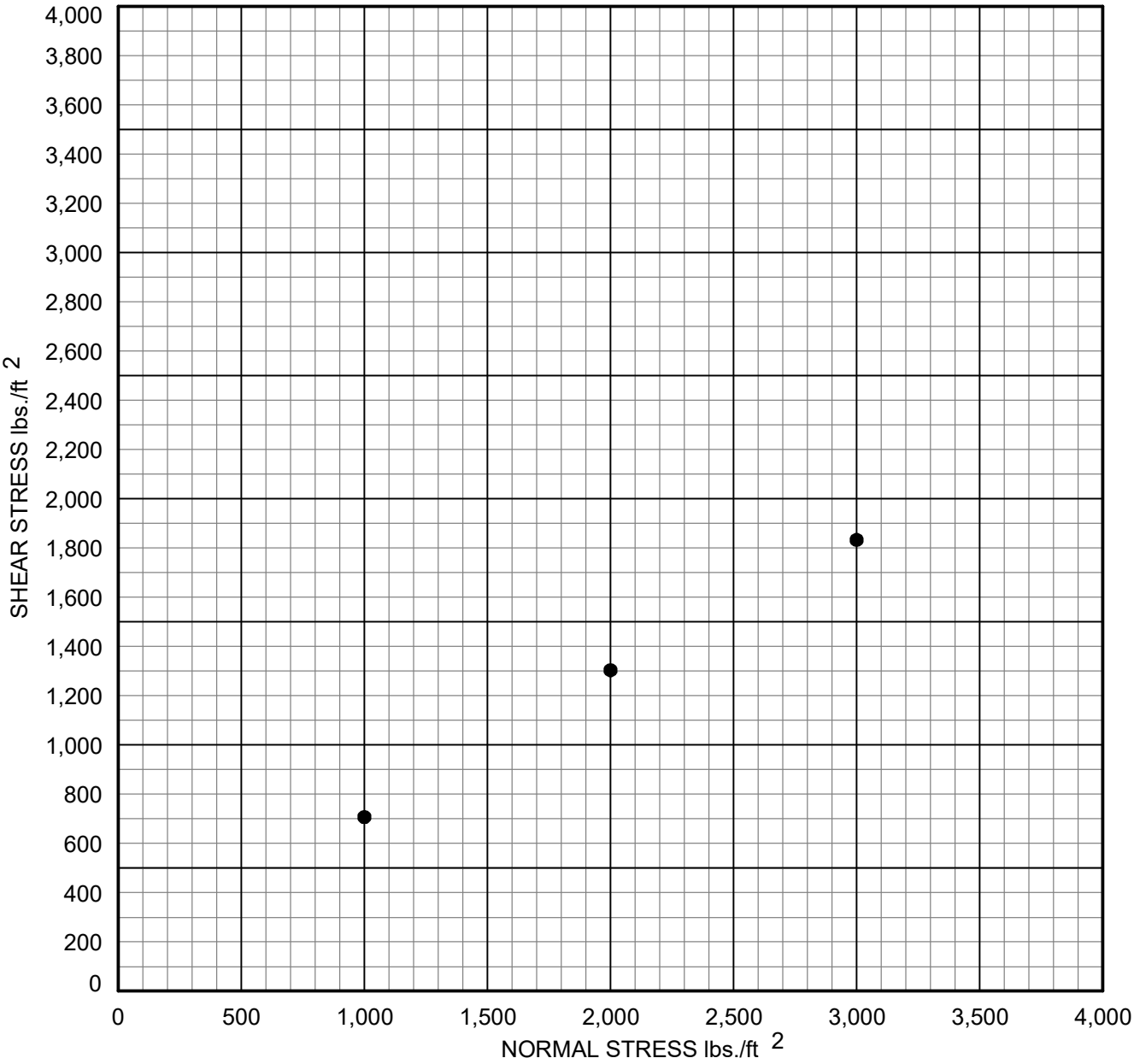
P.N. 1-0410

PLATE C-2

DIRECT SHEAR TEST
Undisturbed



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	-200 sieve (%)	group symbol	typical names
BH-09	30.0	113	17.0	81		Sandy Siltone (Qps)

COHESION	160	psf.
FRICTION ANGLE	29.0	degrees

DIRECT SHEAR TEST

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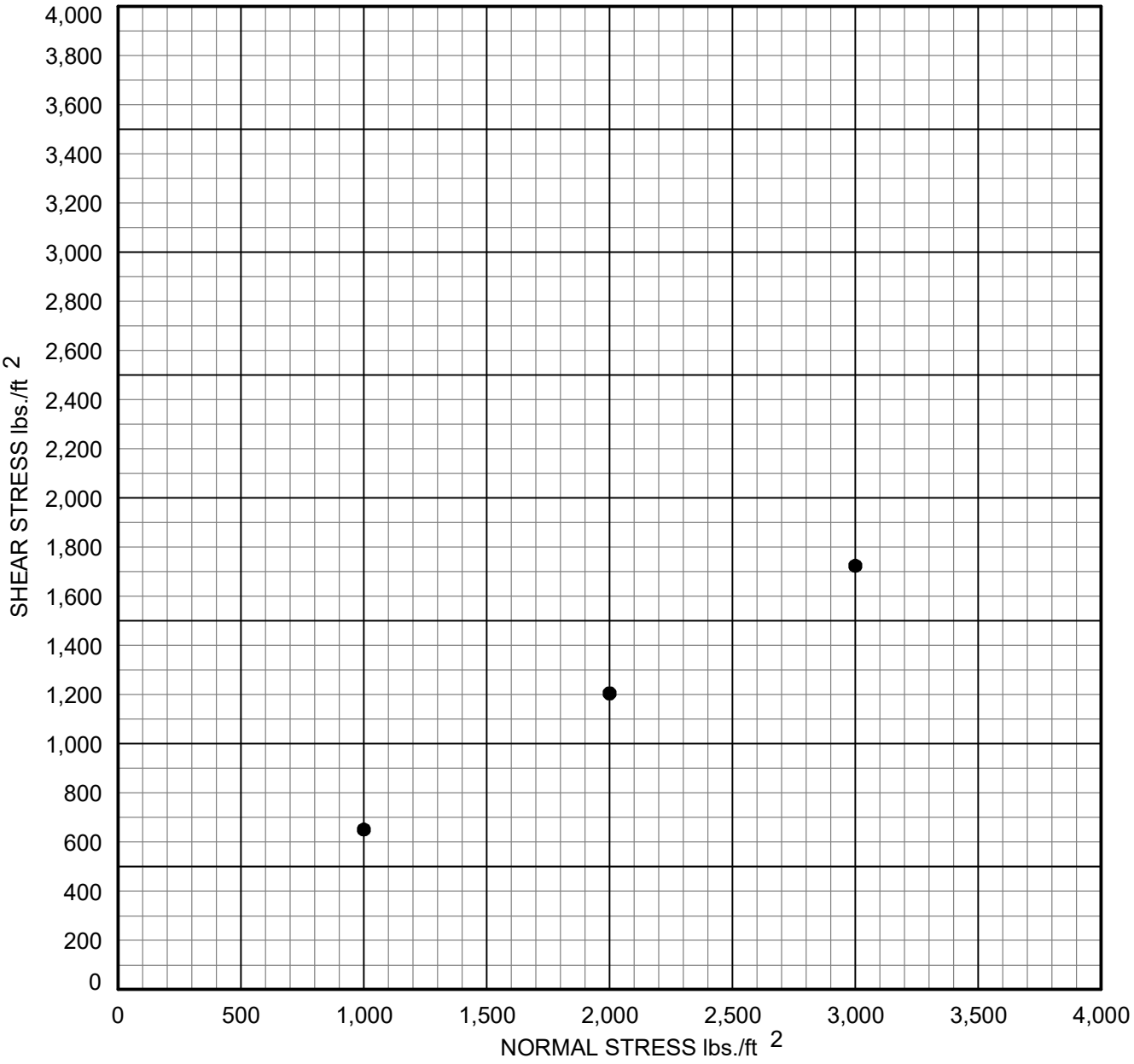
P.N. 1-0410

PLATE C-3

DIRECT SHEAR TEST
Remolded at 90% Relative Compaction



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	-200 sieve (%)	group symbol	typical names
BH-12	2.0-4.0			75	ML	Sandy Silt (afu)

COHESION	120	psf.
FRICTION ANGLE	28.0	degrees

DIRECT SHEAR TEST

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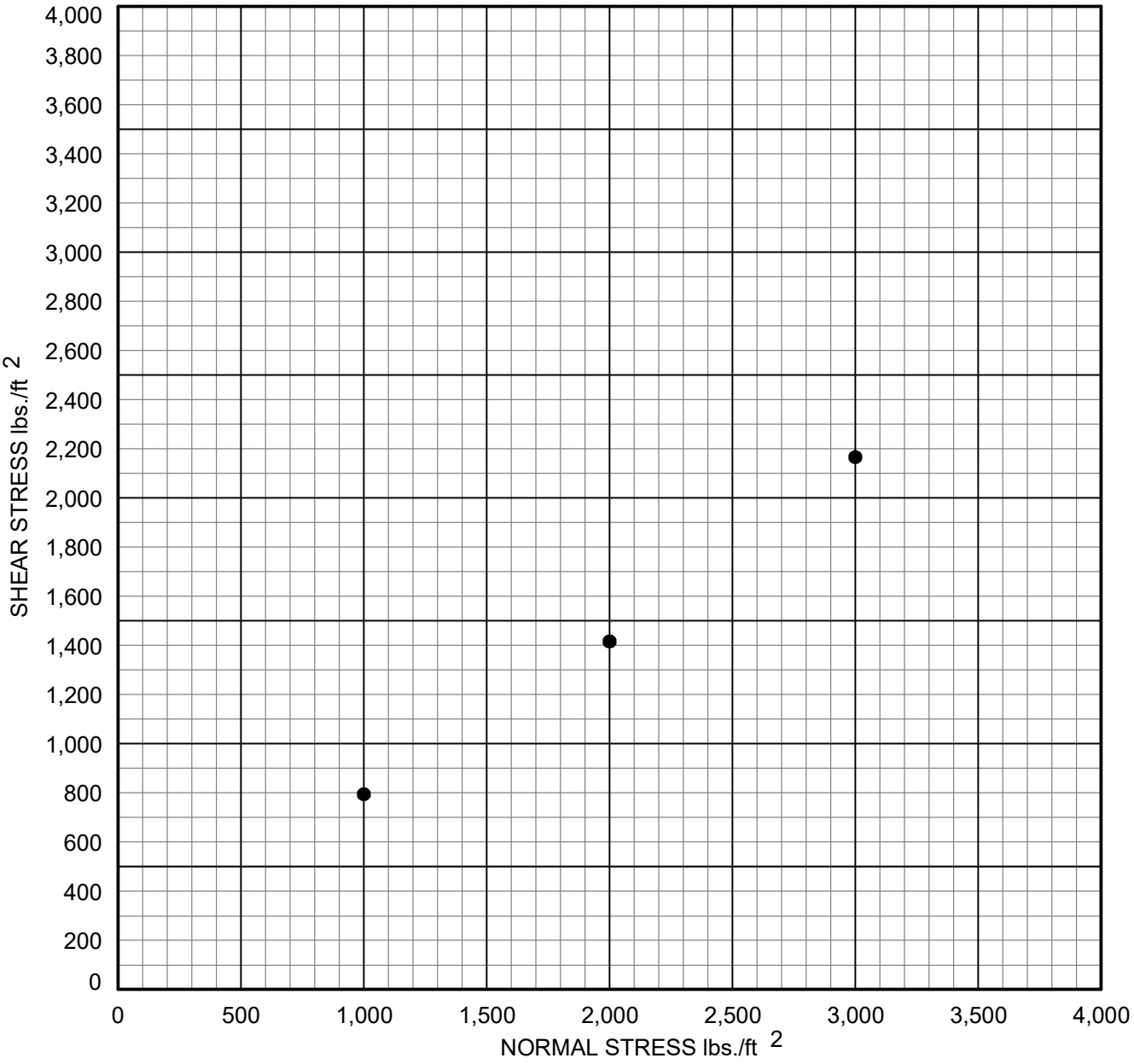
P.N. 1-0410

PLATE C-4

DIRECT SHEAR TEST
Remolded at 90% Relative Compaction



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	-200 sieve (%)	group symbol	typical names
BH-17	3.0-5.0			28	SM	Silty Sand (Qal)

COHESION	90	psf.
FRICTION ANGLE	34.0	degrees

DIRECT SHEAR TEST

Alta California Geotechnical, Inc.

P.N. 1-0410

PLATE C-5

APPENDIX C-1

Previous Laboratory Testing

(Geocon, 2016)

SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS ASTM D1557

Sample No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% of dry wt.)
B-3 @ 0-5’	Silty SAND (SM), yellow brown	126.1	10.1

SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS ASTM D4829

Sample No.	Moisture Content		After Test Dry Density (pcf)	Expansion Index
	Before Test (%)	After Test (%)		
B-4 @ 10’	13.5	28.2	98.3	53

SUMMARY OF CORROSIVITY TEST RESULTS

Sample No.	Chloride Content (ppm)	Sulfate Content (%)	pH	Resistivity (ohm-centimeter)
B-6 @ 0-5’	55	0.002	7.74	4,820

Chloride content determined by California Test 422.
Water-soluble sulfate determined by California Test 417.
Resistivity and pH determined by Caltrans Test 643.

SUMMARY OF LABORATORY R-VALUE TEST RESULTS ASTM D2844

Sample No.	R-Value
B-1 @ 0-5’	21

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AMO		

LABORATORY TEST RESULTS

PRELIMINARY GEOTECHNICAL INVESTIGATION
TERRACES MIXED USE DEVELOPMENT
MURRIETA HOT SPRINGS ROAD & INTERSTATE 15
MURRIETA, CALIFORNIA

APRIL, 2016	PROJECT NO. T2673-22-01	FIG B-1

SUMMARY OF ONE-DIMENSIONAL CONSOLIDATION (COLLAPSE) TESTS
ASTM D2435

Sample No.	In-situ Dry Density (pcf)	Moisture Content Before Test (%)	Final Moisture Content (%)	Axial Load with Water Added (psf)	Percent Collapse
B-7 @ 2.5’	118.6	4.2	12.6	2000	1.2
B-7 @ 5.0’	123.8	6.9	12.6	2500	0.6
B-7 @ 7.5’	124.3	9.3	11.9	2800	0.3
B-7 @ 10.0’	119.3	12.6	14.3	3000	0.2

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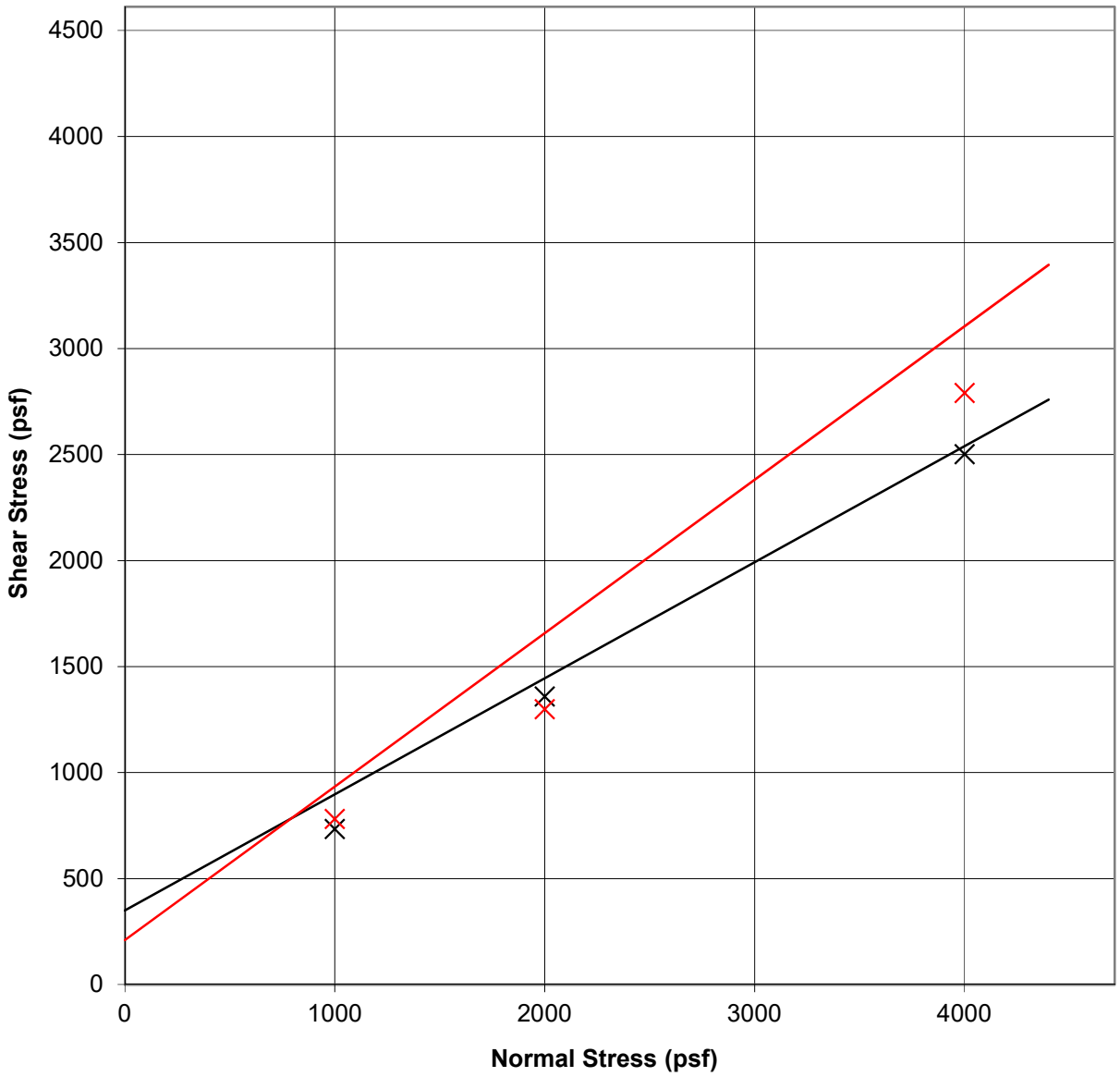
AMO		

LABORATORY TEST RESULTS

PRELIMINARY GEOTECHNICAL INVESTIGATION
TERRACES MIXED USE DEVELOPMENT
MURRIETA HOT SPRINGS ROAD & INTERSTATE 15
MURRIETA, CALIFORNIA

APR, 2016	PROJECT NO. T2673-22-01	FIG B-2



SAMPLE ID	SOIL TYPE	INITIAL DRY DENSITY (pcf)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)	C (psf)	ϕ (deg)
*B-3 @ 0-5'	SM	111.4	12.2	21.3	350	28.7
B-3 @ 10'	SP	102.4	3.3	18.7	210	35.9

*Sample remolded to approximately 90% of the test maximum dry density at optimum moisture content.

