ENGEN CORPORATION
Geotechnical & Environmental Services

Preliminary Updated Geotechnical Feasibility Study

Austin Vineyard and Winery
APN: 942-030-006
Temecula, California

Project Number: 4436UGFS

BGR Number: 1800141

March 7, 2019

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Prepared for:

Austin Vineyard and Winery
c/o Temecula Valley Wine Management
Attention: Mr. Rebaux Steyn
27495 Diaz Road
Temecula, CA 92590

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March 7, 2019

Austin Vineyards and Winery
c/o Temecula Valley Wine Management
Attention: Mr. Rebaux Steyn
27495 Diaz Road
Temecula, CA 92590

Subject: **Updated Geotechnical Feasibility Study**, Austin Vineyard and Winery, APN: 942-030-006, Parcel 1 of Parcel Merger 180016, Glen Oaks Rd, Temecula, California 92592, Project Number: 4436UGFS

References:
1. ***EnGEN Corporation, Geotechnical Feasibility Study***, Austin Vineyard and Winery, APN: 942-030-006, Parcel 1 Merger, dated: December 10, 2018, Project No.: 4436GFS
2. ***Bratene Construction and Engineering, Rough Grading Plan***
BGR Number: 1800141, Austin Vineyard, APN: 942-030-006, Parcel 1 of Parcel Merger 180016, Glen Oaks Rd, Temecula, California, 92592, Job No: 18006, Dated: October 23, 2018

Mr. Steyn,

In accordance with your request and signed authorization, on February 6th, 2019 a representative from this firm visited the subject site to confirm that it remained substantially unchanged from that represented in the Referenced Number 1 Report. Based on the site reconnaissance conducted and a review of the Reference No. 1 report, we are submitted an updated geotechnical report for the Referenced No. 2 Grading Plan.

1.0 EXECUTIVE SUMMARY

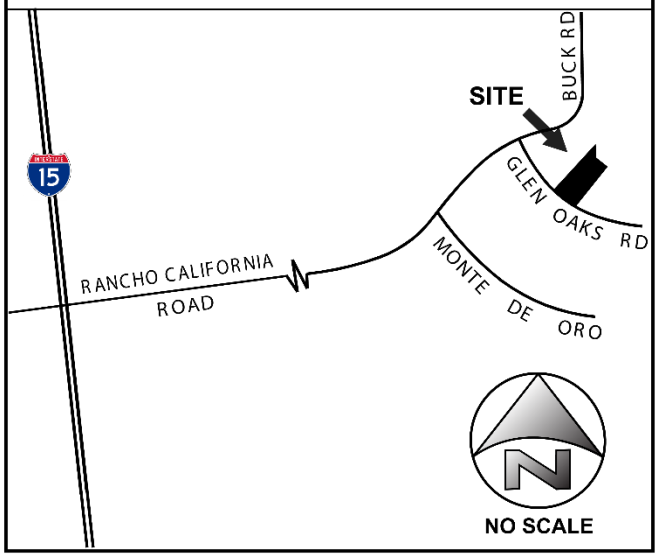
- **Feasibility for development:** Based on the findings of this study it is our opinion that the subject site is developable from a geotechnical standpoint provided the recommendations of this report are incorporated into the design and construction of the proposed improvement areas within the subject property.
- **Grading Operations:** The vineyard and proposed winery layout are being rough graded under residential permit BGR 1800141. Precise grading in the final winery layout will be submitted separately in coordination with this report.
- **Expansive and Corrosive Soil Properties and Foundation Recommendations:** Areas to receive concrete foundations and slabs will be supported on soils that have a **very low** expansion potential and are considered non-corrosive to concrete. Minimum foundation and slab design recommendations are provided under § 7.0 of this report:

2.0 SITE/PROJECT DESCRIPTION

2.1 Site Description:

The subject site is an essentially rectangular shaped 20-acre lot located north of Glenoaks Road in the Temecula area of Riverside County. The 10-acre area to be graded was merged with the adjacent 10-acre parcel to the southwest, creating the 20-acre parcel. Vertical topographic relief across the site is approximately 30-feet with overall site drainage toward the west. At the time the field study was conducted, an existing residence and vineyard occupy the southwestern portion of the subject site. The north and western portions of the site was covered with very sparse grasses and weeds.

FIGURE 1 - SITE LOCATION MAP



2.2 Project Description:

The proposed development for the subject site will be a commercial winery with a planted vineyard. The vineyard and proposed winery layout are being rough graded under residential permit BGR 1800146. Precise grading in the final winery layout will be submitted separately in coordination with this report.

2.3 Scope of Work:

The scope of this study was to provide a preliminary geotechnical assessment of the surface and subsurface conditions within the area to be developed for the winery, and to provide recommendations for the commercial development of the site from a geotechnical point of view. The scope included: 1) site reconnaissance and geologic mapping, 2) review of subsurface exploration data and field testing conducted in the Reference No. 1 Report, 3) engineering analysis of field and laboratory data, and 4) preparation of this report.

2.4 Field Study:

Field reconnaissance, geologic mapping and subsurface exploration was conducted on October 27, 2018. The purpose of the subsurface exploration was to assess the underlying earth materials' existing condition and geotechnical properties as well as the presence of historical groundwater conditions that might affect the geotechnical integrity of the proposed improvements. Exploratory backhoe test pits were excavated within the proposed improvement areas of the subject site (see Plate 1). Soils encountered consisted of alluvium, colluvium and Pauba Formation bedrock (see Exploratory Backhoe Logs in the Appendix). The exploratory test pits were excavated utilizing a rubber-tired backhoe equipped with a 24-inch bucket. Bulk samples were collected from selected depths and in-place density tests were performed in the upper 5-feet of each test pit. Representative soil samples were subsequently returned to this firm's soils laboratory for verification of field classifications and testing. Selected samples were tested for maximum density, USCS classification, shear strength, and expansion. In addition, soil samples were visually inspected for evidence of corrosive properties that would dictate a formal corrosive analysis of materials that will be in direct contact with any proposed concrete within the improvement areas. The approximate locations of the exploratory test pits are denoted on the Geotechnical Feasibility Study Site Plan (Plate 1).

2.5 Exploratory Test Pit Backfill Compaction:

The exploratory test pits were backfilled with loose soil cuttings after completion of logging, testing and sampling operations. Per EnGEN's contract, mechanical bucket tamping was applied to backfill operations. However, tests were not performed to determine the compaction of the backfilled material. Thus, as recommended in the Reference No. 1 Report the exploratory test pit backfill should be removed and re-compacted during the rough grade operations to meet the density of surrounding ground or 90% relative compaction (whichever is required as a result of the grading operations). Verification for the restoration of the test pit backfill should be documented within the body of the final grading report for the proposed project.

3.0 FINDINGS

3.1 Site Review:

The subject site is essentially gently to moderately sloping in general to the southwest. At the time of the site reconnaissance, there was a sparse growth of native grasses and weeds. Based on our site study, the subject property appears to be comprised of Pauba Formation Bedrock with shallow colluvium and alluvial deposits within the surface draining areas (see Plate 1). Alluvium can be found in the western portion of the property, north of the proposed driveway and was found to be loose and unconsolidated in its undisturbed state. At present, the alluvial area of the site is intended to remain undisturbed for use in the infiltration basins to be designed per the Referenced No. 1 grading plan. The site is not located within a State designated Alquist-Priolo Zone.

3.2 Subsurface Soil Profile:

Based on our field reconnaissance and subsurface excavations performed, the site is underlain by the following earth materials:

TABLE 1 - EARTH MATERIALS

Earth Materials	Range of Depth	Condition
Older Alluvium	Surface to max depth explored	Moderately dense
Colluvium	Surface to approximately 2.5 feet	Porous, loose
Pauba Formation Bedrock	± 2.5 feet to max depth explored	Dense to very dense

A thin mantle of Colluvium covers the natural slopes throughout the site and overlies the Pauba Formation Bedrock in the higher elevations (see Plate 1). Alluvium deposits are mapped in the western portion of the property north of the proposed driveway (see Plate 1). The exploratory test pit logs of earth materials encountered during the subsurface exploration are included in Appendix C. Further discussion of the on-site earth material is presented in § 6.0 of this report.

3.3 Transition Areas:

Based on the elevation of the proposed pad, it appears the entire winery building will be situated on engineered fill to be placed and reported in the BGR1800141 documents. As a result, only surficial pad contouring should be necessary at that time, and no other remedial grading is anticipated at this time. If any changes are made to the Referenced #1 grading plan, EnGEN should be notified to review the changes and insure that the supporting materials for the proposed structure have not changed.

4.0 LABORATORY TESTING

4.1 General:

The results of laboratory tests performed on samples of earth material obtained during the site visit are presented in the attached Appendix. Following is a listing and brief explanation of the laboratory tests performed. The samples obtained during the field study will be discarded 30 days after the date of this report. This office should be notified immediately if retention of samples will be needed beyond 30 days.

4.2 Classification:

The field classification of soil materials encountered during our site visit were verified in the laboratory in general accordance with the Unified Soils Classification System, ASTM D 2488-00, Standard Practice for Determination and Identification of Soils (Visual-Manual Procedures). The final classification is shown in the Moisture Density Test Report presented in the Appendix.

4.3 Maximum Dry Density/Optimum Moisture Content Relationship Test:

Maximum dry density/optimum moisture content relationship determinations were performed on samples of near-surface earth material in general accordance with ASTM 1557-12 procedures using a 4.0-inch diameter mold. Samples were prepared at various moisture contents and compacted in five (5) layers using a 10-pound weight dropping 18-inches and with 25 blows per layer. A plot of the

compacted dry density versus the moisture content of the specimens is constructed and the maximum dry density and optimum moisture content determined from the plot. The plot is shown in the Moisture Density Test Report presented in the Appendix.

4.4 Expansion Test:

Laboratory expansion tests were performed on samples of near-surface earth material in general accordance with CBC 18-2. In this testing procedure, a remolded sample is compacted in two (2) layers in a 4.0-inch diameter mold to a total compacted thickness of approximately 1.0-inch by using a 5.5-pound weight dropping 12-inches and with 15 blows per layer. The sample should be compacted at a saturation between 49 and 51 percent. After remolding, the sample is confined under a pressure of 144 pounds per square foot (psf) and allowed to soak for 24 hours. The resulting volume change due to the increase in moisture content within the sample is recorded and the Expansion Index (EI) calculated.

4.5 Soluble Sulfate Test:

Samples of the near –surface earth materials were obtained for soluble sulfate testing for the site. The concentration of soluble sulfates was determined in the general conformance with California Test Method 417 procedures.

4.6 pH/Minimum Resistivity

Sample(s) of near surface soils were tested for pH and minimum resistivity in general accordance to CTM 643.

4.7 Chloride Content

Sample(s) of near surface soils were tested for chloride content in general conformance to CTM 422.

4.8 Direct Shear Test:

Direct shear tests were performed on select samples of near-surface earth material in general accordance with ASTM D 3080-03 procedures.

5.0 GEOLOGY AND SEISMICITY

5.1 Geologic Setting:

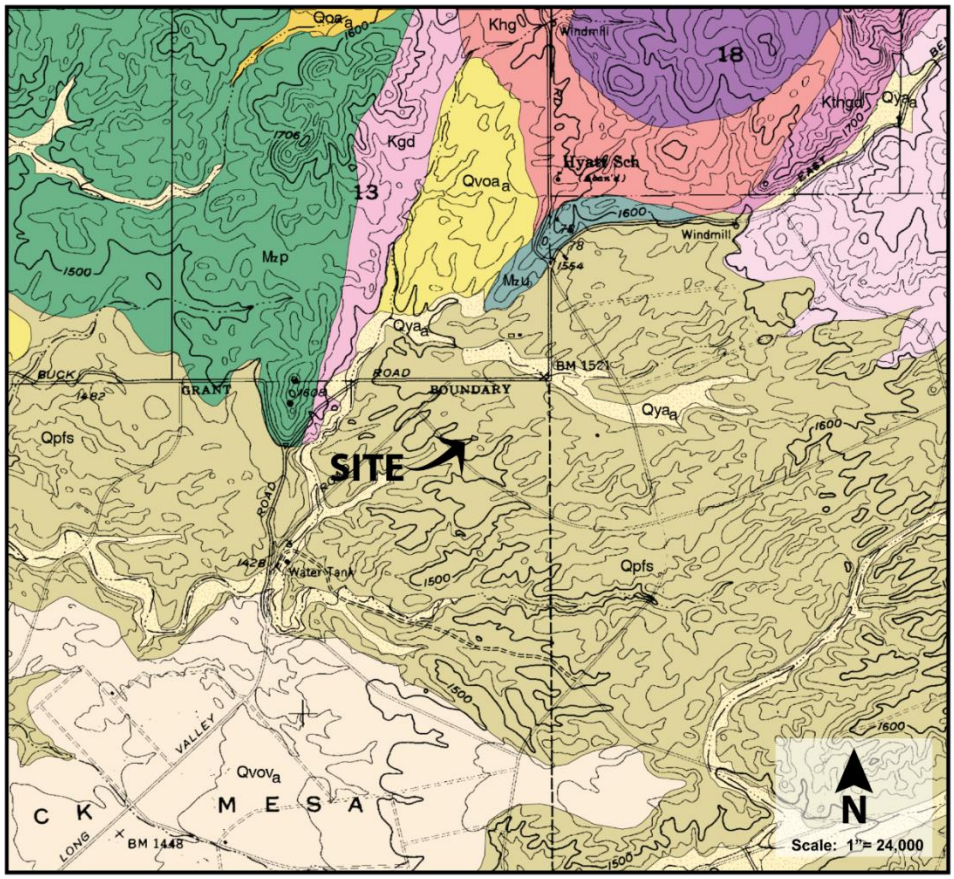
The site is located in the Northern Peninsular Range on the southern sector of the structural unit known as the Perris Block. The Perris Block is bounded on the northeast by the San Jacinto Fault Zone, on the southwest by the Elsinore Fault Zone, and on the north by the Cucamonga Fault Zone. The southern boundary of the Perris Block is not as distinct but is believed to coincide with a complex group of faults trending southeast from the Murrieta, California area (Kennedy, 1977). The Peninsular Range is characterized by large Mesozoic age intrusive rock masses flanked by volcanic, metasedimentary, and sedimentary rocks. Various thicknesses of colluvial/alluvial sediments derived from the erosion of the elevated portions of the region fill the low-lying areas. The earth materials encountered on the subject site on the subject site are described in more detail in subsequent

sections of this report

5.2 Seismic Hazards:

Because the proposed development is located in tectonically active southern California, it will likely experience some effects from earthquakes. The type or severity of seismic hazards affecting the site is mainly dependent upon the distance to the causative fault, the intensity of the seismic event, and the soil characteristics. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction or dynamic settlement. The following is a site-specific discussion about ground motion parameters, earthquake induced settlement hazards, and liquefaction. The purpose of this analysis is to identify potential seismic hazards and propose mitigations, if necessary, to an acceptable level of risk. The following seismic hazards discussion is guided by CBC (2016).

