

July 30, 2020  
J.N. 20-224**RICHLAND COMMUNITIES**3161 Michelson Drive, Suite 425  
Irvine, California 92612

Attention: Mr. Brian Hardy

**Subject: Geotechnical Update Report, Proposed Industrial Park Development, Renaissance Ranch Project, Horsethief Canyon Area of Riverside County, California**

References: See Attached List

Dear Mr. Hardy:

In accordance with your request and authorization, **Petra Geosciences, Inc. (Petra)** is submitting this updated geotechnical evaluation report for the proposed industrial development of the Renaissance Ranch project in the Horsethief Canyon area of Riverside County, California. The purposes of our evaluation were to review available geotechnical and geologic information on the nature of current site conditions, to evaluate the potential geologic constraints that may affect development of the property in lieu of the proposed land use change from residential to industrial use as per Renaissance Conceptual Master Plan (MP) by Architecture Design Relationships (ADR) dated February 24, 2020. Based on the MP, the future industrial development will consist of seven rectangular warehouse type structures constructed on relatively flat pads with adjacent slopes, retaining walls, and associated utility and street improvements. This report includes a review of the prior geotechnical investigation reports (Geosoils, 2003a, 2003b, 2004, 2005), and presents our engineering judgment, opinions, conclusions and recommendations pertaining to geotechnical design aspects, remedial grading and construction of anticipated site improvements in support of the proposed land use change. The approximate area of the proposed project site is depicted on Figure 1.

**SCOPE OF WORK**

The scope of our evaluation consisted of the following.

- Review of available geotechnical investigation reports by others as well as available published and unpublished data, concerning geologic and soil conditions within the site and nearby area, that could have an impact on the proposed development.
- Conduct site reconnaissance to document current site conditions.
- Review readily available aerial imagery of the site and surrounding area.

- Preparation of this geotechnical report presenting the results of our evaluation and providing recommendations for the proposed site development in general conformance with the requirements of the 2019 California Building Code (2019 CBC), as well as in accordance with applicable state and local jurisdictional requirements.

### **LOCATION AND SITE DESCRIPTION**

The subject area is an irregularly shaped, approximately 155-acre project site within the easterly portion of the Horsethief Canyon Ranch area of Riverside County, California. The site consists of multiple APN's which were from the 2005 proposed residential development approvals. The site is essentially vacant raw land. The property descends at a moderate gradient, generally in a northeasterly direction. Site elevations range from approximately 1,200 feet above mean sea level (amsl) near the northern property line and to approximately 1,420 feet amsl near the southwest property line.

The following is a discussion on pertinent site details based on our July 2, 2020 site reconnaissance and review of available reports, plans and maps. The site essentially consists of two areas. For ease of review and discussion, we have divided the site into two areas: 1) Southern Area and 2) Northern Area. The site location with the two areas designated are included as Figure 1 and briefly described below:

- The Southern Area is approximately 135-acres situated south of the 15 Freeway and bounded by residential properties to the south and west. Horsethief Canyon Park and Horsethief Wastewater Treatment Plant operated by Elsinore Valley Municipal Water District (EVMWD) are located to the west (north of the residences). EVMWD sewer lift station is located just outside of the southeast corner of the Southern Area at the end of Bolo Court. Vacant land owned by the County of Riverside is located immediately north and east of the site. The following are some observations of the area:
  - Several dirt paths are present throughout the property and broken drip irrigation piping was found scattered across the site.
  - Two small concrete foundations with four threaded bolts, probably for orchard uses in the Southern Area.
  - Moderate to locally heavy amount of vegetation consisting of brush/weeds/grasses mantles much of the site.
  - Minor amounts of dumped trash or debris were occasionally observed in the Southern Area.
  - Existing fill slopes ascend to adjacent residential properties in the Southern Area.
  - EVMWD access road with existing adjacent cut and fill slopes is located in the southeast portion of the Southern Area as well as associated facilities and a lift station at the end of Bolo Court.
  - Power poles and electrical wires cross the northern part of the Southern Area.

- The Northern Area is approximately 20-acres located off the northwest corner of the Southern Area and situated south of the 15 Freeway. The Northern Area is bounded to the north by residential property, Horsethief Canyon Park and Horsethief Wastewater Treatment Plant operated by EVMWD to the south. Vacant land owned by the County of Riverside is located immediately north and east of the site. The site is bordered on the west by a residential property and Horsethief Canyon Road. Access to this area is from Horsethief Canyon Road. The following are some observations of the area:
  - Northern Area had many piles of construction debris and trash on the elevated areas as well as the canyon areas.
  - Several mature trees are present in the Northern Area.
  - Moderate to locally heavy amount of vegetation consisting of brush/weeds/grasses mantles much of the site.
  - Some large crushed concrete stockpiles as well as end-dump soil/debris piles are present in the Northern Area.
  - The Northern Area appeared to be formerly used as two former residences with associated improvements based on debris and aerial photos. Portions of the area may have been used as a borrow site in the past as flat cut areas and small slopes are present.
  - Existing fill slopes ascend to Horsethief Canyon Park and the residential property named “Brown’s Ranch”.
  - Power poles and electrical wires cross the Northern Area.

### **PROPOSED DEVELOPMENT**

Based on the architectural site plan MP, and our understanding, the area will be rezoned to industrial land use. We anticipate improvements to include several large industrial buildings, underground utilities, asphalt pavements, perimeter and retaining walls with some reinforced walls, underground storm water facilities and/or detention basins, park sites and landscaping. Grading plans are not currently developed; however, we anticipate cuts as much as 70 feet and fills as much as 90 feet from existing grades to create the new industrial building pads. The buildings are expected to be designed such that the fill beneath the building would have varying thicknesses crossing existing canyon fill areas and proposed cut areas. Cut and/or fill slopes are anticipated to be constructed at 2:1 (h:v) gradients. Access to the site is proposed to connect to Horsethief Canyon Road on the west and Bolo Court. on the east.

### **FINDINGS**

#### **Aerial Photo Review**

Readily available online aerial imagery from as early as 1938 was reviewed to assess previous land use. Based on recent aerial imagery, the site has been essentially vacant except for dry farming and orchards

occurred in the area in the past. Some debris still remains from a few former agricultural type structures in the Southern Area. Two former residences were observed in the Northern area as well as a former truck trailer storage facility.

### **Previous Geotechnical Investigation**

Petra has reviewed the previous geotechnical reports prepared by Geosoils (2003a, 2003b, 2004, 2005) as well as researched and reviewed available published and unpublished geologic data pertaining to regional geology, faulting and geologic hazards that may affect the site. The results of this review are included within this report and the geologic maps from these reports are included in Appendix A as well as the exploration logs are included in Appendix B. Each investigation report is discussed below:

- Geosoils 2003a – this investigation report evaluated subsurface conditions for the Southern Area 135-acre portion of the site. Proposed development was planned for approximately 330 residential building pads, associated infrastructure, and underground utility improvements. The investigation included drilling of three hollow-stem borings and excavation of 30 test pits throughout the site. The following recommendations were noted in this report:
  - Recommended complete removal of alluvium in the canyon areas estimated up to 30 feet.
  - Recommended remedial removals for hilltops and side slopes ranging from 2 to 10 feet.
  - Recommended subdrain systems for control of localized groundwater seepage in canyon areas and potential cut slope exposures.
  - Stated that conventional earthmoving equipment should be able to excavate the older alluvial fan deposits; however, oversized rock may be generated.
  - Recommended settlement monitoring for fill areas in excess of 50 feet in thickness and that fill materials placed below 50 feet to be compacted to 95 percent.
  - Fill slopes should not exceed 70 feet in height and cut slopes should be limited to 50 feet in height.
  - Onsite soils will range from very low to medium expansion.
  - Local subsidence due to vibration/loading during grading would be less than 0.15 feet.
  - Provided estimated shrinkage and bulking factors as follows:
    - Artificial Fill (15% to 20% shrinkage), Topsoil/Colluvium (10% to 15% shrinkage), Younger Alluvium (15% to 20% shrinkage), Weathered Fan Deposits (5% to 10% shrinkage), and cuts in Fan Deposits (0% to 5% bulking).
- Geosoils 2003b - this investigation report evaluated subsurface conditions for the Northern Area 23-acre portion of the site. Proposed development was for approx. 76 residential building pads, associated infrastructure, and underground utility improvements. The investigation included

excavation of 17 test pits throughout the site. The recommendations in this report were similar to Geosoils 2003a except as follows:

- Recommended complete removal of alluvium in the canyon areas estimated up to 25 feet.
- Recommended remedial removals for hilltops and side slopes ranging from 2 to 6 feet.
- Recommended removal, screening and offsite disposal for deleterious materials found to be up to 30 feet in thickness located in the canyons onsite.
- Geosoils 2004 – this investigation report focused on the eastern portion of the Southern Area where a proposed Lot “O” MSHSCP riparian mitigation project planned to evaluate groundwater depths, map and approximately locate current surficial water and nuisance water flows and to provide geotechnical design criteria for the watershed area. This investigation included drilling of four hollow-stem borings. The following notes are from the report:
  - Groundwater was encountered in the MSHCP area between 10 and 20 feet below ground surface (bgs).
  - Surficial nuisance and low-volume water flows were noted.
  - Siltation/sedimentation should be anticipated due to the nature of the steep slopes descending into the MSHCP area.
- Geosoils 2005 – this investigation report focused on the northwest area identification of trash/debris areal limits. This investigation included excavation of eleven test pits. The recommendations in this report were similar to Geosoils 2003b.

The previous reports concluded that the proposed development is geologically and geotechnically feasible, provided that the recommendations presented are fully implemented during design, grading, and construction.

### **Regional Geologic Setting**

The proposed project is situated in the northern portion of the Peninsular Range Province of Southern California. In general, the Peninsular Ranges are underlain primarily of plutonic rock of the Southern California Batholith. These rocks formed from the cooling of molten magma deep within the earth's crust. Intense heat associated with the plutonic magma metamorphosed the ancient sedimentary rocks into which the plutons intruded.

Specifically, the site is located in the western portion of the Perris Peneplain, which is a broad valley bounded on three sides by mountain ranges: the San Jacinto Mountains on the east, the San Bernardino Mountains on the north, and the Santa Ana Mountains to the west. The northwestern extent of the Perris Peneplain is the Santa Ana River. The Peneplain is a large depositional basin composed primarily of

materials eroded from the granitic bedrock surfaces of the Southern California Batholith. Granitic and/or metasedimentary bedrock related to the Santa Ana Mountains are located just to the south of the site.

### **Local Geology and Subsurface Soil Conditions**

The subject property is located on the distal portion of a large alluvial fan emanating from the Santa Ana mountains further to the southwest. These fan deposits are generally mapped as Pleistocene aged older fan deposits and are incised by various recent drainages generally trending to the north. These incised drainages have been infilled with recent alluvium including active wash deposits and existing undocumented fill. Older fan deposits are generally located in the elevated portions of the site. Recent alluvium is prominently in the eastern portion of the site and within the drainages overlying the older fan deposits. Appendix A includes geologic maps which depict the approximate surface contact between the two main units. In some places, a thin veneer of topsoil and/or colluvium is present above the older fan deposits and younger alluvium. Existing artificial fill from past residential development is present along the southern and western edges of the site. Undocumented fill is present in various places on the site due to undocumented filling of canyons with trash and debris and well as for bridging drainages for agriculture purposes. The descriptions of each of these units are included in the referenced reports (Geosoils, 2003a, 2003b).

### **Groundwater**

Groundwater was encountered in the lower eastern canyons of the Southern Area at approximately 10 to 20 feet bgs (Geosoils, 2004). These groundwater depths in the Southern Area are equivalent to about 1,160 to 1,180 feet amsl. Seepage was noted in test pits at 2 to 20 feet bgs in the lower canyons of the Northern Area (Geosoils, 2005). These groundwater depths in the Northern Area are equivalent to about 1,210 to 1,250 feet amsl. Research for other sources of groundwater levels in the vicinity of the site did not indicate available groundwater data (California Department of Water Resources, Water Data Library and State Water Resources Control Board, GeoTracker). In addition, no seepage was noted in the canyon sidewalls of the Northern and Southern Areas. Based on available data of lack of, a groundwater table could not be inferred beneath the site. Therefore, it is reasonable to estimate groundwater in the elevated areas of the Southern Area as being greater than 50 feet in depth. Groundwater within the Northern Area should be considered as being within 20 feet in depth. These estimates reflect site conditions at the time of previous investigations in 2003 to 2005 and do not preclude changes in local groundwater conditions from heavy irrigation, precipitation, or other factors not obvious in the alluvium and fan deposits.

Groundwater is expected to be encountered in the canyon areas as discussed above and not anticipated to affect the proposed development; however, as with any development, there is the possibility of localized perched water and minor seepage may occur in fill or alluvial layers of differing permeability once site landscaping is installed and irrigation implemented.

### **Faulting**

Based on our review of published and unpublished geologic maps, no known active faults are located within or immediately adjacent to the site. Additionally, the site does not lie within an “Earthquake Fault Zone” as defined by the State of California in the Alquist-Priolo (AP) Earthquake Fault Hazard Zoning Act or within a Riverside County fault zone (CGS, 2018, 2020). Based on our review of published and unpublished geotechnical maps and literature pertaining to site and regional geology, the closest active fault to the site is the Elsinore fault-Glen Ivy Section located approximately 0.6 mile to the southwest, which is the most significant fault, with respect to anticipated ground motions at the site, due to its proximity and large possible magnitude.

### **Secondary Seismic Effects**

Secondary effects of seismic activity normally considered as possible hazards to a site include several types of ground failure. Various general types of ground failures, which might occur as a consequence of severe ground shaking at the site, include ground subsidence, ground lurching and lateral spreading. The probability of occurrence of each type of ground failure depends on the severity of the earthquake, distance from faults, topography, subsoil, and groundwater conditions, in addition to other factors. Landslides or evidence for surficial slope instability were not observed within the site during our site reconnaissance or fieldwork conducted by others, however ongoing erosion along near vertical cuts along the major active drainages is present. The potential for ground lurching and lateral spreading are considered very low. The potential for seismically-induced flooding due to tsunami or seiche (i.e., a wave-like oscillation of the surface of water in an enclosed basin) is considered negligible at this site.

### **Liquefaction and Seismically-Induced Settlement**

Liquefaction occurs when dynamic loading of a saturated sand or silt causes pore-water pressures to increase to levels where grain-to-grain contact is lost, and the material temporarily behaves as a viscous fluid. Liquefaction can cause settlement of the ground surface, settlement and tilting of engineered structures, flotation of buoyant buried structures and fissuring of the ground surface.

Riverside County has mapped the subject property within a low to moderate liquefaction susceptibility zone. The low zones generally coincide with the older alluvial areas and the moderate zones generally coincide with the younger alluvial areas and drainages. Based on the absence of a shallow groundwater table in the older fan deposits, the dense to very dense nature of the older fan, the potential for liquefaction in the Southern Area and for seismic (i.e., dynamic) settlement, in the form of dry sand settlement, are anticipated to be very low. Geosoils 2003a concluded that based on extremely dense, and locally cemented nature of the older fan deposits that underlie the site at depth, their laboratory testing and their liquefaction screening process as per CDMG 1997 Special Publication 117 the potential for liquefaction, after remedial grading (i.e. complete removal of undocumented fill, topsoil/colluvium, alluvial soils and weathered terrace deposits) with areas proposed for development is considered very low (Geosoils, 2003a and 2003b). Special Publication 117a (CGS, 2008) is now the current revision and findings remain consistent.

### **Compressible Soils**

A geotechnical factor affecting the project site is the presence of porous, dry, and compressible near-surface undocumented fills, topsoil/colluvium, alluvial soils, and weathered terrace deposits. Such materials in their present state are not considered suitable for support of fill or structural loads. Accordingly, these materials will require removal to competent alluvial deposits as observed by the geotechnical consultant and replacement as moisture-conditioned and properly compacted fill.

### **Slope Considerations**

Geosoils conducted limited slope stability analysis in the evaluation of the sites (Geosoils 2003a and 2003b). Based on their slope stability analyses, proposed cut and fill slopes should be designed at 2:1 (h:v) and not exceed 50 feet in height (cut slopes) and 70 feet in height (fill slopes). Supplemental subsurface investigation and slope stability analyses may be warranted when reviewing future plans and proposed slopes and walls.

### **Volumetric Changes - Shrinkage and Subsidence**

Volumetric changes in earth quantities occur when excavated onsite soil and bedrock materials are replaced as properly compacted fill. Following is an estimate of shrinkage and bulking factors for the various geologic units present onsite. These estimates are based upon field and laboratory testing at the site by previous consultant (Geosoils, 2003a). It is our opinion that these estimates are considered representative of materials at the site. Therefore, the information presented below represents average shrinkage/bulking values:

- Artificial Fill.....Shrinkage 15 to 20%
- Topsoil/Colluvium..... Shrinkage 10% to 15%
- Younger Alluvium.....Shrinkage 15 to 20%
- Weathered Quaternary Fan Deposits..... Shrinkage 5% to 10%
- Quaternary Fan Deposits .....Bulking 0 to 5%

Subsidence from scarification and re-compaction of exposed bottom surfaces in over-excavated areas to receive fill is expected to vary from negligible to approximately 0.1 foot.

The above estimates of shrinkage, bulking and subsidence are intended as an aid for project engineers in determining earthwork quantities. However, these estimates should be used with some caution since they are not absolute values. Contingencies should be made for balancing earthwork quantities based on actual shrinkage and subsidence that occurs during the grading.

## **CONCLUSIONS AND RECOMMENDATIONS**

### **Development Feasibility**

Based on previous field explorations, research and review of pertinent geologic literature, and preliminary laboratory testing, development of the project site is considered feasible for the proposed residential development from a geotechnical standpoint. Furthermore, it is our opinion that the proposed grading and construction will not adversely affect the geologic stability of adjoining properties in an adverse manner provided that the grading and construction are performed in accordance with current standards of practice, all applicable grading ordinances and the recommendations presented in this report.