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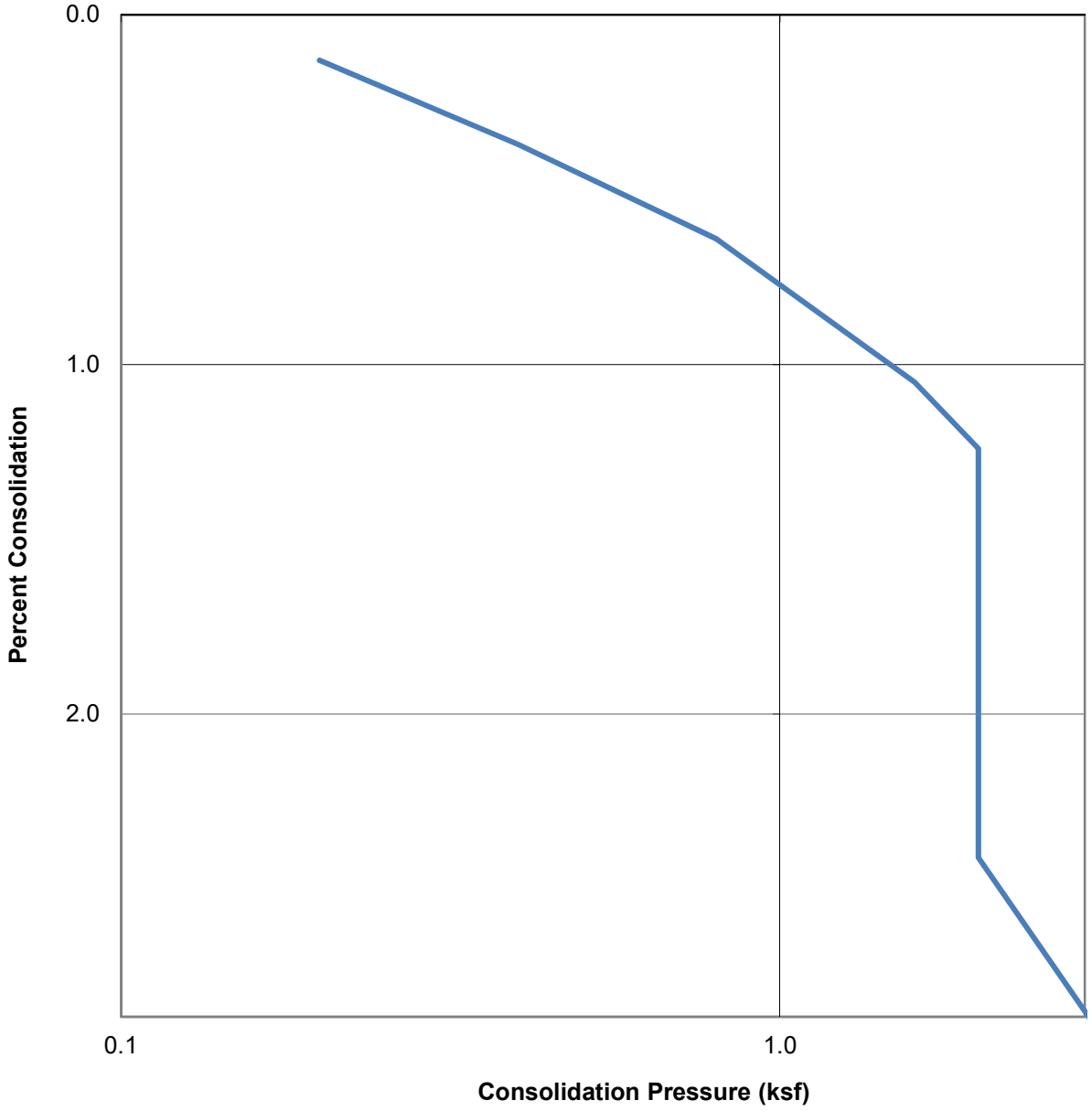
DIRECT SHEAR TEST RESULTS

PRELIMINARY GEOTECHNICAL INVESTIGATION
TERRACES MIXED USE DEVELOPMENT
MURRIETA HOT SPRINGS ROAD & INTERSTATE 15
MURRIETA, CALIFORNIA

APRIL, 2016	PROJECT NO. T2673-22-01	FIG B-3

WATER ADDED AT 2 KSF



SAMPLE ID	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B-7 @ 2.5'	SC-SM	118.6	4.2	12.6

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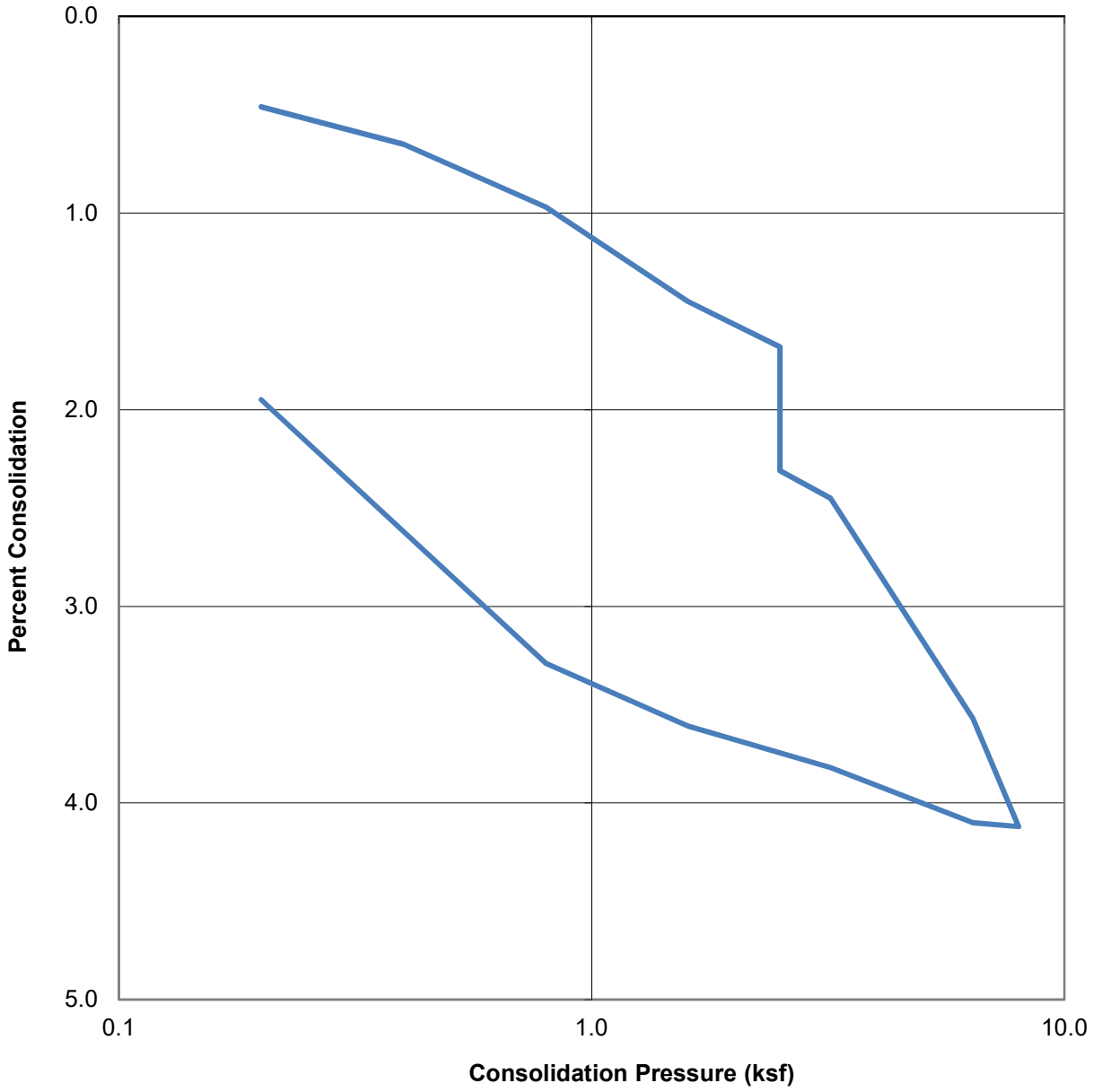
CONSOLIDATION TEST RESULTS

PRELIMINARY GEOTECHNICAL INVESTIGATION
TERRACES MIXED USE DEVELOPMENT
MURRIETA HOT SPRINGS ROAD & INTERSTATE 15
MURRIETA, CALIFORNIA

APRIL, 2016 | PROJECT NO. T2673-22-01 | FIG B4

WATER ADDED AT 2.5 KSF



SAMPLE ID	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B-7 @ 5'	SC	123.8	6.9	12.6

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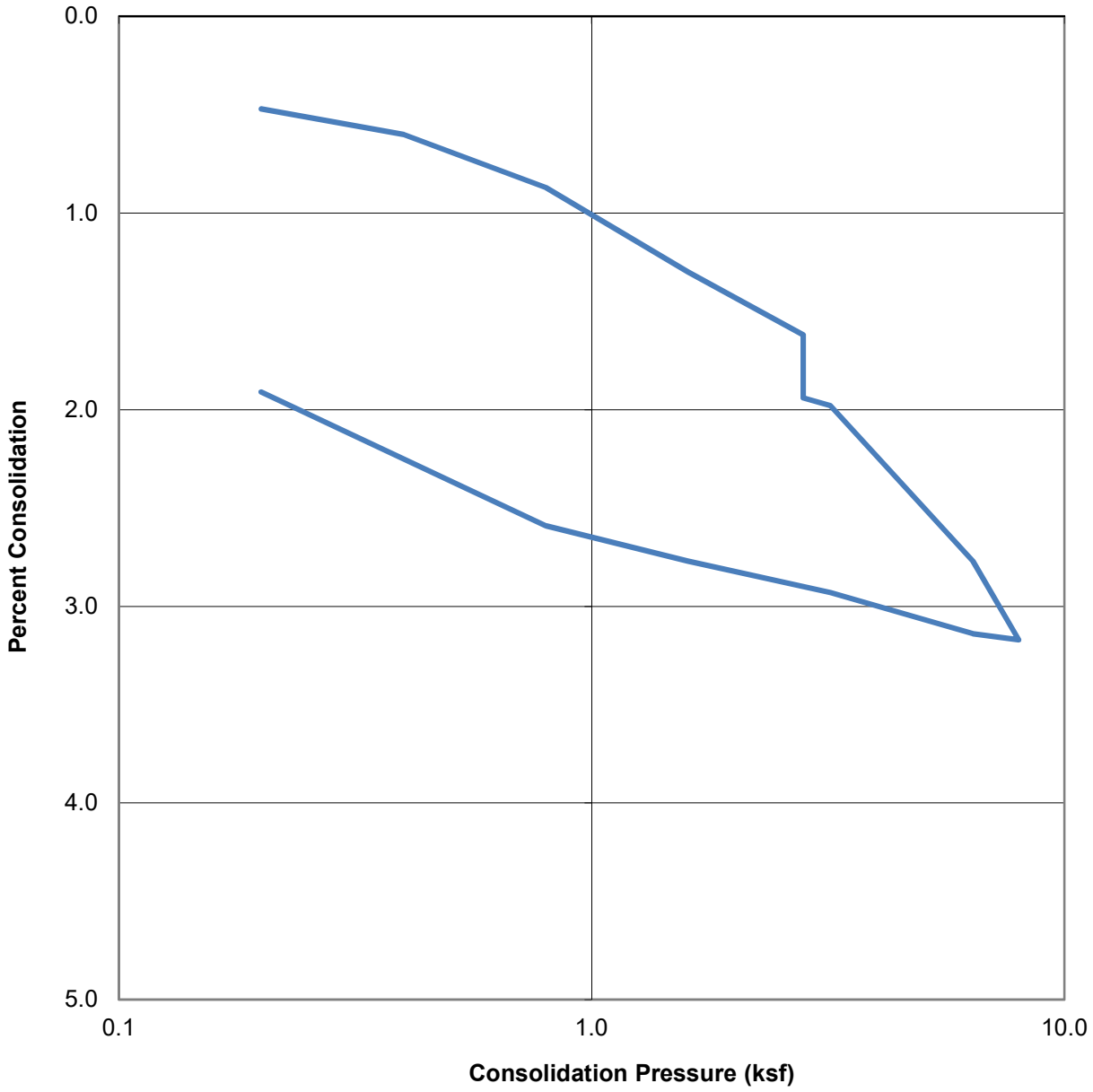
CONSOLIDATION TEST RESULTS

PRELIMINARY GEOTECHNICAL INVESTIGATION
TERRACES MIXED USE DEVELOPMENT
MURRIETA HOT SPRINGS ROAD & INTERSTATE 15
MURRIETA, CALIFORNIA

APRIL, 2016 | PROJECT NO. T2673-22-01 | FIG B5

WATER ADDED AT 2.8 KSF



SAMPLE ID	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B-7 @ 7.5'	SC	124.3	9.3	11.9

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CONSOLIDATION TEST RESULTS

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TERRACES MIXED USE DEVELOPMENT
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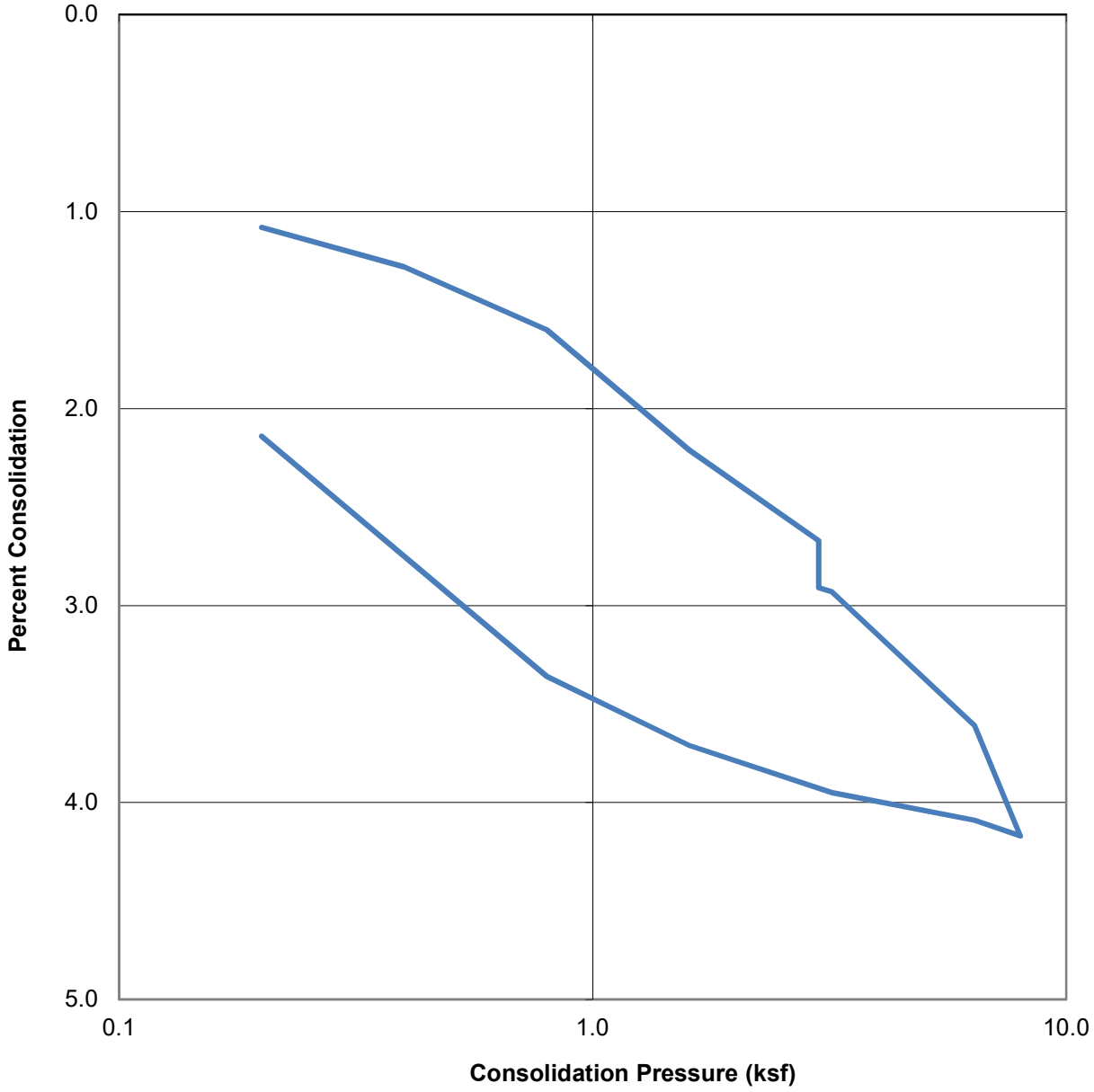
APRIL, 2016 | PROJECT NO. T2673-22-01 | FIG B6

WATER ADDED AT 3 KSF



SAMPLE ID	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B-7 @ 10'	SC/CL	119.3	12.6	14.3

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CONSOLIDATION TEST RESULTS

PRELIMINARY GEOTECHNICAL INVESTIGATION
TERRACES MIXED USE DEVELOPMENT
MURRIETA HOT SPRINGS ROAD & INTERSTATE 15
MURRIETA, CALIFORNIA