FIGURE 2



5.3 Seismic Design Parameters:

The 2016 California Building Code (CBC) seismic design parameters for the subject site are as follows:

Description	Design Parameters
Site Latitude:	33.55212ºN
Site Longitude:	-117.03471ºW
Site Class:	D
Spectral Response (Short):	**(0.2 sec) – S_s**: 1.500g
Spectral Response – (1-Second):	**(1.0 sec) – S_1**: 0.600g
Short Period Site Coefficient:	**Fa**: 1.0
1-Second Period Site Coefficient:	**Fv**: 1.5
Adjusted Spectral Response:	**(Short Period) - 0.2 sec – S_{ms}**: 1.500g
Adjusted Spectral Response:	(**One Sec) – S_{m1}**: 0.900g
Design Spectral Response:	**(Short Period) 0.2 sec – S_{ds}**: 1.000g
Design Spectral Response:	**(One Sec) 1.0 sec – S_{d1}**: 0.600g

5.4 Surface Fault Rupture:

No known active faults are mapped trending across on the subject site based on a review of the AP Zone maps provided by the U.S. Geologic Survey (see Figure 2 and References). Accordingly, the potential for fault surface rupture on the site is considered unlikely.

5.5 Liquefaction:

Based on the nature and density of the Pauba Formation bedrock, and the assumed depth to groundwater the potential for hazards associated with liquefaction are considered low.

5.6 Seismically Induced Landsliding:

Due to the density and coarse-grained nature of the engineered fill and underlying Pauba Formation bedrock at the subject site, the probability of seismically induced landsliding is considered low.

5.7 Seismically Induced Flooding, Seiches:

Due to the lack of a large body of water located above the subject site, the possibility of seismically induced flooding or seiches is considered low. Due to the large distance of the project site to the Pacific Ocean, the possibility for seismically induced tsunamis to impact the site is considered nil.

6.0 EARTH MATERIALS

6.1 Colluvium/Residual Soils (CQal):

Based on the subsurface exploration, colluvial material and residual soils cover the majority of the site and is underlain by Pauba Formation Bedrock (see Plate 1).

6.2 Alluvium (Qal):

Alluvium was mapped in the shallow surface drainage swales in the western area of subject site, both north and south of the proposed driveway (See Plate 1).

6.3 Pauba Formation Bedrock (Qps):

The subject site has been mapped within the geologic bedrock formation commonly referred to as the Pauba Formation. The Pauba Formation Bedrock is a sandstone formation comprised of silty and clayey sands to gravelly clean sands that is partially weathered near the surface and becomes dense to very dense at a depth of 2 to 3 feet.

6.4 Proposed Commercial Grading

The proposed residential grading will result in the entire proposed winery area being underlain by either certified engineered fill or competent Pauba Formation bedrock. As a result, all colluvium and alluvium will have been properly recompacted, and shall be verified as such in the final grading report for the subject project (BGR 1800141).

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 General:

Based on the findings of this study it is our opinion that the subject site is developable from a geotechnical standpoint provided the recommendations of this report are incorporated into the design and construction of the proposed improvement areas within the subject property.

7.2 Earthwork Recommendations (All Areas)

a) **Vegetation**: All vegetation should be removed from areas to be graded and not used in fills.

b) **Man Made Debris**: All man-made debris material (fi any), should be removed from the site and not used in fills.

c) **Removals and Re-compaction:** Removals and re-compaction are planned to be completely addressed and executed during BGR 1800141 grading. No additional remedial work is expected to be needed subsequent to that permitted work. The following recommendations are being implemented in the BGR 1800141 procedures and are required to be completed prior to certifying rough grade for the winery.

d) **Removals**: Removals should expose competent unweathered bedrock in most areas to receive fill. Removal depths in colluvial deposits are anticipated to be on the order of 2 to 2.5 feet existing natural slopes and shallow drainage courses near TP2, TP-3 and TP5. Removals within the alluvium in the southwest corner near TP-1 and in the area of the detention basin will be on the order of 8 or a depth were competent natural ground with relative compaction of 85 percent or greater are encountered (whichever is deeper). The material generated during removals should be cleared of any debris and may then be placed as engineered fill. Deeper removals may be required depending upon exposed conditions encountered.

e) **Removal Inspections**: All exposed removal bottoms should be inspected by the Geotechnical Engineer's representative prior to placement of any fill. Bottoms should be

probed to verify competency and a natural density of 85 percent or greater.

f) **Preparation of Removal Bottoms to Receive Fill**: The approved exposed bottoms of all removal areas should be scarified 12-inches, brought to near optimum moisture content, and compacted to a minimum of 90 percent relative compaction before placement of fill. Structural fill should be compacted to a minimum of 90 percent relative compaction. Maximum dry density and optimum moisture content for compacted materials should be determined according to ASTM D 1557-12 procedures.

g) **Steepness of Cut and Fill Slopes**: Any fill or cut slopes should be constructed at slope ratios no steeper than 2:1 (horizontal to vertical).

h) **Restoration of Exploratory Test Pits**: Where grading within the areas of the exploratory Test Pits do not result in removing the entire test pit to competent bedrock, restoration of the exploratory test pit backfill should be reviewed and appropriate measures taken if required to insure the backfill meets the relative density of the surrounding ground and appropriate documentation of actions taken provided within the final grading report.

i) **Winery Grade Preparation**: All pre-graded and certified areas to be tailored for drainage and final pad configuration shall be scarified, moisture conditioned and compacted to at least 90 percent of maximum density to receive additional fill or to make final grade.

7.3 Oversize Material:

Oversize material is defined as rock, or other irreducible material with a maximum dimension greater than 12-inches. Oversize material shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Project Geotechnical Engineer. Placement operations shall be such that nesting of oversize material does not occur, and such that oversize material is completely surrounded by compacted fill (windrow). Alternative methods, such as water jetting or wheel rolling with a backhoe may be required to achieve compaction in the fill materials immediately adjacent to the windrow. Oversize material shall not be placed within ten (10) vertical feet of finish grade, within fifteen (15) lateral feet of a finished slope face, or within two (2) feet of future utilities.

7.4 Structural Fill:

All fill material, whether on-site material or import, should be accepted by the Project Geotechnical Engineer and/or his representative before placement. All fill should be free from vegetation, organic material, and other debris. Import fill should be no more expansive than the existing on-site material, unless approved by the Project Geotechnical Engineer. Approved fill material should be placed in horizontal lifts not exceeding 6.0 to 8.0-inches in thickness and watered or aerated to obtain near-optimum moisture content (within 2.0 percent of optimum). Each lift should be spread evenly and should be thoroughly mixed to ensure uniformity of soil moisture. Structural fill should meet a minimum relative compaction of 90 percent of maximum dry density based upon ASTM D 1557-12

procedures. Moisture content of fill materials should not vary more than 2.0 percent of optimum, unless approved by the Project Geotechnical Engineer.

7.5 Soil Expansion Potential:

Preliminary Expansion Index testing was performed, yielding an EI of **6**. This is classified as a **Very Low** expansion potential. Import soils or soils used near finish grade may have a different EI. Final design parameters should be based on EI testing of near-surface soils and be performed at the conclusion of rough grading. Those results should be forwarded and incorporated into the final design by the Project Engineer, as appropriate.

7.6 Soil Corrosive Potential:

The highest sulfate (SO_4) concentration measured was 48.1 ppm (mg/kg). Generally, sulfate concentrations greater than 1,500 ppm are considered to be corrosive to metals and concrete. The highest chloride concentrations were 27.2 ppm. Generally, chloride concentrations greater than 500 ppm are considered to be corrosive to metals and concrete. The soil pH level was 5.7. Generally, a pH level less than 5.5 is considered to be corrosive to metal and concrete. Based on the tests performed for soil corrosive potential, the soils throughout the site are not corrosive to concrete and steel. Type II concrete may be used.

Table 3 - Summary of Laboratory Corrosion Test Results

Sample Location	Sample No.	Depth in (ft)	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
TP3	C3	2-feet	2800	5.7	48.1	27.2

The client may wish to have a corrosion engineer review the test results for design consideration if the concentration levels presented above are such that a more detailed review is deemed necessary. **EnGEN** can provide this service upon request.

7.7 Stormwater Infiltration:

The infiltration test areas were verified as being in undisturbed natural earth materials. A total of four (4) tests were performed at the subject site, at elevations represented to be near the bottom of the proposed basins. The test pits were pre-soaked and tested in general accordance with the procedures outlined in Appendix A of the "Riverside County – Low Impact Development BMP Design Handbook" publication issued by the Riverside County Flood Control. The soils tested meet the “sandy soil” test criteria wherein two consecutive 30 minute readings dropped more than 6-inches. After the first two 30-minute readings were completed, time intervals of 30-minute readings were used for the remainder of the test. The diameter and depth of the test holes were 8-inches and 20-inches respectively.

TABLE 1 – SUMMARY OF INFILTRATION TEST RESULTS	
FOR LOCATION SEE PLATE 1	
Test No.	**Rate (in./hr.)**
1.	0.77
2.	0.51
3.	0.33
4.	0.40
RECOMMENDED RATE = in./hr.	
0.33	

The infiltration test results are summarized on Table 1 above with detailed readings presented in Exhibit 3 of this report.

8.0 SLOPE STABILITY (GENERAL):

8.1 Cut and Fill Slopes:

It is our opinion that the proposed Slopes as inclined at a ratio of 2:1 or flatter will possess gross and surficial stability in excess of generally accepted minimum engineering criteria (Factor of Safety at least 1.5) would be suitable for their intended purpose, provided that proper slope maintenance procedures are maintained. These procedures include but are not limited to installation and maintenance of drainage devices and planting of slope faces to protect from erosion in accordance with County standards.

9.0 FOUNDATION RECOMMENDATIONS:

9.1 Foundation Design Recommendations:

Foundations for the proposed structures may consist of conventional column footings and continuous wall footings founded either on native bedrock material or compacted fill but not a combination of both. The recommendations presented in the subsequent paragraphs for foundation design and construction are based on geotechnical characteristics and upon a very low expansion potential for the supporting soils and should not preclude more restrictive structural requirements. The Structural Engineer for the project should determine the actual footing width and depth in accordance with the latest edition of the California Building Code to resist design vertical, horizontal, and uplift forces and should either verify or amend the design based on final expansion testing at the completion of grading.

9.2 Foundation Size:

Continuous footings should have a minimum width of 12-inches. Continuous footings should be continuously reinforced with a minimum of two (2) No. 4 steel reinforcing bars located near the top and two (2) No. 4 steel reinforcing bars located near the bottom of the footings to minimize the effects of slight differential movements which may occur due to minor variations in the engineering characteristics or seasonal moisture change in the supporting soils. Column footings should have a minimum width of 18-inches by 18-inches and be suitably reinforced, based on structural requirements. A grade beam, founded at the same depths and reinforced the same as the adjacent

footings, should be provided across doorway and garage entrances.

9.3 Depth of Embedment:

Exterior and interior footings founded in native bedrock material should extend to a minimum depth of 12-inches for single story structures and 18-inches for two story structures below lowest adjacent finish grade.

9.4 Bearing Capacity:

Provided the recommendations for site earthwork, minimum footing width, and minimum depth of embedment for footings are incorporated into the project design and construction, the allowable bearing value for design of continuous and column footings, for the residential structure for the total dead plus frequently-applied live loads, is 1,500 psf for footings in competent engineered fill. The allowable bearing value has a Factor of Safety of at least 3.0 and may be increased by 33.3 percent for short durations of live and/or dynamic loading such as wind or seismic forces.

9.5 Settlement:

Footings designed according to the recommended bearing values and the maximum assumed wall and column loads are not expected to exceed a maximum settlement of 0.75-inch or a differential settlement of 0.50-inch over a distance of 40-feet in compacted fill material under static load conditions.