### **Grading Plan Review**

This report is based on the preliminary design concept of the project area. We recommend that our firm be retained to review the finalized grading plan when they become available. Additional recommendations and/or modification of the recommendations provided herein will be provided if necessary, depending on the results of the grading plan review.

If additional or alternative improvements are considered in the future, our firm should be notified so that we may provide design recommendations. It is further recommended that we be engaged to review the final design drawings, specifications, and grading plan prior to any new construction. If we are not provided the opportunity to review these documents with respect to the geotechnical aspects of new construction and

grading, it should not be assumed that the recommendations provided herein are wholly or in part applicable to the proposed construction.

### **Earthwork and Grading**

#### **General Specifications**

Earthwork and grading should be performed in accordance with applicable requirements of the Grading Code of the County of Riverside, in addition to the provisions of the 2019 CBC. Grading should be performed in accordance with applicable provisions of the attached Standard Grading Specifications (Appendix C) prepared by Petra, unless specifically revised or amended herein.

#### **Geotechnical Observations and Testing**

Prior to the start of earthwork, a meeting should be held at the site with the owner, contractor, and geotechnical consultant to discuss the work schedule and geotechnical aspects of the grading. Earthwork, which in this instance will generally entail removal and re-compaction of loose existing soils to expose competent natural soils, should be accomplished under full-time observation and testing of the geotechnical consultant. A representative of the project geotechnical consultant should be present onsite during all earthwork operations to document proper placement and compaction of fills, as well as to document compliance with the other recommendations presented herein.

#### **Demolition, Clearing and Grubbing**

All existing structures should be demolished and removed from the site. All existing trees and vegetation within areas to be graded should be stripped and removed from the site. Clearing operations should also include the removal of any remaining irrigation pipes, trash, debris, vegetation, and similar deleterious materials. Any cavities or excavations created upon removal of any unknown subsurface structure(s) should be cleared of loose soil, shaped to provide access for backfilling and compaction equipment and then backfilled with properly compacted fill. Following surface stripping, any remaining roots or deleterious may need to be removed by hand (i.e. root pickers), during grading operations.

The project geotechnical consultant should provide periodic observation and testing services during clearing and grubbing operations to document compliance with the above recommendations. In addition, should unusual or adverse soil conditions or buried structures be encountered during grading that are not described herein, these conditions should be brought to the immediate attention of the project geotechnical consultant for corrective recommendations.

### **Geotechnical Observations**

Exposed bottom surfaces in remedial removal areas should be observed and approved by a representative of the project geotechnical consultant *prior to the placement of fill*. A representative of the project geotechnical consultant should also be present on site during major grading operations to document that proper placement and adequate compaction of fills has been achieved, as well as to observe compliance with the other recommendations presented herein. It is the grading contractor's responsibility to notify the project geotechnical consultant at least 24 hours prior to requiring observation (including excavation bottom verification).

### **Unsuitable Soil Removals and Bottom Processing**

Existing undocumented fills, topsoil/colluvium, alluvial soils, and weathered terrace deposits are considered unsuitable for support of proposed fills, structures, flatwork, pavement, or other improvements and should be removed to underlying competent terrace deposits as approved by the project geotechnical consultant. The estimated depth of removals is recommended to be approximately 2 to 30 feet below the existing ground surface in proposed building areas and adjacent slopes. Soil removals may need to be locally deeper depending upon the exposed conditions encountered during grading.

Prior to placing engineered fill, the exposed bottom surfaces in the removal areas should be approved by a representative of project geotechnical consultant. The exposed removal bottoms should be scarified to a minimum depth of 12 inches, moisture-conditioned to achieve at least 1 to 2 percent above optimum moisture content and compacted with a heavy construction equipment prior to placement of fill. Minimum compaction of the upper 12 inches of the removal bottom should meet or exceed 90 percent relative compaction with reference to ASTM D1557. The laboratory maximum dry density and optimum moisture content for each change in soil type should be determined in accordance with test method ASTM D1557. report.

### **Boundary Conditions**

Average remedial removals within the building pad areas of the subject site may be up to 30 feet below the existing ground surface. Temporary backcut slopes adjacent to developed tract boundaries should generally be restricted to a slope ratio of 1:1 (h:v) or flatter to protect adjacent offsite improvements such as fencing or walls along the southeasterly property boundaries. Depending on the actual horizontal extent of remedial grading that is achievable by the grading contractor, it is likely that a wedge of unsuitable soil will remain in place along the site perimeter that will extend into the site to a horizontal distance equal to as much as

twice the depth of remedial removals. Since new perimeter wall improvements may be proposed within this zone, such improvements may need to be designed and constructed with deepened and/or strengthened foundation systems designed to withstand relative movement that is likely to result from settlement of these likely compressible surficial soils. The use temporary shoring or slot cut techniques along perimeter of the site may also be considered.

**Cut Lots**

Buildings located entirely in cut should be overexcavated a minimum of 10 feet below proposed finished pad grade elevations and replaced as properly compacted fill. Limits of overexcavation should extend 10 feet from the building edge. Prior to placing engineered fill, all exposed overexcavation bottom surfaces in the building pad areas should be first scarified to a depth of 12 inches, watered or air-dried as necessary to achieve near-optimum moisture conditions and then compacted in-place to a relative compaction of 90 percent or more.

**Cut-Fill Transition beneath Building/Remedial Laybacks**

Cut/fill transitions should be eliminated from beneath building-pad areas to reduce the detrimental effects of differential settlement. This should be accomplished by overexcavating the "cut" or shallow-fill portions and replacing the excavated materials as properly compacted fill. In addition, canyon sidewalls should be laid back as indicated in the following table. Recommended depths of overexcavation are given below.

<b>Depth of Fill Below Pad Grade (design plus remedial)</b>	<b>Depth of Overexcavation (ox) Below Pad Grade</b>	<b>Offset /Layback Recommendations/</b>	<b>Compaction Requirements/Settlement Monitoring</b>
0 to 10 feet	10 feet	Extend ox 10 feet beyond building footprint	90% compaction
0 to 40 feet	10 feet	Extend ox 10 feet beyond building footprint; layback 2:1 to 15 feet bgs; 1.5:1 from 15 feet to 40 feet bgs	90% compaction
0 to 90 feet	10 feet	Extend ox 10 feet beyond building footprint; layback 2:1 to 15 feet bgs; 1.5:1 from 15 feet to 40 feet bgs; 1:1 below 40 feet	90% compaction to 40 feet; 95% compaction to 90 feet; granular fill below 40 feet; settlement monitoring required
0 to greater than 90 feet	10 feet	Extend ox 10 feet off building edge; layback 2:1 to 15 feet bgs; 1.5:1 from 15 feet to 40 feet bgs; 1:1 below 40 feet	90% compaction to 40 feet; 95% compaction; granular fill below 40 feet; settlement monitoring required

Horizontal limits of overexcavation should extend across the entire level portion of the lot. Prior to placing engineered fill, all exposed overexcavation bottom surfaces in the removal areas should be first scarified to a depth of 6 or 8 inches, watered or air-dried as necessary to achieve near-optimum moisture conditions and then compacted in-place to a relative compaction of 90 percent or more.

### **Settlement Monitoring**

Settlement monitoring has been recommended for deep fill areas to evaluate the amount of time for primary consolidation to take place and the magnitude of any remaining long-term secondary consolidation. The building pads are designed to span across cut and fill areas, therefore settlement would be expected to be minimal in cut areas, and more pronounced in the fill areas. Where deep cuts are planned it may be recognized that the ground would actually heave and not settle from current position based on the stress relief. However, this effect would be expected to occur during the grading process, so it is generally ignored, as it would not be expected to affect the finished pad.

We suggest a limited verification effort where the settlement estimate is verified prior to construction by conducting a few additional borings in the proposed deep fill areas that also includes some additional laboratory testing considering the expected fill conditions and depths.

- **Settlement Monitoring:** The locations of recommended near-surface settlement monuments should be determined by the project geotechnical consultant during and upon completion of rough grading. Surface monuments should be installed at finished grade in deep fill areas (total fill depth exceeding 40 feet) immediately following completion of grading to verify post-grading settlement. The survey monuments should be surveyed by the project civil engineer. A monitoring period of at least 3 to 6 months will likely be required prior to the commencement of construction.

The survey monuments should be monitored on a weekly basis for the first four weeks, then once every two weeks for a total of one month. Subsequent readings should be taken once a month for three months, or whenever the settlement appears to stabilize. Building construction and underground utility installation should not proceed until it is determined that primary consolidation has occurred and that any further settlement will be within the acceptable limits of tolerance.

The estimates for time to complete primary settlement are inadequately expressed, as time-lapsed measurements were not shown in the laboratory data. With more granular type soils found onsite (more sandy soils vs mostly clayey soil), time rate effects should not be as pronounced, and most of the settlement should occur during the construction grading process or shortly thereafter.

- **Settlement Reduction:** To potentially decrease the amount of total settlement within the deep fill areas and decrease the time duration of the settlement monitoring program, consideration can be given to placing compacted fill materials at depths in excess of 40 feet below proposed grade at a minimum relative compaction of 95 percent rather than 90 percent. This will decrease the amount of time that the lots will need to be monitored but will not release them from the monitoring program.

- **Differential Settlement:** Differential settlement below the building pads is expected to occur based on the differences in depths of fill and older fan deposits below the buildings. This is primarily from the pressure changes/differences between the cut areas, and the areas with deep fill placed above existing grades. Where the fill thickness difference from one part of the building to the other part is the highest, so is the potential for the highest occurrence of differential settlement.

### **Benching**

Fills placed against excavated slope surfaces inclining at 5:1, (h:v), or steeper, should be placed on a series of level benches excavated into or competent soils. These benches should be provided at vertical intervals of approximately 3 to 4 feet. Typical benching details are shown on Plates SG-2, SG-5, SG-6, SG-7 and SG-8 (Appendix C).

### **Suitability of Site Soils as Fill**

Based on review of previous site reports, the on-site soil materials would be suitable for use as engineered fill provided they are clean of construction debris or other deleterious materials. Granular fill may be required for fills deeper than 40 feet or backfill of reinforced walls and slopes. As with most remedial grading, the majority of soils exposed at or near the surface would require moisture-conditioning to at least optimum moisture content for use as engineered fill.

### **Excavation Characteristics**

The existing site soils are expected to be readily excavated with conventional earthmoving equipment, however depending on the depth of cut within older alluvium areas that are very dense, some ripping may be necessary.

### **Fill Placement**

Fill materials should be placed in approximately 6- to 8-inch thick loose lifts, watered or air-dried as necessary to achieve a moisture content of at least above optimum moisture condition, and then compacted in-place to a minimum relative compaction of no less than 90 percent. The laboratory maximum dry density and optimum moisture content for each change in soil type should be determined in accordance with ASTM D1557.

### **Fill Slope Construction**

A fill key excavated at a depth of 2 feet or more into competent soils is recommended at the base of all new fill slopes. The width of the fill key should equal one-half the slope height or 15 feet, whichever is greater.

Typical fill-key construction details are shown on Plates SG-2, SG-5, SG-6, and SG-8 (Appendix C). To obtain proper compaction to the face of fill slopes, low-height fill slopes should be overfilled during construction and then trimmed-back to the compacted inner core. Where this procedure is not practical for higher slopes final surface compaction should be obtained by back-rolling during construction to achieve proper compaction to within 6 to 8 inches of the finish surface, followed by rolling with a cable-lowered sheepsfoot and grid roller. For achieving compaction on the existing ascending fill slopes along the western property boundary, they should be track-walked with a dozer.

The finish surface of the fill slopes should be both grossly and surficially stable to the planned heights at an inclination of 2:1 (h:v); however, based on the anticipated granular nature of the soil materials, these slopes may be somewhat erodible. Recommendations for mitigating the potential for surficial erosion is presented in the Slope Landscaping and Maintenance section below.

### **Cut Slope Construction**

Observations during grading of individual cut slopes by the project engineering geologist to document favorable geologic conditions of the exposed slopes is recommended. Where cohesionless sandy soil materials, seepage or out-of-slope bedding are observed in the cut slope face, they may require stabilization by means of a compacted stabilization fill.

### **Fill-Over-Cut Slopes**

Where fill-above-cut slopes are proposed, a 15-foot wide key excavated into competent natural soils should be constructed at the contact. The bottom of the key should be tilted-back into the slope at a gradient of 2 percent or more. A typical section for construction of fill-above-cut slopes is shown on Plate SG-6 (Appendix C). The lower cut portion of the slope should be excavated to grade and observed by the project engineering geologist prior to constructing the fill portion. Where cut-to-fill transition slopes are proposed, the fill portion should be placed on a series of benches excavated into competent soils. The benches should be 8 to 10 feet wide, constructed at vertical intervals of approximately 5 feet and tilted-back into the slope at a gradient of 2 percent or more.

### **Temporary Excavations**

Temporary excavations varying up to a height of 30± feet below existing grades may be required to accommodate the recommended over-excavation of existing soft/loose alluvial soils and undocumented fills. Based on the physical properties of the onsite soils, temporary excavations which are constructed

exceeding 4 feet in height should be cut back to a ratio of 1:1 (h:v) or flatter for the duration of the over-excavation of unsuitable soil material and replacement as compacted fill, as well as placement of underground utilities. The temporary excavations should be observed by a representative of the project geotechnical consultant for evidence of potential instability. Depending on the results of these observations, revised slope configurations may be in order. Other factors which should be considered with respect to the stability of the temporary slopes include construction traffic and/or storage of materials on or near the tops of the slopes, construction scheduling, presence of nearby walls or structures on adjacent properties and weather conditions at the time of construction. Applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health act of 1970 and the Construction Safety Act should also be followed.

### **Import Soils for Grading**

If import soils are needed to achieve final design grades the soils should be free of deleterious materials, oversize rock, and any hazardous materials. The soils should also be non-expansive and essentially non-corrosive and approved by the project geotechnical consultant *prior* to being brought onsite. The geotechnical consultant should visit the potential borrow site and conduct testing of the soil at least three days before the commencement of import operations.

### **REPORT LIMITATIONS**

This report is based on the project site, as we understand, and preliminary subsurface exploration and geotechnical laboratory testing and analysis by others. The materials encountered on the project site and utilized in our laboratory evaluation are believed representative of the total area; however, soil materials and conditions can vary in characteristics between excavations, both laterally and vertically.

The conclusions and opinions contained in this report are based on the results of the described geotechnical evaluations and represent our professional judgment. This report has been prepared consistent with that level of care being provided by other professionals providing similar services at the same locale and in the same time period. The contents of this report are professional opinions and as such, are not to be considered a guaranty or warranty. This report has not been prepared for use by parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes. In addition, this report should be reviewed and updated after a period of 1 year or if the site ownership or project concept changes from that described herein.

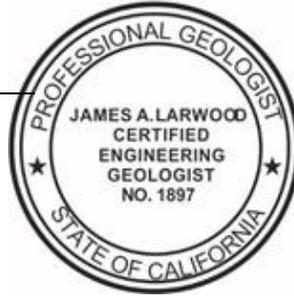
It has been a pleasure to be of service to you on this project. Should you have questions regarding the contents of this report or should you require additional information, please contact this office.

Respectfully submitted,

**PETRA GEOSCIENCES, INC.,**



Jim Larwood  
Principal Geologist  
CEG 1897



Siamak Jafroudi, PhD  
Senior Principal Engineer  
GE 2024



JL/SJ/lv

Attachments:   References  
                          Figure 1 – Site Location Map  
                          Appendix A – Previous Geotechnical Maps  
                          Appendix B – Previous Exploration Logs  
                          Appendix C – Standard Grading Specifications

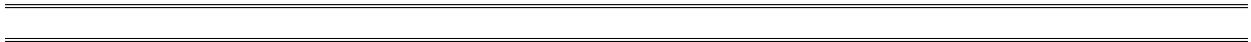
Distribution:   (1) Addressee  
                          (1) Mr. Keith Osborn, K&A Engineering

W:\2020-2025\2020\200\20-224 Richland Communities (Renaissance Ranch, Temescal Valley)\Reports\20-224 110 Geotechnical Update Report.docx

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- \_\_\_\_\_, 2004, Supplemental Geologic and Soils Engineering Evaluation, Proposed Riparian Mitigation Project, Lot "O" MSHCP Conservation Area, Tentative Tract Map 31210, Horsethief Canyon Area, Riverside County, California, dated September 15.
- \_\_\_\_\_, 2005, Supplemental Subsurface Investigation and Preliminary Trash/Debris Areal Limits, Tract 31485, Horsethief Canyon area, Riverside County, California, dated December 15.
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***FIGURE***





Reference: Bing Maps

<p><b>PETRA GEOSCIENCES, INC.</b>          40880 County Center Drive, Suite M          Temecula, California 92591          PHONE: (951) 600-9271          COSTA MESA TEMECULA VALENCIA PALM DESERT CORONA SAN DIEGO</p>		
<p><b>Site Location Map</b></p>		
<p>Renaissance Ranch Project          Horsethief Canyon Area of Riverside County, California</p>		
	<p>DATE: July 2020          J.N.: 20-224</p>	<p><b>Figure 1</b></p>

# *APPENDIX A*

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## *PREVIOUS GEOLOGIC MAPS*

HORSETHIEF CANYON DRIVE

RENAISSANCE RANCH ROAD

# TENTATIVE TRACT NO. 31210 IN THE COUNTY OF RIVERSIDE



100 0 100 200  
scale 1" = 100' feet

### LEGEND

- Afu** Artificial fill - undocumented
- Afe** Artificial fill - engineered
- Qal** Quaternary alluvium - younger
- Qf** Quaternary fan deposits (Pleistocene-age fans)
- TP-30** Approximate location of exploratory test pit
- B-3** Approximate location of exploratory boring
- Approximate location of geologic contact
- Approximate location of proposed subdrainage system
- Area under the purview of this report
- A-A'** Location of geologic cross-section

PREPARED FOR:

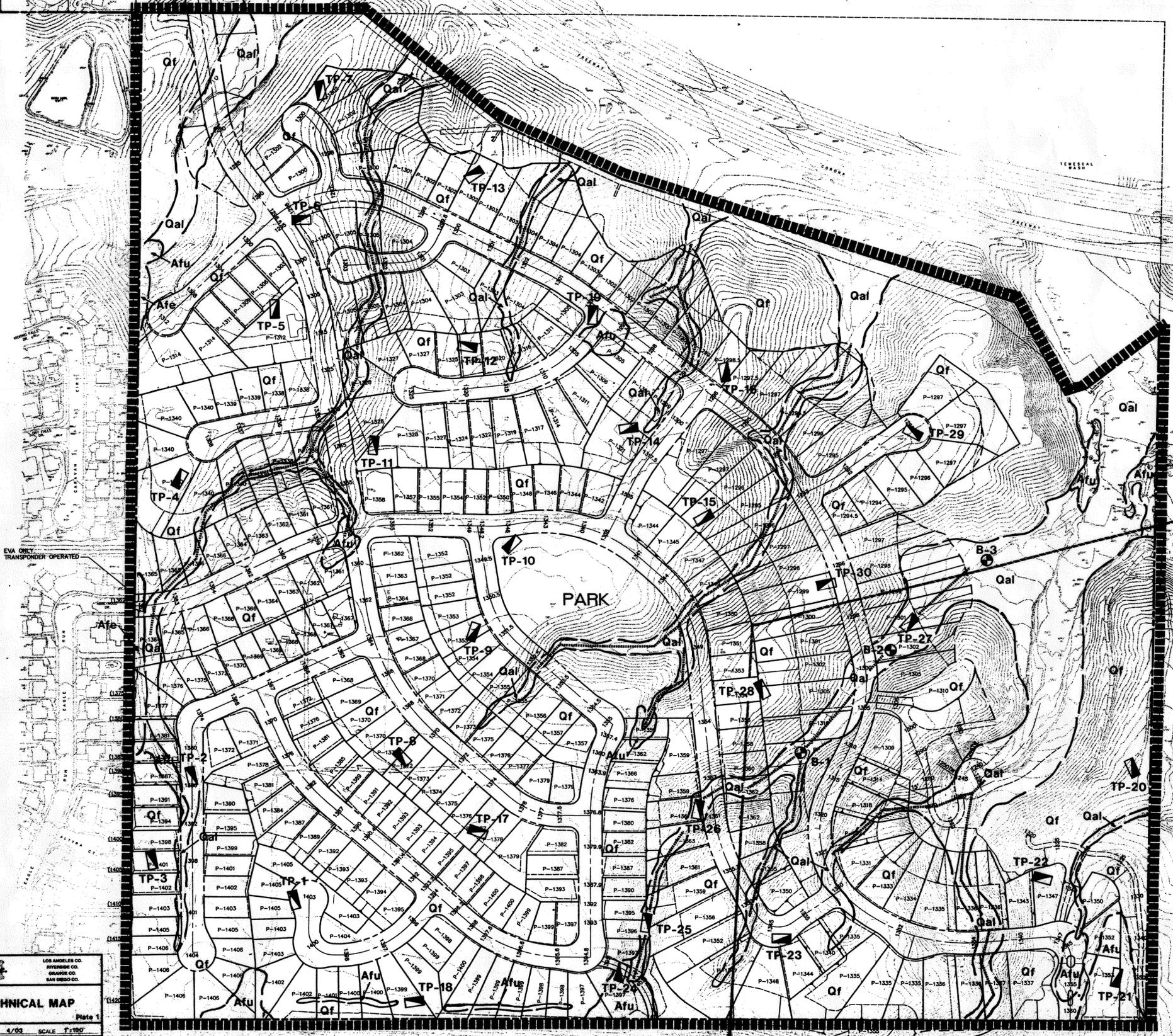
RENAISSANCE RANCH LLC

PREPARED BY:

**Hall & Foreman, Inc.**  
Civil Engineering • Planning • Surveying • Public Works  
420 Exchange, Suite 100 • Irvine, CA 92602-1301 • 714/665-4500

LOS ANGELES CO.  
RIVERSIDE CO.  
ORANGE CO.  
SAN DIEGO CO.

**GEOTECHNICAL MAP**  
Plate 1  
W.O. 3444-A-BC DATE 4/89 SCALE 1"=100'



# TENTATIVE TRACT NO. 31485

IN THE COUNTY OF RIVERSIDE

Geosols, Inc.

RIVERSIDE CO.  
ORANGE CO.  
SAN DIEGO CO.

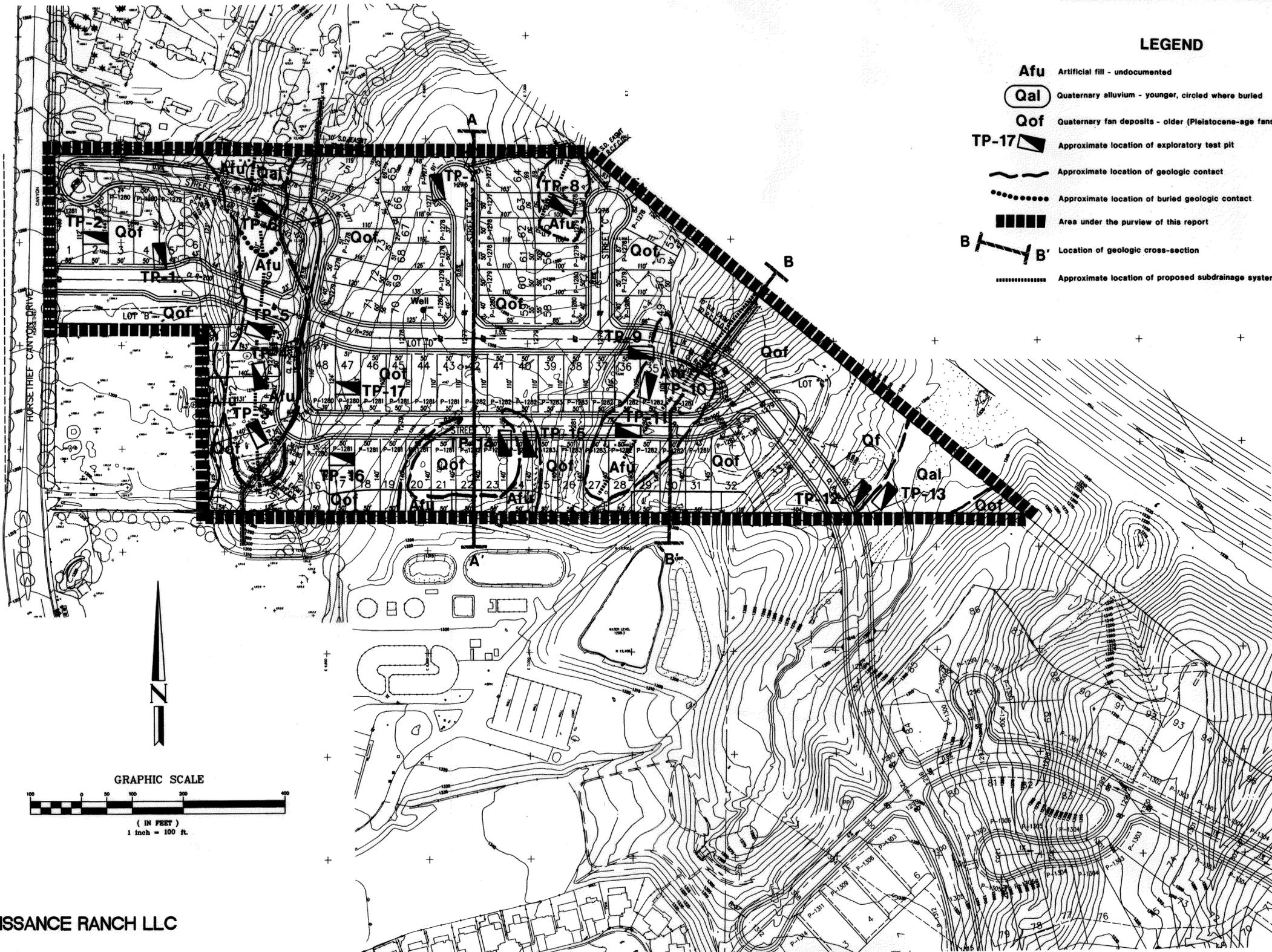
## GEOTECHNICAL MAP

Plate 1

W.O. 3532-A-SC DATE 6/03 SCALE 1"=100'

### LEGEND

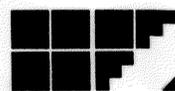
- Afu** Artificial fill - undocumented
- Qal** Quaternary alluvium - younger, circled where buried
- Qof** Quaternary fan deposits - older (Pleistocene-age fans)
- TP-17** Approximate location of exploratory test pit
- ~ Approximate location of geologic contact
- ..... Approximate location of buried geologic contact
- ▬▬▬▬ Area under the purview of this report
- B-B' Location of geologic cross-section
- ..... Approximate location of proposed subdrainage system



PREPARED FOR:

RENAISSANCE RANCH LLC

PREPARED BY:



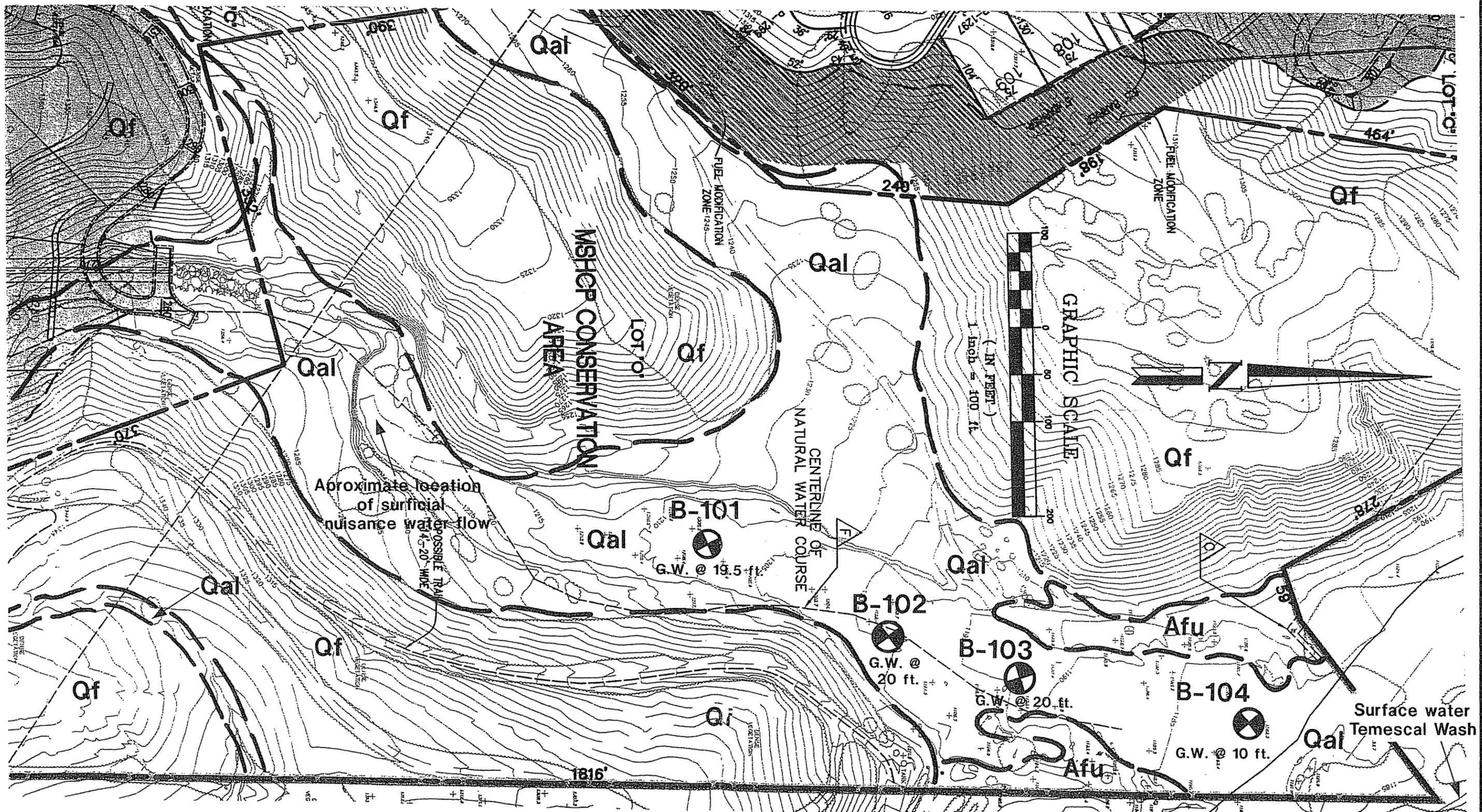
**Hall & Foreman, Inc.**

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GS1 2003

Drawing Name: H:\06-28-03\31485-490  
 Last Updated: May 28, 2003 - 1:56pm by Bill



- Afu Artificial fill -undocumented
- Qal Quaternary alluvium - younger
- Qf Quaternary fan deposits

**LEGEND**

-  Location of geologic contact
-  B-104  Approximate location of exploratory boring

**GeoSoils, Inc.**

RIVERSIDE CO.  
ORANGE CO.  
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---

**BORING LOCATION MAP**

Figure 1

---

W.O. 3441-A1-SC DATE 9/04 SCALE 1"=100'



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**PERMIT NOTE:** WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

The private engineer signing these plans is responsible for assuring the accuracy and acceptability of the design hereon. In the event of discrepancies arising after county approval or during construction, the private engineer shall be responsible for determining an acceptable solution and revising the plans for approval by the county.

DATE	BY	MAR:	ENGINEER	REVISIONS	APPR. DATE	COUNTY

SEAL-COUNTY

COUNTY OF RIVERSIDE  
BUILDING AND SAFETY DEPARTMENT  
APPROVED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

RECOMMENDED DATE: \_\_\_\_\_

BENCHMARK:  
STD. BRASS DISK IN CONC.  
STAMPED "G. HOST, R. P.I.  
R-100" \* PER CALTRANS  
MON. MAP 204-975  
ELEV.=1180.61'



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420 EXCHANGE, SUITE 100 • IRVINE, CA 92602 • 714-665-4500

P.E. R.C.E. DATE: \_\_\_\_\_

**TRACT 30297**  
**ROUGH GRADING PLAN**

CLIENT: RENAISSANCE RANCH, LLC

SHEET NO. **6**  
OF **8**

FILE NUMBER  
XXXXX

Drawing Name: S:\03009\31485\Eng\Final Plans\RO\_G6-RG-SHT.dwg  
 Last Opened: Jun 02, 2005 - 4:56pm by 3fritaw

SEE SHEET 7



**CONSTRUCTION NOTES:**

- 1 CONSTRUCT TOP OF SLOPE BERM PER DETAIL 'A' ON SHT. 2
- 2 CONSTRUCT 18" WIDE CONCRETE 'V' DRAIN PER DETAIL 'B' ON SHT. 2
- 3 CONSTRUCT 5' WIDE CONCRETE TERRACE DRAIN PER DETAIL 'K' ON SHT. 2
- 4 CONSTRUCT 18" x 18" GRATE INLET AT CONCRETE DITCH PER DETAIL 'L' ON SHT. 2
- 5 INSTALL 4" NDS PIPE SDR 35
- 6 INSTALL 6" NDS PIPE SDR 35

WATER LEVEL  
1298.3

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 The private engineer signing these plans is responsible for assuring the accuracy and acceptability of the design hereon. In the event of discrepancies arising after county approval or during construction, the private engineer shall be responsible for determining an acceptable solution and revising the plans for approval by the county.