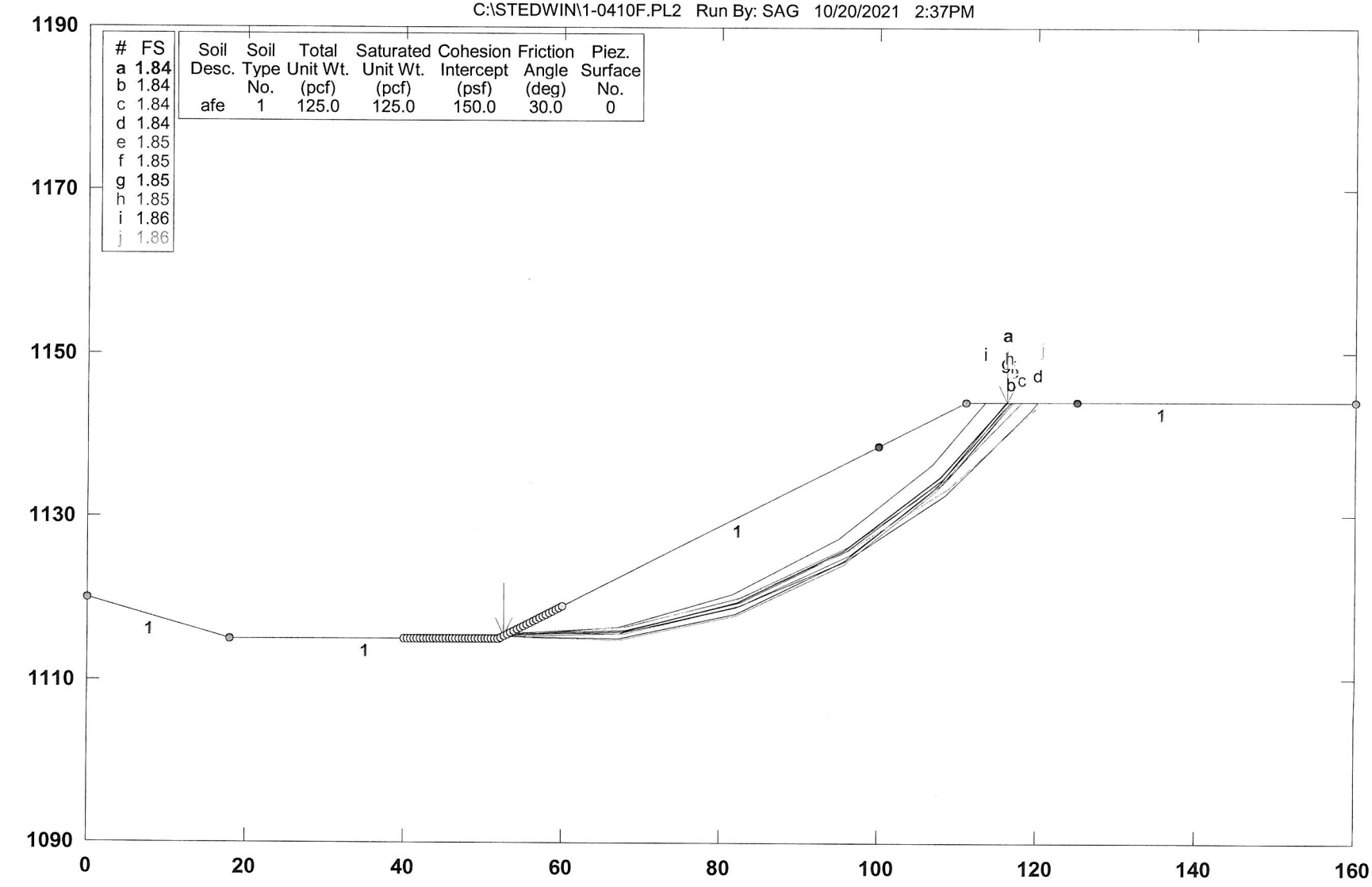
APRIL, 2016 | PROJECT NO. T2673-22-01 | FIG B7

APPENDIX D

SLOPE STABILITY ANALYSIS

1-0410 2:1 29-ft Fill Slope Static Analysis

C:\STEDWIN\1-0410F.PL2 Run By: SAG 10/20/2021 2:37PM



#	FS
a	1.84
b	1.84
c	1.84
d	1.84
e	1.85
f	1.85
g	1.85
h	1.85
i	1.86
j	1.86

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
afe	1	125.0	125.0	150.0	30.0	0

GSTABL7 v.2 FSmin=1.84

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

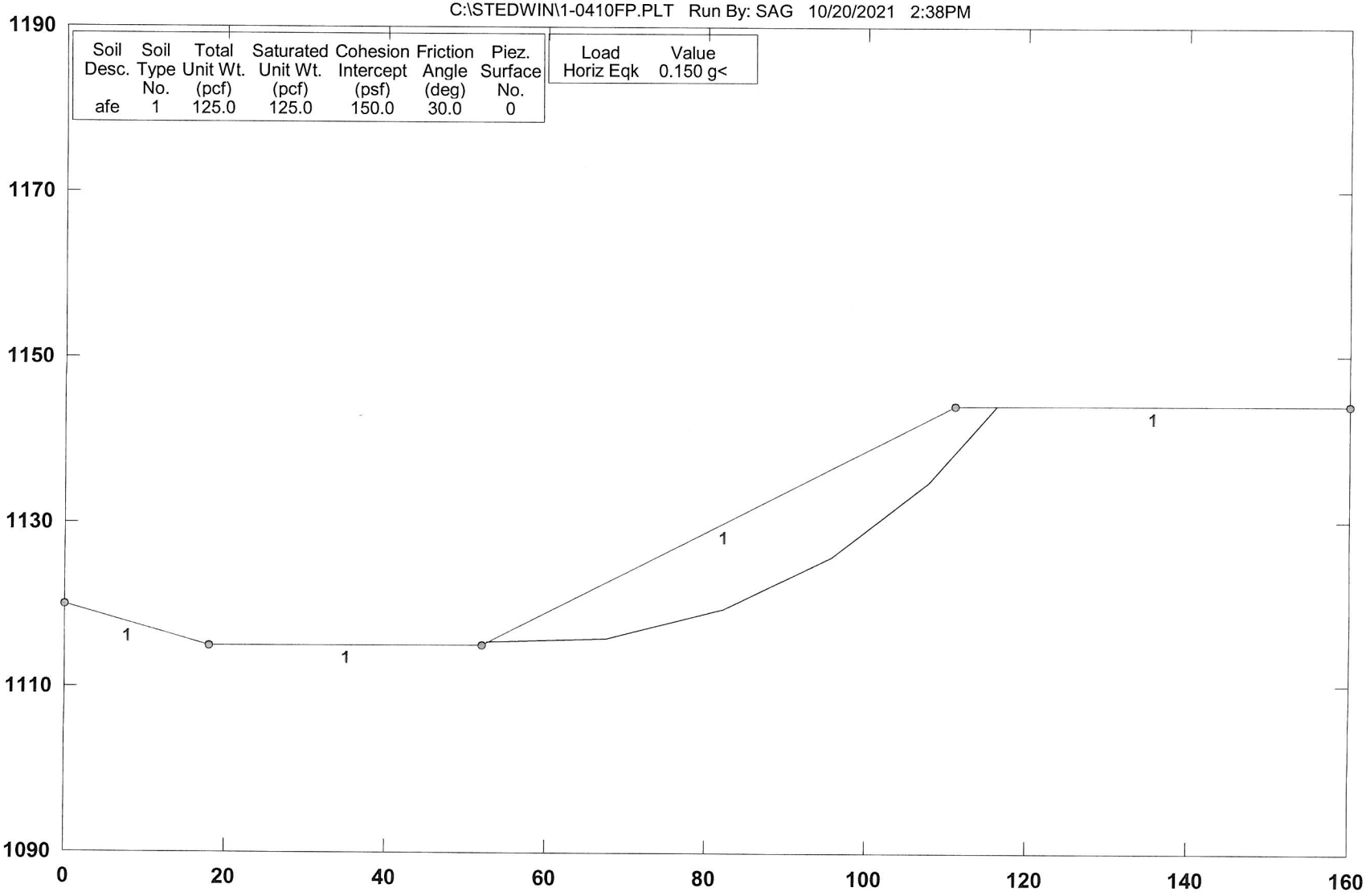
Plate D-1

1-0410 2:1 29-ft Fill Slope Psuedostatic Analysis

C:\STEDWIN\1-0410FP.PLT Run By: SAG 10/20/2021 2:38PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
afe	1	125.0	125.0	150.0	30.0	0

Load	Value
Horiz Eqk	0.150 g<



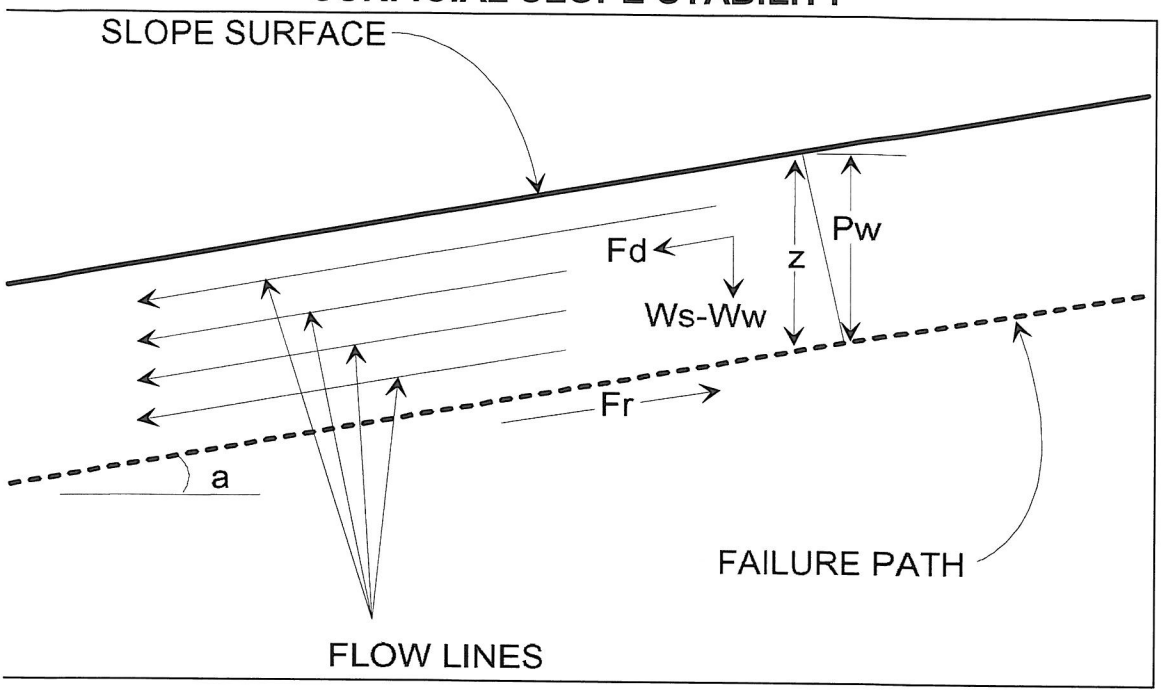
GSTABL7 v.2 FSmin=1.26

Factor Of Safety Is Calculated By The Simplified Janbu Method

GSTABL7

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

Given:

Ws (pcf)	z (ft)	a (degrees)	(radians)	phi (degrees)	(radians)	c (psf)
125	3	26.565051	0.4636476	30	0.5235988	150

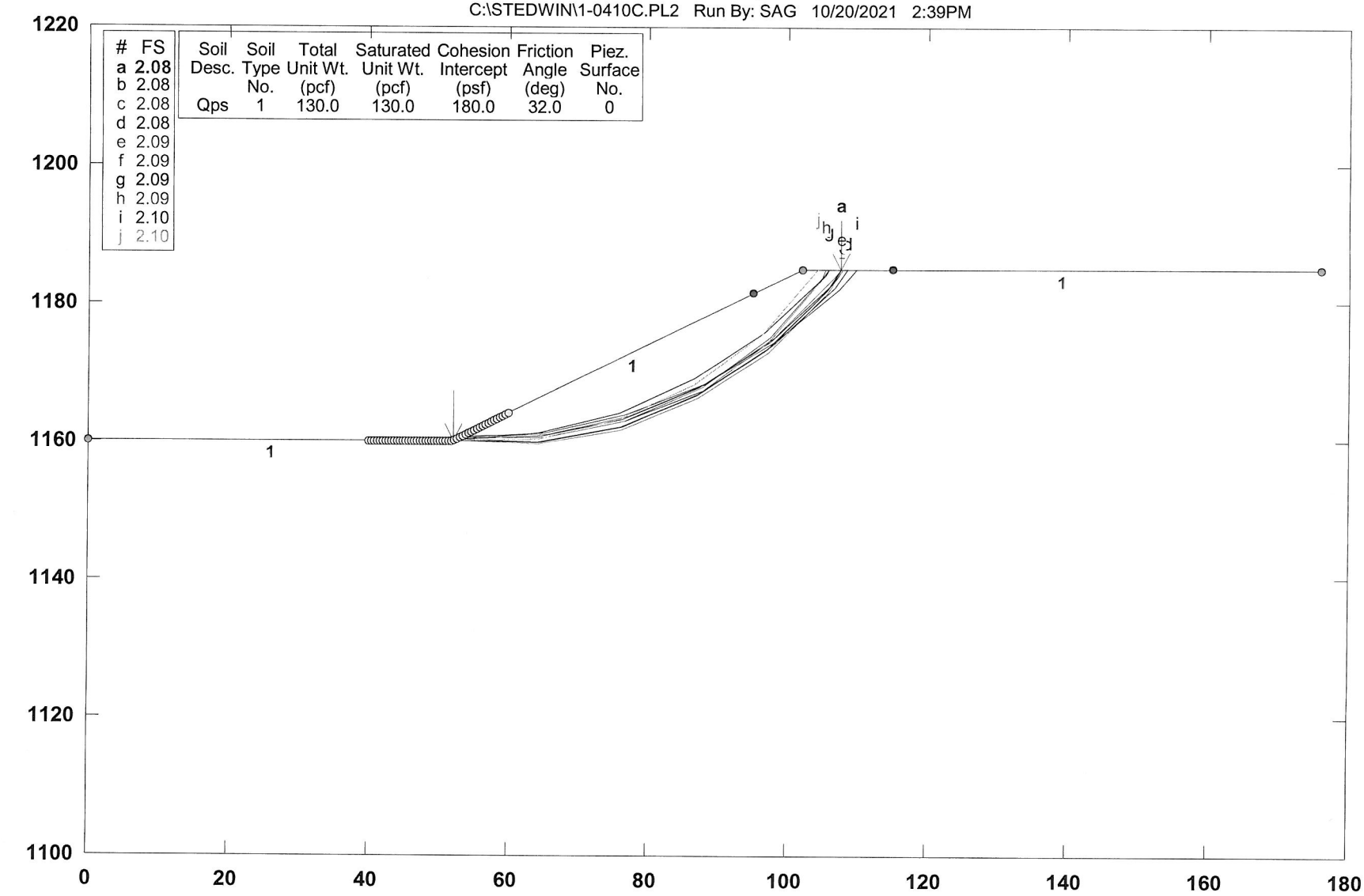
Calculations:

Pw	u	Fd	Fr	**FS**
2.40	149.76	150.00	236.74	**1.58**

Plate D-3

1-0410 2:1 25-ft Cut Slope Static Analysis

C:\STEDWIN\1-0410C.PL2 Run By: SAG 10/20/2021 2:39PM



#	FS
a	2.08
b	2.08
c	2.08
d	2.08
e	2.09
f	2.09
g	2.09
h	2.09
i	2.10
j	2.10

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qps	1	130.0	130.0	180.0	32.0	0

GSTABL7 v.2 FSmin=2.08

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

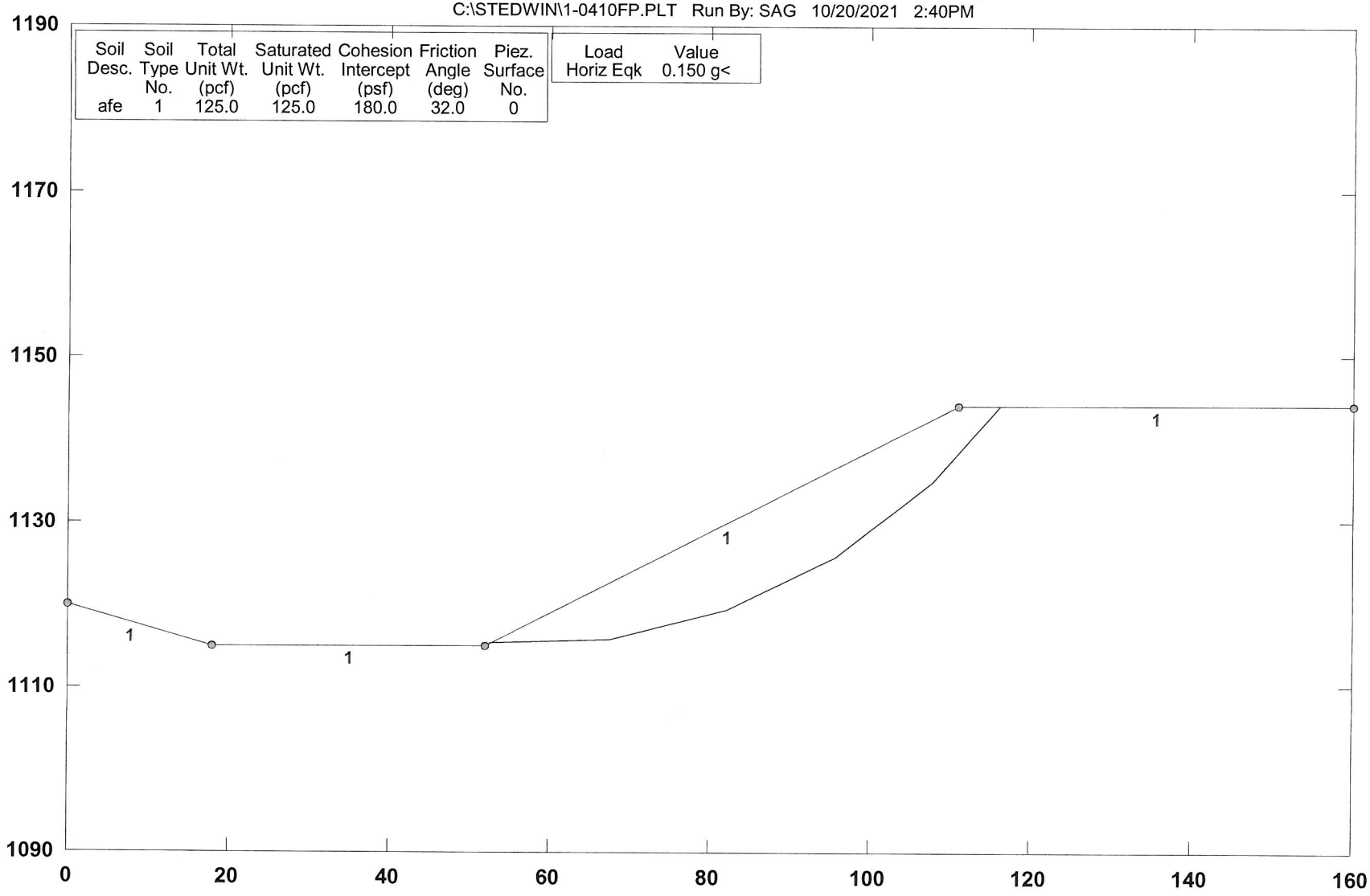
Plate D-4

1-0410 2:1 29-ft Fill Slope Psuedostatic Analysis

C:\STEDWIN\1-0410FP.PLT Run By: SAG 10/20/2021 2:40PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
afe	1	125.0	125.0	180.0	32.0	0

Load	Value
Horiz Eqk	0.150 g<



GSTABL7 v.2 FSmin=1.41

Factor Of Safety Is Calculated By The Simplified Janbu Method

GSTABL7

Plate D-5

APPENDIX E

Maintenance and Improvement Considerations

MAINTENANCE AND IMPROVEMENT CONSIDERATIONS

General

Owners purchasing property must assume a certain degree of responsibility for improvements and for maintaining conditions around their home. Of primary importance from a geotechnical standpoint are maintaining drainage patterns and minimizing the soil moisture variation below all improvements. Such design, construction and owner maintenance provisions may include:

- Employing contractors for improvements who design and build in recognition of local building codes and specific site soils conditions.
- Establishing and maintaining positive drainage away from all foundations, walkways, driveways, patios, and other 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. 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 that are designed to carry roof runoff directly into area drains or discharged well away from the foundation areas.
- 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 uniform moisture conditions.