9.6 Lateral Capacity:

Additional foundation design parameters for the residence based on compacted fill for resistance to static lateral forces, are as follows:

- **Allowable Lateral Pressure (Equivalent Fluid Pressure), Passive Case:**
  Engineered Fill – 200 pcf
- **Allowable Coefficient of Friction:**
  Engineered fill – 0.35

Lateral load resistance may be developed by a combination of friction acting on the base of foundations and slabs and passive earth pressure developed on the sides of the footings and stem walls below grade when in contact with undisturbed, native bedrock material. The above values are allowable design values and may be used in combination without reduction in evaluating the resistance to lateral loads. The allowable values may be increased by 33.3 percent for short durations of live and/or dynamic loading, such as wind or seismic forces. For the calculation of passive earth resistance, the upper 1.0-foot of material should be neglected unless confined by a concrete slab or pavement. The maximum recommended allowable passive pressure is 5.0 times the recommended design value.

9.7 Slab-on-Grade Recommendations:

The recommendations for concrete slabs, both interior and exterior, excluding PCC pavement, are based upon the anticipated building usage and upon a very low expansion potential for the supporting material as determined by Chapter 18 of the California Building Code. Concrete slabs should be

designed to minimize cracking as a result of shrinkage. Joints (isolation, contraction, and construction) should be placed in accordance with the American Concrete Institute (ACI) guidelines. Special precautions should be taken during placement and curing of all concrete slabs. Excessive slump (high water/cement ratio) of the concrete and/or improper curing procedures used during either hot or cold weather conditions could result in excessive shrinkage, cracking, or curling in the slabs. It is recommended that all concrete proportioning, placement, and curing be performed in accordance with ACI recommendations and procedures. Slab-on-grade reinforcement and thickness should be provided by the structural engineer based on structural considerations, but as a minimum, it is recommended that concrete floor slabs be at least 4-inches in actual thickness and reinforced with at least No. 3 reinforcing bars placed 24-inches on center, both ways, placed at mid-height of the slab cross-section.

9.8 Exterior Slabs:

All exterior concrete slabs cast on finish subgrade (patios, sidewalks, etc., with the exception of PCC pavement) should be a minimum of 4-inches nominal in thickness. Reinforcing in the slabs and the use of a compacted sand or gravel base beneath the slabs should be according to the current local standards. Subgrade soils should be moisture conditioned to at least optimum moisture content to a depth of 12-inches immediately before placing the concrete.

10.0 RETAINING WALL RECOMMENDATIONS:

10.1 Earth Pressures:

Retaining walls backfilled with non-expansive granular soil (EI=0) or very low expansive potential materials (Expansion Index of 20 or less) within a zone extending upward and away from the heel of the footing at a slope of 0.5:1 (horizontal to vertical) or flatter should be designed to resist the following static lateral soil pressures:

Condition	Level Backfill	2:1 Slope	Seismic*
Active	35 pcf	50 pcf	K_u=0.2
At Rest	65 pcf	--	--

*For use on walls exceeding 6' in height. To be used with Mononobe-Okabe method.

Further expansion testing of potential backfill material should be performed at the time of retaining wall construction to determine suitability. Walls that are free to deflect 0.01 radian at the top may be designed for the above-recommended active condition. Walls that need to be restricted from this amount of movement should be assumed rigid and designed for the at-rest condition. The above values assume well-drained backfill and no buildup of hydrostatic pressure. Surcharge loads, dead and/or live, acting on the backfill behind the wall should also be considered in the design.

10.2 Retaining Wall Design:

Retaining wall footings should be founded to the same depths into firm, competent, undisturbed, engineered fill or unweathered bedrock as standard foundations and may be designed for an allowable bearing value of 1,500 psf and 2,500 psf respectively (as long as the resultant force is

located in the middle one-third of the footing), and with an allowable static lateral bearing pressure of 200 psf/ft and allowable sliding resistance coefficient of friction of 0.35. When using the allowable lateral pressure and allowable sliding resistance, a Factor of Safety of 1.5 should be achieved.

10.3 Subdrain:

A subdrain system should be constructed behind and at the base of retaining walls equal to or in excess of 4-feet in height to allow drainage and to prevent the buildup of excessive hydrostatic pressures. Gravel galleries and/or filter rock, if not properly designed and graded for the on-site and/or import materials, should be enclosed in a geotextile fabric such as Mirafi 140N, Supac 4NP, or a suitable substitute in order to prevent infiltration of fines and clogging of the system. The perforated pipes should be at least 4.0-inches in diameter. Pipe perforations should be placed downward. Gravel filters should have volume of at least 1.0 cubic foot per lineal foot of pipe. For retaining walls with an overall height of less than 4-feet, subdrains may include weep holes with a continuous gravel gallery, perforated pipe surrounded by filter rock, or some other approved system. Subdrains should maintain a positive flow gradient and have outlets that drain in a non-erosive manner.

10.4 Backfill:

Backfill directly behind retaining walls (if backfill width is less than 3 feet) may consist of 0.5 to 0.75-inch diameter, rounded to subrounded gravel enclosed in a geotextile fabric such as Mirafi 140N, Supac 4NP, or a suitable substitute or a clean sand (Sand Equivalent Value greater than 50) water jetted into place to obtain proper compaction. If water jetting is used, the subdrain system should be in place. Even if water jetting is used, the sand should be densified to a minimum of 90 percent relative compaction. If the specified density is not obtained by water jetting, mechanical methods will be required. If other types of soil or gravel are used for backfill, mechanical compaction methods will be required to obtain a relative compaction of at least 90 percent of maximum dry density. Backfill directly behind retaining walls should not be compacted by wheel, track or other rolling by heavy construction equipment unless the wall is designed for the surcharge loading. If gravel, clean sand or other imported backfill is used behind retaining walls, the upper 18-inches of backfill in unpaved areas should consist of typical on-site material compacted to a minimum of 90 percent relative compaction in order to prevent the influx of surface runoff into the granular backfill and into the subdrain system. Maximum dry density and optimum moisture content for backfill materials should be determined in accordance with ASTM D 1557-02 procedures.

11.0 MISCELANEOUS RECOMMENDATIONS

11.1 Utility Trench Recommendations:

Utility trenches should be backfilled with properly compacted soil. It is recommended that all utility trenches excavated to depths of 5.0-feet or deeper be cut back to an inclination not steeper than 1:1 (horizontal to vertical) or be adequately shored during construction. Where interior or exterior utility trenches are proposed parallel and/or perpendicular to any building footing, the bottom of the trench should not be located below a 1:1 plane projected downward from the outside bottom edge of the

adjacent footing unless the utility lines are designed for the footing surcharge loads. Backfill material should be placed in a lift thickness appropriate for the type of backfill material and compaction equipment used. Backfill material should be compacted to a minimum of 90 percent relative compaction by mechanical means. Jetting of the backfill material will not be considered a satisfactory method for compaction. Maximum dry density and optimum moisture content for backfill material should be determined according to ASTM D 1557-12 procedures.

11.2 Finish Lot Drainage Recommendations:

Finish lot surface gradients in unpaved areas should be provided next to tops of slopes to direct surface water away from flowing over the tops of slopes. The surface water should be directed toward suitable drainage facilities. Ponding of surface water should not be allowed next to structures or on pavements. In unpaved areas, a minimum positive gradient of 2.0 percent away from the structures and tops of slopes for a minimum distance of 10.0-feet and a minimum of 1.0 percent pad drainage off the property in a non-erosive manner should be provided.

11.3 Planter Recommendations:

Above ground planters should be designed with proper surface slope to ensure that adequate drainage is maintained, and minimal irrigation water is allowed to percolate into the soils.

11.4 Supplemental Construction Observations and Testing:

Any subsequent grading for development of the subject property should be performed under engineering observation and testing performed by **EnGEN Corporation**. Subsequent grading includes, but is not limited to, any additional over-excavation of cut and/or cut/fill transitions, fill placement, and excavation of temporary and permanent cut and fill slopes. Observations of over-excavation cuts, fill placement, finish grading, utility or other trench backfill, pavement subgrade and base course, retaining wall backfill, slab pre-saturation, or other earthwork completed for the development of subject property should be performed by **EnGEN Corporation**. If any of the observations and testing to verify site geotechnical conditions are not performed by **EnGEN Corporation**, liability for the safety and performance of the development is limited to the actual portions of the project observed and/or tested by **EnGEN Corporation**.

12.0 PLAN REVIEW:

Subsequent to formulation of final plans and specifications for the project but before bids for construction are requested, grading and other plans for the proposed development should be reviewed by **EnGEN Corporation** to verify compatibility with site geotechnical conditions and conformance with the recommendations contained in this report. If **EnGEN Corporation** is not accorded the opportunity to make the recommended review, we will assume no responsibility for misinterpretation of the recommendations presented in this report.

12.1 Pre-Bid Conference:

It is recommended that a pre-bid conference be held with the owner or an authorized representative,

the Project Architect, the Project Civil Engineer, the Project Geotechnical Engineer and the proposed contractors present. This conference will provide continuity in the bidding process and clarify questions relative to the supplemental grading and construction requirements of the project.

12.2 Pre-Grading Conference:

Before the start of any grading, a conference should be held with the owner or an authorized representative, the contractor, the Project Architect, the Project Civil Engineer, and the Project Geotechnical Engineer present. The purpose of this meeting should be to clarify questions relating to the intent of the supplemental grading recommendations and to verify that the project specifications comply with the recommendations of this geotechnical engineering report. Any special grading procedures and/or difficulties proposed by the contractor can also be discussed at that time.

13.0 CLOSURE

This report has been prepared for use by the parties or project named or described in this document. It may or may not contain sufficient information for other parties or purposes. In the event that changes in the assumed nature, design, or location of the proposed structure and/or project as described in this report, are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed, and the conclusions and recommendations of this report are modified or verified in writing. This study was conducted in general accordance with the applicable standards of our profession and the accepted soil and foundation engineering principles and practices at the time this report was prepared. No other warranty, implied or expressed beyond the representations of this report, is made. Although every effort has been made to obtain information regarding the geotechnical and subsurface conditions of the site, limitations exist with respect to the knowledge of unknown regional or localized off-site conditions that may have an impact at the site. The recommendations presented in this report are valid as of the date of the report. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or to the works of man on this and/or adjacent properties. If conditions are observed or information becomes available during the design and construction process that are not reflected in this report, **EnGEN Corporation** should be notified so that supplemental evaluations can be performed, and the conclusions and recommendations presented in this report can be modified or verified in writing. Changes in applicable or appropriate standards of care or practice occur, whether they result from legislation or the broadening of knowledge and experience. Accordingly, the conclusions and recommendations presented in this report may be invalidated, wholly or in part, by changes outside of the control of **EnGEN Corporation** which occur in the future.

Thank you for the opportunity to provide our services. Often, because of design and construction details which occur on a project, questions arise concerning the geotechnical conditions on the site. If we can be of further service or should you have questions regarding this report, please do not hesitate to contact this office at your convenience. Because of our involvement in the project to date, we would be pleased to discuss engineering testing and observation services that may be applicable on the project.

Respectfully submitted,
EnGEN Corporation

H. Wayne Baimbridge, Principal
REPA 467279, Project Manager

Osbjorn Bratene, Principal
GE 162

REGISTERED PROFESSIONAL ENGINEER
OSBJORN BRATENE
No. 162
STATE OF CALIFORNIA

HWB/OB:pm

Distribution: (2) Addressee

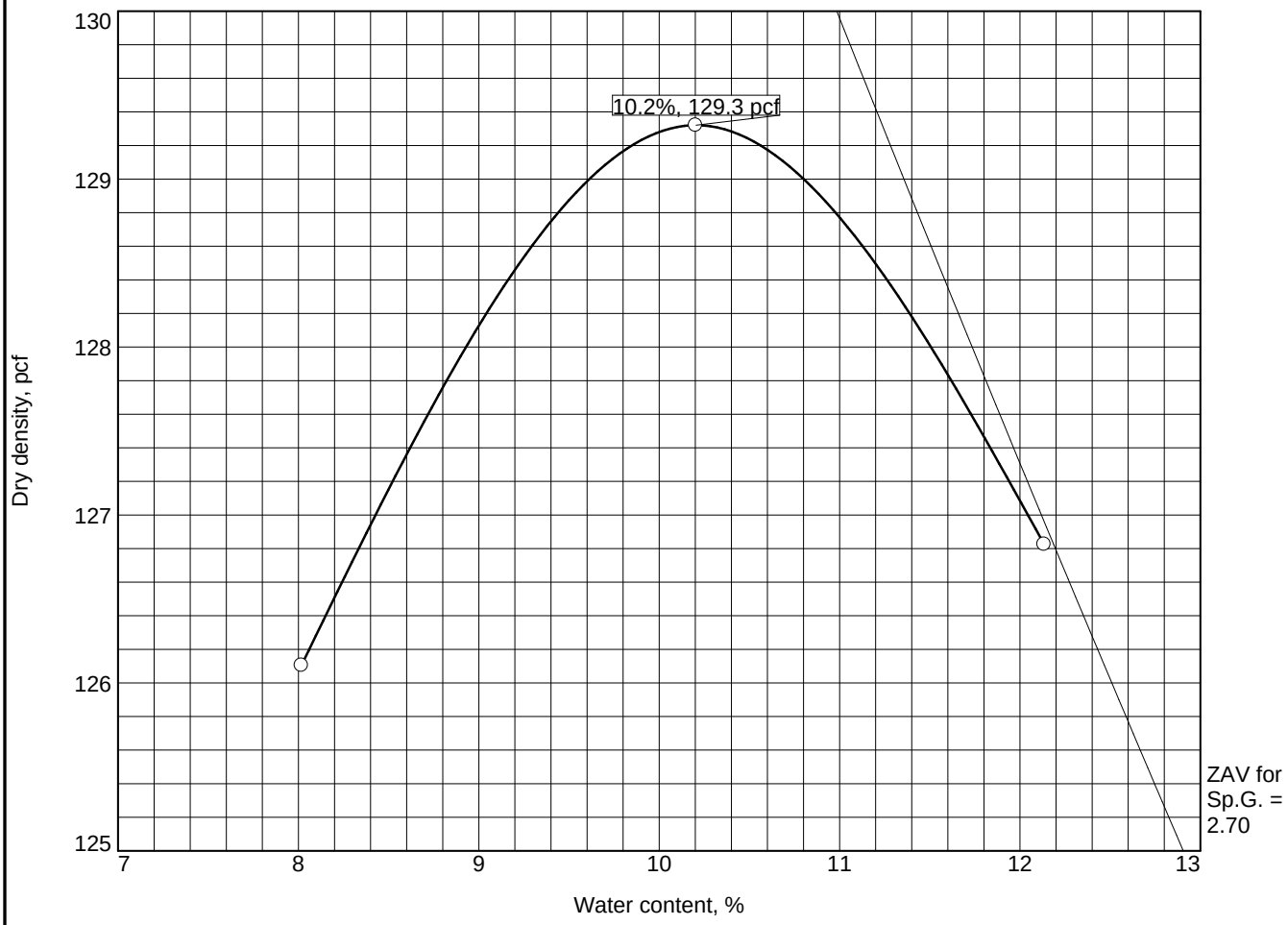
Appendix 1 - General Technical References