DATE	BY	MARK	APPR.	DATE

SEAL-COUNTY  
 COUNTY OF RIVERSIDE  
 BUILDING AND SAFETY DEPARTMENT  
 APPROVED BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 RECOMMENDED DATE: \_\_\_\_\_

**BENCHMARK:**  
 STD. BRASS DISK IN CONC.  
 STAMPED "E" HOST. R. P.I.  
 R=100' \* PER CALTRANS  
 MON. MAP 204-975  
 ELEV.=1180.61'



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**TRACT 30297**  
**ROUGH GRADING PLAN**  
 CLIENT: RENAISSANCE RANCH, LLC

SHEET NO. **5** OF **8**  
 FILE NUMBER XXXXX

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SEE SHEET 6

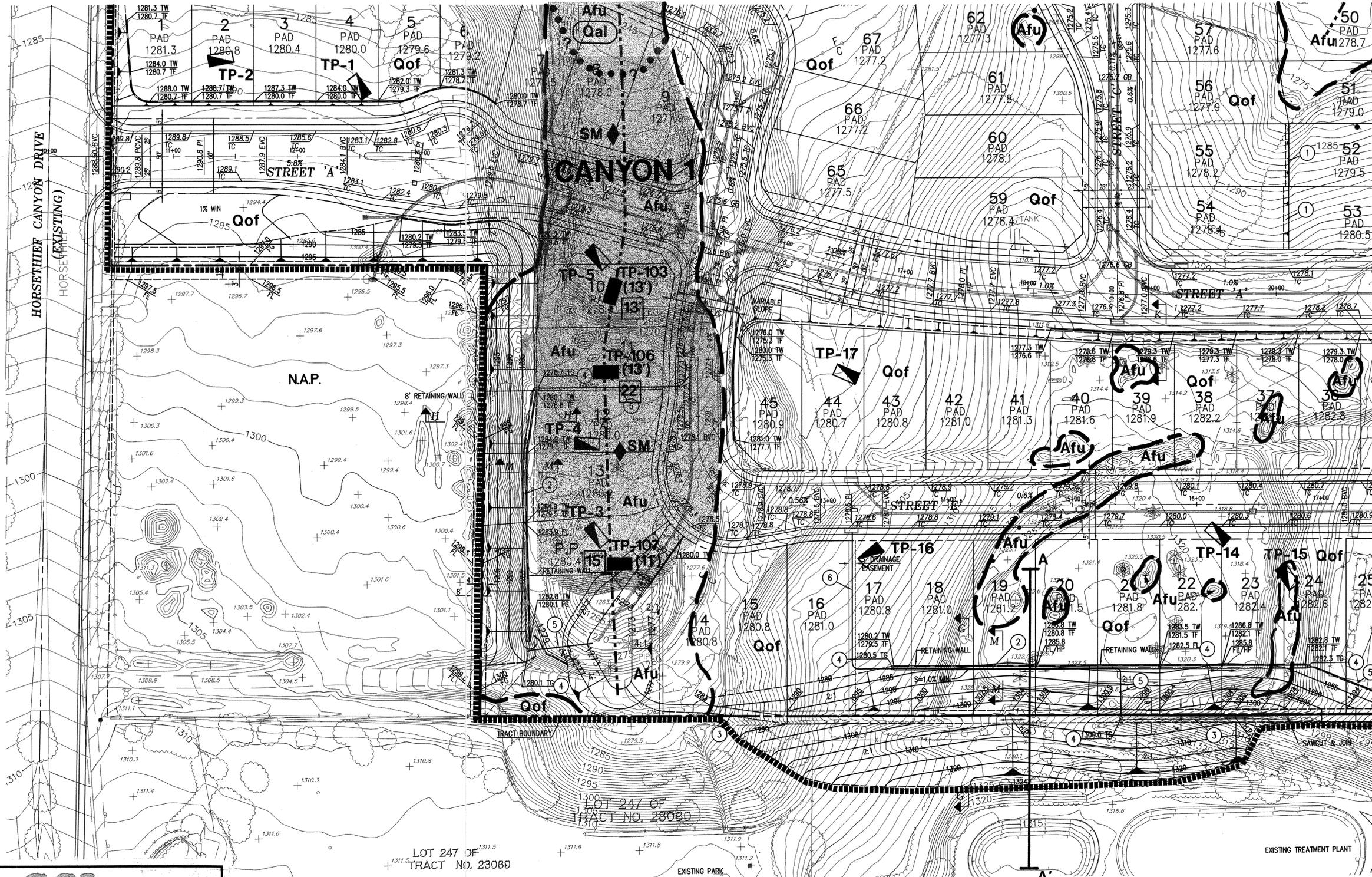
CONSTRUCTION NOTES:

- ② CONSTRUCT 18" WIDE CONCRETE "V" DRAIN PER DETAIL "B" ON SHT. 2
- ③ CONSTRUCT 5' WIDE CONCRETE TERRACE DRAIN PER DETAIL "K" ON SHT. 2
- ④ CONSTRUCT 18" x 18" GRATE INLET AT CONCRETE DITCH PER DETAIL "L" ON SHT. 2
- ⑤ INSTALL 4" NDS PIPE SDR 35
- ⑥ INSTALL 6" NDS PIPE SDR 35

LEGEND

- Afu** Artificial fill - undocumented
- Qal** Quaternary alluvium - younger, circled where buried
- Qof** Quaternary fan deposits - older (Pleistocene-age fans)
- TP-17** Approximate location of exploratory test pit (GSI, 2003)
- TP-111** Approximate location of exploratory test pit (this investigation)  
(Approximate depth of trash and deleterious debris)  
(Approximate total depth of remedial grading)
- Approximate Areal Limit of Trash and Debris
- Approximate location of geologic contact
- Approximate location of buried geologic contact, queried where uncertain
- Area under the purview of this report
- Location of geologic cross-section
- Approximate location of proposed subdrainage system
- SM** Tentative location of settlement monument, if necessary

All locations are approximate



**GeoSoils, Inc.**  
RIVERSIDE CO.  
ORANGE CO.  
SAN DIEGO CO.

**GEOTECHNICAL MAP**

Plate 1

W.O. 4800-A-SC DATE 12-14-05 SCALE 1"=40'

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DATE	BY	MAR:	ENGINEER	DESIGNED BY	DRAWN BY	CHECKED BY	APPR. DATE	COUNTY

SEAL-COUNTY

COUNTY OF RIVERSIDE  
BUILDING AND SAFETY DEPARTMENT  
APPROVED BY:

DATE

RECOMMENDED DATE

BENCHMARK:  
STD. BRASS DISK IN CONC.  
STAMPED "E" HOST, R. P.I.  
R-100' \* PER CALTRANS  
MON. MAP 204-975  
ELEV.=1180.61'

REGISTERED PROFESSIONAL ENGINEER  
RABBIT F. MANNING  
60421  
EXPIRES  
6/30/08  
CIVIL  
STATE OF CALIFORNIA

**Hall & Foreman, Inc.**  
Engineering-Surveying-Planning-Landscape Architecture  
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P.E. R.C.E. DATE:

TRACT 30297  
ROUGH GRADING PLAN

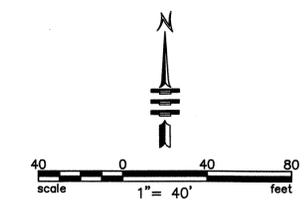
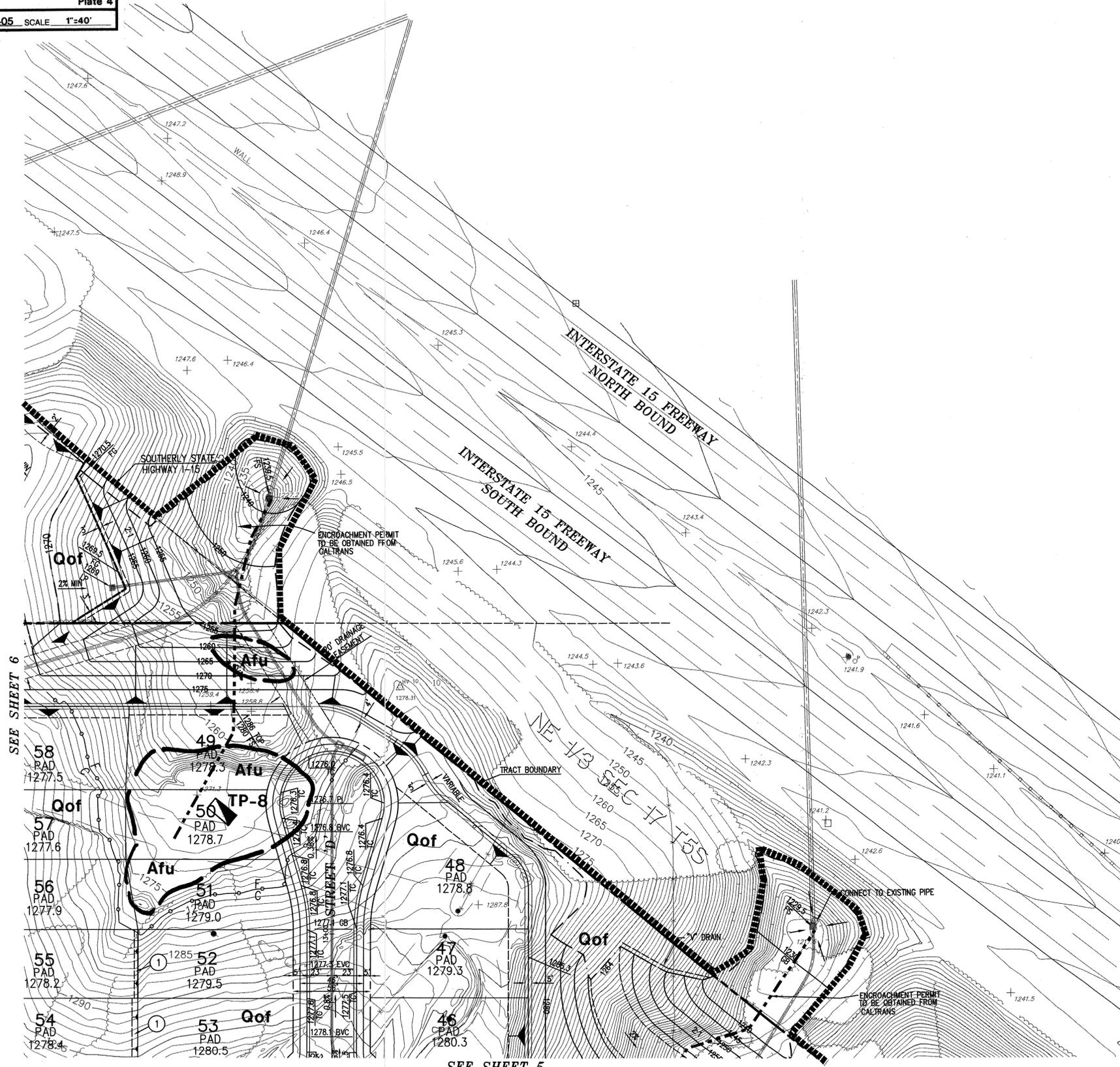
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OF 8  
FILE NUMBER XXXXX

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**CONSTRUCTION NOTES:**

- ① CONSTRUCT TOP OF SLOPE BERM PER DETAIL "A" ON SHT. 2



SEE SHEET 6

SEE SHEET 5

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 BEFORE YOU DIG

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DATE	BY	MARK	APPR.	DATE
	ENGINEER			COUNTY
DESIGNED BY	DRAWN BY		CHECKED BY	

SEAL-COUNTY

COUNTY OF RIVERSIDE  
 BUILDING AND SAFETY DEPARTMENT  
 APPROVED BY: \_\_\_\_\_

RECOMMENDED \_\_\_\_\_ DATE \_\_\_\_\_

**BENCHMARK:**  
 STD. BRASS DISK IN CONC.  
 STAMPED "G. HOST. R. P.I.  
 R=100' PER CALTRANS  
 MON. MAP 204-975  
 ELEV.=1180.61'



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\_\_\_\_\_, P.E. R.C.E. \_\_\_\_\_ DATE: \_\_\_\_\_

**TRACT 30297**  
**ROUGH GRADING PLAN**

CLIENT: RENAISSANCE RANCH, LLC

SHEET NO. **7**  
 OF **8**  
 FILE NUMBER  
 XXXXX

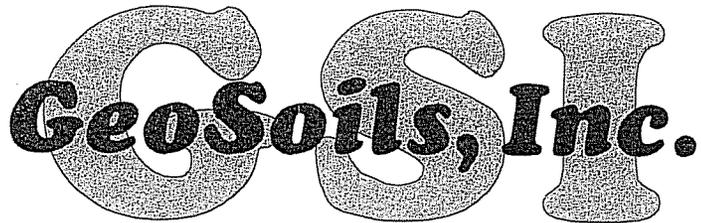
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# ***APPENDIX B***

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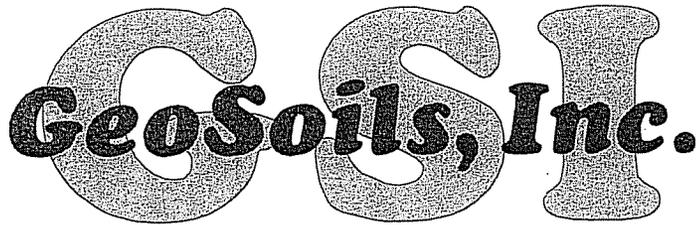
## ***PREVIOUS FIELD EXPLORATION LOGS (BORINGS AND TRENCHES)***



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

LOG OF EXPLORATORY TEST PITS

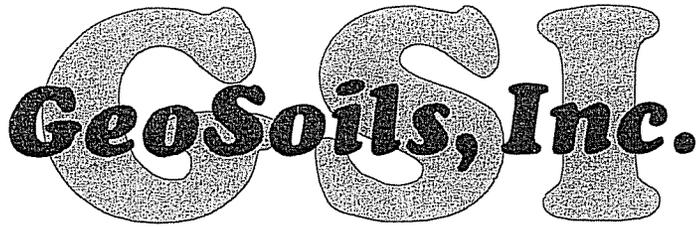
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-1	0 - 2'	SM	Nuke - 1'	6.52	98.6	<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, medium to reddish brown, dry, loose; minor to locally abundant gravel and cobble sized clasts.
	2' - 5'	SM	Ring - 1½'	11.7	110.1	<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, reddish brown, dry, dense to very dense; locally abundant gravel to boulder sized clasts.
						Total Depth = 5' No Groundwater Encountered Backfilled 1/23/03
TP-2	0 - 4'	GM				<b>QUATERNARY ALLUVIUM:</b> Silty SAND w/cobbles and boulders, dark brown, moist, loose.
	4' - 6'	SM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, yellowish brown, dry, dense; coarse grained.
						Total Depth = 6' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

LOG OF EXPLORATORY TEST PITS

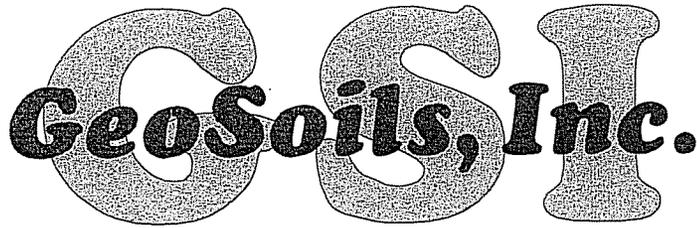
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-3	0 - 2½'	SM				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, medium to reddish brown, damp, loose.
	2½' - 4'	SM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, reddish brown, dry, dense to very dense; locally abundant cobbles.
						Total Depth = 4' No Groundwater Encountered Backfilled 1/23/03
TP-4	0 - 1'	SM	Nuke - 1'	9.4	101.6	<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, reddish brown, dry to damp, medium dense; abundant clay film on ped faces.
	1' - 5'	SM	Nuke - 3'	10.6	115.4	<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, reddish brown, dry to moist, dense to very dense; granitic clasts are extremely weathered.
						Total Depth = 5' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

LOG OF EXPLORATORY TEST PITS

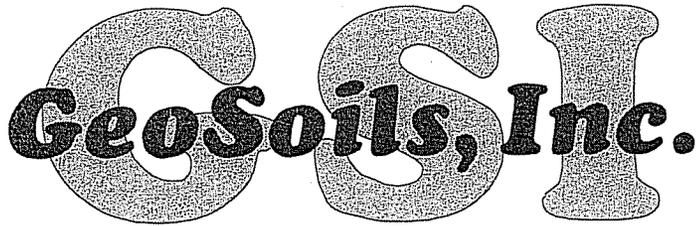
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-5	0 - 2½'	SM				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, medium brown, moist, loose; abundant roots and rootlets (old grove area).
	2½' - 4'	SM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND w/cobbles, reddish brown, dry, dense to very dense; clasts are extremely weathered.
						Total Depth = 4' No Groundwater Encountered Backfilled 1/23/03
TP-6	0 - 2½'	SM				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, reddish brown, moist, loose; porous.
	2½' - 5'	SM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, orange brown, damp, dense to very dense with depth.
						Total Depth = 5' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

LOG OF EXPLORATORY TEST PITS

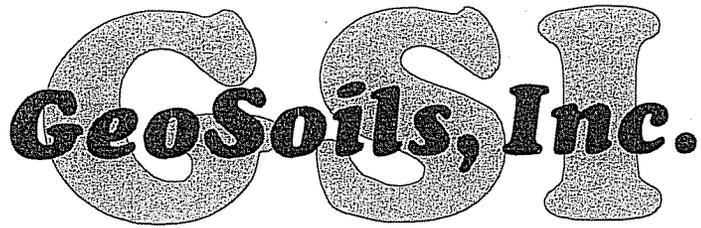
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-7	0 - 2½'	SM/SC	Nuke - 2'	10.6	108.4	<b>COLLUVIUM/TOPSOIL:</b> Silty SAND and CLAYEY SAND, medium to dark reddish brown, dry, loose; abundant rootlets.
	2½' - 7'	SM	Nuke - 4'	4.2	118.1	<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, reddish brown, dry, dense to very dense.
						Total Depth = 7' No Groundwater Encountered Backfilled 1/23/03
TP-8	0 - 3'	SM/ML	Nuke - 2' Bulk - 1' - 2'	6.8	108.5	<b>COLLUVIUM/TOPSOIL:</b> Silty SAND and SILT, medium brown, dry, loose to soft; porous.
	3' - 5'	SM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, reddish brown, dry, very dense. At 4' - 5', difficult excavation.
						Total Depth = 5' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

LOG OF EXPLORATORY TEST PITS

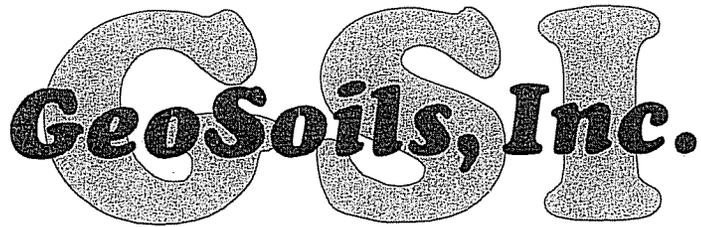
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-9	0 - 3'	SM				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, dark brown, dry, loose.
	3' - 8'	SM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, yellowish brown, dense; weathered near surface.
						Total Depth = 8' No Groundwater Encountered Backfilled 1/23/03
TP-10	0 - 4'	SM				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND and Sandy GRAVEL, medium to dark brown, dry, loose; porous, abundant rootlets, locally abundant cobbles and boulders.
	4' - 10'	SM/GM	Nuke - 4'	8.67	106.7	<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, reddish to yellowish brown, dry, dense.
						Total Depth = 10' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

LOG OF EXPLORATORY TEST PITS

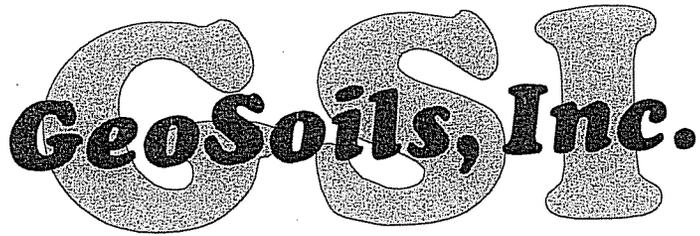
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-11	0 - 2½'	SC				<b>COLLUVIUM/TOPSOIL:</b> Clayey SAND, reddish brown, damp, loose; porous.
	2½' - 4'	SM	Nuke - 3'	9.2	111.2	<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, reddish brown, dry dense to very dense; minor cementation.
						Total Depth = 4' No Groundwater Encountered Backfilled 1/23/03
TP-12	0 - 3'	SM				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, medium brown, dry, loose; locally abundant cobbles and boulders.
	3' - 6'	SM/GM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND/Sandy GRAVEL, light yellowish brown, dry, dense; coarse grained, abundant extremely weathered granitic cobbles and boulders.
						Total Depth = 6' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