Sulfates

Owners should be cautioned against the import and use of certain inorganic 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 and increase the sulfate concentrations to potentially detrimental levels.

Site Drainage

- The owners should be made aware of the potential problems that may develop when drainage is altered through construction of hardscape improvements. Ponded water, drainage over the slope face, leaking irrigation systems, overwatering, or other conditions which could lead to ground saturation must be avoided.
- No water should be allowed to flow over the slopes. No alteration of pad gradients should be allowed that would prevent pad and roof runoff from being directed to approved disposal areas.
- Drainage patterns have been established at the time of the fine grading should be maintained throughout the life of the structure. No alterations to these drainage patterns should be made unless designed by qualified professionals in compliance with local code requirements and site-specific soils conditions.

Slope Drainage

- Residents should be made aware of the importance of maintaining and cleaning all interceptor ditches, drainage terraces, down drains, and any other drainage devices, which have been installed to promote slope stability.
- Subsurface drainage pipe outlets may protrude through slope surfaces and/or wall faces. These pipes, in conjunction with the graded features, are essential to slope and wall stability and must be protected in-place. They should not be altered or damaged in any way.

Planting and Irrigation of Slopes

- 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 is 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.
- Sprinklers should be adjusted to provide maximum uniform coverage with a minimum of water usage and overlap. Overwatering with consequent wasteful runoff and serious ground saturation must be avoided.
- If automatic sprinkler systems are installed, their use must be adjusted to account for seasonal and natural rainfall conditions.

Burrowing Animals

- Residents must undertake a program to eliminate burrowing animals. This must be an ongoing program in order to promote slope stability.

Owner Improvement

Owner improvements (pools, spas, patio slabs, retaining walls, planters, etc.) should be designed to account for the terrain of the project, as well as expansive soil conditions and chemical characteristics. Design considerations on any given lot may need to include provisions for differential bearing materials, ascending/descending slope conditions, bedrock structure, perched (irrigation) water, special geologic surcharge loading conditions, expansive soil stresses, and long-term creep/settlement.

All owner improvements should be designed and constructed by qualified professionals utilizing appropriate design methodologies, which account for the on-site soils and geologic conditions. Each lot and proposed improvement should be evaluated on an individual basis.

Setback Zones

Manufactured slopes maybe subject to long-term settlement and creep that can manifest itself in the form of both horizontal and vertical movement. These movements typically are produced as a result of weathering, erosion, gravity forces, and other natural phenomenon. A setback adjacent to slopes is required by most building codes, including the California Building Code. This zone is intended to locate and support the residential structures away from these slopes and onto soils that are not subject to the potential adverse effects of these natural phenomena.

The owner may wish to construct patios, walls, walkways, planters, swimming pools, spas, etc. within this zone. Such facilities may be sensitive to settlement and creep and should not be constructed within the setback zone unless properly engineered. It is suggested that plans for such improvements be designed by a professional engineer who is familiar with grading ordinances and design and construction requirements. In addition, we recommend that the designer and contractor familiarize themselves with the site specific geologic and geotechnical conditions on the specific lot.

APPENDIX F

Earthwork Specifications

ALTA CALIFORNIA GEOTECHNICAL, INC.
EARTHWORK SPECIFICATIONS

These specifications present the generally accepted standards and minimum earthwork requirements for the development of the project. These specifications shall be the project guidelines for earthwork except where specifically superseded in preliminary geology and soils reports, grading plan review reports or by the prevailing grading codes or ordinances of the controlling agency.

A. GENERAL

1. The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications.

2. The project Geotechnical Engineer and Engineering Geologist, or their representatives, shall provide observation and testing services, and Geotechnical consultation for the duration of the project.

3. All clearing, grubbing, stripping and site preparation for the project shall be accomplished by the Contractor to the satisfaction of the Geotechnical Engineer/Engineering Geologist.

4. It is the Contractor's responsibility to prepare the ground surface to receive fill to the satisfaction of the Geotechnical Engineer and to place, spread, mix, moisture condition, and compact the fill in accordance with the job specifications and as required by the Geotechnical Engineer. The Contractor shall also remove all material considered by the Geotechnical Engineer to be unsuitable for use in the construction of engineered fills.

5. The Contractor shall have suitable and sufficient equipment in operation to handle the amount of fill being placed. When necessary, equipment will be shut down temporarily in order to permit the proper preparation of fills.

B. PREPARATION OF FILL AREAS

1. Excessive vegetation and all deleterious material should be disposed of offsite as required by the Geotechnical Engineer.

   Existing fill, soil, alluvium or rock materials determined by the Geotechnical Engineer as being unsuitable for placement in compacted fills shall be removed and hauled from the site. Where applicable, the Contractor may obtain the

approval of the Soils Engineer and the controlling authorities for the project to dispose of the above described materials, or a portion thereof, in designated areas onsite.

After removal of the deleterious materials have been accomplished, earth materials deemed unsuitable in their natural, in-place condition, shall be removed as recommended by the Geotechnical Engineer/Engineering Geologist.

2. Upon achieving a suitable bottom for fill placement, the exposed removal bottom shall be disced or bladed by the Contractor to the satisfaction of the Geotechnical Engineer. The prepared ground surfaces shall then be brought to the specified moisture content mixed as required, and compacted and tested as specified. In localities where it is necessary to obtain the approval of the controlling agency prior to placing fill, it will be the Contractor's responsibility to contact the proper authorities to visit the site.

3. Any underground structure such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines or other structures not located prior to grading are to be removed or treated in a manner prescribed by the Geotechnical Engineer and/or the controlling agency for the project.

C. ENGINEERED FILLS

1. Any material imported or excavated on the property may be utilized as fill, provided the material has been determined to be suitable by the Geotechnical Engineer. Deleterious materials shall be removed from the fill as directed by the Geotechnical Engineer.

2. Rock or rock fragments less than twelve inches in the largest dimension may be utilized in the fill, provided they are not placed in concentrated pockets and the distribution of the rocks is approved by the Geotechnical Engineer.

3. Rocks greater than twelve inches in the largest dimension shall be taken offsite, or placed in accordance with the recommendations of the Geotechnical Engineer in areas designated as suitable for rock disposal.

4. All materials to be used as fill, shall be tested in the laboratory by the Geotechnical Engineer. Proposed import materials shall be approved by the Geotechnical Engineer 48 hours prior to importation.

5. The fill materials shall be placed by the Contractor in lifts, that when compacted, shall not exceed six inches. Each lift shall be spread evenly and shall be

thoroughly mixed to achieve a near uniform moisture condition and a uniform blend of materials.

All compaction shall be achieved at or above the optimum moisture content, as determined by the applicable laboratory standard. The Contractor will be notified if the fill materials are too wet or too dry to achieve the required compaction standard.

6. When the moisture content of the fill material is below the limit specified by the Geotechnical Engineer, water shall be added and the materials shall be blended until a uniform moisture content, within specified limits, is achieved. When the moisture content of the fill material is above the limits specified by the Geotechnical Engineer, the fill materials shall be aerated by discing, blading, mixed with dryer fill materials, or other satisfactory methods until the moisture content is within the specified limits.

7. Each fill lift shall be compacted to the minimum project standards, in compliance with the testing methods specified by the controlling governmental agency, and in accordance with recommendations of the Geotechnical Engineer.

   In the absence of specific recommendations by the Geotechnical Engineer to the contrary, the compaction standard shall be the most recent version of ASTM:D 1557.

8. Where a slope receiving fill exceeds a ratio of five-horizontal to one-vertical, the fill shall be keyed and benched through all unsuitable materials into sound bedrock or firm material, in accordance with the recommendations and approval of the Geotechnical Engineer.

9. Side hill fills shall have a minimum key width of 15 feet into bedrock or firm materials, unless otherwise specified in the soil report and approved by the Geotechnical Engineer in the field.

10. Drainage terraces and subdrainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency and/or with the recommendations of the Geotechnical Engineer and Engineering Geologist.

11. The Contractor shall be required to maintain the specified minimum relative compaction out to the finish slope face of fill slopes, buttresses, and stabilization fills as directed by the Geotechnical Engineer and/or the governing agency for the project. This may be achieved by either overbuilding the slope and cutting

back to the compacted core; by direct compaction of the slope face with suitable equipment; or by any other procedure which produces the required result.

12. The fill portion of fill-over-cut slopes shall be properly keyed into rock or firm material; and the fill area shall be stripped of all soil or unsuitable materials prior to placing fill.

    The design cut portion of the slope should be made first and evaluated for suitability by the Engineering Geologist prior to placement of fill in the keyway above the cut slope.

13. Pad areas in cut or natural ground shall be approved by the Geotechnical Engineer. Finished surfaces of these pads may require scarification and recompaction, or over excavation as determined by the Geotechnical Engineer.

D. CUT SLOPES

1. The Engineering Geologist shall observe all cut slopes and shall be notified by the Contractor when cut slopes are to be started.

2. If, during the course of grading, unforeseen adverse or potentially adverse geologic conditions are encountered, the Engineering Geologist and Soil Engineer shall investigate, analyze and make recommendations to remediate these problems.

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

4. Unless otherwise specified in specific geotechnical reports, no cut slopes shall be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies.

5. Drainage terraces shall be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the Geotechnical Engineer or Engineering Geologist.

E. GRADING CONTROL

1. Fill placement shall be observed and tested by the Geotechnical Engineer and/or his representative during grading.

   Field density tests shall be made by the Geotechnical Engineer and/or his representative to evaluate the compaction and moisture compliance of each fill lift. Density tests shall be conducted at intervals not to exceed two feet of fill

height. Where sheepsfoot rollers are used, the fill may be disturbed to a depth of several inches. Density determinations shall be taken in the compacted material below the disturbed surface at a depth determined by the Geotechnical Engineer or his representative.

2. Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction, or improper moisture content is in evidence, that particular layer or portion thereof shall be reworked until the required density and/or moisture content has been attained. Additional fills shall not be placed over an area until the previous lift of fill has been tested and found to meet the density and moisture requirements for the project and the previous lift is approved by the Geotechnical Engineer.

3. When grading activities are interrupted by heavy rains, fill operations shall not be resumed until field observations and tests by the Geotechnical Engineer indicate the moisture content and density of the fill are within the specified limits.

4. During construction, the Contractor shall properly grade all surfaces to maintain good drainage and prevent the ponding of water. The Contractor shall take remedial action to control surface water and to prevent erosion of graded areas until such time as a permanent drainage and erosion devices have been installed.

5. Observation and testing by the Geotechnical Engineer and/or his representative shall be conducted during filling and compacting operations in order that he will be able to state in his opinion that all cut and filled areas are graded in accordance with the approved specifications.

6. Upon the completion of grading activities and after the Geotechnical Engineer and Engineering Geologist have finished their observations of the work, final reports shall be submitted. No further excavation or fill placement shall be undertaken without prior notification of the Geotechnical Engineer and/or Engineering Geologist.

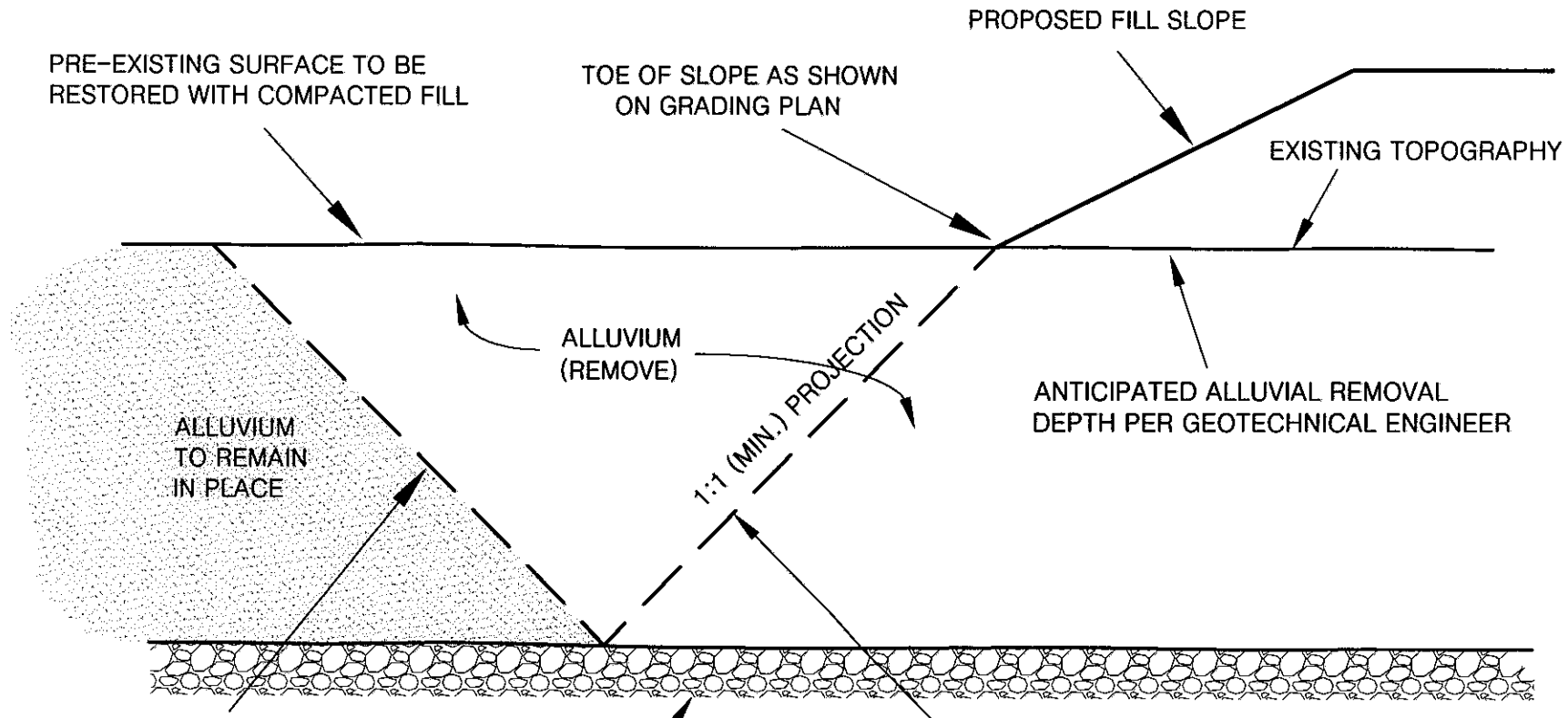
F. FINISHED SLOPES

All finished cut and fill slopes shall be planted and irrigated and/or protected from erosion in accordance with the project specifications, governing agencies, and/or as recommended by a landscape architect.