1. **California Building Code**, 2016, State of California, California Code of Regulations, Title 24, 2010, California Building Code.
2. **California Division of Mines and Geology**, 1997, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117.
3. **California Geological Survey**, 2002, California Geomorphic Provinces: CDMG, Note 36.
4. **Hart, Earl W., and Bryant, William A**., Revised 2007, Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zone Maps: State of California, Department of Conservation, Division of Mines and Geology, Special Publication 42.
5. **Kennedy, M.P**., 1977, Recency and Character of Faulting Along the Elsinore Fault Zone in Southern Riverside County, California: California Division of Mines and Geology, Special Report 131, 12 p., 1 Plate, Scale 1:24,000.
6. **D.M. Morton and M.P. Kennedy**, Geologic Map of the Bachelor Mountain Quadrangle, Riverside County, California, 1991, 1995-98, Open -File Report 03-103.
7. **Mann, J.F., Jr**., October 1955, Geology of a Portion of the Elsinore Fault Zone, California: State of California, Department of Natural Resources, Division of Mines, Special Report 43.
8. **Michael P Kennedy and D.M. Morton**, Geologic Map of the Murrieta 7.5 Quadrangle, California, Version 1.0, Scale 1:24,000, Digital Database by Rachel Alvarez and Morton, dated 2008.
9. **County of Riverside**, 2000, Transportation and Land Management Agency, Technical Guidelines for Review of Geotechnical and Geologic Reports.
10. **Riverside County Planning Department**, December 2015, Riverside County Comprehensive General Plan - County Seismic Hazards Map, Scale 1 Inch = 2 Miles.
11. **Riverside County Land Information System**: http://www3.tlma.co.riverside.ca.us/pa/rclis/
12. **Guidelines for Evaluating and Mitigating Seismic Hazards in California (SCEC),** 2008, California Geologic Survey (CGS), Special Publication 117A.
13. **Southern California Earthquake Data Center (SCEDC),** 2019, Southern California Earthquake Data Center Website, http://www.scecdc.scec.org.
14. **U.S. Seismic Design Maps Web Application**, United States Geologic Survey Website (http://geohazards.usgs.gov/designmaps/us/application.php), Earthquake Hazards Program, Seismic Design Maps for Engineers, 2019.

Exhibit 1

Laboratory Test Results

MAX. DEN./OPT. MOIST. (ASTM-D-1557-00)



Test specification: ASTM D 1557-00 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	SM		8.0					

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 129.3 pcf Optimum moisture = 10.2 %	Silty sand, brown

Project No. 4436GFS **Client:** Austin Winery
Project: Austin Winery

○**Location:** TP1 @ 0-2' **Sample Number:** A1

Remarks:
SAMPLE# A1
SAMPLED BY JP
SAMPLED ON 10/27/18

EnGEN Corporation

Figure

Tested By: JP **Checked By:** JP

CBC Laboratory Expansion Test Results

Job Number:	4436GFS
Job Name:	Austin Winery
Location:	Glen Oaks Road
Date:	11/09/18
Sample Source:	TP1 @ 0-2'
Sampled by:	JP
Lab Technician:	JP
Sample Descr:	Silty sand, brown
Sample #:	A1

Wet Compacted Wt.:	615.9
Ring Wt.:	196.6
Net Wet Wt.:	419.3
Wet Density:	126.6
Wet Soil:	103.5
Dry Soil:	94.7
Initial Moisture (%):	9.3%
Initial Dry Density:	115.9
% Saturation:	55.2%
Final Wt. & Ring Wt.:	641.7
Net Final Wt.:	445.1
Dry Wt.:	383.6
Loss:	61.5
Net Dry Wt.:	380.3
Final Density:	114.9
Saturated Moisture:	16.2%

	Dial	Change	Time
Reading 1:	0.100	N/A	12:00 PM
Reading 2:	0.106	0.006	12:15 PM
Reading 3:	0.106	0.006	12:30 PM
Reading 4:	0.106	0.006	12-Nov

Expansion Index:	6
Adjusted Index:	8.3
(CBC 18-2)	

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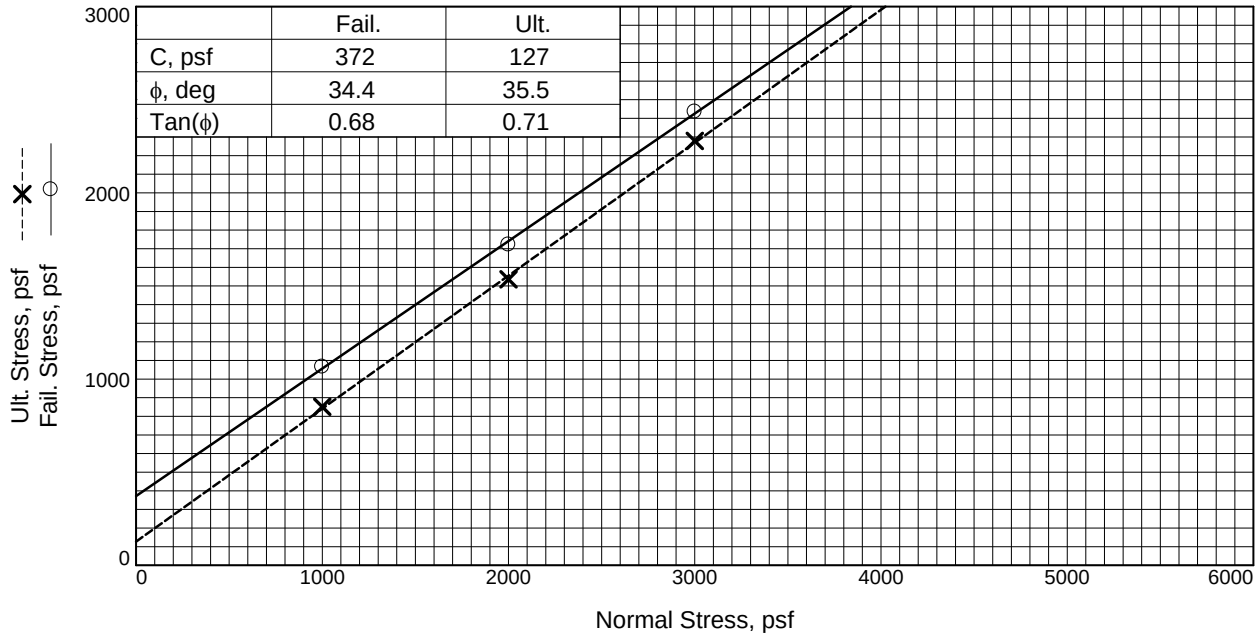
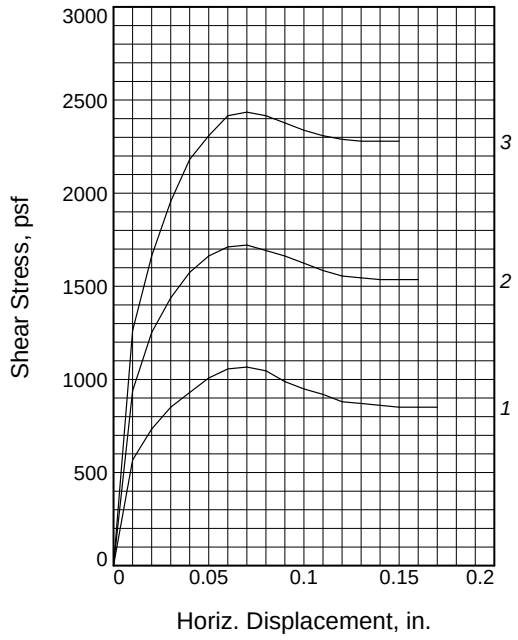




Sample No.		1	2	3
Initial	Water Content, %	11.2	11.2	11.2
	Dry Density, pcf	122.1	121.1	121.2
	Saturation, %	79.7	77.4	77.8
	Void Ratio	0.3808	0.3919	0.3902
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	16.5	15.5	15.3
	Dry Density, pcf	122.1	121.1	121.2
	Saturation, %	116.7	107.0	105.7
	Void Ratio	0.3808	0.3919	0.3902
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
Normal Stress, psf		1000	2000	3000
Fail. Stress, psf		1066	1722	2436
Displacement, in.		0.07	0.07	0.07
Ult. Stress, psf		851	1536	2279
Displacement, in.		0.15	0.14	0.13
Strain rate, in./min.		0.100	0.100	0.100

Sample Type: REMOLD
Description: Silty sand, brown

Specific Gravity= 2.7
Remarks: SAMPLE# A1
SAMPLED BY JP

Figure _____

Client: Austin Winery

Project: Austin Winery

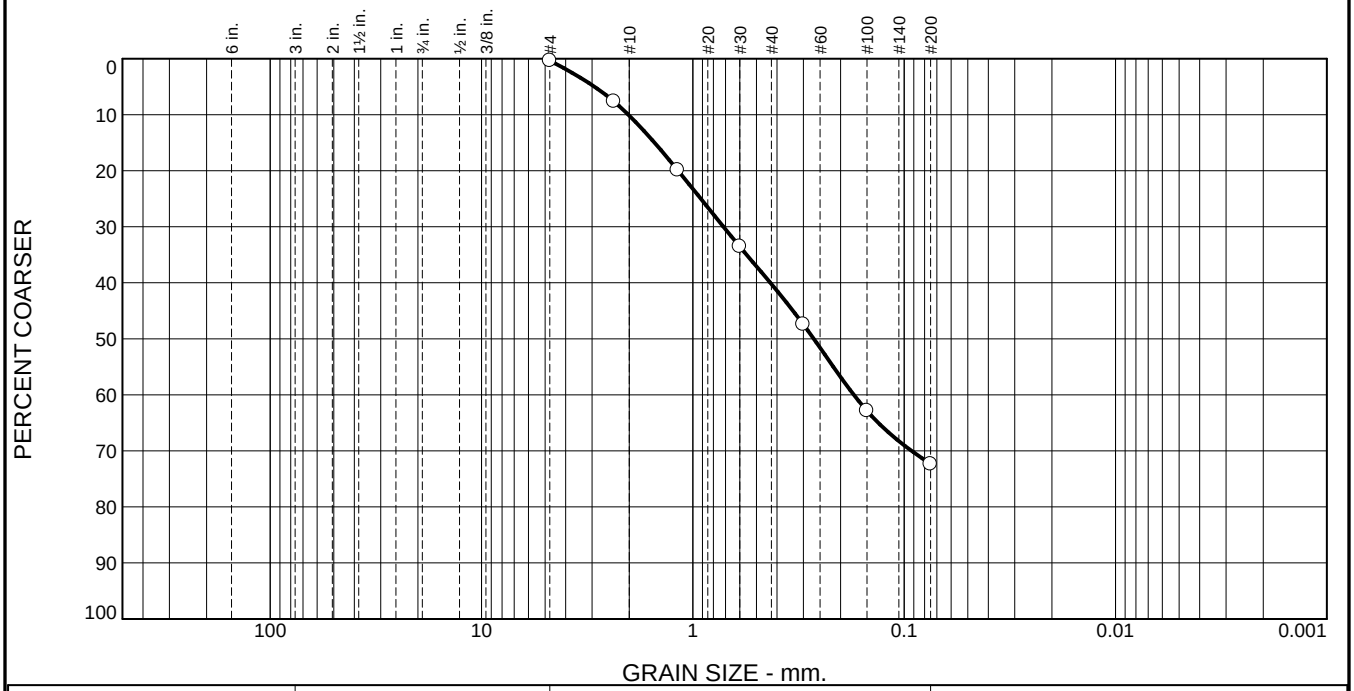
Location: TP1 @ 0-2'
Sample Number: A1
Proj. No.: 4436GFS **Date Sampled:** 10/27/18

DIRECT SHEAR TEST REPORT

EnGEN Corporation

Tested By: JP **Checked By:** JP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			9.8	30.0	32.2	27.6	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	99.6		
#8	92.3		
#16	80.1		
#30	66.5		
#50	52.6		
#100	37.1		
#200	27.6		

* (no specification provided)