LOG OF EXPLORATORY TEST PITS

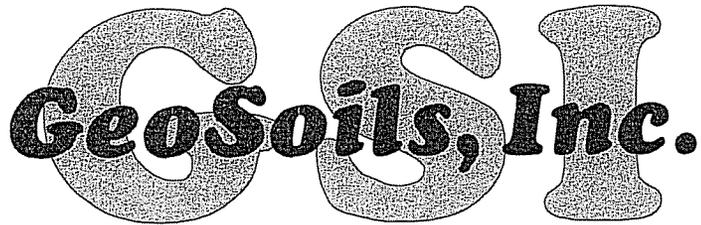
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-13	0 - 2½'	SM	Nuke - 2'	10.6	98.2	<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, medium brown, dry, loose.
	2½' - 6'	SM	Nuke - 4'	6.2	109.7	<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, light yellowish brown, dry, dense; coarse grained, locally abundant cobbles.
						Total Depth = 6' No Groundwater Encountered Backfilled 1/23/03
TP-14	0 - 3'	SM				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, reddish brown, dry, loose.
	3' - 8'	SM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, light reddish brown, dry, dense; abundant weathered granitic cobbles and boulders.
						Total Depth = 8' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

LOG OF EXPLORATORY TEST PITS

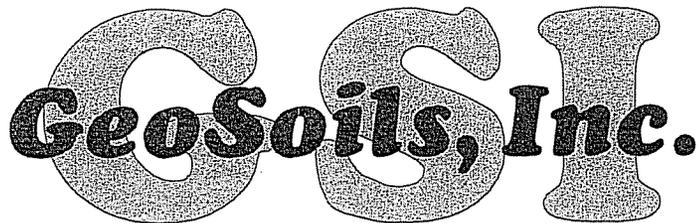
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-15	0 - 2'	SM/ML	Bulk - 0 - 1'			<b>COLLUVIUM/TOPSOIL:</b> Silty SAND and SILT, medium to grayish brown, dry, loose to soft; porous.
	2' - 4'	SM	Nuke - 3'	10.1	113.4	<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, reddish brown, dry dense; coarse grained, minor cementation.
						Total Depth = 4' No Groundwater Encountered Backfilled 1/23/03
TP-16	0 - 2'	SM	Nuke - 1'	6.7	105.4	<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, reddish brown, dry, medium dense; abundant rootlets, porous.
	2' - 6'	SM	Nuke - 3'	13.4	114.6	<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, reddish brown, dry, dense to very dense.
						Total Depth = 6' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

LOG OF EXPLORATORY TEST PITS

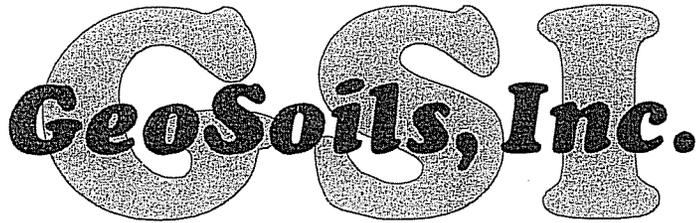
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-17	0 - 2'	SM				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, reddish brown, dry, loose; porous.
	2' - 5'	SM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, reddish brown, dry, dense to very dense.
						Total Depth = 5' No Groundwater Encountered Backfilled 1/23/03
TP-18	0 - 2½'	SM/ML				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND and SILT, medium to reddish brown, dry, loose to soft; abundant cobble and boulder sized clasts.
	2½' - 6'	SM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, reddish brown, dry, very dense; abundant weathered cobbles and boulders.
						Total Depth = 6' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

LOG OF EXPLORATORY TEST PITS

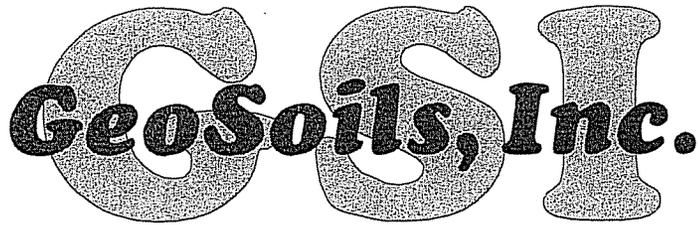
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-19	0 - 3'	SM/ML				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND and SILT, medium brown, dry, loose; abundant rootlets.
	3' - 8'	GM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND w/gravel and cobbles, light brown, dry, dense; clasts are grussified and weathered.
						Total Depth = 8' No Groundwater Encountered Backfilled 1/23/03
TP-20	0 - 1'	SM				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, reddish brown, dry, loose; porous, abundant rootlets.
	1' - 4'	SM/GM	Nuke - 2'	6.4	110.7	<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND and Sandy GRAVEL w/cobbles and boulders, reddish brown, dry, dense to very dense; very difficult excavation at 4'.
						Total Depth = 4' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

**LOG OF EXPLORATORY TEST PITS**

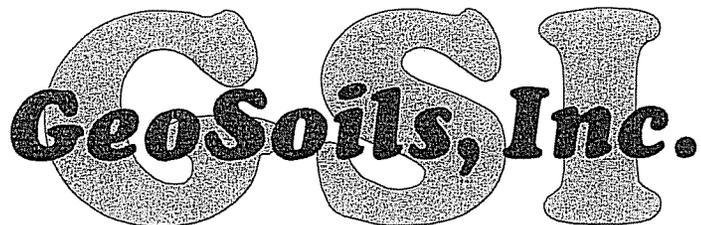
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-21	0 - 2'	SM				<b>ARTIFICIAL FILL UNDOCUMENTED:</b> Silty SAND, very dark brown, damp, loose; abundant rootlets.
	2' - 4'	SC				<b>COLLUVIUM/TOPSOIL:</b> Clayey SAND, dark brown, dry, loose; porous.
	4' - 6'	SM/GM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND and Sandy GRAVEL w/cobbles and boulders, reddish brown, dry, dense.
						Total Depth = 6' No Groundwater Encountered Backfilled 1/23/03
TP-22	0 - 5'	SM	Nuke - 3'	6.4	112.6	<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, yellowish brown, dry, dense; colluvium stripped by grading activity along roadway, material is well cemented.
						Total Depth = 5' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

**LOG OF EXPLORATORY TEST PITS**

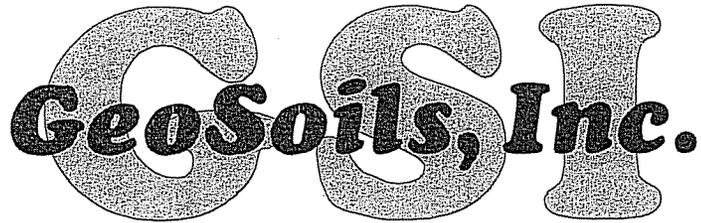
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-23	0 - 2½'	GM	Nuke - 1½'	9.6	94.2	<b><u>COLLUVIUM/TOPSOIL:</u></b> Sandy GRAVEL w/cobbles and boulders, reddish brown, dry, loose to medium dense.
	2½'	SM/GM				<b><u>QUATERNARY FAN DEPOSITS:</u></b> Silty SAND w/cobbles and boulders, reddish to light yellowish brown, dry, dense.
						Total Depth = 2½' No Groundwater Encountered Backfilled 1/23/03
TP-24	0 - 3'					<b><u>ARTIFICIAL FILL/TRASH/DEBRIS:</u></b> Old dumpsite.
	3' - 5'	SP				<b><u>QUATERNARY ALLUVIUM:</u></b> SAND, grayish brown, dry, loose.
						Total Depth = 5' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

**LOG OF EXPLORATORY TEST PITS**

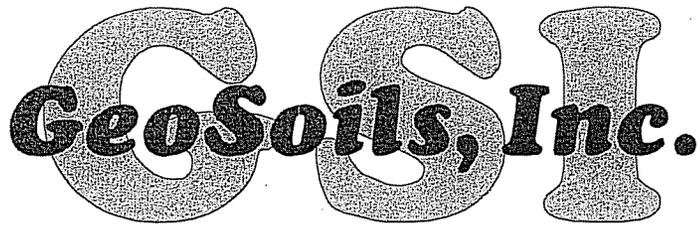
TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-25	0 - 6'	SP/SM	Nuke - 2' Nuke - 4'	10.2 14.6	84.2 91.0	<b>QUATERNARY ALLUVIUM:</b> SAND and Silty SAND, light grayish brown, dry, loose; poorly sorted.
	6' - 10'	SM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, medium brown, damp, medium dense to dense; abundant cobbles and boulders.
						Total Depth = 10' No Groundwater Encountered Backfilled 1/23/03
TP-26	0 - 7'	SP/SM				<b>QUATERNARY ALLUVIUM:</b> SAND and Silty SAND, medium brown to light greyish brown, dry, very loose; abundant cross-beds noted.
	7' - 10'	GM				<b>QUATERNARY FAN DEPOSITS:</b> SANDY GRAVEL w/cobbles and boulders, grayish brown, damp, dense w/depth.
						Total Depth = 10' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

**LOG OF EXPLORATORY TEST PITS**

TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-27	0 - 10'	SP/SM				<b>QUATERNARY ALLUVIUM:</b> SAND and Silty SAND, medium to light brown, dry, loose to medium dense.
	10' - 14'	SM				<b>QUATERNARY FAN DEPOSITS:</b> Silty SAND, medium to reddish brown, damp to moist, medium dense to dense.
						Total Depth = 14' No Groundwater Encountered Backfilled 1/23/03
TP-28	0 - 2'	SM				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, medium to reddish brown, dry, loose to medium dense with depth.
	2' - 4'	GC	Bulk - 3' - 4' Nuke - 3'	6.6	110.5	<b>QUATERNARY FAN DEPOSITS:</b> Clayey SAND w/gravel and cobbles, reddish brown, dry, dense to very dense; some cobbles and boulders are extremely weathered.
						Total Depth = 4' No Groundwater Encountered Backfilled 1/23/03



W.O. 3441-A-SC  
 Renaissance Ranch, LLC  
 January 23, 2003

**LOG OF EXPLORATORY TEST PITS**

TEST PIT NO.	DEPTH (ft.)	GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	FIELD DRY DENSITY (pcf)	DESCRIPTION
TP-29	0 - 1'	SM				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND, reddish brown, dry, medium dense; porous.
	1' - 4'	SC	Nuke - 3'	26.1	105.6	<b>QUATERNARY FAN DEPOSITS:</b> Clayey SAND, red, damp, dense to very dense w/depth.
						Total Depth = 4' No Groundwater Encountered Backfilled 1/23/03
TP-30	0 - 1½'	SM/SC				<b>COLLUVIUM/TOPSOIL:</b> Silty SAND and Clayey SAND, reddish brown, dry, medium dense.
	1½' - 5'	SC	Nuke - 2'	14.2	110.8	<b>QUATERNARY FAN DEPOSITS:</b> Clayey SAND, red, dry, dense to very dense w/depth.
						Total Depth = 5' No Groundwater Encountered Backfilled 1/23/03

GeoSoils, Inc.

BORING LOG

W.O. 3441-A-SC

PROJECT: RENNAISSANCE COMMUNITIES, LLC  
Horsethief Canyon

BORING B-1 SHEET 1 OF 1

DATE EXCAVATED 2-4-03

Depth (ft.)	Sample			USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	Description of Material
	Bulk	Undis-turbed	Blows/ft.					
0-5			14	SP	108.4	4.7	23.8	<p><b>QUATERNARY ALLUVIUM YOUNGER:</b> @ 0' SAND, grayish brown, dry, loose.</p> <p>@ 5' SAND, medium to reddish brown, dry, medium dense; fine to coarse grained, porous.</p>
5-10			102	SM	115.5	3.5	21.5	<p><b>QUATERNARY FAN DEPOSITS:</b> @ 10' SILTY SAND, light reddish brown, dry, very dense; minor gravel encountered, minor cementation.</p>
10-15			31	SMML		13.6		<p>@ 15' SILTY SAND and SILT, yellowish to reddish brown, damp, dense to very stiff.</p>
15-20			40+ 50-5"	SM	119.9	9.1	63.7	<p>@ 20' SILTY SAND, medium brown, moist, very dense; well cemented.</p>
20-21	<p>Total Depth = 21' No Groundwater Encountered No Caving Encountered Backfilled 2-4-03</p>							

SAMPLE METHOD: 8" HOLLOWSTEM AUGER

 Standard Penetration Test

 Undisturbed, Ring Sample

 Groundwater

GeoSoils, Inc.

BORING LOG

W.O. 3441-A-SC

PROJECT: RENNAISSANCE COMMUNITIES, LLC  
Horsethief Canyon

BORING B-2 SHEET 1 OF 1

DATE EXCAVATED 2-4-03

Depth (ft.)	Sample			USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	SAMPLE METHOD: 8" HOLLOWSTEM AUGER	 Standard Penetration Test  Undisturbed, Ring Sample  Groundwater	Description of Material
	Bulk	Undis- turbed	Blows/ft.							
0				SM					<b>QUATERNARY ALLUVIUM YOUNGER:</b> @ 0' SILTY SAND, light gray, loose.	
5			31		109.9	2.5	13.0		@ 5' SILTY SAND, medium brown, dry, medium dense, porous.	
10			15	SM/SP		3.5			@ 10' SILTY SAND and SAND, medium to reddish brown, dry, medium dense.	
15			29	SM	110.3	4.4	23.5		@ 15' SILTY SAND, reddish brown, dry, medium dense; fine to course grained.  @ 17½' Minor Gravel.	
20			22			9.1			@ 20' SILTY SAND, medium to reddish brown, dry, medium dense.	
25			36+ 50-5"	SM	112.7	6.6	37.3		<b>QUATERNARY FAN DEPOSITS:</b> @ 25' SILTY SAND, reddish to yellowish brown, damp, very dense.  Total Depth = 25' No Groundwater Encountered No Caving Encountered Backfilled 2-4-03	

GeoSoils, Inc.

BORING LOG

W.O. 3441-A-SC

PROJECT: RENNAISSANCE COMMUNITIES, LLC  
Horsethief Canyon

BORING B-3 SHEET 1 OF 2

DATE EXCAVATED 2-4-03

Depth (ft.)	Sample			USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	Description of Material
	Bulk	Undisturbed	Blows/ft.					
				SM				<p><b>QUATERNARY ALLUVIUM (YOUNGER):</b> SILTY SAND, light gray, dry, very loose.</p>
5			33		111.0	2.1	11.2	@ 5' SILTY SAND, light reddish brown, dry, medium dense; minor gravel.
10			30		110.0	2.2	11.8	@ 10' As per 5'.
15			18			2.3		@ 15' SILTY SAND, light yellowish brown, dry, medium dense; fine to coarse grained.
20			27		106.1	3.3	15.8	@ 20' SILTY SAND, light reddish brown, dry, medium dense.
25			30			4.2		@ 25' As per 20', medium brown.
								@ 27' Minor gravel and cobbles encountered.

SAMPLE METHOD: 8" HOLLOWSTEM AUGER

 Standard Penetration Test

 Undisturbed, Ring Sample

 Groundwater

Depth (ft.)	Sample			USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	SAMPLE METHOD: 8" HOLLOWSTEM AUGER  Standard Penetration Test  Undisturbed, Ring Sample  Groundwater	Description of Material
	Bulk	Undis-turbed	Blows/ft.						
			50-6"	SM	118.9	3.9	26.5		@ 30' SILTY SAND, medium brown, damp, dense; abundant coarse grained sands.
35			27+ 50-2"	GM		5.7			<b>QUATERNARY FAN DEPOSITS:</b> @ 35' SILTY SAND w/GRAVEL, medium to light reddish brown, dry, very dense.
40			50-3 1/2"	SM	115.5	5.7	35.1		@ 40' SILTY SAND, yellowish brown, damp, very dense; abundant coarse grained sands. Total Depth = 41' No Groundwater Encountered No Caving Encountered Backfilled 2-4-03
45									
50									
55									

GeoSoils, Inc.

BORING LOG

W.O. 3441-A1-SC

PROJECT: RENAISSANCE RANCH, LLC  
Tract 31210, Lot O, Horsetheif Canyon

BORING B-101 SHEET 1 OF 1

DATE EXCAVATED 8-31-04

SAMPLE METHOD: 8" HOLLOW STEM AUGER, 140 LB @ 30" DROP

Depth (ft.)	Sample			USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	Description of Material
	Bulk	Undis-turbed	Blows/ft.					
0				SP				<b>QUATERNARY ALLUVIUM - YOUNGER:</b> @ 0' SAND, light brown, dry, very loose.
10			44	SP/SM	117.2	2.9	18.6	@ 10' SAND and SILTY SAND, medium brown, dry, dense; minor gravel.
20			65	SM/SP	123.0	10.4	80.2	@ 19½' Groundwater encountered. @ 20' SILTY SAND and SAND w/GRAVEL, medium brown, wet, dense.
30			26/ 50-4"	SM	120.1	14.2	99.7	<b>ALLUVIUM - OLDER:</b> @ 30' SILTY SAND, medium to yellowish brown, saturated, dense. Total Depth = 31' Groundwater Encountered @ 19½' Backfilled 8-31-2004

 Standard Penetration Test

 Undisturbed, Ring Sample

 Groundwater

GeoSoils, Inc.