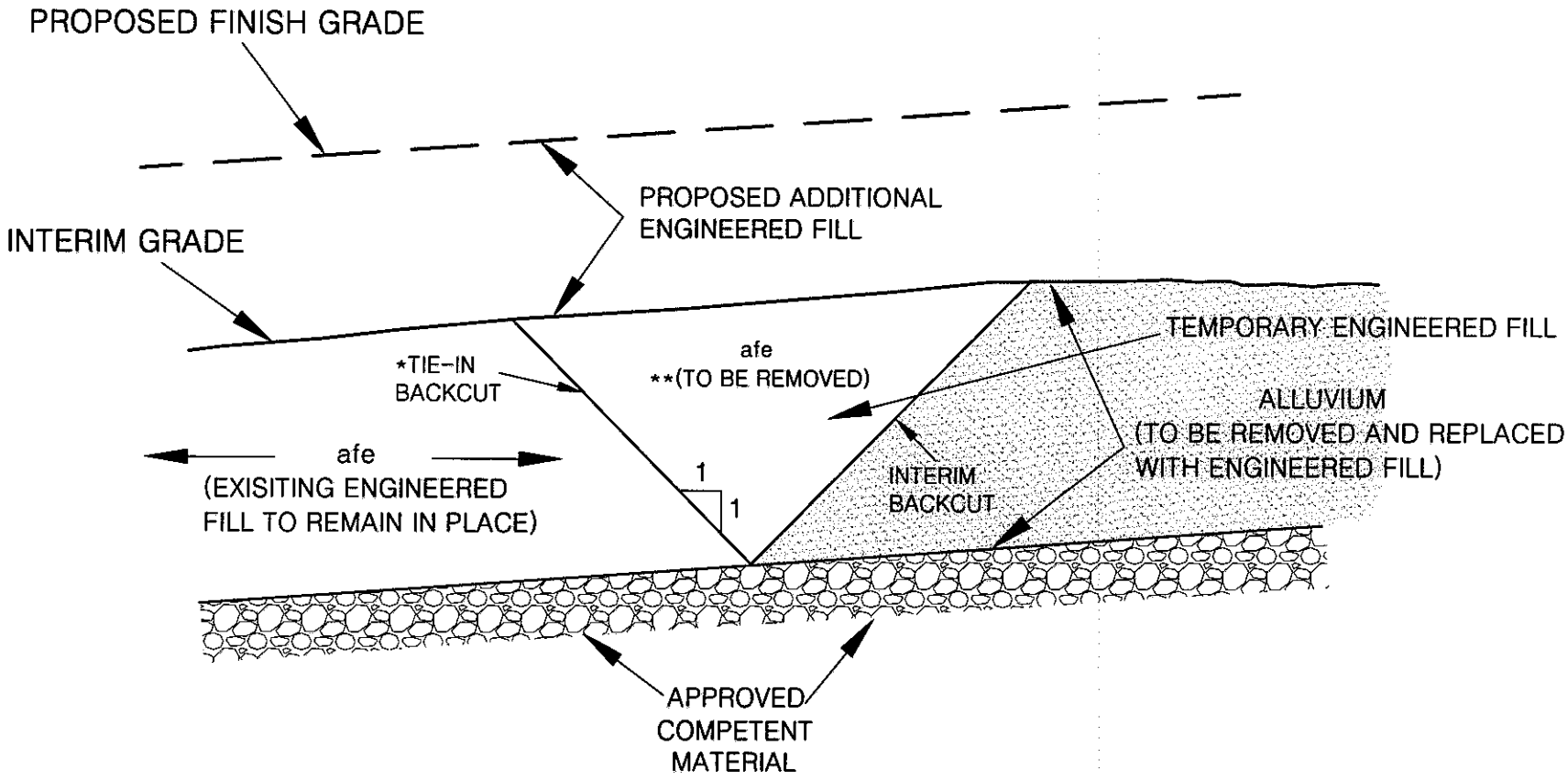
APPENDIX G

Grading Details

DETAIL FOR FILL SLOPE TOEING OUT ON FLAT ALLUVIATED CANYON



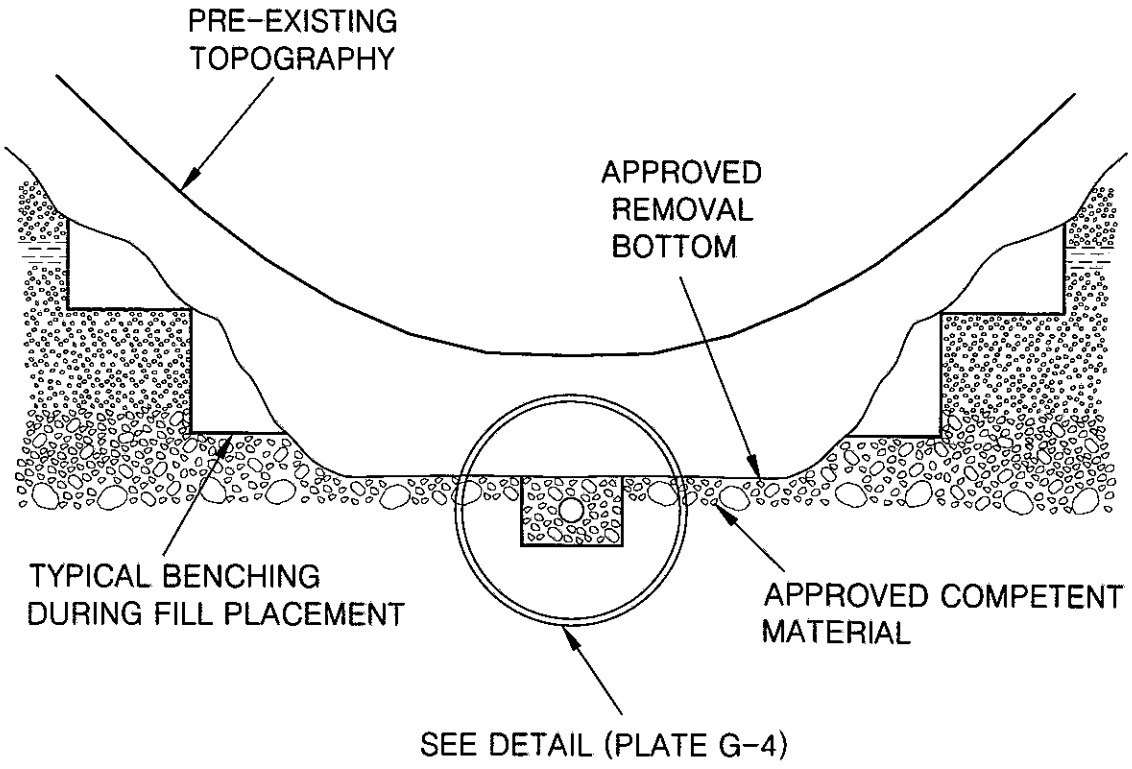
REMOVAL ADJACENT TO EXISTING FILL



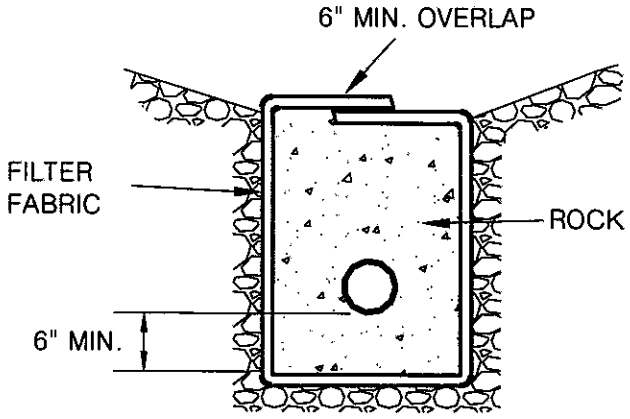
*INITIATE 1:1 TIE-IN BACKCUT TO INTERCEPT TOE OF INTERIM BACKCUT

**AS PART OF TIE-IN FOR ADDITIONAL ENGINEERED FILL

CANYON SUBDRAIN



CANYON SUBDRAIN DETAIL



PERFORATED PIPE SURROUNDED WITH ROCK AND FILTER FABRIC

ROCK: MIN. VOLUME OF 9 CU.FT. PER LINEAR FT. OF 3/4 IN. MAX. ROCK

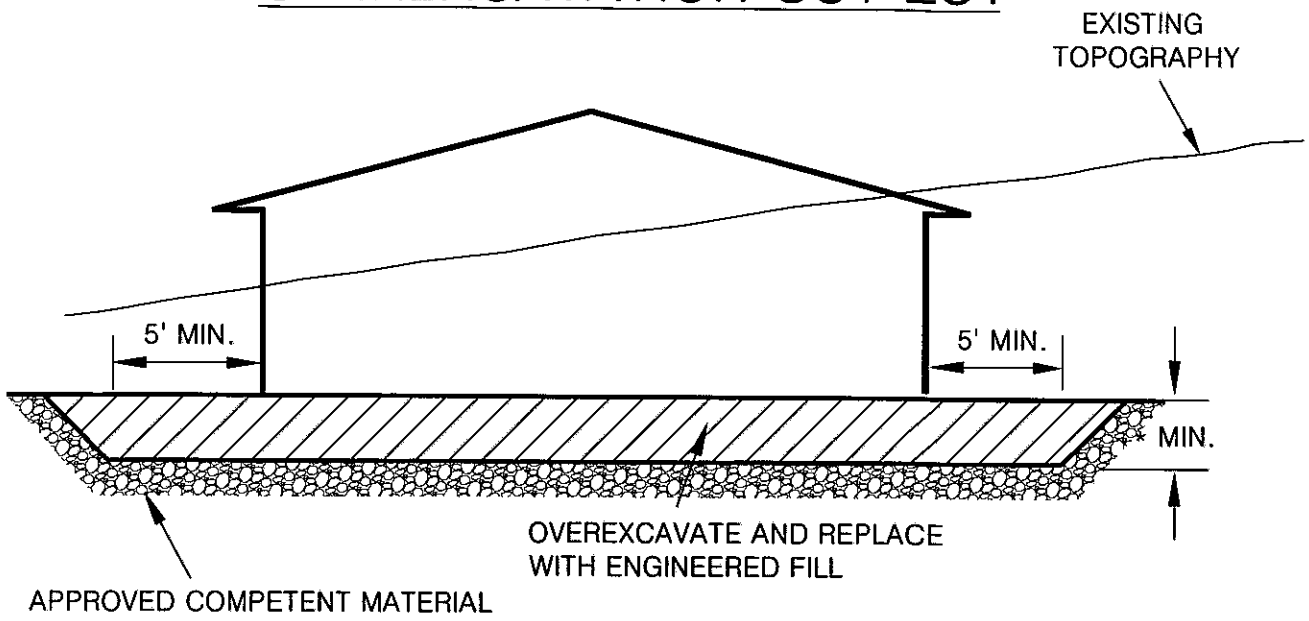
PIPE: 6 IN. ABS OR PVC PIPE WITH A MINIMUM OF 8 PERFORATIONS (1/4-IN. DIA.) PER LINEAL FT. IN BOTTOM HALF OF PIPE ASTM D2751, SDR 35, OR ASTM D3034 OR ASTM D1527, SCHD. 40 ASTM D1785, SCHD. 40

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT

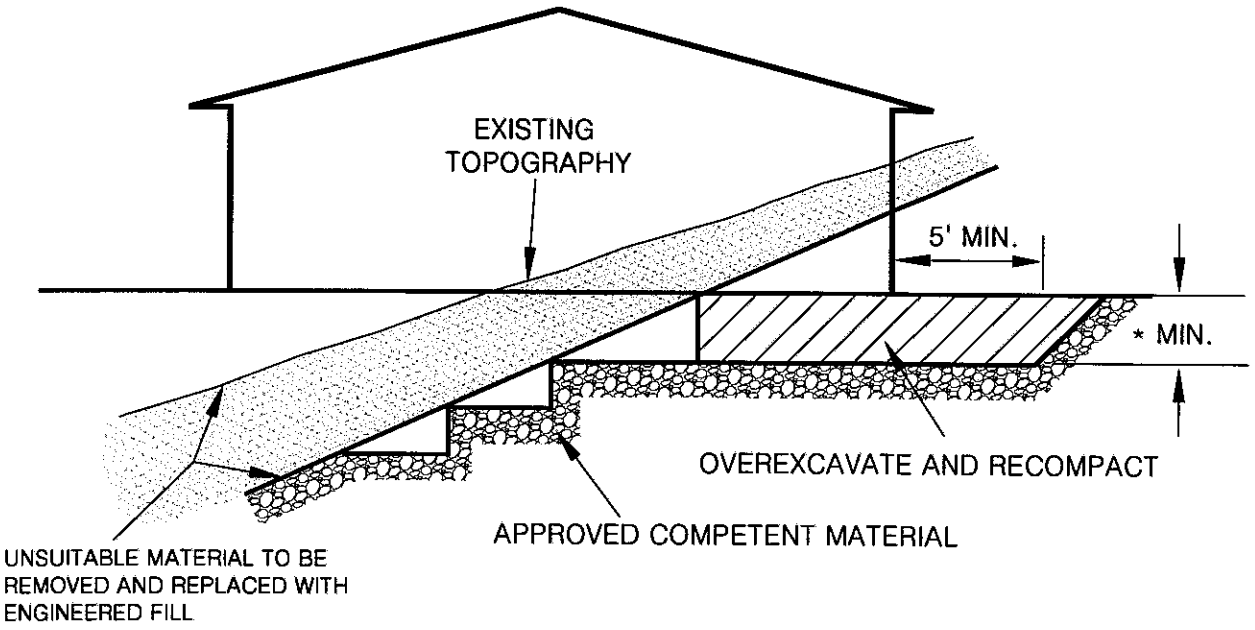
NOTES:

1. FOR CONTINUOUS RUN IN EXCESS OF 500. FT USE 8 IN. DIA. PIPE
2. ENGINEERED FILL PLACED BELOW DRAINS SHALL BE COMPACTED TO 93% OF THE LABORATORY MAXIMUM DRY DENSITY (ASTM:D1557)

OVEREXCAVATION CUT LOT



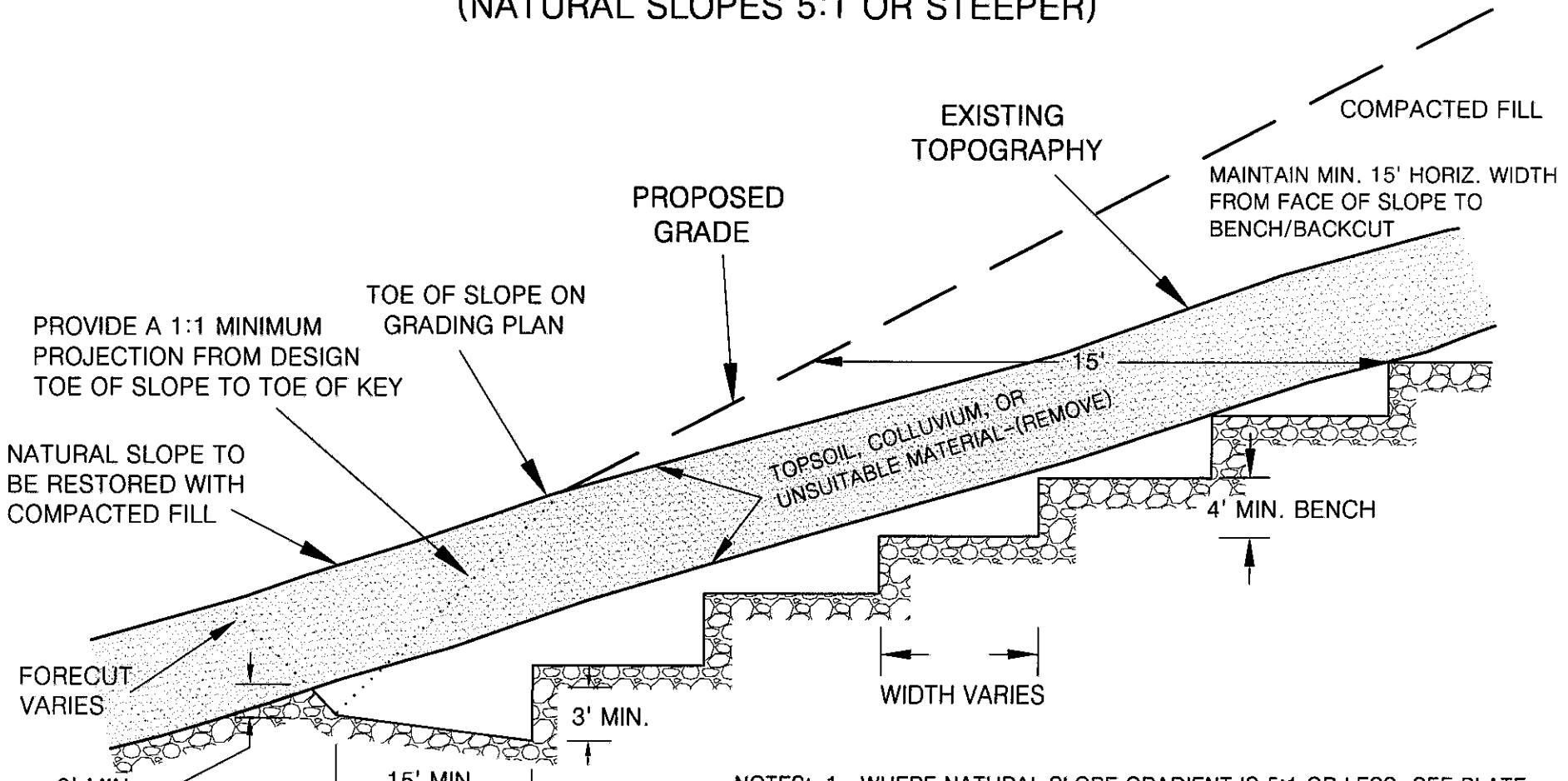
CUT-FILL LOT (TRANSITION)



*NOTE ALL BUILDING PADS SHALL BE OVER EXCAVATED TO A MINIMUM OF 1/3 OF THE MAXIMUM DEPTH OF FILL BELOW THE BUILDING PAD TO A MAXIMUM OF 17 FEET (SEE PLATE G-16)

SIDE HILL SLOPE FILL DETAIL

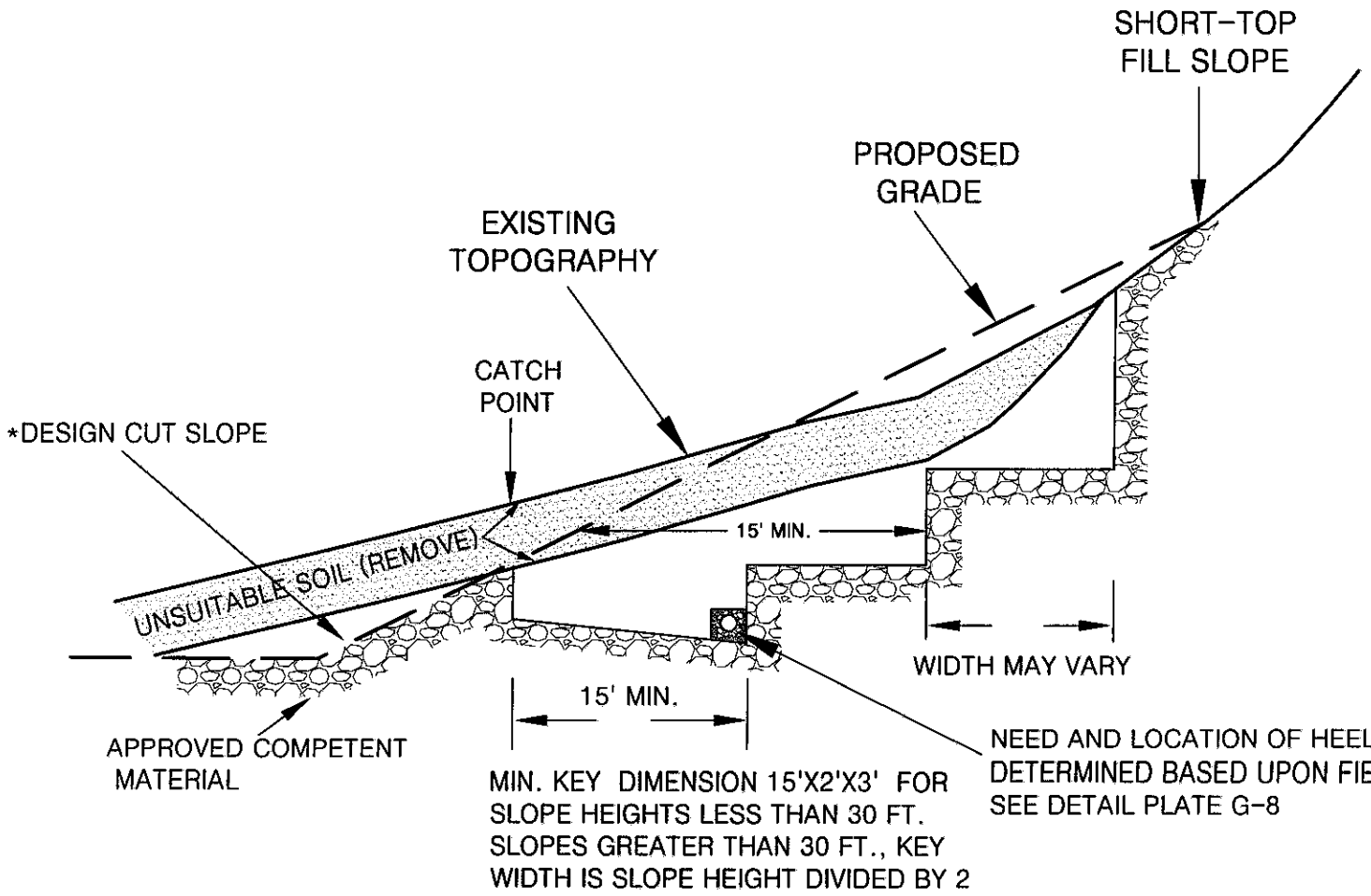
(NATURAL SLOPES 5:1 OR STEEPER)



NOTES:

1. WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, SEE PLATE G-1. WHERE THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN SLOPE RATIO, SPECIAL RECOMMENDATIONS WILL BE PROVIDED BY THE GEOTECHNICAL ENGINEER.
2. THE NEED FOR AND PLACEMENT OF DRAINS WILL BE DETERMINED BY THE GEOTECHNICAL ENGINEER OR GEOLOGIST BASED UPON EXPOSED FIELD CONDITIONS.