Material Description

Silty sand, brown

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= SM **AASHTO (M 145)=**

Coefficients

D_{90}= 2.0193 D_{85}= 1.5182 D_{60}= 0.4299
D_{50}= 0.2679 D_{30}= 0.0922 D_{15}=
D_{10}= C_u= C_c=

Remarks

SAMPLE# A3
SAMPLED BY JP
F.M.=1.72

Date Received: _____ **Date Tested:** 11/6/18

Tested By: JP

Checked By: JP

Title: _____

Location: TP3 @ 15'
Sample Number: A3

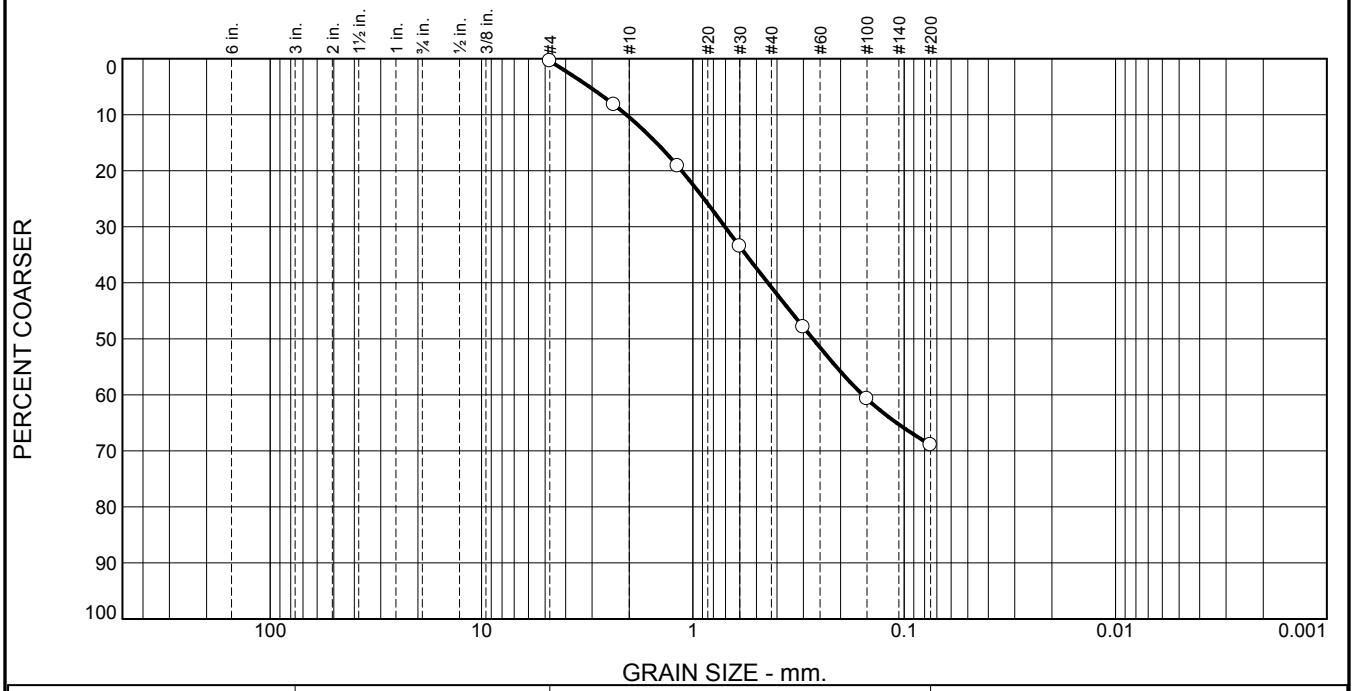
Date Sampled: 10/27/18

EnGEN Corporation

Client: Austin Vineyards
Project: Austin Vineyards

Project No: 4436P **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			10.1	30.3	28.2	31.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	99.6		
#8	91.8		
#16	80.8		
#30	66.5		
#50	52.1		
#100	39.3		
#200	31.0		

* (no specification provided)

Material Description

Silty sand, brown

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= SM AASHTO (M 145)=

Coefficients

D_{90}= 2.0670 D_{85}= 1.4882 D_{60}= 0.4416
D_{50}= 0.2704 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

SAMPLE# A2
SAMPLED BY JP
F.M.=1.70

Date Received: **Date Tested:** 11/6/18

Tested By: JP

Checked By: JP

Title:

Location: TP2 @ 15'
Sample Number: A2

Date Sampled: 10/27/18

EnGEN Corporation

Client: Austin Vineyards
Project: Austin Vineyards

Project No: 4436GFS **Figure**

Exhibit 2

Exploratory Test Pit Log(s)

TEST PIT LOG SUMMARY
Test Pit No.: TP1

PROJECT	PROJECT NO.
AUSTIN WINERY	4436GFS
CLIENT	DATE
AUSTIN WINERY	10/27/2018
LOCATION	ELEV.
SEE PLATE 1	
EXCAVATION METHOD	LOGGER
WHEEL-MOUNTED BACKHOE WITH 18-INCH BUCKET	JP
DEPTH TO - Water: N/A When checked: 10/27/2018	Caving: NO CAVING

ELEVATION/ DEPTH	GRAPHIC	USCS	DESCRIPTION	% NAT. MOIST.	% OPT. MOIST.	MAX. DEN. (pcf)	DRY. DEN. (pcf)	% REL. COMPACTION	TEST METHOD
0		SM	ALLUVIUM (Qal) Fine to medium very silty sand, with some coarse material, slightly moist, loose, dark yellowish brown (10YR-3/4)						
		SM	Medium dense	12.6	10.2	129.3	105.1	81.3	Nuke
2.5									
				13.3	10.2	129.3	109.5	84.7	Nuke
5									
		SM	Dense						
7.5									
10									
12.5									
15		SM	BOTTOM OF EXCAVATION @ 15'						

Notes: NO GROUNDWATER ENCOUNTERED & NO EVIDENCE OF HISTORICAL GROUNDWATER OBSERVED

TEST PIT LOG SUMMARY
Test Pit No.: TP2

PROJECT	PROJECT NO.
AUSTIN WINERY	4436GFS
CLIENT	DATE
AUSTIN WINERY	10/27/2018
LOCATION	ELEV.
SEE PLATE 1	
EXCAVATION METHOD	LOGGER
WHEEL-MOUNTED BACKHOE WITH 18-INCH BUCKET	JP
DEPTH TO - Water: N/A When checked: 10/27/2018	Caving: NO CAVING

ELEVATION/ DEPTH	GRAPHIC	USCS	DESCRIPTION	% NAT. MOIST.	% OPT. MOIST.	MAX. DEN. (pcf)	DRY. DEN. (pcf)	% REL. COMPACTION	TEST METHOD
0		SM	COLLUVIUM (CQal) Fine to medium very silty sand, with some coarse material, slightly moist, loose, dark yellowish brown (10YR-3/6)						
		SM	PAUBA FORMATION BEDROCK? (Qps)						
		SM	Fine to medium, very silty sand with some coarse material, slightly moist, medium dense ,dark yellowish brown (10YR-3/6)	6.4	11.0	126.1	112.0	89.0	Nuke
2.5		SM	Sample Taken (A2) Dense						
5		SM		6.8	11.0	126.1	115.5	91.6	Nuke
7.5									
10									
12.5									
15		SM	BOTTOM OF EXCAVATION @ 15'						

Notes: NO GROUNDWATER ENCOUNTERED & NO EVIDENCE OF HISTORICAL GROUNDWATER OBSERVED

TEST PIT LOG SUMMARY
Test Pit No.: TP3

PROJECT	PROJECT NO.
AUSTIN WINERY	4436GFS
CLIENT	DATE
AUSTIN WINERY	10/27/2018
LOCATION	ELEV.
SEE PLATE 1	
EXCAVATION METHOD	LOGGER
WHEEL-MOUNTED BACKHOE WITH 18-INCH BUCKET	JP
DEPTH TO - Water: N/A When checked: 10/27/2018	Caving: NO CAVING

ELEVATION/ DEPTH	GRAPHIC	USCS	DESCRIPTION	% NAT. MOIST.	% OPT. MOIST.	MAX. DEN. (pcf)	DRY. DEN. (pcf)	% REL. COMPACTION	TEST METHOD
0		SM	COLLUVIUM (CQal) Fine to medium very silty sand with some coarse material, slightly moist, loose, dark yellowish brown (10YR-3/4)						
2.5		SM	PAUBA FORMATION BEDROCK (Qps) Fine to medium, very silty sand with some coarse material, slightly moist, medium dense ,dark yellowish brown (10YR-3/6)	12.2	10.2	126.1	110.6	87.7	NG
5		SM	BOTTOM OF EXCAVATION @ 5'	13.2	10.2	126.1	112.2	90.0	NG
7.5									
10									
12.5									
15									

Notes: NO GROUNDWATER ENCOUNTERED & NO EVIDENCE OF HISTORICAL GROUNDWATER OBSERVED

TEST PIT LOG SUMMARY
Test Pit No.: TP4

PROJECT	PROJECT NO.
AUSTIN WINERY	4436GFS
CLIENT	DATE
AUSTIN WINERY	10/27/2018
LOCATION	ELEV.
SEE PLATE 1	
EXCAVATION METHOD	LOGGER
WHEEL-MOUNTED BACKHOE WITH 18-INCH BUCKET	JP
DEPTH TO - Water: N/A When checked: 10/28/2018	Caving: NO CAVING

ELEVATION/ DEPTH	GRAPHIC	USCS	DESCRIPTION	% NAT. MOIST.	% OPT. MOIST.	MAX. DEN. (pcf)	DRY. DEN. (pcf)	% REL. COMPACTION	TEST METHOD
0		SM	COLLUVIUM (CQal) Fine to medium very silty sand, with some coarse material, slightly moist, loose, dark yellowish brown (10YR-3/4)	10.4	10.2	129.3	105.3	81.4	Nuke
2.5		SM	PAUBA FORMATION BEDROCK (Qps) Fine to medium, very silty sand with some coarse material, slightly moist, dense, dark yellowish brown (10YR-3/6)	8.0	11.0	126.1	112.0	88.8	Nuke
5		SM	BOTTOM OF EXCAVATION @ 5'						
7.5									
10									
12.5									
15									

Notes: NO GROUNDWATER ENCOUNTERED & NO EVIDENCE OF HISTORICAL GROUNDWATER OBSERVED

TEST PIT LOG SUMMARY
Test Pit No.: TP5

PROJECT	PROJECT NO.
AUSTIN WINERY	4436GFS
CLIENT	DATE
AUSTIN WINERY	10/27/2018
LOCATION	ELEV.
SEE PLATE 1	
EXCAVATION METHOD	LOGGER
WHEEL-MOUNTED BACKHOE WITH 18-INCH BUCKET	JP
DEPTH TO - Water: N/A When checked: 10/27/2018	Caving: NO CAVING

ELEVATION/ DEPTH	GRAPHIC	USCS	DESCRIPTION	% NAT. MOIST.	% OPT. MOIST.	MAX. DEN. (pcf)	DRY. DEN. (pcf)	% REL. COMPACTION	TEST METHOD
0		SM	COLLUVIUM (CQal) Fine to medium very silty sand, with some coarse material, slightly moist, loose, dark yellowish brown (10YR-3/4)						
				11.8	10.2	129.3	101.2	78.3	Nuke
2.5		SM	PAUBA FORMATION BEDROCK (Qps) Fine to medium, very silty sand, with some coarse material, slightly moist, medium dense, dark yellowish brown (10YR-3/6)						
5				7.1	11.0	126.1	109.6	85.0	Nuke
		SM	BOTTOM OF EXCAVATION @ 5.5'						
7.5									
10									
12.5									
15									

Notes: NO GROUNDWATER ENCOUNTERED & NO EVIDENCE OF HISTORICAL GROUNDWATER OBSERVED

KEY TO SYMBOLS

Symbol Description

Strata symbols

Silty sand

Description not given for:
"0N"

Notes:

1. **Exploratory borings were drilled on 10/27/2018 using a 4-inch diameter continuous flight power auger.**

2. **No free water was encountered at the time of drilling or when re-checked the following day.**

3. **Boring locations were taped from existing features and elevations extrapolated from the final design schematic plan.**

4. **These logs are subject to the limitations, conclusions, and recommendations in this report.**

5. **Results of tests conducted on samples recovered are reported on the logs.**

Exhibit 3

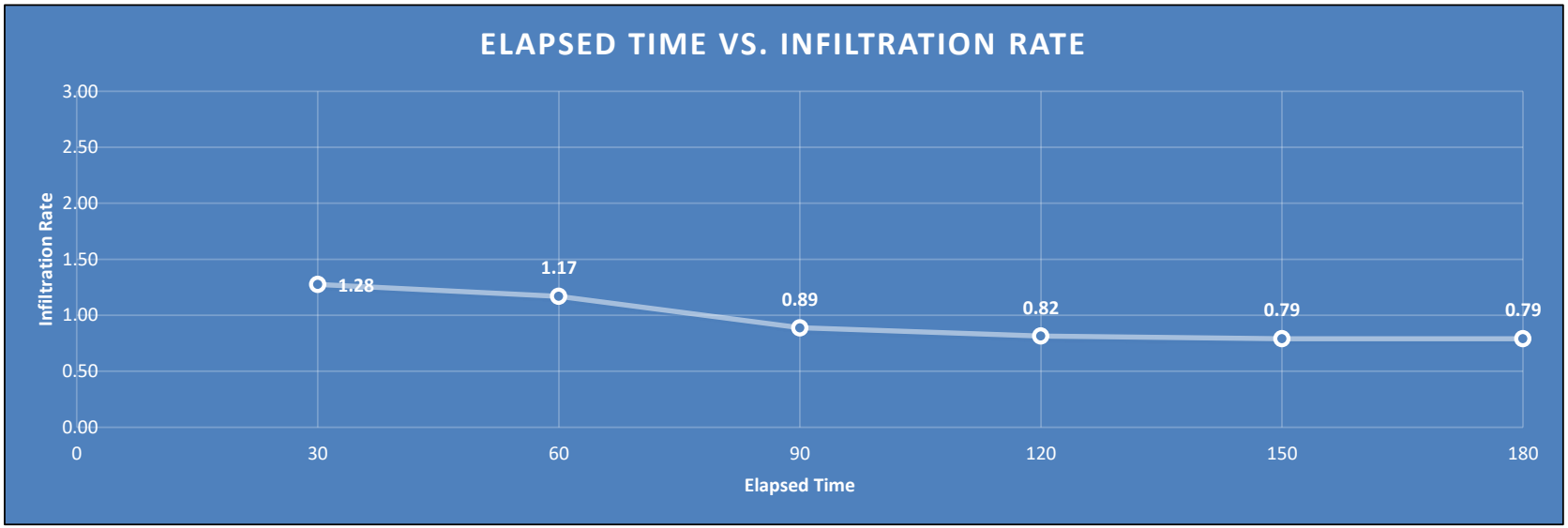
Infiltration Test Results

Project Number: 4436GFS
Job Name: AUSTIN
Test Hole Number: 1
Soil Classification: SM