BORING LOG

W.O. 3441-A1-SC

PROJECT: RENAISSANCE RANCH, LLC  
Tract 31210, Lot O, Horsetheif Canyon

BORING B-102 SHEET 1 OF 1

DATE EXCAVATED 8-31-04

Depth (ft.)	Sample			USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	Description of Material
	Bulk	Undis-turbed	Blows/ft.					
0				SP				<u>QUATERNARY ALLUVIUM - YOUNGER:</u> @ 0' SAND, light brown, dry, very loose.
10			29	SM	115.6	9.3	57.2	@ 10' SILTY SAND, medium to yellowish brown, moist, medium dense.
20			55	SP	123.9	12.1	95.6	@ 20' SAND, medium brown, wet, dense. @ 20' Groundwater encountered.
30			67		124.8	11.4	93.1	@ 30' SAND, medium brown, wet, dense.
								Total Depth = 31' Groundwater Encountered @ 20' Backfilled 8-31-2004

SAMPLE METHOD: 8" HOLLOW STEM AUGER, 140 LB @ 30" DROP

-  Standard Penetration Test
-  Undisturbed, Ring Sample
-  Groundwater

GeoSoils, Inc.

BORING LOG

W.O. 3441-A1-SC

PROJECT: RENAISSANCE RANCH, LLC  
 Tract 31210, Lot O, Horsetheif Canyon

BORING B-103 SHEET 1 OF 1

DATE EXCAVATED 8-31-04

Depth (ft.)	Sample			USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	Description of Material
	Bulk	Undis- turbed	Blows/ft.					
0 - 10			20	SP	95.0	8.6	30.8	QUATERNARY ALLUVIUM - YOUNGER: @ 0' SAND, light brown, dry, very loose.  @ 10' SAND, medium brown, damp, medium dense.
10 - 20			32		118.8	13.4	90.6	@ 20' SAND, medium brown, wet, medium dense. @ 20' Groundwater encountered.
20 - 30			48	SM/SP		13.3		@ 30' SILTY SAND and SAND, medium brown, wet, dense; disturbed sample. Total Depth = 31' Groundwater Encountered @ 20' Backfilled 8-31-2004

SAMPLE METHOD: 8" HOLLOW STEM AUGER, 140 LB @ 30" DROP

 Standard Penetration Test

 Undisturbed, Ring Sample

 Groundwater

GeoSoils, Inc.

BORING LOG

W.O. 3441-A1-SC

PROJECT: RENAISSANCE RANCH, LLC  
Tract 31210, Lot O, Horsetheif Canyon

BORING B-104 SHEET 1 OF 1

DATE EXCAVATED 8-31-04

Depth (ft.)	Sample			USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	Description of Material
	Bulk	Undis-turbed	Blows/ft.					
0 - 10			8	SP	111.4	17.3	94.5	<p><b>QUATERNARY ALLUVIUM - YOUNGER:</b> @ 0' SAND, light brown, dry, very loose.</p> <p>@ 10' SAND, medium brown, wet, loose. @ 10' Groundwater encountered.</p>
10 - 20			17					@ 20' No recovery, heaving SANDS.
20 - 21								Total Depth = 21' Groundwater Encountered @ 10' Backfilled 8-31-2004

SAMPLE METHOD: 8" HOLLOW STEM AUGER, 140 LB @ 30" DROP

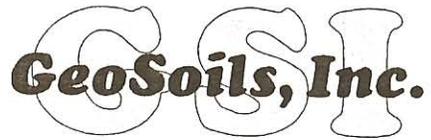
-  Standard Penetration Test
-  Undisturbed Ring Sample
-  Groundwater



W.O. 4800-A2-SC  
 KB Home Coastal, Inc.  
 Tract 31485, Horsethief Canyon Area  
 November 11, 2005

LOG OF EXPLORATORY TEST PITS

TEST PIT NO.	TEST PIT ELEV.	DEPTH (ft.)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	DRY DENSITY (pcf)	DESCRIPTION
TP-101	1228.5	0-5	SM				<b>ARTIFICIAL FILL - UNDOCUMENTED:</b> SILTY SAND, light to dark brown, dry to damp, loose; fine, rootlets.
		5-18	SM				<b>QUATERNARY ALLUVIUM:</b> SILTY SAND, dark brown to black, moist to saturated, loose.
		18	CL/SC				<b>OLDER FAN DEPOSITS:</b> SILTY CLAY/CLAYEY SAND, light brown, saturated, medium dense to dense.
							Total Depth = 18' Groundwater Encountered @ 12' Caving Encountered to 18' Backfilled 11-11-2005
TP-102	1233.0	0-2	SM				<b>ARTIFICIAL FILL - UNDOCUMENTED:</b> SILTY SAND, dark brown, damp to moist, loose, fine to coarse, rootlets.
		2-13	SM				<b>QUATERNARY ALLUVIUM:</b> SILTY SAND, dark brown, moist to saturated, loose; fine to coarse.
		13-14	CL/SC				<b>OLDER FAN DEPOSITS:</b> SILTY CLAY/CLAYEY SAND, light brown, saturated, medium dense to dense.
							Total Depth = 14' Groundwater Encountered @ 6' Caving Encountered to 14' Backfilled 11-11-2005



W.O. 4800-A2-SC  
 KB Home Coastal, Inc.  
 Tract 31485, Horsethief Canyon Area  
 November 11, 2005

LOG OF EXPLORATORY TEST PITS

TEST PIT NO.	TEST PIT ELEV.	DEPTH (ft.)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	DRY DENSITY (pcf)	DESCRIPTION
TP-103	1257.0	0-13	SM				<b>ARTIFICIAL FILL - UNDOCUMENTED:</b> SILTY SAND, dark brown to black, moist to saturated, loose; fine to coarse, abundant debris.
		13-15	SM				<b>OLDER FAN DEPOSITS:</b> SILTY SAND, light brown to reddish brown, moist, medium dense to dense; fine.
							Total Depth = 15' Groundwater Encountered @ 2' Caving Encountered to 15' Backfilled 11-11-2005
TP-104	1245.0	0-3	SM				<b>ARTIFICIAL FILL - UNDOCUMENTED:</b> SILTY SAND, light brown, damp, loose; fine to coarse, debris.
		3-13	SM				<b>QUATERNARY ALLUVIUM:</b> SILTY SAND, dark brown to black, moist to saturated, loose; fine to coarse, roots.
		13-15	SM				<b>OLDER FAN DEPOSITS:</b> SILTY SAND, light brown, moist to wet, medium dense to dense; fine, trace clay.
							Total Depth = 15' Groundwater Encountered @ 8' Caving Encountered to 15' Backfilled 11-11-2005



W.O. 4800-A2-SC  
 KB Home Coastal, Inc.  
 Tract 31485, Horsethief Canyon Area  
 November 11, 2005

LOG OF EXPLORATORY TEST PITS

TEST PIT NO.	TEST PIT ELEV.	DEPTH (ft.)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	DRY DENSITY (pcf)	DESCRIPTION
TP-105	1233.0	0-12	SM				<b>ARTIFICIAL FILL - UNDOCUMENTED:</b> SILTY SAND, dark brown, damp, loose; fine to coarse, rootlets.
		12-15	CL/SC				<b>OLDER FAN DEPOSITS:</b> SANDY CLAY to CLAYEY SAND, light brown, saturated, medium dense to dense.
							Total Depth = 15' Groundwater Encountered @ 8' No Caving Encountered Backfilled 11-11-2005
TP-106	1273.0	0-13	SM				<b>ARTIFICIAL FILL - UNDOCUMENTED:</b> SILTY SAND, dark brown, dry to 6' damp to 10' moist to 13', loose; fine to coarse, abundant debris.
		13-22	SM				<b>QUATERNARY ALLUVIUM:</b> SILTY SAND, dark gray, moist to saturated, loose; prone to caving, fine to coarse, organic odor.
		22-23	SM				<b>OLDER FAN DEPOSITS:</b> SILTY SAND, light brown to reddish brown, wet, medium dense to dense; fine to coarse.
						Total Depth = 23' Groundwater Encountered @ 15' Caving Encountered to 22' Backfilled 11-11-2005	



W.O. 4800-A2-SC  
 KB Home Coastal, Inc.  
 Tract 31485, Horsethief Canyon Area  
 November 11, 2005

LOG OF EXPLORATORY TEST PITS

TEST PIT NO.	TEST PIT ELEV.	DEPTH (ft.)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	DRY DENSITY (pcf)	DESCRIPTION
TP-107	1278.0	0-11	SM				<b>ARTIFICIAL FILL - UNDOCUMENTED:</b> SILTY SAND, brown to black, dry to 6' damp to 10' moist to 11, loose; fine to coarse, abundant debris @ 11' at bottom of pond (concrete).
		11-15	SM				<b>QUATERNARY ALLUVIUM:</b> SILTY SAND, dark gray, moist to 15' saturated @ 15'+.
		15-19	SM				<b>OLDER FAN DEPOSITS:</b> SILTY SAND, yellowish brown, moist, medium dense to dense; fine to coarse.
							Total Depth = 19' Groundwater Encountered @ 6' Caving Encountered to 19' Backfilled 11-11-2005
TP-108	1281.5	0-12	SM				<b>ARTIFICIAL FILL - UNDOCUMENTED:</b> SILTY SAND, yellowish brown, damp, loose; abundant pavers and other debris.
		12-16	SM				<b>QUATERNARY ALLUVIUM:</b> SILTY SAND, reddish brown to dark gray, moist, loose; fine to coarse.
		16-20	SM				<b>OLDER FAN DEPOSITS:</b> SILTY SAND, yellowish brown, moist, medium dense to dense; fine to coarse.
							Total Depth = 20' No Groundwater/Caving Encountered Backfilled 11-11-2005



W.O. 4800-A2-SC  
 KB Home Coastal, Inc.  
 Tract 31485, Horsethief Canyon Area  
 November 11, 2005

LOG OF EXPLORATORY TEST PITS

TEST PIT NO.	TEST PIT ELEV.	DEPTH (ft.)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	DRY DENSITY (pcf)	DESCRIPTION
TP-109	1276.0	0-15	SM				<b>ARTIFICIAL FILL - UNDOCUMENTED:</b> mostly pavers w/abundant tires and other trash in a SILTY SAND matrix.
		15-19	SM				<b>QUATERNARY ALLUVIUM:</b> SILTY SAND, reddish brown to dark gray, moist, loose; fine to coarse.
		19-24	SM				<b>OLDER FAN DEPOSITS:</b> SILTY SAND, yellowish brown, moist, medium dense; fine to coarse, trace clay.
							Total Depth = 24' No Groundwater/Caving Encountered Backfilled 11-11-2005
TP-110	1254.0	0-20	SM				<b>QUATERNARY ALLUVIUM:</b> SILTY SAND, light brown to white, dry to 8' damp to 18' wet to 20', loose; fine to coarse, gravel.
		20-22	ML				<b>OLDER FAN DEPOSITS:</b> SANDY SILT, brownish gray to light brown, moist to wet, dense; fine to coarse, sand lenses, gravel.
							Total Depth = 22' Groundwater Encountered @ 20' No Caving Encountered Backfilled 11-11-2005



W.O. 4800-A2-SC  
 KB Home Coastal, Inc.  
 Tract 31485, Horsethief Canyon Area  
 November 11, 2005

LOG OF EXPLORATORY TEST PITS

TEST PIT NO.	TEST PIT ELEV.	DEPTH (ft.)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH (ft.)	MOISTURE (%)	DRY DENSITY (pcf)	DESCRIPTION
TP-111	1244.0	0-12	SM				<b>QUATERNARY ALLUVIUM:</b> SILTY SAND, light brown to white, moist to 2' wet 2-3' saturated @ 3', loose; fine to coarse, cobbles at surface.
		12-15	ML				<b>OLDER FAN DEPOSITS:</b> SANDY SILT, yellowish brown, moist, medium dense; fine to coarse, trace clay.
							Total Depth = 15' Groundwater Encountered @ 3' Caving Encountered to 12' Backfilled 11-11-2005

# *APPENDIX C*

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## *STANDARD GRADING SPECIFICATIONS*

## **STANDARD GRADING SPECIFICATIONS**

These specifications present the usual and minimum requirements for projects on which Petra Geosciences, Inc. (Petra) is the geotechnical consultant. No deviation from these specifications will be allowed, except where specifically superseded in the preliminary geology and soils report, or in other written communication signed by the Soils Engineer and Engineering Geologist of record (Geotechnical Consultant).

### **I. GENERAL**

- A. The Geotechnical Consultant is the Owner's or Builder's representative on the project. For the purpose of these specifications, participation by the Geotechnical Consultant includes that observation performed by any person or persons employed by, and responsible to, the licensed Soils Engineer and Engineering Geologist signing the soils report.
- B. The contractor should prepare and submit to the Owner and Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" and the estimated quantities of daily earthwork to be performed prior to the commencement of grading. This work plan should be reviewed by the Geotechnical Consultant to schedule personnel to perform the appropriate level of observation, mapping, and compaction testing as necessary.
- C. All clearing, site preparation, or earthwork performed on the project shall be conducted by the Contractor in accordance with the recommendations presented in the geotechnical report and under the observation of the Geotechnical Consultant.
- D. It is the Contractor's responsibility to prepare the ground surface to receive the fills to the satisfaction of the Geotechnical Consultant and to place, spread, mix, water, and compact the fill in accordance with the specifications of the Geotechnical Consultant. The Contractor shall also remove all material considered unsatisfactory by the Geotechnical Consultant.
- E. It is the Contractor's responsibility to have suitable and sufficient compaction equipment on the job site to handle the amount of fill being placed. If necessary, excavation equipment will be shut down to permit completion of compaction to project specifications. Sufficient watering apparatus will also be provided by the Contractor, with due consideration for the fill material, rate of placement, and time of year.
- F. After completion of grading a report will be submitted by the Geotechnical Consultant.

### **II. SITE PREPARATION**

#### **A. Clearing and Grubbing**

- 1. All vegetation such as trees, brush, grass, roots, and deleterious material shall be disposed of offsite. This removal shall be concluded prior to placing fill.
- 2. Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipe lines, etc., are to be removed or treated in a manner prescribed by the Geotechnical Consultant.

## STANDARD GRADING SPECIFICATIONS

### III. FILL AREA PREPARATION

#### A. Remedial Removals/Overexcavations

1. Remedial removals, as well as overexcavation for remedial purposes, shall be evaluated by the Geotechnical Consultant. Remedial removal depths presented in the geotechnical report and shown on the geotechnical plans are estimates only. The actual extent of removal should be determined by the Geotechnical Consultant based on the conditions exposed during grading. All soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as determined by the Geotechnical Consultant.
2. Soil, alluvium, or bedrock materials determined by the Soils Engineer as being unsuitable for placement in compacted fills shall be removed from the site. Any material incorporated as a part of a compacted fill must be approved by the Geotechnical Consultant.
3. Should potentially hazardous materials be encountered, the Contractor should stop work in the affected area. An environmental consultant specializing in hazardous materials should be notified immediately for evaluation and handling of these materials prior to continuing work in the affected area.

#### B. Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide sufficient survey control for determining locations and elevations of processed areas, keys, and benches.

#### C. Processing

After the ground surface to receive fill has been declared satisfactory for support of fill by the Geotechnical Consultant, it shall be scarified to a minimum depth of 6 inches and until the ground surface is uniform and free from ruts, hollows, hummocks, or other uneven features which may prevent uniform compaction.

The scarified ground surface shall then be brought to optimum moisture, mixed as required, and compacted to a minimum relative compaction of 90 percent.

#### D. Subdrains

Subdrainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency, and/or with the recommendations of the Geotechnical Consultant. (Typical Canyon Subdrain details are given on Plate SG-1).

#### E. Cut/Fill & Deep Fill/Shallow Fill Transitions

In order to provide uniform bearing conditions in cut/fill and deep fill/shallow fill transition lots, the cut and shallow fill portions of the lot should be overexcavated to the depths and the horizontal limits discussed in the approved geotechnical report and replaced with compacted fill. (Typical details are given on Plate SG-7.)

## **STANDARD GRADING SPECIFICATIONS**

### **IV. COMPACTED FILL MATERIAL**

#### **A. General**

Materials excavated on the property may be utilized in the fill, provided each material has been determined to be suitable by the Geotechnical Consultant. Material to be used for fill shall be essentially free of organic material and other deleterious substances. Roots, tree branches, and other matter missed during clearing shall be removed from the fill as recommended by the Geotechnical Consultant. Material that is spongy, subject to decay, or otherwise considered unsuitable shall not be used in the compacted fill.

Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

#### **B. Oversize Materials**

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 12 inches in diameter, shall be taken offsite or placed in accordance with the recommendations of the Geotechnical Consultant in areas designated as suitable for rock disposal (Typical details for Rock Disposal are given on Plate SG-4).

Rock fragments less than 12 inches in diameter may be utilized in the fill provided, they are not nested or placed in concentrated pockets; they are surrounded by compacted fine grained soil material and the distribution of rocks is approved by the Geotechnical Consultant.

#### **C. Laboratory Testing**

Representative samples of materials to be utilized as compacted fill shall be analyzed by the laboratory of the Geotechnical Consultant to determine their physical properties. If any material other than that previously tested is encountered during grading, the appropriate analysis of this material shall be conducted by the Geotechnical Consultant as soon as possible.

#### **D. Import**

If importing of fill material is required for grading, proposed import material should meet the requirements of the previous section. The import source shall be given to the Geotechnical Consultant at least 2 working days prior to importing so that appropriate tests can be performed and its suitability determined.

### **V. FILL PLACEMENT AND COMPACTION**

#### **A. Fill Layers**

Material used in the compacting process shall be evenly spread, watered, processed, and compacted in thin lifts not to exceed 6 inches in thickness to obtain a uniformly dense layer. The fill shall be placed and compacted on a horizontal plane, unless otherwise approved by the Geotechnical Consultant.

## STANDARD GRADING SPECIFICATIONS

### B. Moisture Conditioning

Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly above optimum moisture content.

### C. Compaction

Each layer shall be compacted to 90 percent of the maximum density in compliance with the testing method specified by the controlling governmental agency. (In general, ASTM D 1557-02, will be used.)