FILL OVER CUT SLOPE DETAIL



*THE CUT PORTION OF THE SLOPE SHOULD BE EXCAVATED AND EVALUATED BY THE ENGINEERING GEOLOGIST/GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTING THE FILL SLOPE

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PLATE G-7

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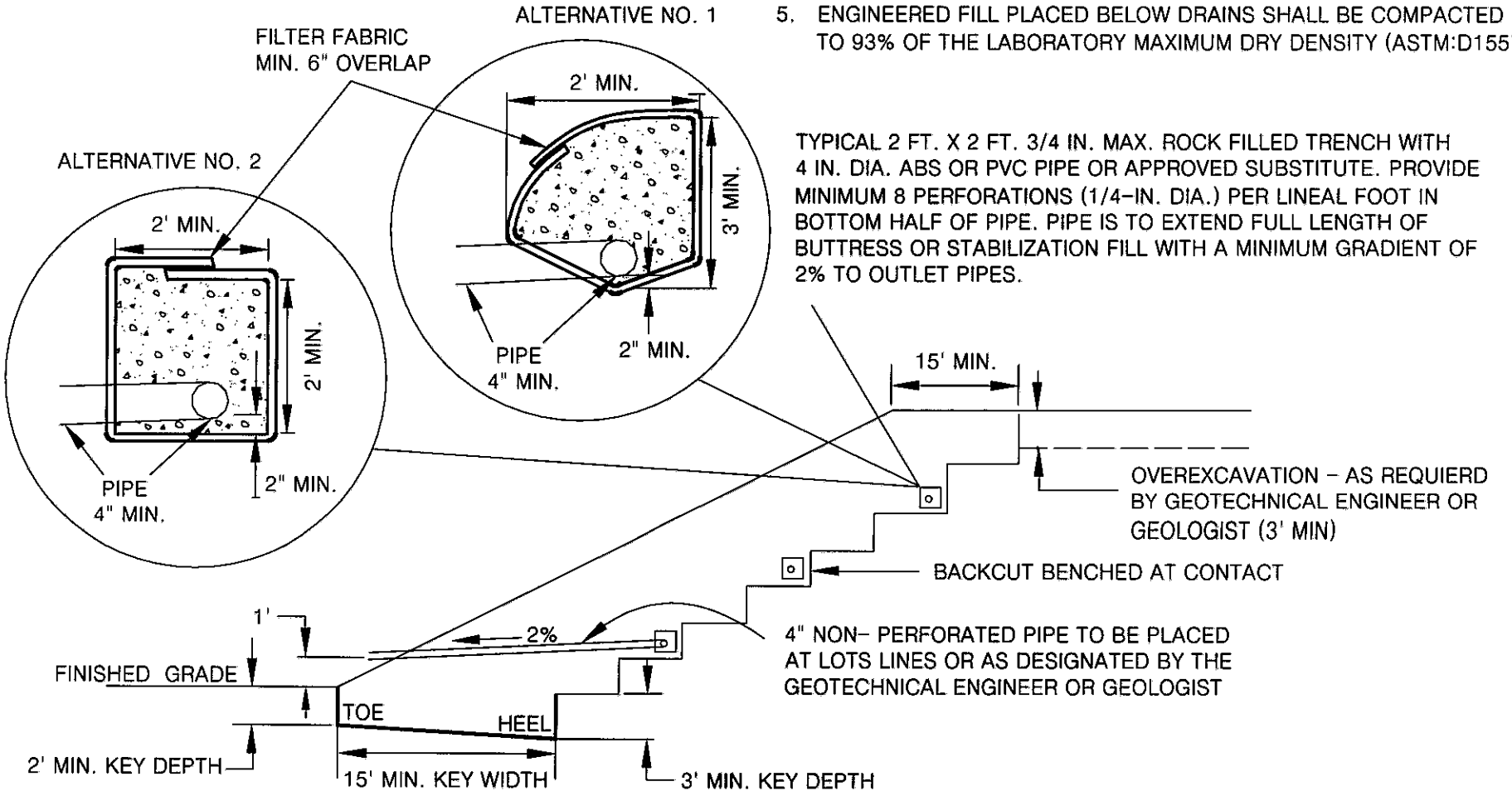
STABILIZATION/BUTTRESS FILL BACKDRAIN

NOTE:

1. ASTM D2751, SDR 35, OR ASTM D3034 OR ASTM D1527, SCHD. 40 ASTM D1785, SCHD. 40
2. SOLID PIPE OUTLETS TO BE PROVIDED EVERY 100 FT. AND JOINED TO PERFORATED BACKDRAIN PIPE WITH "L" OR "T"s. MIN. 2% GRADIENT.
3. GRAVEL TRENCH TO BE FILLED WITH 3/4 IN. MAXIMUM ROCK
4. THE NECESSITY FOR UPPER TIER BACKDRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL ENGINEER OR GEOLOGIST. UPPER TIER OUTLETS SHOULD DRAIN INTO PAVED TERRACE DRAINS.
5. ENGINEERED FILL PLACED BELOW DRAINS SHALL BE COMPACTED TO 93% OF THE LABORATORY MAXIMUM DRY DENSITY (ASTM:D1557)



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VER. 3/12

PLATE G-8

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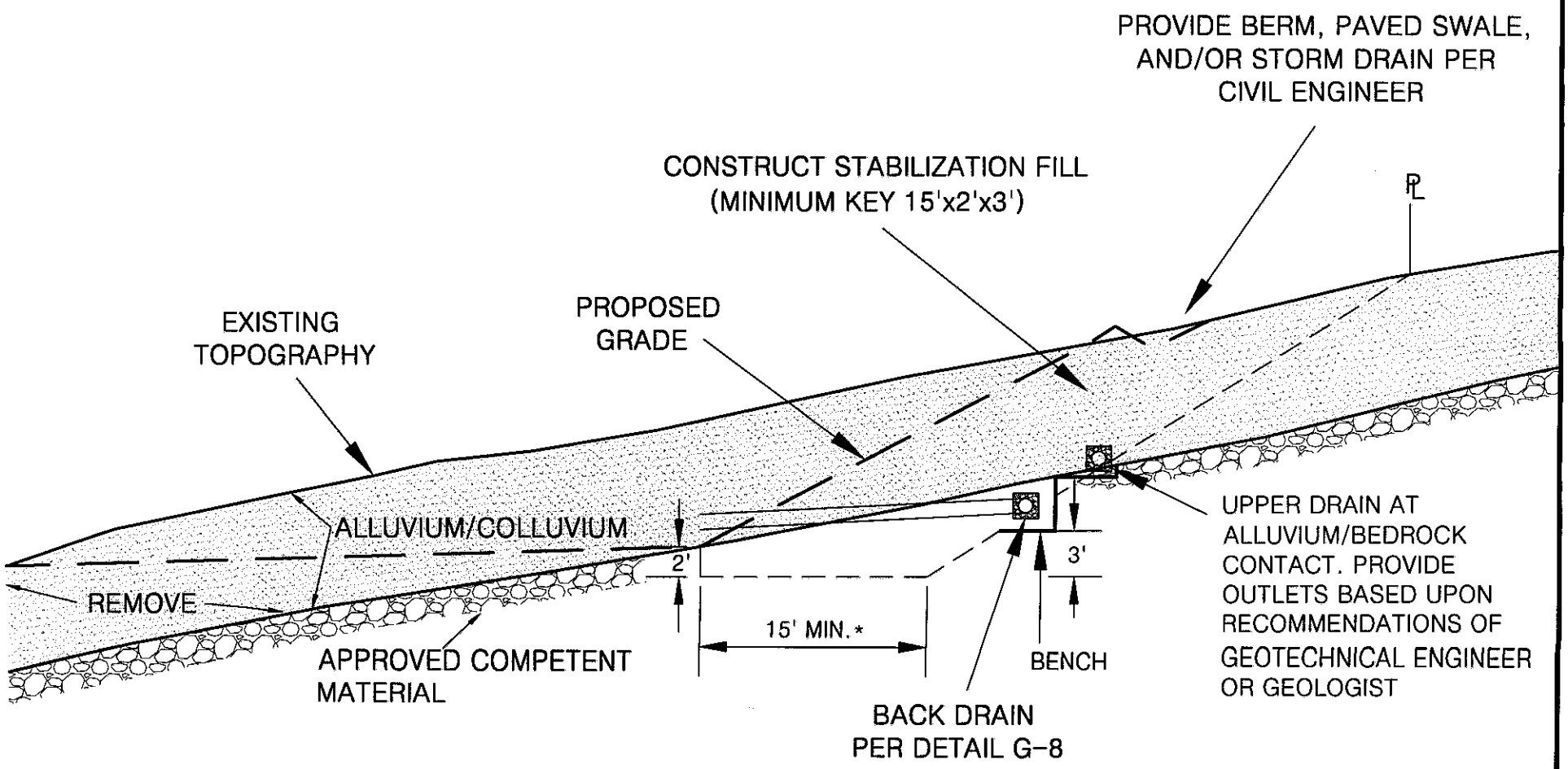
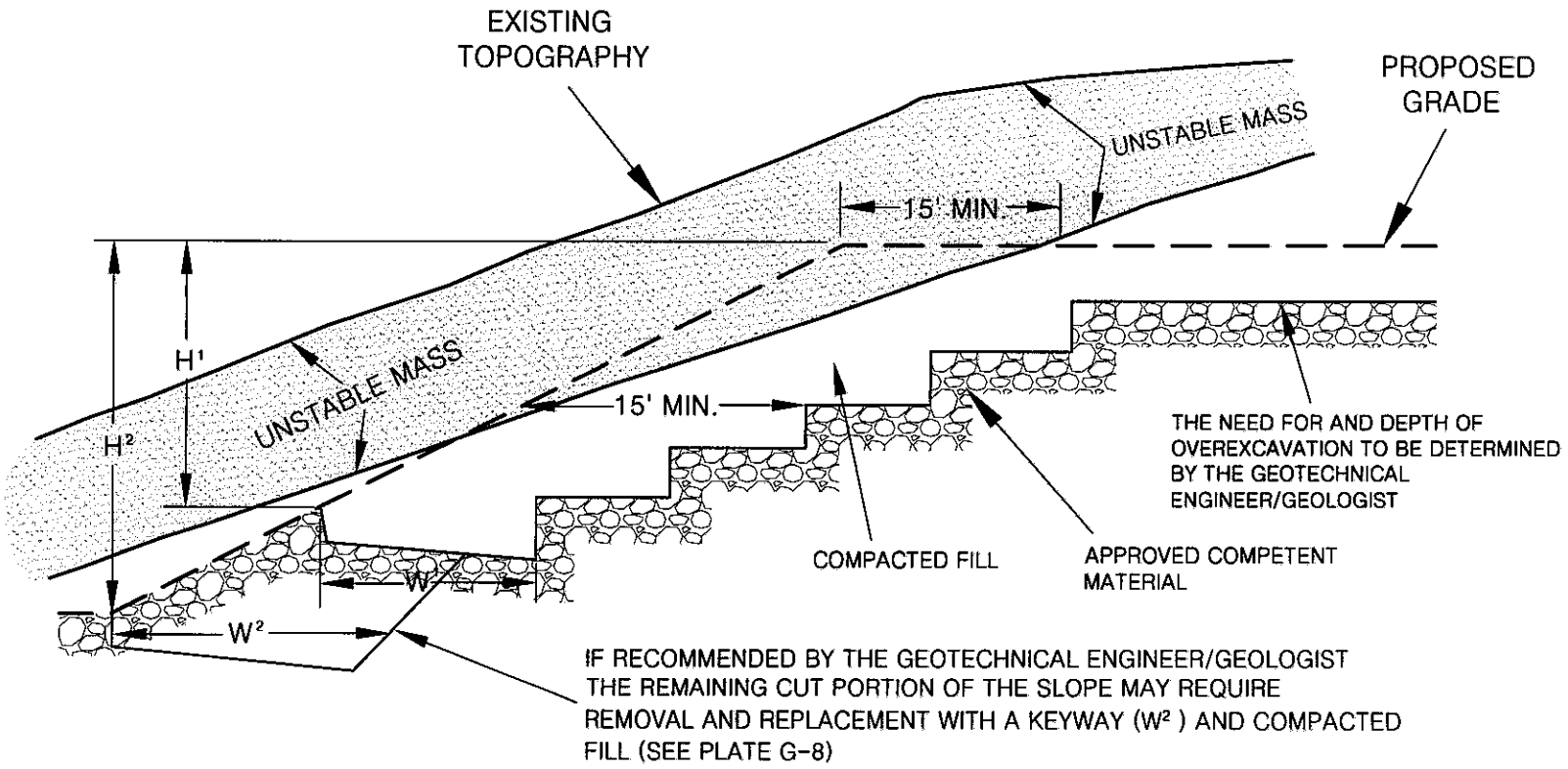
STABILIZATION FILL

(UPSLOPE ALLUVIATED AREA)



* FOR SLOPE HEIGHTS LESS THAN 30 FT. SLOPES GREATER THAN 30 FT., KEY WIDTH IS SLOPE HEIGHT DIVIDED BY 2

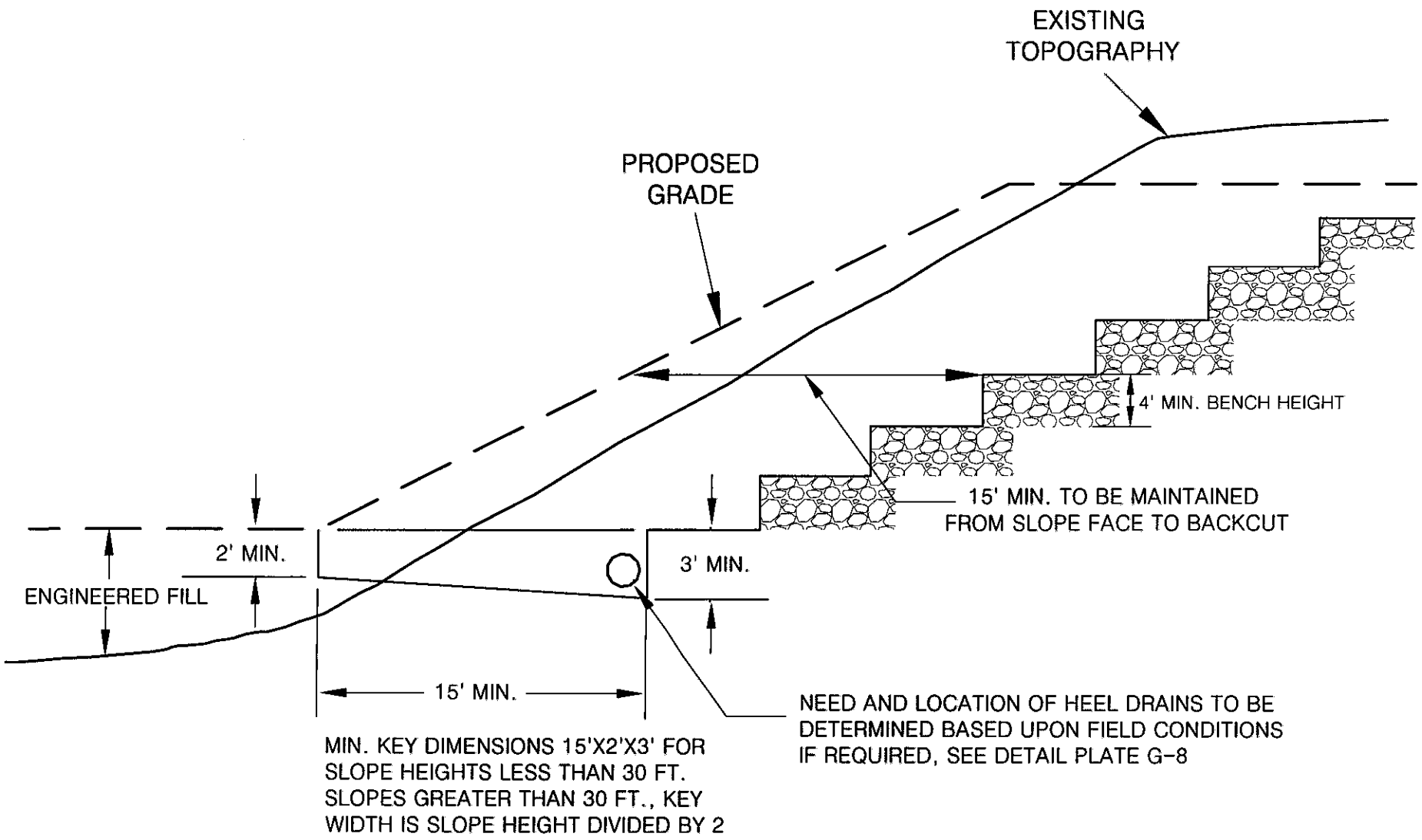
SELECTIVE GRADING DETAIL FOR STABILIZATION FILL
UNSTABLE MATERIAL EXPOSED IN PORTION OF CUT SLOPE



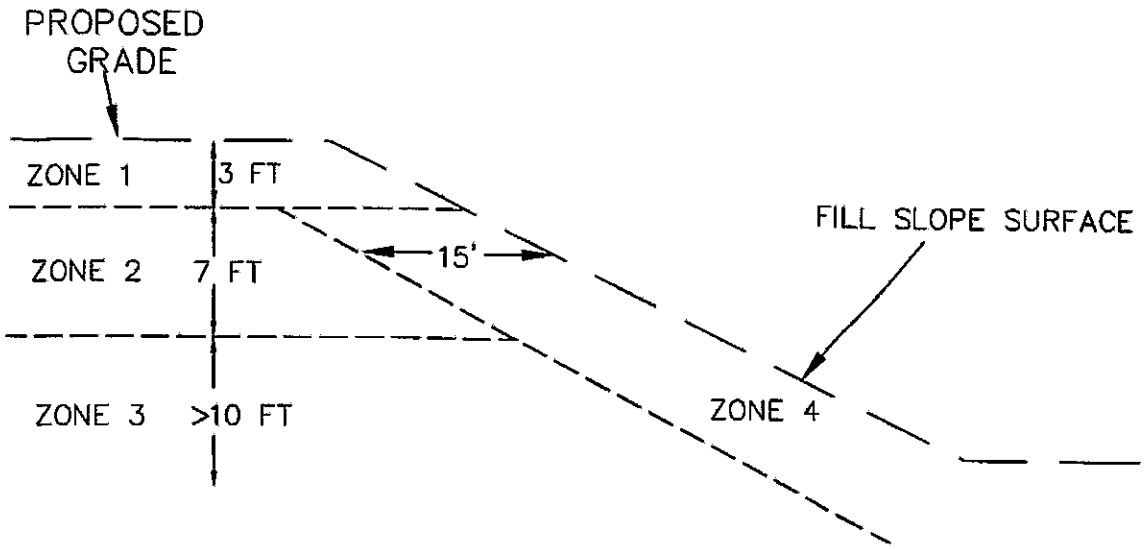
NOTES: 1. BACKDRAINS ARE NOT REQUIRED UNLESS SPECIFIED.