Tested By: JP
Test Hole Diameter (Inches): 8
Date Excavated: 10/27/2018

Test Hole Depth (ft): 48"
Date Tested: 11/2/2018
Time Interval of Presoak 24 HOURS
Date/Time Start: 11/1/2018 7:AM

	time	Time Interval (Min)	Initial Water Level (inches)	Final Water Level (inches)	Water Level Drop	Percolation Rate (min./inch)	Total Depth of Percolation Hole	Time Interval (at)	Initial Water (Ho)	Final Water (HT)	Total Depth of Test Hole (Dt)	Raduis of Perc Hole ®	AH	H AVG	AH 60 r(/(at(r+2 Havg)) (it)	Elaspsed Time
1	10:15AM 10:45 AM	30	30	35.50	5.50	5	48	30	18	12.5	48	8	5.5	15.25	1.28	30
2	10:45 AM 11:15 AM	30	30	35.10	5.10	6	48	30	18	12.9	48	8	5.1	15.45	1.17	60
3	11:15 AM 11:45 AM	30	30	34.00	4.00	8	48	30	18	14	48	8	4	16.00	0.89	90
4	11:45 AM 12:15 AM	30	30	33.70	3.70	8	48	30	18	14.3	48	8	3.7	16.15	0.82	120
5	12:15 AM 12:45 PM	30	30	33.60	3.60	8	48	30	18	14.4	48	8	3.6	16.20	0.79	150
6	12:45 PM 1:15 PM	30	30	33.60	3.60	8	48	30	18	14.4	48	8	3.6	16.20	0.79	180
7	1:15 PM 1:45 PM	30	30	33.60	3.60	8	48	30	18	14.4	48	8	3.6	16.20	0.79	210
8	1:45 PM 2:15 PM	30	30	33.60	3.60	8	48	30	18	14.4	48	8	3.6	16.20	0.79	240
9	2:15 PM 2:45 PM	30	30	33.50	3.50	9	48	30	18	14.5	48	8	3.5	16.25	0.77	270
10	2:45 PM 3:15 PM	30	30	33.50	3.50	9	48	30	18	14.5	48	8	3.5	16.25	0.77	300
11	3:15 PM 3:45 PM	30	30	33.50	3.50	9	48	30	18	14.5	48	8	3.5	16.25	0.77	330
12	3:45 PM 4:15 PM	30	30	33.50	3.50	9	48	30	18	14.5	48	8	3.5	16.25	0.77	360



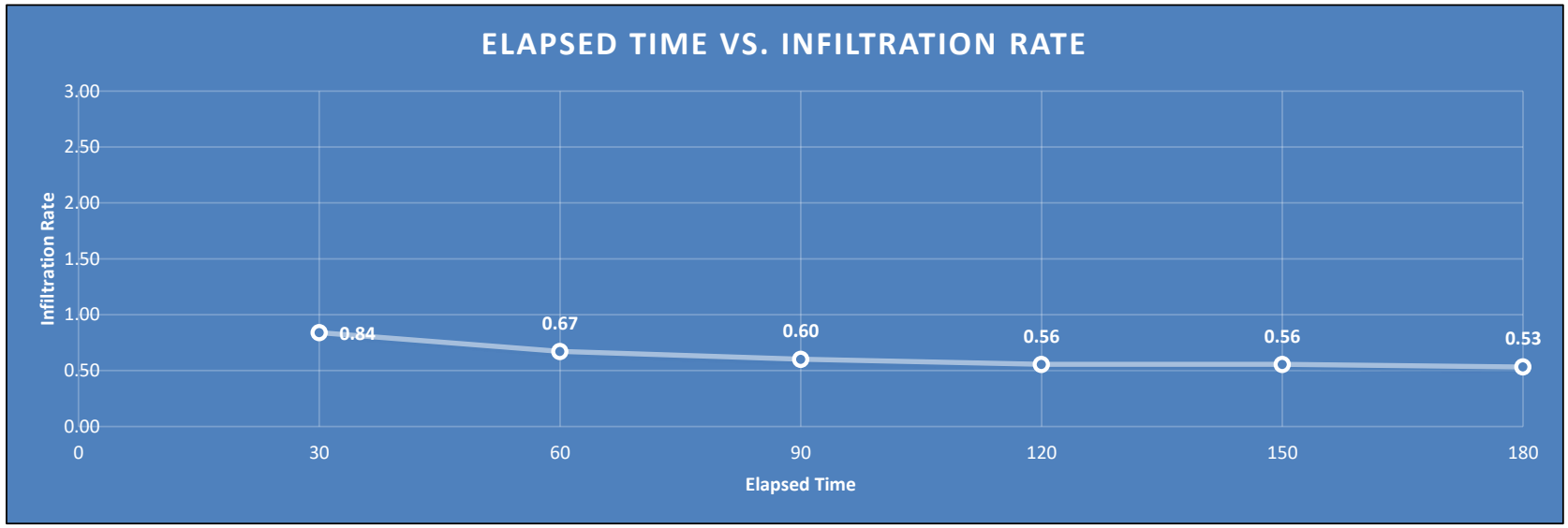
EnGEN Corporation

Project Number: 4436GFS
Job Name: AUSTIN
Test Hole Number: 2
Soil Classification: SM

Tested By: JP
Test Hole Diameter (Inches): 8
Date Excavated: 10/27/2018

Test Hole Depth (ft): 48" Date Tested: 11/2/2018
Time Interval of Presoak 24 HOURS
Date/Time Start: 11/1/2018 7:AM

	time	Time Interval (Min)	Initial Water Level (inches)	Final Water Level (inches)	Water Level Drop	Percolation Rate (min./inch)	Total Depth of Percolation Hole	Time Interval (at)	Initial Water (Ho)	Final Water (HT)	Total Depth of Test Hole (Dt)	Raduis of Perc Hole ®	AH	H AVG	AH 60 r(/(at(r+2 Havg)) (it)	Elaspsed Time
1	10:16 AM 10:46 AM	30	30	33.80	3.80	8	48	30	18	14.2	48	8	3.8	16.10	0.84	30
2	10:46 AM 11:16 AM	30	30	33.10	3.10	10	48	30	18	14.9	48	8	3.1	16.45	0.67	60
3	11:16 AM 11:46 AM	30	30	32.80	2.80	11	48	30	18	15.2	48	8	2.8	16.60	0.60	90
4	11:46 AM 12:16 PM	30	30	32.60	2.60	12	48	30	18	15.4	48	8	2.6	16.70	0.56	120
5	12:16 PM 12:46 PM	30	30	32.60	2.60	12	48	30	18	15.4	48	8	2.6	16.70	0.56	150
6	12:46 PM 1:16 PM	30	30	32.50	2.50	12	48	30	18	15.5	48	8	2.5	16.75	0.53	180
7	1:16 PM 1:46 PM	30	30	32.50	2.50	12	48	30	18	15.5	48	8	2.5	16.75	0.53	210
8	1:46 PM 2:16 PM	30	30	32.50	2.50	12	48	30	18	15.5	48	8	2.5	16.75	0.53	240
9	2:16 PM 2:46 PM	30	30	32.50	2.50	12	48	30	18	15.5	48	8	2.5	16.75	0.53	270
10	2:46 PM 3:16 PM	30	30	32.40	2.40	13	48	30	18	15.6	48	8	2.4	16.80	0.51	300
11	3:16 PM 3:46 PM	30	30	32.40	2.40	13	48	30	18	15.6	48	8	2.4	16.80	0.51	330
12	3:46 PM 4:46 PM	30	30	32.40	2.40	13	48	30	18	15.6	48	8	2.4	16.80	0.51	360



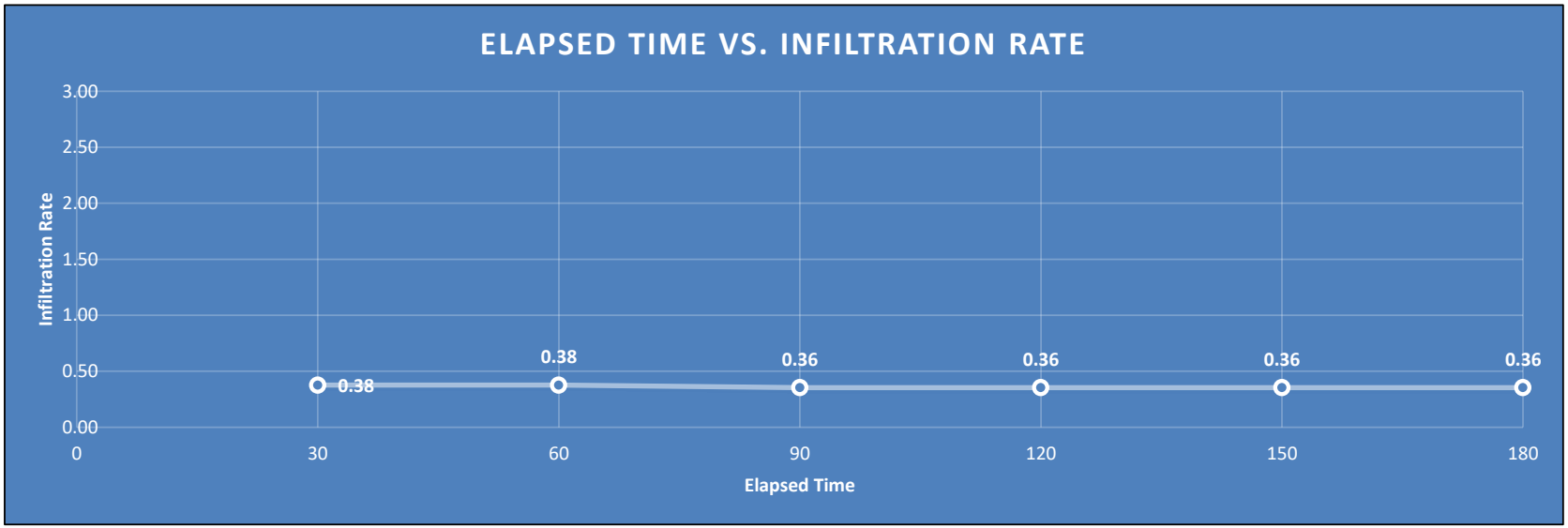
EnGEN Corporation

Project Number: 4436GFS
Job Name: AUSTIN
Test Hole Number: 3
Soil Classification: SM

Tested By: JP
Test Hole Diameter (Inches): 8
Date Excavated: 10/27/2018

Test Hole Depth (ft): 48" Date Tested: 11/2/2018
Time Interval of Presoak 24 HOURS
Date/Time Start: 11/1/2018 7:AM

	time	Time Interval (Min)	Initial Water Level (inches)	Final Water Level (inches)	Water Level Drop	Percolation Rate (min./inch)	Total Depth of Percolation Hole	Time Interval (at)	Initial Water (Ho)	Final Water (HT)	Total Depth of Test Hole (Dt)	Raduis of Perc Hole ®	AH	H AVG	AH 60 r(/(at(r+2 Havg)) (it)	Elaspsed Time
1	10:18 AM 10:48 AM	30	30	31.80	1.80	17	48	30	18	16.2	48	8	1.8	17.10	0.38	30
2	10:48 AM 11:18 AM	30	30	31.80	1.80	17	48	30	18	16.2	48	8	1.8	17.10	0.38	60
3	11:18 AM 11:48 AM	30	30	31.70	1.70	18	48	30	18	16.3	48	8	1.7	17.15	0.36	90
4	11:48 AM 12:18 PM	30	30	31.70	1.70	18	48	30	18	16.3	48	8	1.7	17.15	0.36	120
5	12:18 PM 12:48 PM	30	30	31.70	1.70	18	48	30	18	16.3	48	8	1.7	17.15	0.36	150
6	12:48 PM 1:18 PM	30	30	31.70	1.70	18	48	30	18	16.3	48	8	1.7	17.15	0.36	180
7	1:18 PM 1:48 PM	30	30	31.60	1.60	19	48	30	18	16.4	48	8	1.6	17.20	0.33	210
8	1:48 PM 2:18 PM	30	30	31.60	1.60	19	48	30	18	16.4	48	8	1.6	17.20	0.33	240
9	2:18 PM 2:48 PM	30	30	31.60	1.60	19	48	30	18	16.4	48	8	1.6	17.20	0.33	270
10	2:48 PM 3:18 PM	30	30	31.60	1.60	19	48	30	18	16.4	48	8	1.6	17.20	0.33	300
11	3:18 PM 3:48 PM	30	30	31.60	1.60	19	48	30	18	16.4	48	8	1.6	17.20	0.33	330
12	3:48 PM 4:48 PM	30	30	31.60	1.60	19	48	30	18	16.4	48	8	1.6	17.20	0.33	360