If compaction to a lesser percentage is authorized by the controlling governmental agency because of a specific land use or expansive soils condition, the area to received fill compacted to less than 90 percent shall either be delineated on the grading plan or appropriate reference made to the area in the soils report.

### D. Failing Areas

If the moisture content or relative density varies from that required by the Geotechnical Consultant, the Contractor shall rework the fill until it is approved by the Geotechnical Consultant.

### E. Benching

All fills shall be keyed and benched through all topsoil, colluvium, alluvium or creep material, into sound bedrock or firm material where the slope receiving fill exceeds a ratio of 5 horizontal to 1 vertical, in accordance with the recommendations of the Geotechnical Consultant.

## VI. SLOPES

### A. Fill Slopes

The contractor will be required to obtain a minimum relative compaction of 90 percent out to the finish slope face of fill slopes, buttresses, and stabilization fills. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment, or by any other procedure that produces the required compaction.

### B. Side Hill Fills

The key for side hill fills shall be a minimum of 15 feet within bedrock or firm materials, unless otherwise specified in the soils report. (See detail on Plate SG-5.)

### C. Fill-Over-Cut Slopes

Fill-over-cut slopes shall be properly keyed through topsoil, colluvium or creep material into rock or firm materials, and the transition shall be stripped of all soils prior to placing fill. (see detail on Plate SG-6).

## **STANDARD GRADING SPECIFICATIONS**

### **D. Landscaping**

All fill slopes should be planted or protected from erosion by other methods specified in the soils report.

### **E. Cut Slopes**

1. The Geotechnical Consultant should observe all cut slopes at vertical intervals not exceeding 10 feet.
2. If any conditions not anticipated in the preliminary report such as perched water, seepage, lenticular or confined strata of a potentially adverse nature, unfavorably inclined bedding, joints or fault planes are encountered during grading, these conditions shall be evaluated by the Geotechnical Consultant, and recommendations shall be made to treat these problems (Typical details for stabilization of a portion of a cut slope are given in Plates SG-2 and SG-3.).
3. Cut slopes that face in the same direction as the prevailing drainage shall be protected from slope wash by a non-erodible interceptor swale placed at the top of the slope.
4. Unless otherwise specified in the soils and geological report, 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 controlling governmental agencies, or with the recommendations of the Geotechnical Consultant.

## **VII. GRADING OBSERVATION**

### **A. General**

All cleanouts, processed ground to receive fill, key excavations, subdrains, and rock disposals must be observed and approved by the Geotechnical Consultant prior to placing any fill. It shall be the Contractor's responsibility to notify the Geotechnical Consultant when such areas are ready.

### **B. Compaction Testing**

Observation of the fill placement shall be provided by the Geotechnical Consultant during the progress of grading. Location and frequency of tests shall be at the Consultants discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations may be selected to verify adequacy of compaction levels in areas that are judged to be susceptible to inadequate compaction.

### **C. Frequency of Compaction Testing**

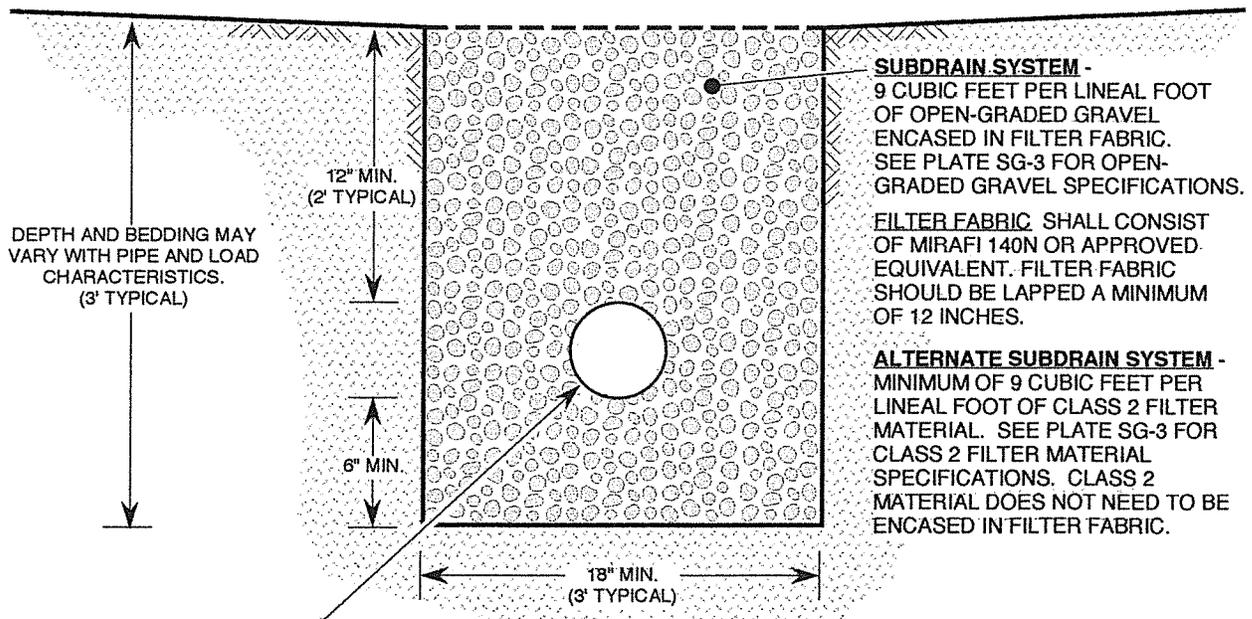
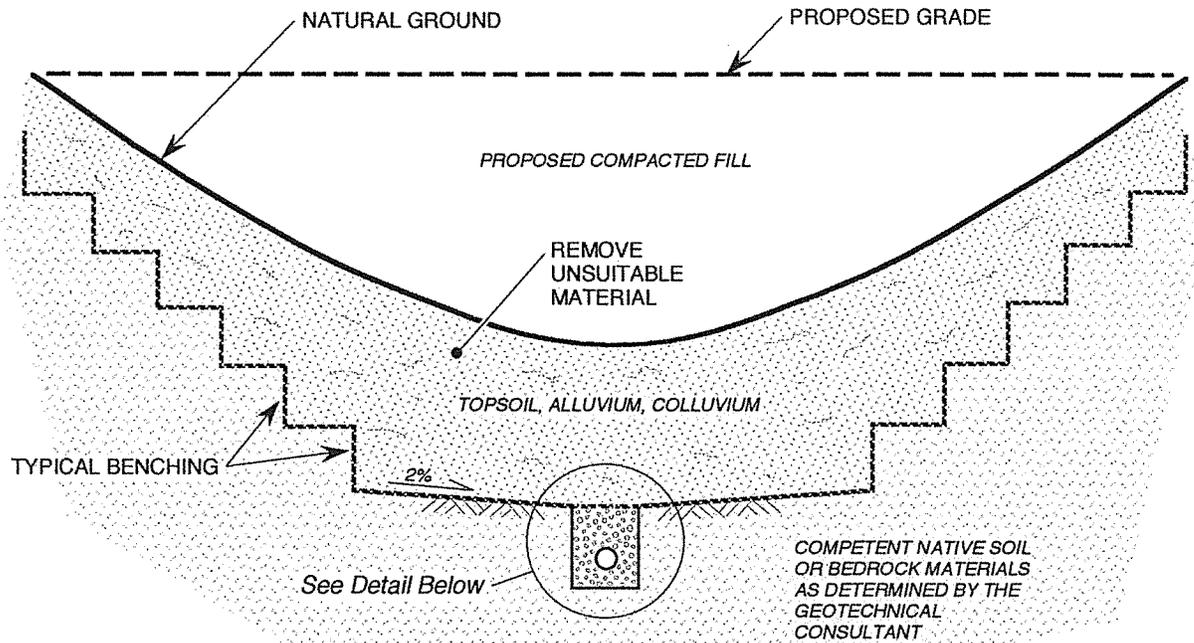
In general, density tests should be made at intervals not exceeding 2 feet of fill height or every 1000 cubic yards of fill placed. This criteria will vary depending on soil conditions and the size of the job. In any event, an adequate number of field density tests shall be made to verify that the required compaction is being achieved.

## **STANDARD GRADING SPECIFICATIONS**

### **VIII. CONSTRUCTION CONSIDERATIONS**

- A. Erosion control measures, when necessary, shall be provided by the Contractor during grading and prior to the completion and construction of permanent drainage controls.
- B. Upon completion of grading and termination of observations by the Geotechnical Consultant, no further filling or excavating, including that necessary for footings, foundations, large tree wells, retaining walls, or other features shall be performed without the approval of the Geotechnical Consultant.
- C. Care shall be taken by the Contractor during final grading to preserve any berms, drainage terraces, interceptor swales, or other devices of permanent nature on or adjacent to the property.

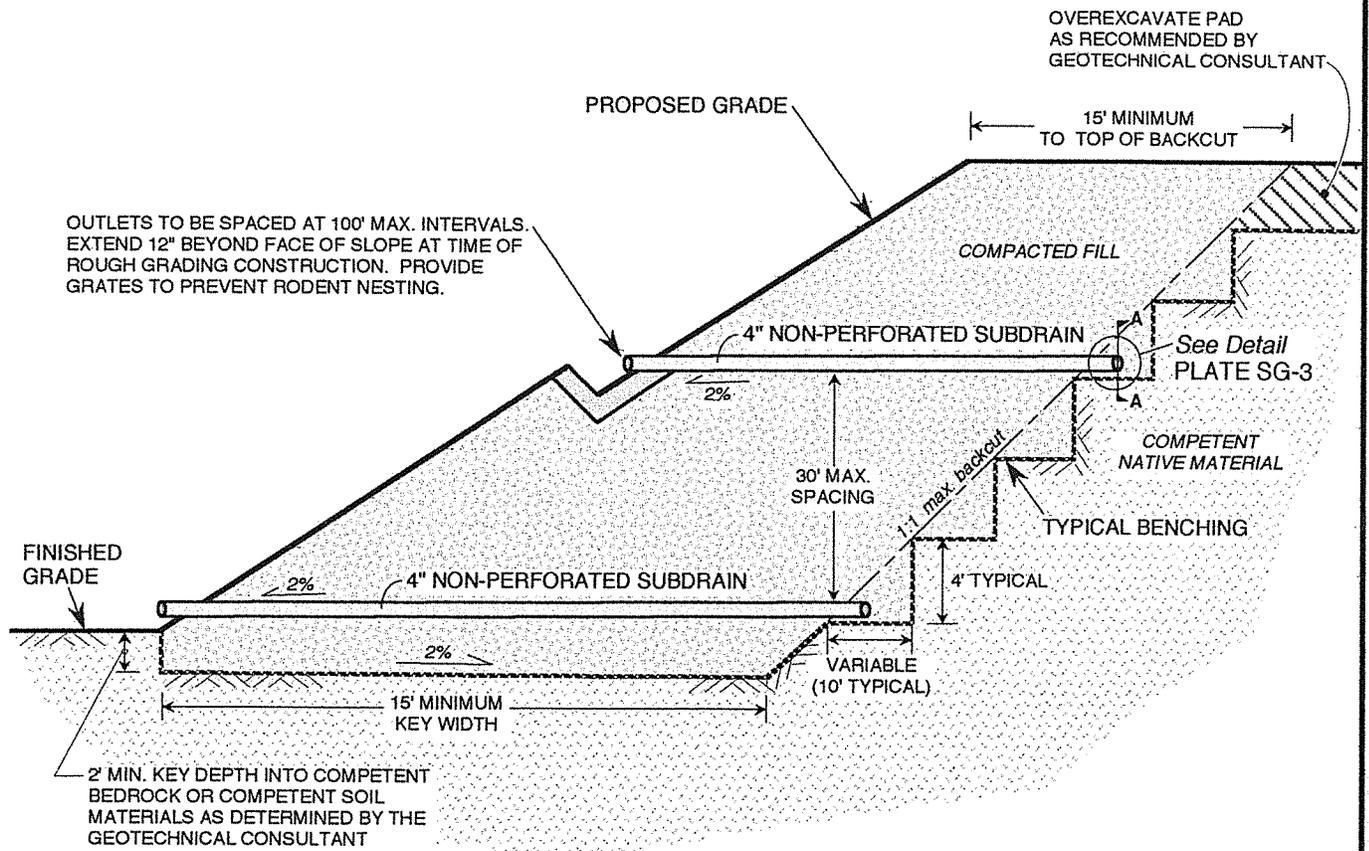
S:\BOILERS-WORK\REPORT INSERTS\STANDARD GRADING SPECS



MINIMUM 6-INCH DIAMETER PVC SCHEDULE 40, OR ABS SDR-35 WITH A MINIMUM OF EIGHT 1/4-INCH DIAMETER PERFORATIONS PER LINEAL FOOT IN BOTTOM HALF OF PIPE. PIPE TO BE LAID WITH PERFORATIONS FACING DOWN.

**NOTES:**

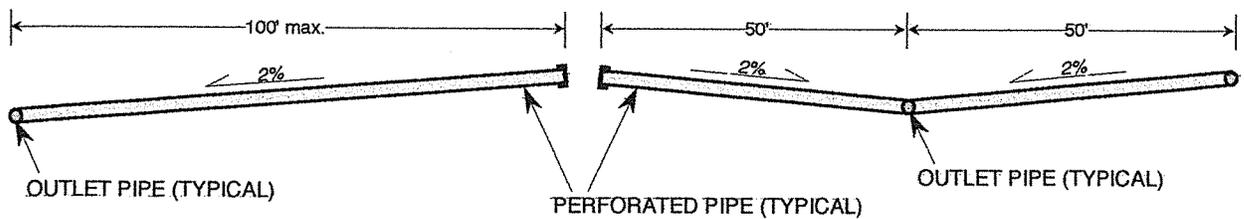
1. FOR CONTINUOUS RUNS IN EXCESS OF 500 FEET USE 8-INCH DIAMETER PIPE.
2. FINAL 20 FEET OF PIPE AT OUTLET SHALL BE NON-PERFORATED AND BACKFILLED WITH FINE-GRAINED MATERIAL.

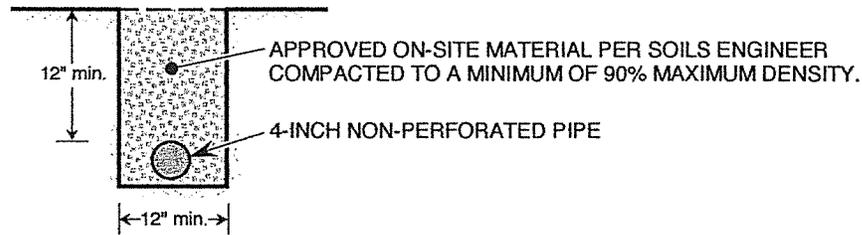
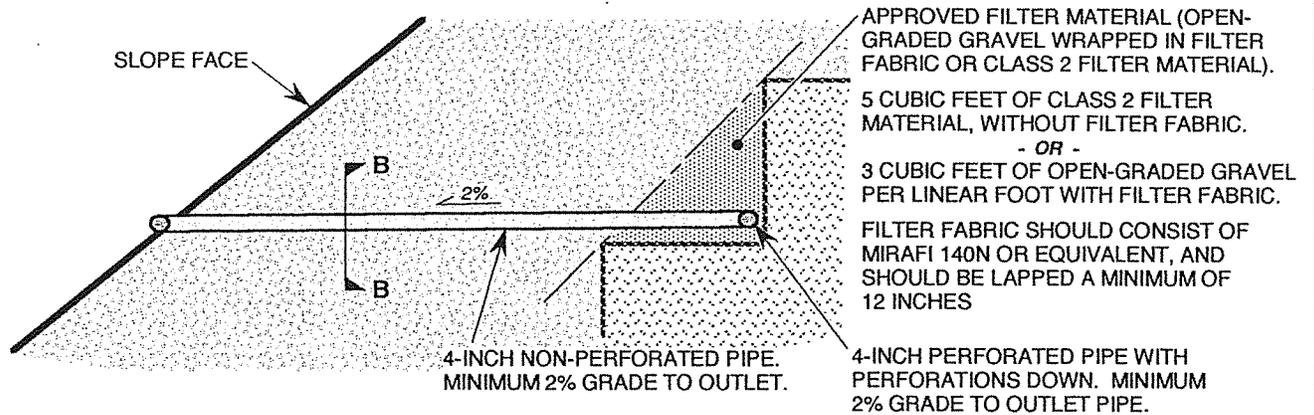


**NOTES:**

1. 30' MAXIMUM VERTICAL SPACING BETWEEN SUBDRAIN SYSTEMS.
2. 100' MAXIMUM HORIZONTAL DISTANCE BETWEEN NON-PERFORATED OUTLET PIPES. (See Below)
3. MINIMUM GRADIENT OF 2% FOR ALL PERFORATED AND NON-PERFORATED PIPE.

**SECTION A-A (PERFORATED PIPE PROFILE)**





**SECTION B-B (OUTLET PIPE)**

**PIPE SPECIFICATIONS:**

1. 4-INCH MINIMUM DIAMETER, PVC SCHEDULE 40 OR ABS SDR-35.
2. FOR PERFORATED PIPE, MINIMUM 8 PERFORATIONS PER FOOT ON BOTTOM HALF OF PIPE.