2. "W" SHALL BE EQUIPMENT WIDTH (15') FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE PROJECT GEOTECHNICAL ENGINEER/GEOLOGIST. AT NO TIME SHALL "W" BE LESS THAN H/2.

SKIN FILL SLOPE OVER NATURAL GROUND



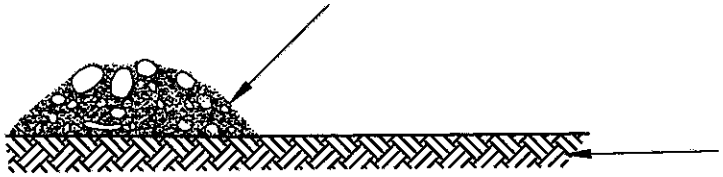
DETAIL FOR MAXIMUM PARTICLE DIMENSION



ZONE	DEPTH	PARTICLE MAX. DIMENSION	PLACEMENT METHOD
1	0-3 ft.	≤1.0 ft.	STANDARD OR CONVENTIONAL COMPACTION METHODS (SEE EARTHWORK SPECIFICATIONS)
2	3-10 ft.	≤2.0 ft.	ROCK BLANKETS (SEE PLATE G-13)
3	>10 ft.	≤8.0 ft.	ROCK BLANKETS (PLATE G-13) ROCK WINDROW (PLATE G-14) INDIVIDUAL ROCK BURIED (PLATE G-15)
4	15 HORIZONTAL FEET FROM FILL SLOPE FACE	≤1.0 ft.	STANDARD OR CONVENTIONAL COMPACTION METHODS (SEE EARTHWORK SPECIFICATIONS)

ROCK BLANKET DETAILS

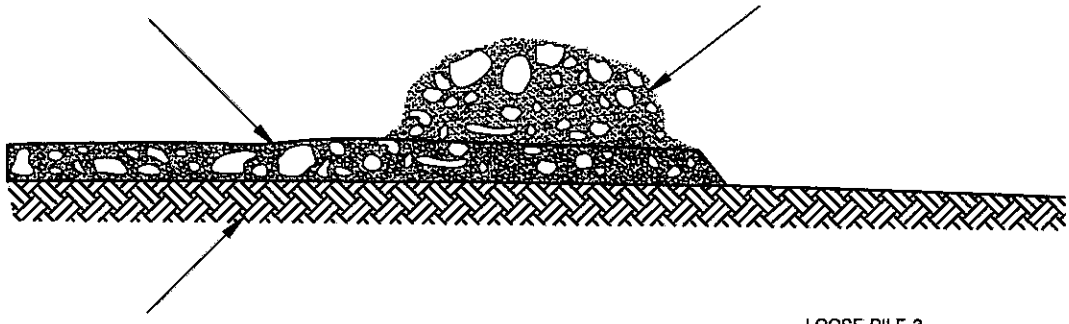
LOOSE PILE 1
LOOSE, DUMPED ROCK, GRAVEL AND SAND MIXTURE REMOVE FRAGMENTS LARGER THAT 2 FEET FOR ISOLATED BURIAL (PLATE G-15) OR WINDROW (PLATE G-10)



APPROVED BOTTOM, OR TOP OF PREVIOUSLY APPROVED BLANKET FILL

COMPACT PILE 1
SPREAD LOOSE PILE FORWARD WITH HEAVY TRACKED DOZER (D-8 OR LARGER). HEAVILY WATER, TRACK, AND APPLY ADDITIONAL SAND AND GRAVEL AS NECESSARY TO FILL VOIDS AND CREATE A DENSE MATRIX OF ROCK, COBBLES, GRAVEL AND SAND (2 FOOT MAXIMUM THICKNESS)

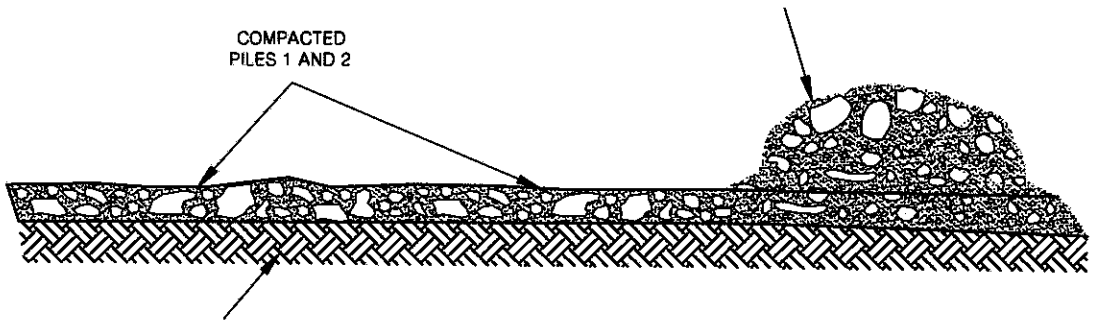
LOOSE PILE 2
DUMP SUCCESSIVE PILES OF LOOSE ROCK, GRAVEL AND SAND MIXTURE ON FORWARD EDGE OF PREVIOUSLY COMPACTED LIFT WITH TRUCKS AND/OR SCRAPERS. USE PREVIOUS LIFT TO ACCESS AND FURTHER COMPACT PILE 1.



APPROVED BOTTOM, OR TOP OF PREVIOUSLY APPROVED BLANKET FILL

LOOSE PILE 3
DUMP SUCCESSIVE PILES OF LOOSE ROCK, GRAVEL AND SAND MIXTURE ON FORWARD EDGE OF PREVIOUSLY COMPACTED LIFT WITH TRUCKS AND/OR SCRAPERS. USE PREVIOUS LIFT TO ACCESS AND FURTHER COMPACT EXISTING BLANKET.

COMPACTED PILES 1 AND 2

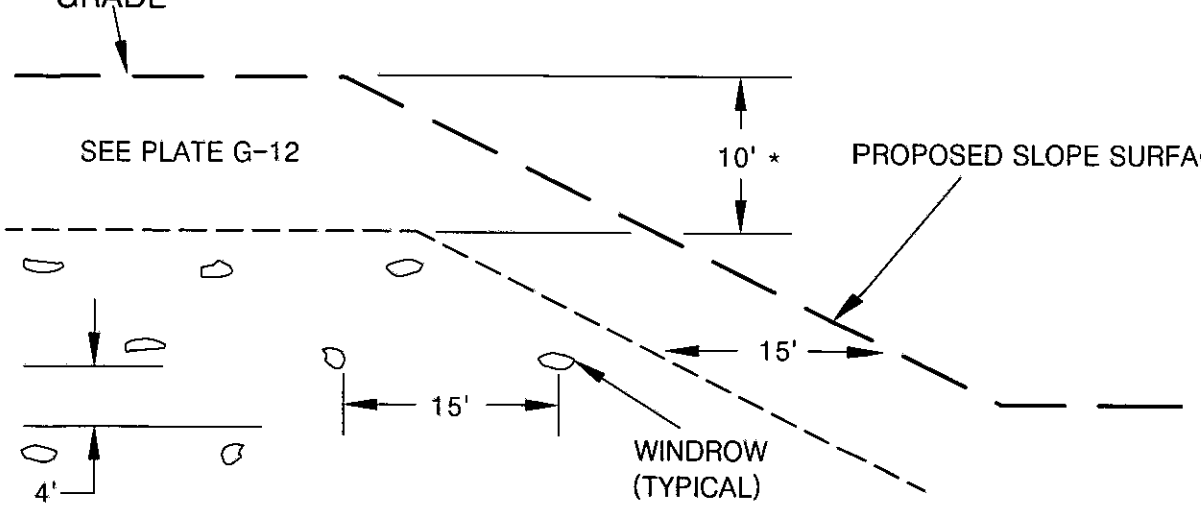


APPROVED BOTTOM, OR TOP OF PREVIOUSLY APPROVED BLANKET FILL

OBSERVATION TESTING AND APPROVAL PROCEDURES

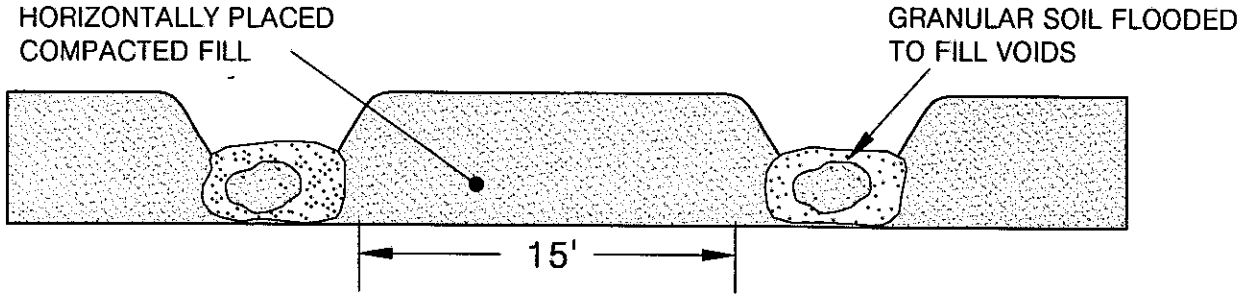
OBSERVE EQUIPMENT. SCRAPERS AND TRUCKS SHOULD BE FULLY SUPPORTED ON BLANKET WITHOUT SIGNIFICANT YIELDING. EXCAVATE TEST/OBSERVATION PITS TO CONFIRM EXISTENCE OF MIXTURE OF VARIOUS PARTICLE SIZES, WITHOUT SIGNIFICANT VOIDS, AND FORMING A DENSE, COMPACTED FILL MATRIX. TEST BY ASTM D1556, D2922 AND/OR D3017 WHEN APPROPRIATE. RECORD LIMITS AND ELEVATION OF BLANKET. ALL FILL AND COMPACTION OPERATIONS TO BE CONDUCTED UNDER THE OBSERVATION OF THE GEOTECHNICAL ENGINEER. SUBSEQUENT LIFTS TO BE APPLIED ONLY AFTER OBSERVATION AND CONFIRMATION OF SUITABILITY OF FILL AND RELEASE BY THE GEOTECHNICAL ENGINEER. BLANKETS TO BE CONSTRUCTED IN ACCORDANCE WITH PLATE G-12.

ROCK WINDROW DETAIL



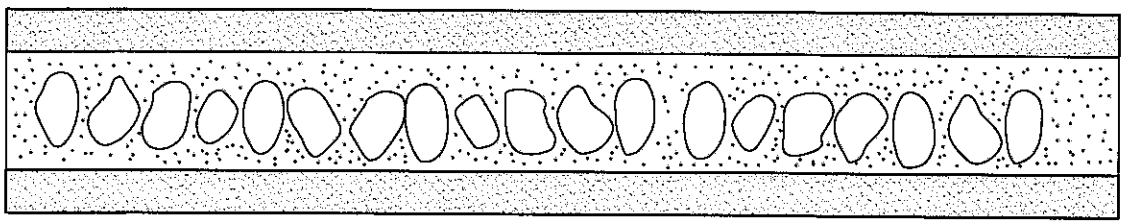
NOTE: OVERSIZED MATERIAL SHOULD BE REMOVED FROM THE 15' CLEAR ZONES WITH SPECIAL EQUIPMENT, SUCH AS A ROCK RAKE, PRIOR TO PLACING THE NEXT FILL LIFT.
*VARIANCES TO THE ABOVE ROCK HOLD DOWN MAY BE GRANTED SUBJECT TO APPROVAL BY THE OWNER, GEOTECHNICAL ENGINEER, AND GOVERNING AGENCY

TYPICAL WINDROW DETAIL (END VIEW)

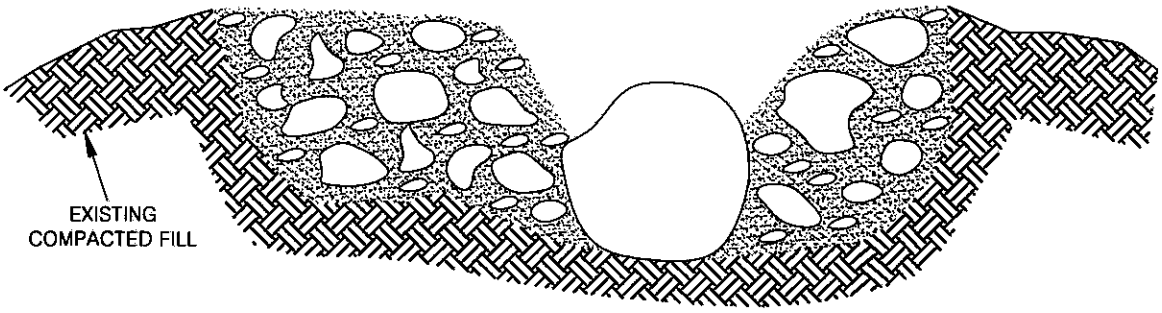


NOTE: COMPACTED FILL SHALL BE BROUGHT UP TO A HIGHER ELEVATION ALONG EACH WINDROW SO GRANULAR SOIL CAN BE FLOODED IN A "TRENCH CONDITION".

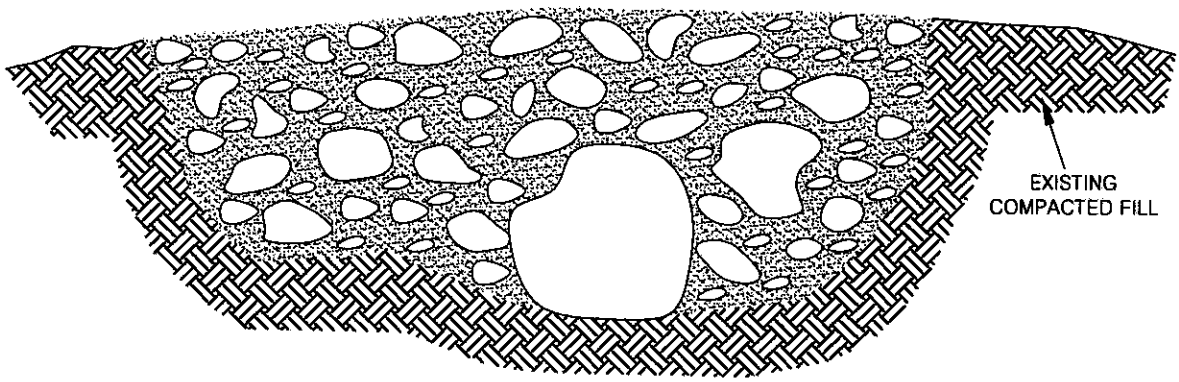
PROFILE VIEW



ISOLATED ROCK BURIAL DETAILS

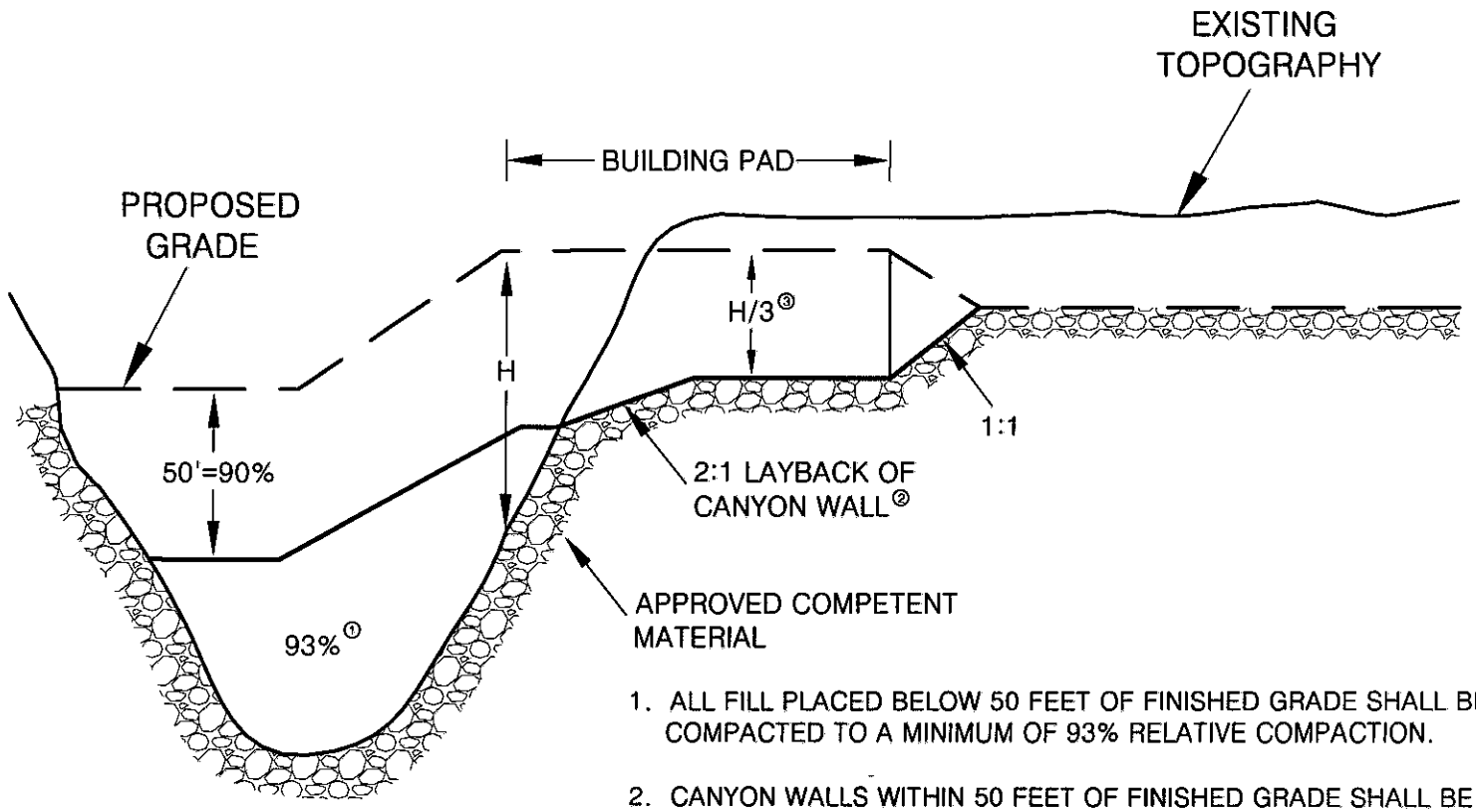


EXCAVATE HOLE INTO EXISTING FILL PRISM, PLACE BOULDER (< 8 feet in maximum dimension) INTO EXISTING COMPACTED FILL. SURROUND WITH SAND, GRAVEL, COBBLES AND WATER HEAVILY. TRACK WITH D8 OR LARGER EQUIPMENT UNTIL RESULTING FILL FULLY SUPPORTS EQUIPMENT. OBSERVE AND/OR TEST IN ACCORDANCE WITH ASTM D1556, D2922 OR D3017. ROCKS LARGER THAN 8 FEET SHALL BE FURTHER REDUCED IN SIZE BY SECONDARY BREAKING.