EnGEN Corporation

Project Number: 4436GFS
Job Name: AUSTIN
Test Hole Number: 4
Soil Classification: SM

Tested By: JP
Test Hole Diameter (Inches): 8
Date Excavated: 10/27/2018

Test Hole Depth (ft): 48" Date Tested: 11/2/2018
Time Interval of Presoak 24 HOURS
Date/Time Start: 11/1/2018 7:AM

	time	Time Interval (Min)	Initial Water Level (inches)	Final Water Level (inches)	Water Level Drop	Percolation Rate (min./inch)	Total Depth of Percolation Hole	Time Interval (at)	Initial Water (Ho)	Final Water (HT)	Total Depth of Test Hole (Dt)	Raduis of Perc Hole ®	AH	H AVG	AH 60 r(/(at(r+2 Havg)) (it)	Elaspsed Time
1	10:19 AM 10:49AM	30	30	32.40	2.40	13	48	30	18	15.6	48	8	2.4	16.80	0.51	30
2	10:49 AM 11:19 AM	30	30	32.30	2.30	13	48	30	18	15.7	48	8	2.3	16.85	0.49	60
3	11:19 AM 11:49 AM	30	30	32.30	2.30	13	48	30	18	15.7	48	8	2.3	16.85	0.49	90
4	11:49 AM 12:19 PM	30	30	32.20	2.20	14	48	30	18	15.8	48	8	2.2	16.90	0.47	120
5	12:19 PM 12:49 PM	30	30	32.00	2.00	15	48	30	18	16	48	8	2	17.00	0.42	150
6	12:49 PM 1:19 PM	30	30	31.90	1.90	16	48	30	18	16.1	48	8	1.9	17.05	0.40	180
7	1:19 PM 1:49 PM	30	30	31.90	1.90	16	48	30	18	16.1	48	8	1.9	17.05	0.40	210
8	1:49 PM 2:198 PM	30	30	31.90	1.90	16	48	30	18	16.1	48	8	1.9	17.05	0.40	240
9	2:19 PM 2:49 PM	30	30	31.90	1.90	16	48	30	18	16.1	48	8	1.9	17.05	0.40	270
10	2:49 PM 3:19 PM	30	30	31.90	1.90	16	48	30	18	16.1	48	8	1.9	17.05	0.40	300
11	3:19 PM 3:49 PM	30	30	31.90	1.90	16	48	30	18	16.1	48	8	1.9	17.05	0.40	330
12	3:49 PM 4:49 PM	30	30	31.90	1.90	16	48	30	18	16.1	48	8	1.9	17.05	0.40	360

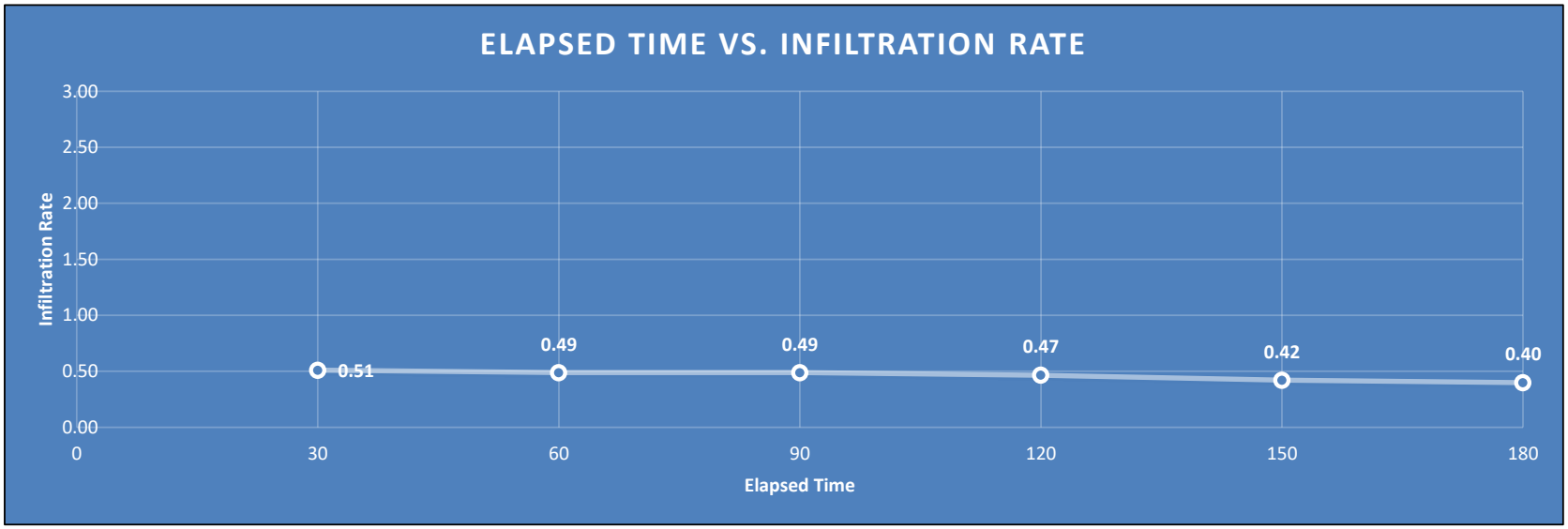


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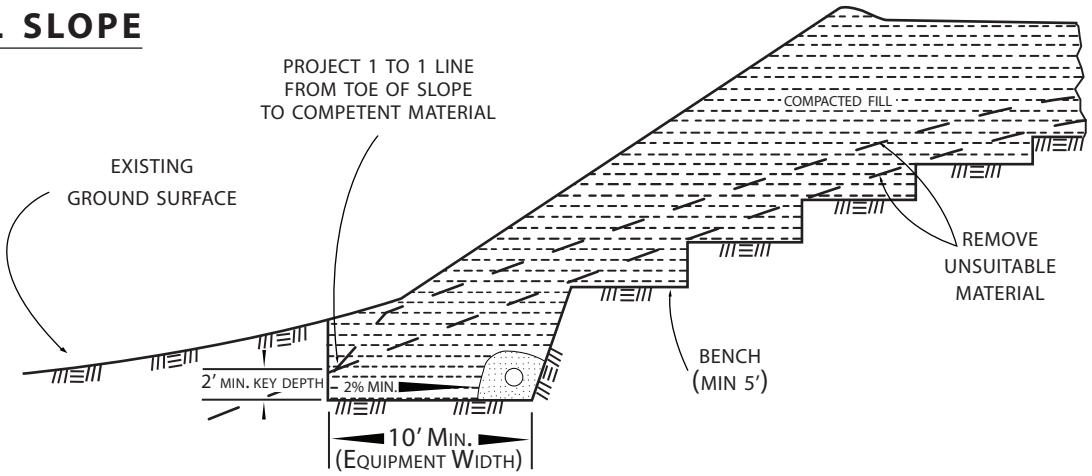
Exhibit 4

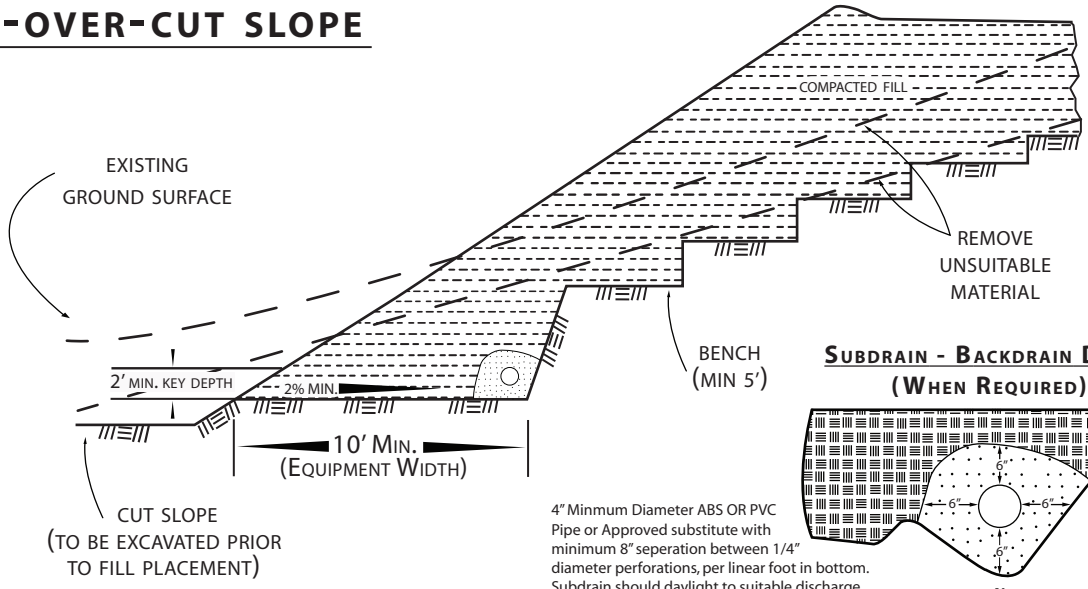
Typical Grading Detail

KEY AND BENCHING DETAIL

FILL SLOPE



FILL-OVER-CUT SLOPE

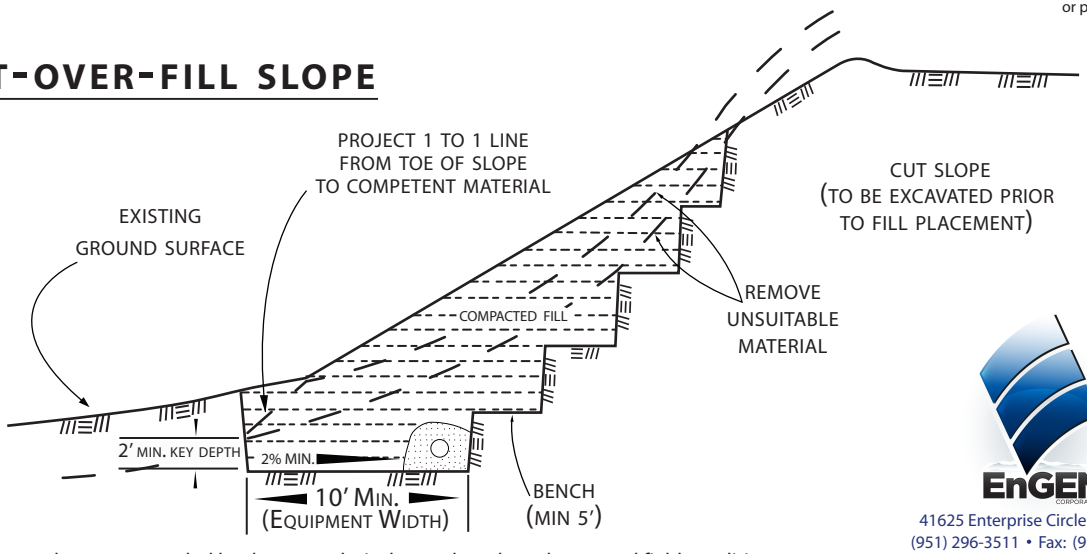


SUBDRAIN - BACKDRAIN DETAIL (WHEN REQUIRED)

4" Minmum Diameter ABS OR PVC Pipe or Approved substitute with minimum 8" seperation between 1/4" diameter perforations, per linear foot in bottom. Subdrain should daylight to suitable discharge facility per geotechnical engineer's approval.

Note: An approved filter fabric (Burrieto) may be wrapped around 3/4" crushed rock or pea gravel.

CUT-OVER-FILL SLOPE



Note: Back drain may be recommended by the geotechnical consultant based on actual field conditions encountered. Bench dimension recommendations may also be altered on field conditions encountered.