RELATIVE COMPACTION VS. DEPTH

CANYON WALL LAY BACK
DIFFERENTIAL FILL OVEREXCAVATION DETAILS



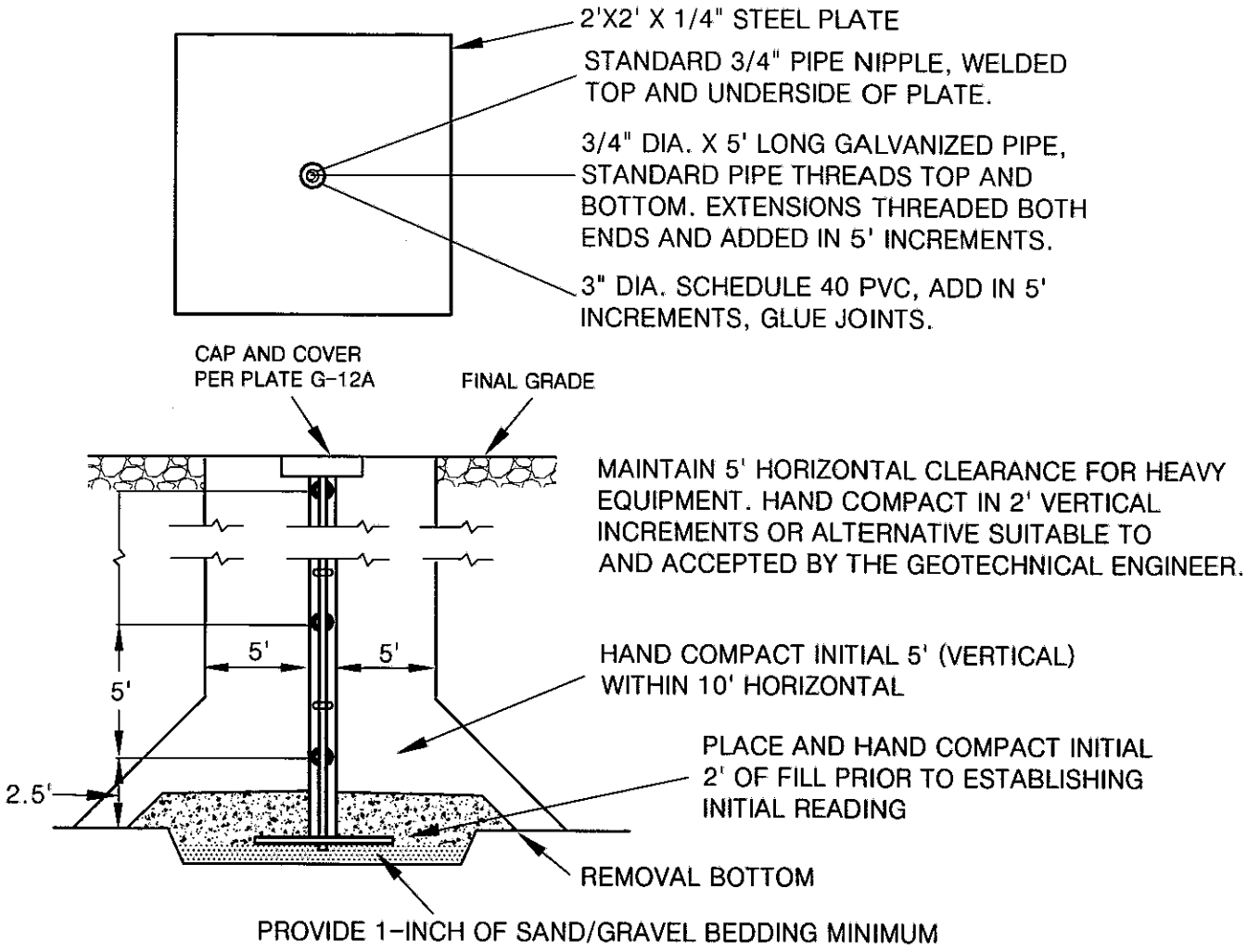
1. ALL FILL PLACED BELOW 50 FEET OF FINISHED GRADE SHALL BE COMPACTED TO A MINIMUM OF 93% RELATIVE COMPACTION.

2. CANYON WALLS WITHIN 50 FEET OF FINISHED GRADE SHALL BE LAID BACK TO A SLOPE RATIO OF 2:1 OR FLATTER.

3. ALL BUILDING PADS SHALL BE OVER EXCAVATED TO A MINIMUM OF 1/3 OF THE MAXIMUM DEPTH OF FILL BELOW THE BUILDING PAD TO A MAXIMUM OF 17 FEET.

4. IF THE 2:1 LAY BACK OF THE CANYON WALL IS IMPRACTICAL, THEN AS AN ALTERNATIVE THE INCREASED COMPACTION STANDARDS IN NOTE 1 SHOULD BE EXTENDED UP TO H/3 AND THE LAY BACK WILL NOT BE REQUIRED.

SETTLEMENT PLATE DETAIL



NOTES:

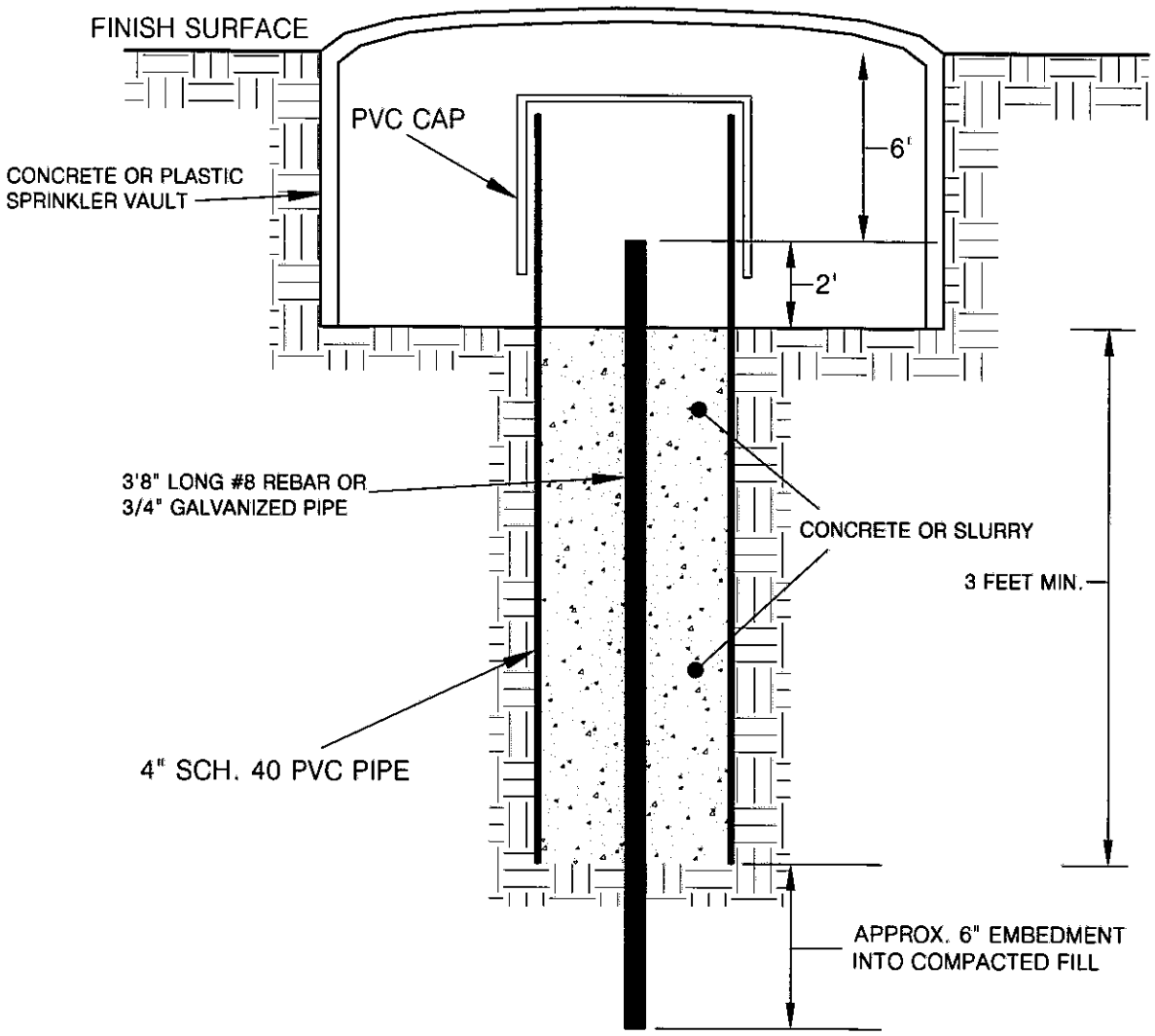
1) LOCATIONS OF SETTLEMENT PLATES SHALL BE CLEARLY MARKED AND READILY VISIBLE (RED FLAGGED) TO EQUIPMENT OPERATORS.

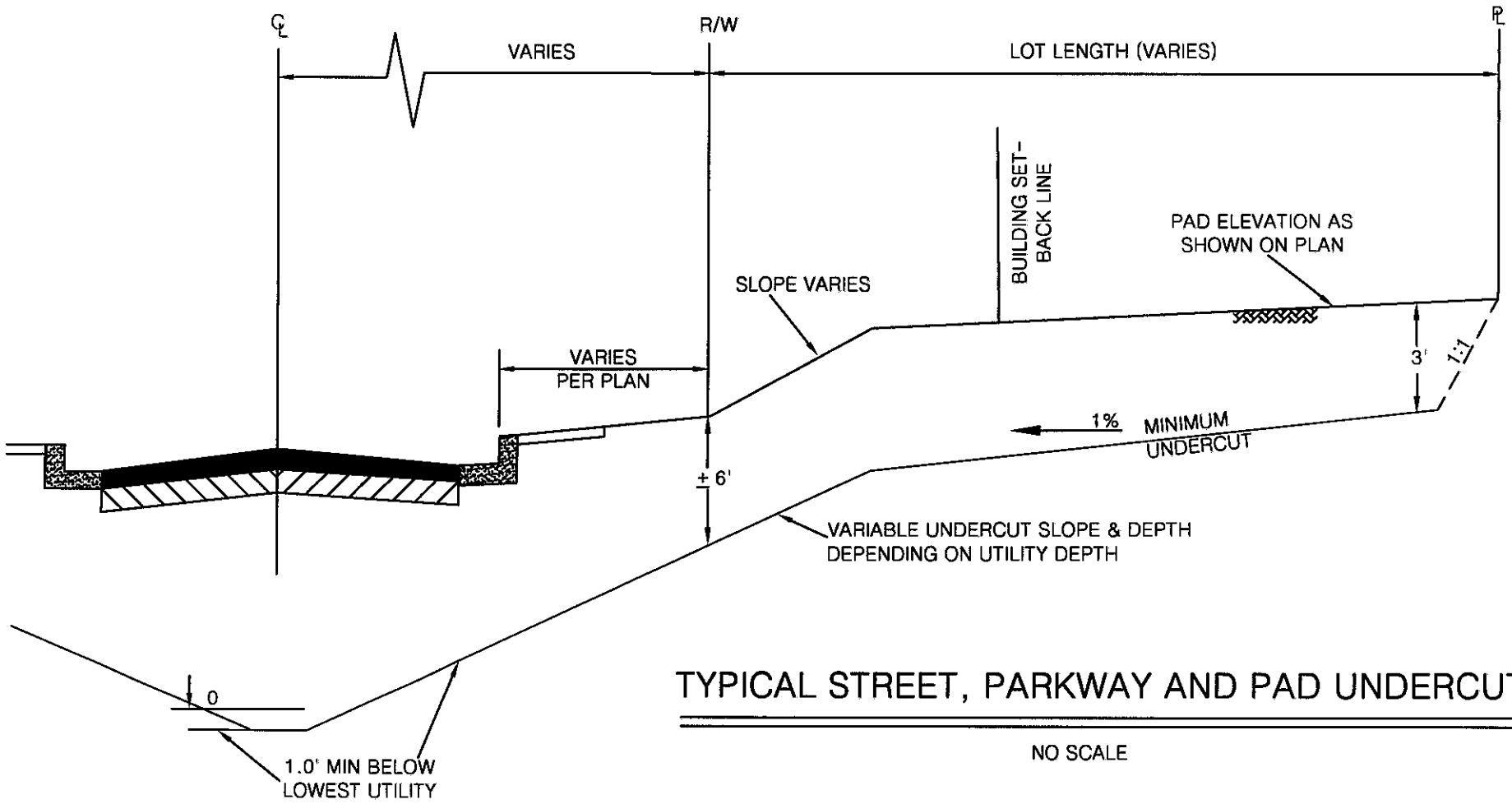
2) CONTRACTOR SHALL MAINTAIN 10' HORIZONTAL CLEARANCE FOR HEAVY EQUIPMENT WITHIN 5' (VERTICAL) OF PLATE BASE. FILL WITHIN CLEARANCE AREA SHALL BE HAND COMPACTED TO PROJECT SPECIFICATIONS OR COMPACTED BY ALTERNATIVE APPROVED BY THE GEOTECHNICAL ENGINEER.

3) AFTER 5' (VERTICAL) OF FILL IS IN PLACE, CONTRACTOR SHALL MAINTAIN 5' HORIZONTAL EQUIPMENT CLEARANCE. FILL IN CLEARANCE AREA SHALL BE HAND COMPACTED (OR APPROVED ALTERNATIVE) IN VERTICAL INCREMENTS NOT TO EXCEED 2 FEET.

4) IN THE EVENT OF DAMAGE TO SETTLEMENT PLATE OR EXTENSION RESULTING FROM EQUIPMENT OPERATING WITHIN PRESCRIBED CLEARANCE AREA, CONTRACTOR SHALL IMMEDIATELY NOTIFY GEOTECHNICAL ENGINEER AND SHALL BE RESPONSIBLE FOR RESTORING THE SETTLEMENT PLATE AND EXTENSION RODS TO WORKING ORDER.

SURFACE SETTLEMENT MONUMENT DETAIL





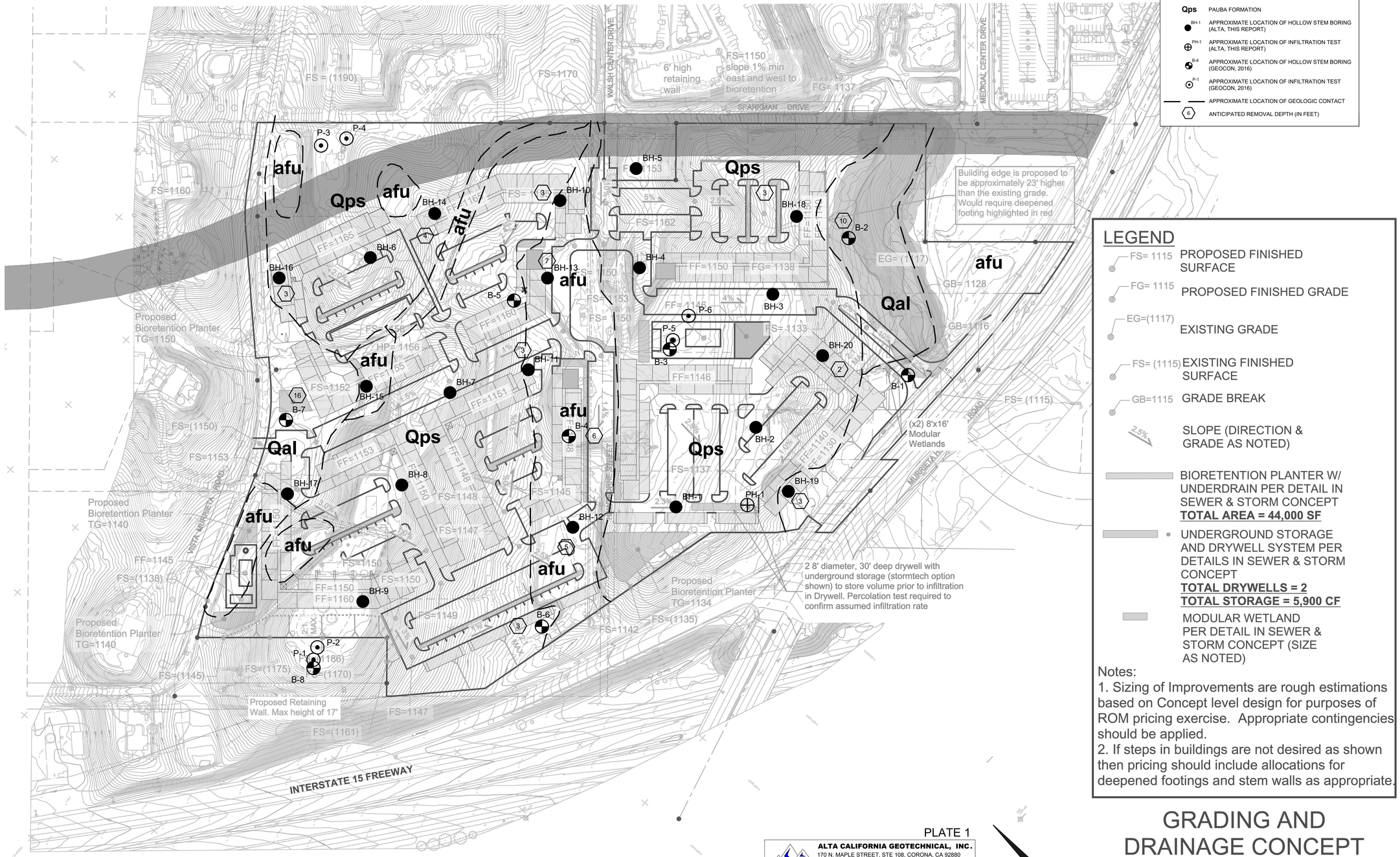
TYPICAL STREET, PARKWAY AND PAD UNDERCUT

NO SCALE

ALTA CALIFORNIA GEOTECHNICAL, INC .
VER. 3/13

PLATE G-19

PATH: C:\Users\Jinks\Desktop\Drafting\GRADING DETAILS\G-19.dwg



GRADING AND DRAINAGE CONCEPT

PSOMAS

DATE: 08/12/2021 REVISED ON:
JOB No: 2MAR300100