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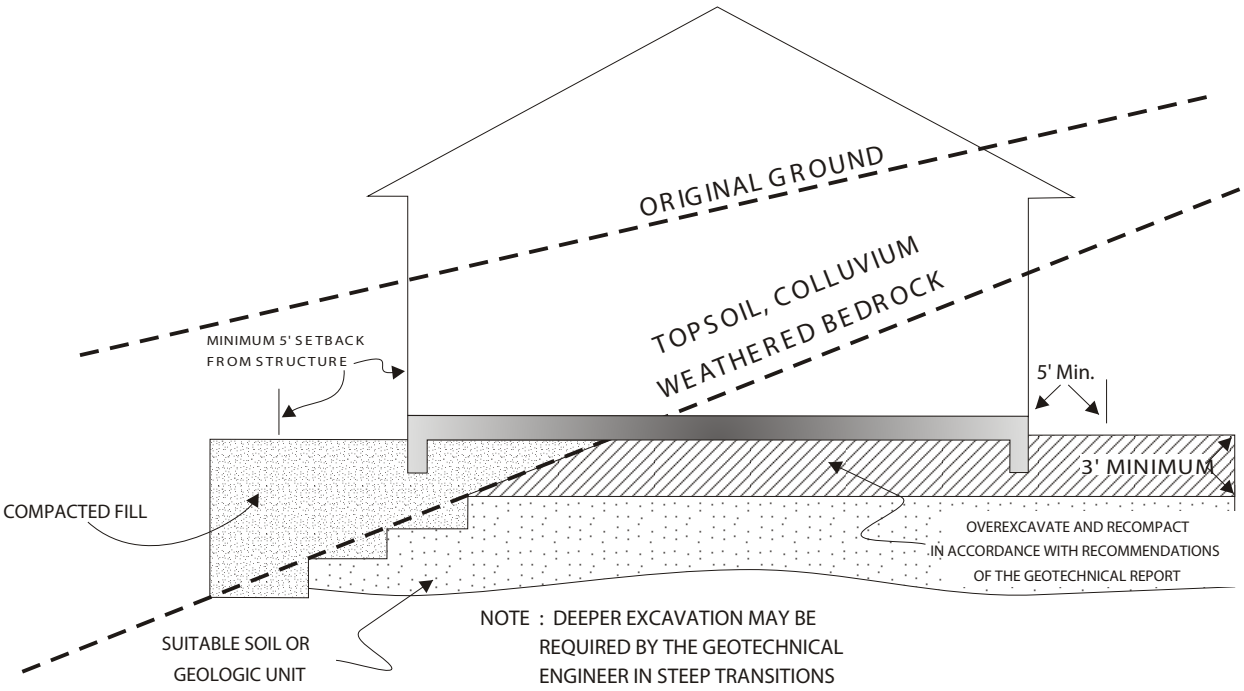
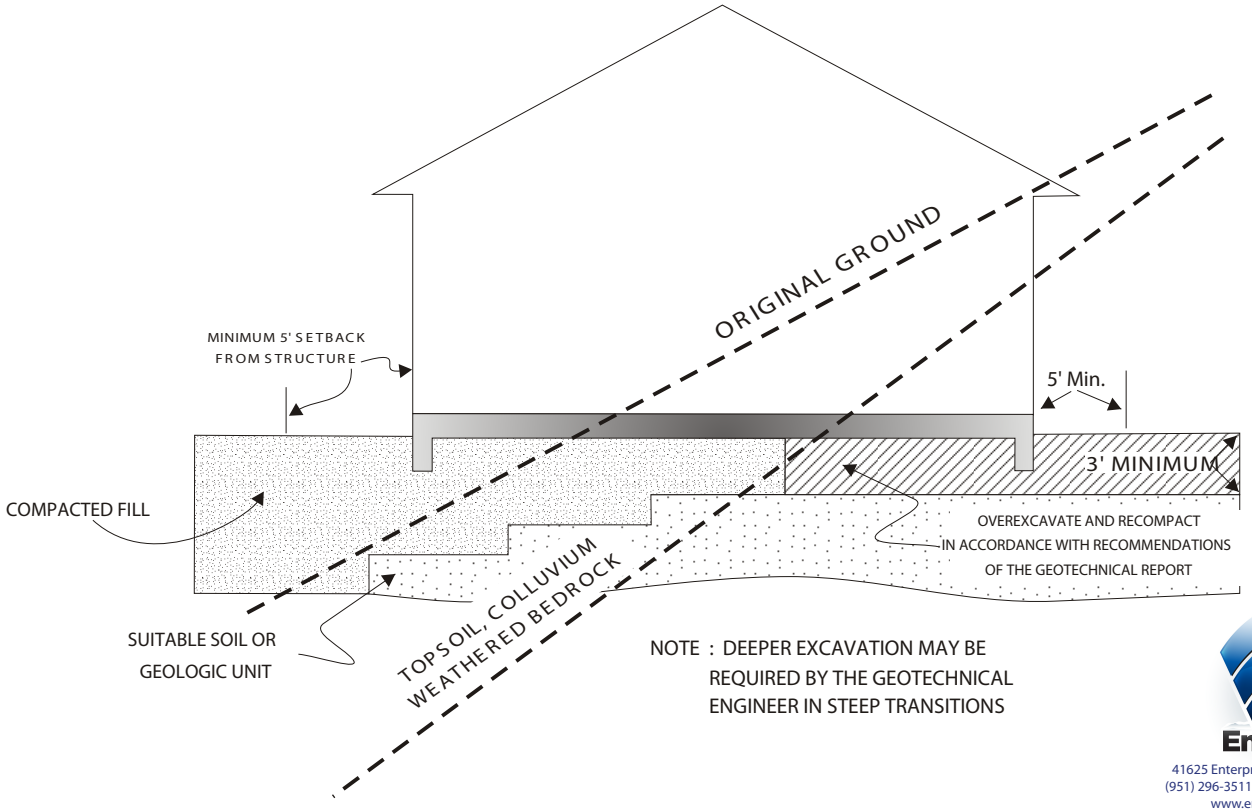
GENERAL GRADING RECOMMENDATIONS

CUT LOT



CUT-FILL LOT (TRANSITION)



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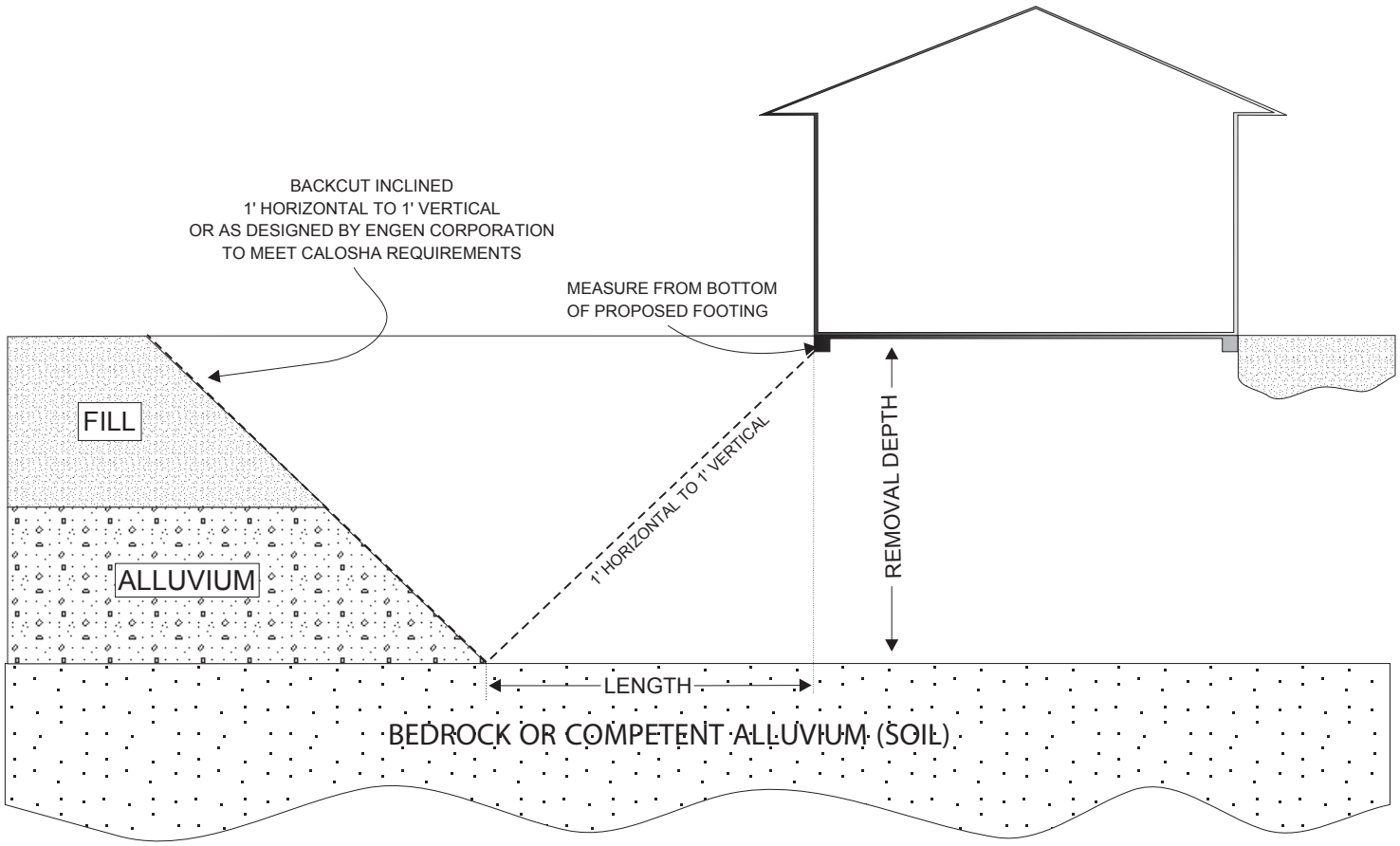
Minimum Horizontal Removal Limits



REMOVALS TO EXTEND TO THE HORIZONTAL DISTANCE OUTSIDE OF THE BUILDING LINES EQUAL TO DEPTH OF REMOVAL (LENGTH = HEIGHT)

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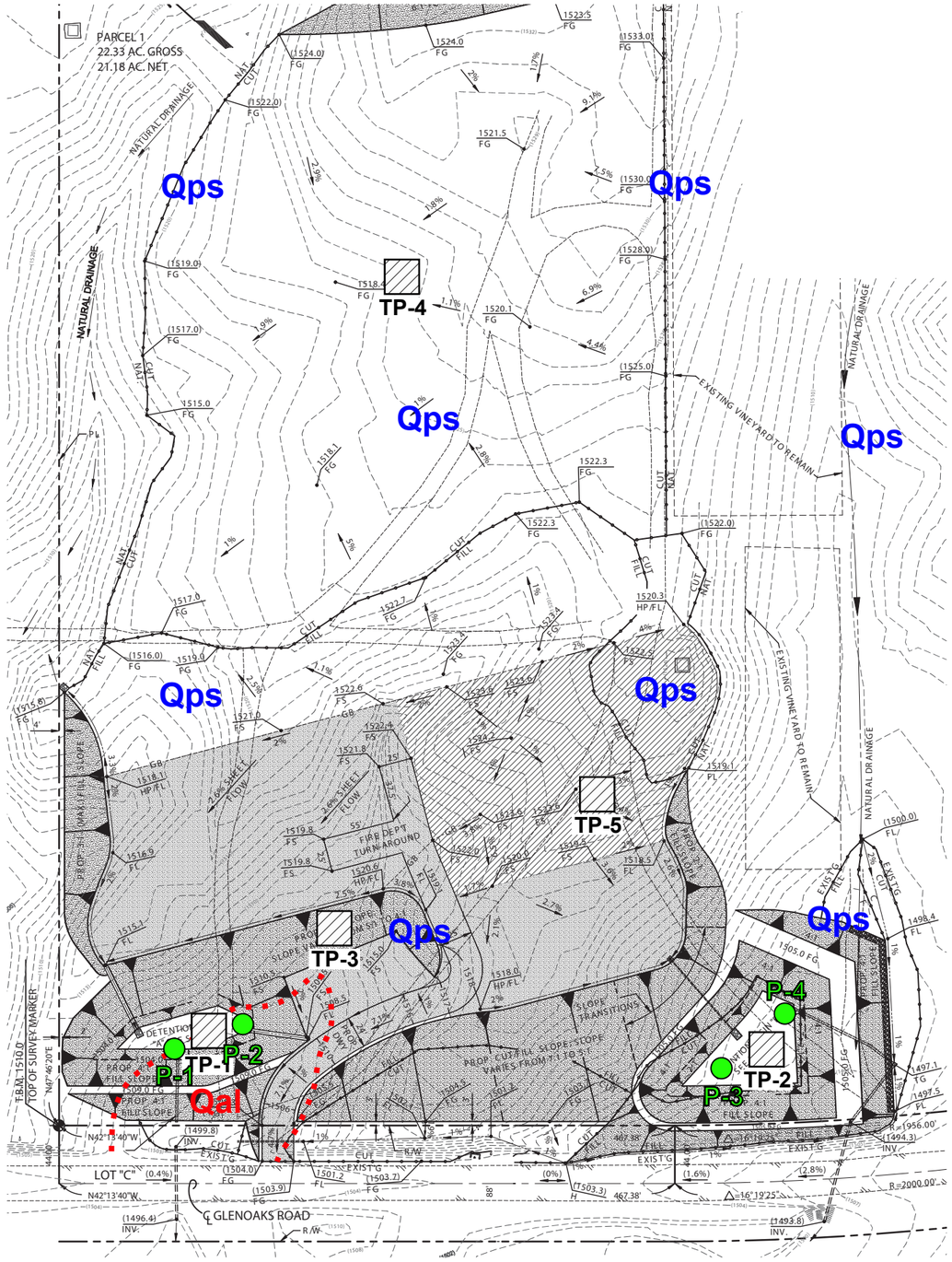
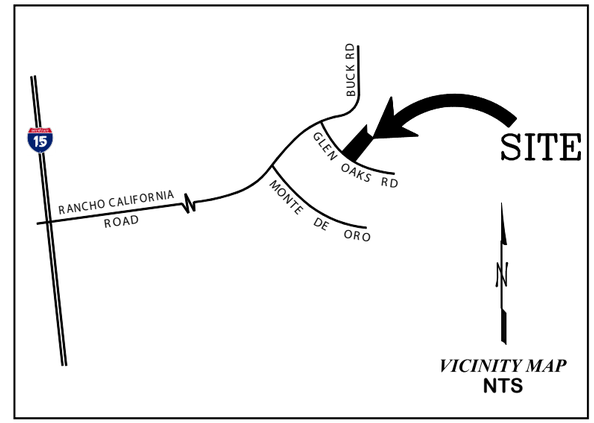
Plate 1

Geotechnical Feasibility Study Plan

PLATE 1





GRAPHIC SCALE
0 50 100 200 300 400
1" = 100'

LEGEND

- = *Approximate Boundary of Geologic Contact*
- Qal = *Alluvium*
- Qps = *Pauba Formation Bedrock overlain by 2 to 2.5-feet of colluvium.*
- TP-1 = *Approximate Location of Exploratory Test Pit*
- IT-1 = *Approximate Location of Infiltration Test Pit*

GEOTECHNICAL FEASIBILITY STUDY SITE PLAN

Project Name:	Austin Winery	Date:	11/15/18
Project Number:	4436GFS	Client:	Austin Winery
Legal Description:	APN: 942-030-006	Plate No.	1

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