**FILTER MATERIAL/FABRIC SPECIFICATIONS:**

OPEN-GRADED GRAVEL ENCASED IN FILTER FABRIC.  
(MIRAFI 140N OR EQUIVALENT)

**ALTERNATE:**

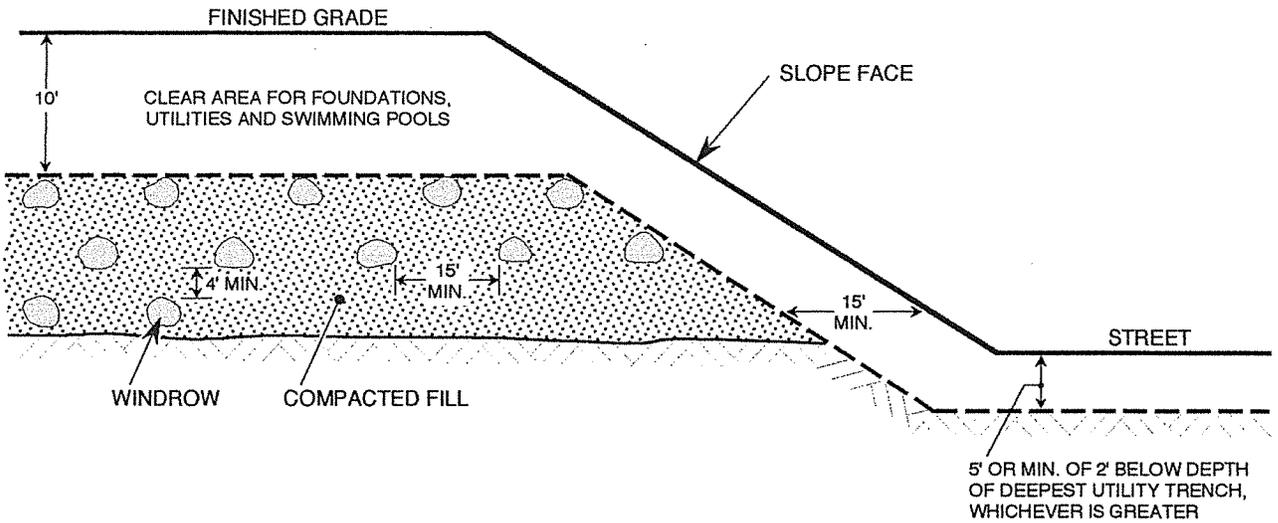
CLASS 2 PERMEABLE FILTER MATERIAL PER CALTRANS  
STANDARD SPECIFICATION 68-1.025.

**OPEN-GRADED GRAVEL**

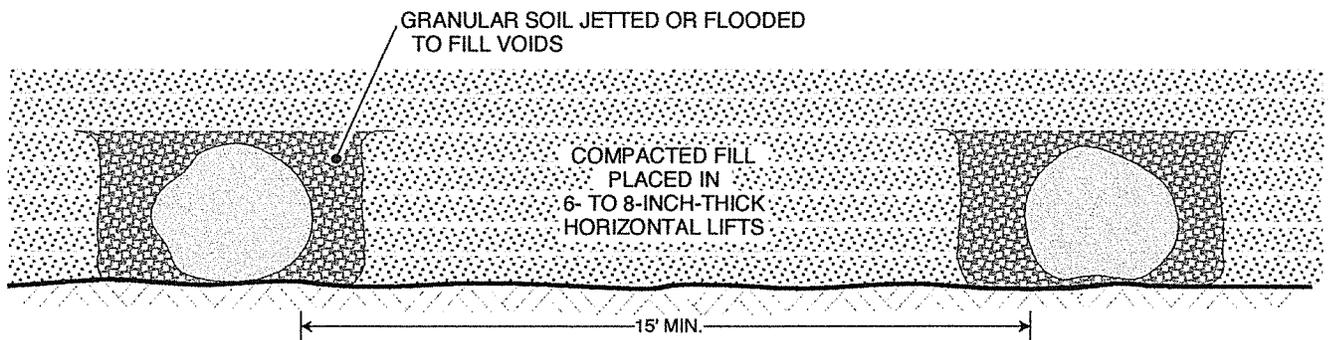
SIEVE SIZE	PERCENT PASSING
1 1/2-INCH	88 - 100
1-INCH	5 - 40
3/4-INCH	0 - 17
3/8-INCH	0 - 7
No. 200	0 - 3

**CLASS 2 FILTER MATERIAL**

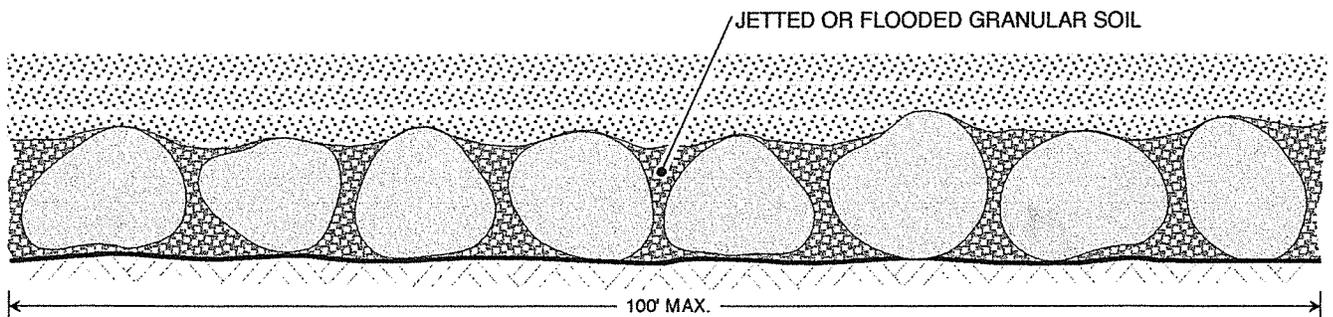
SIEVE SIZE	PERCENT PASSING
1-INCH	100
3/4-INCH	90 - 100
3/8-INCH	40 - 100
No. 4	25 - 40
No. 8	18 - 33
No. -30	5 - 15
No. -50	0 - 7
No. 200	0 - 3



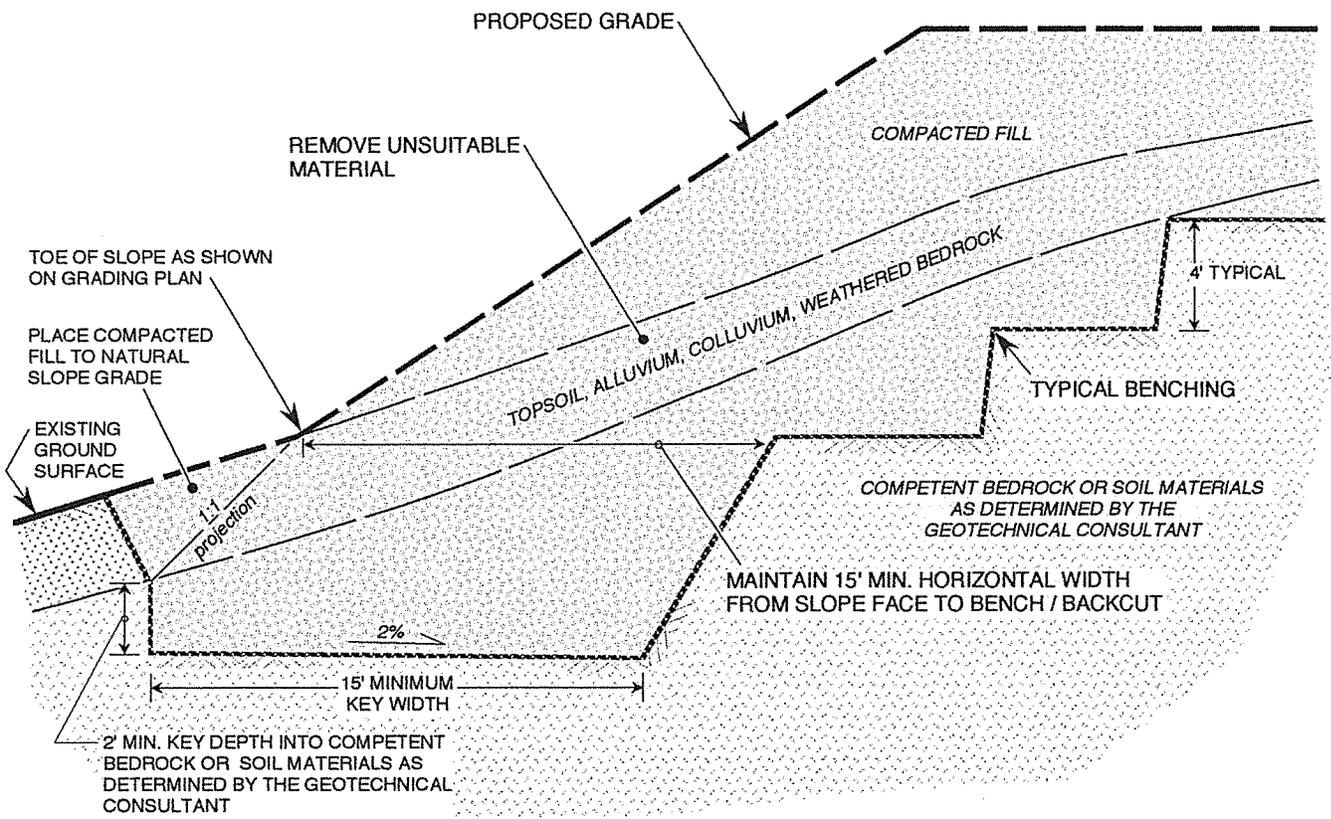
**TYPICAL WINDROW DETAIL (END VIEW)**



**TYPICAL WINDROW DETAIL (PROFILE VIEW)**

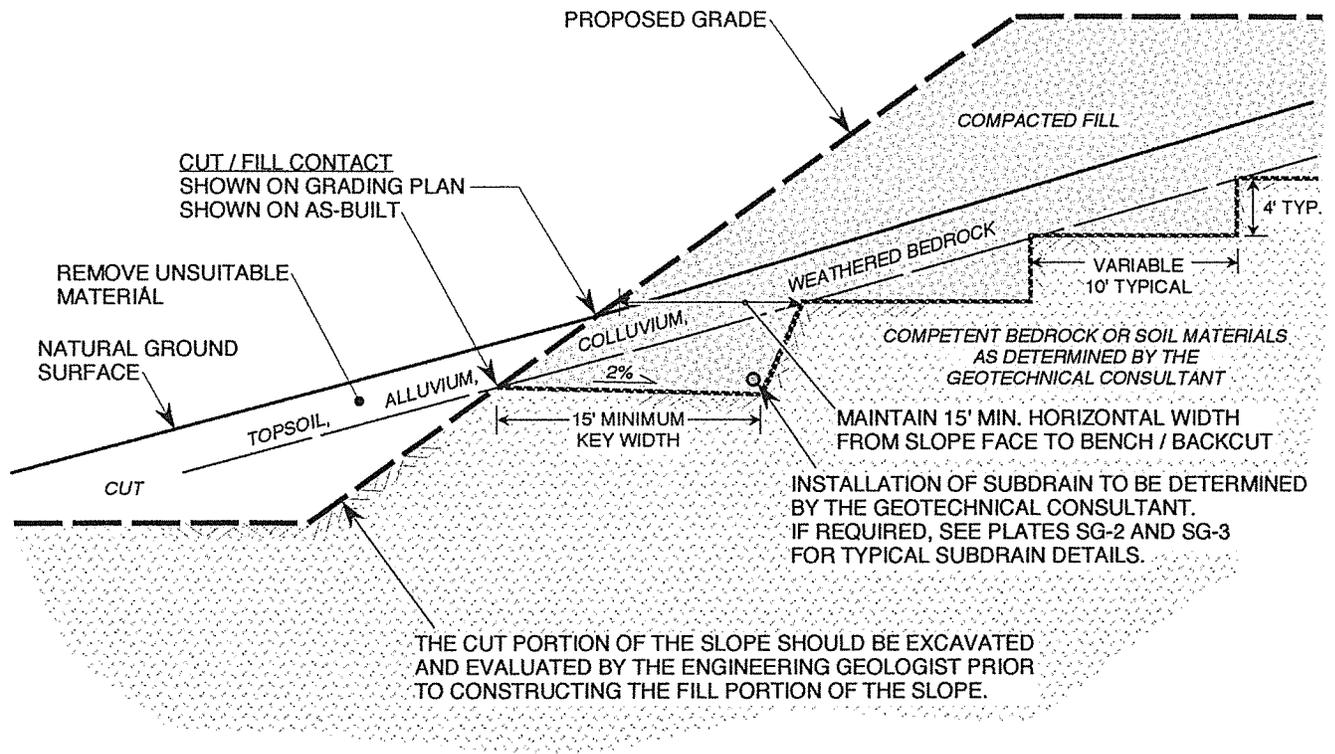


**NOTE:** OVERSIZE ROCK IS DEFINED AS CLASTS HAVING A MAXIMUM DIMENSION OF 12" OR LARGER



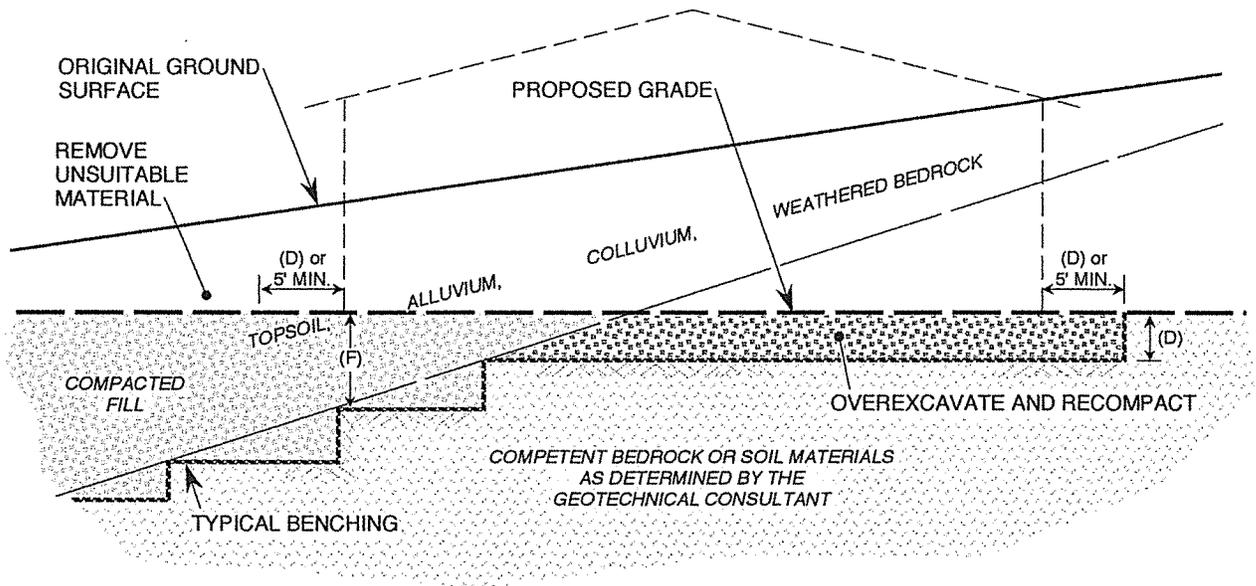
**NOTES:**

1. WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, BENCHING IS NOT NECESSARY; HOWEVER, FILL IS NOT TO BE PLACED ON COMPRESSIBLE OR UNSUITABLE MATERIAL.
2. SOILS ENGINEER TO DETERMINE IF SUBDRAIN IS REQUIRED.

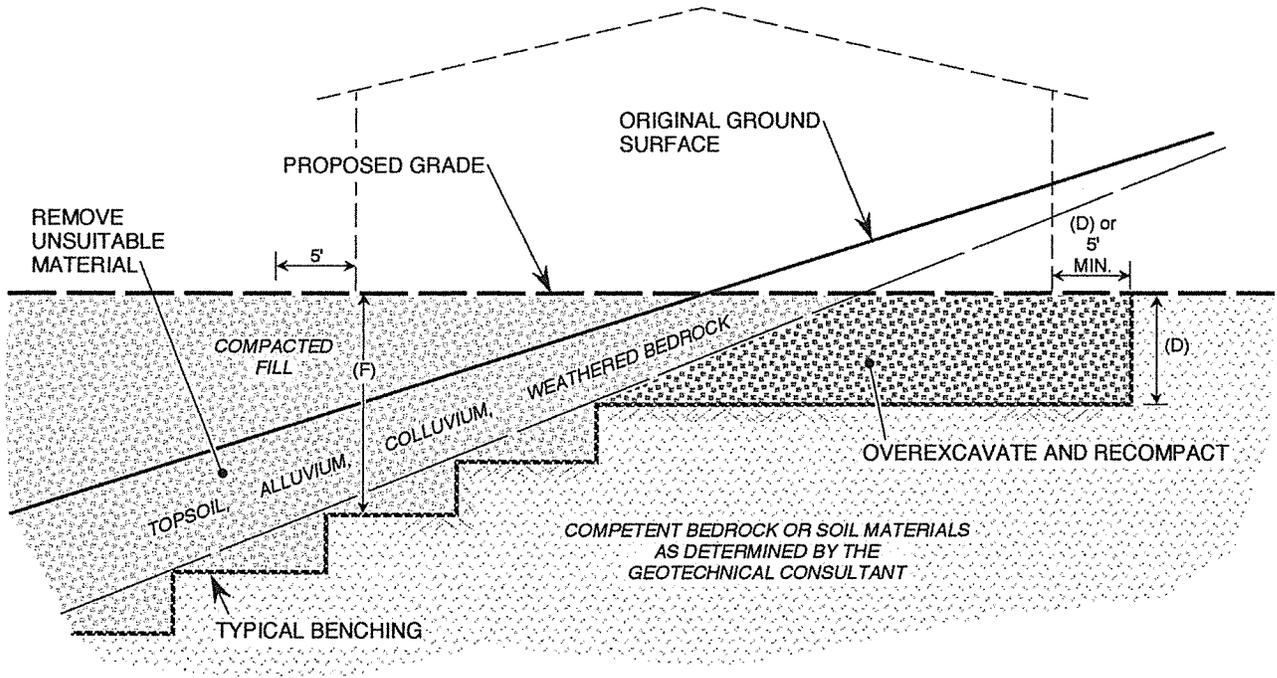


## CUT LOT

UNSUITABLE MATERIAL EXPOSED IN PORTION OF CUT PAD



## CUT-FILL TRANSITION LOT



**MAXIMUM FILL THICKNESS (F)**

FOOTING DEPTH TO 3 FEET .....

3 TO 6 FEET .....

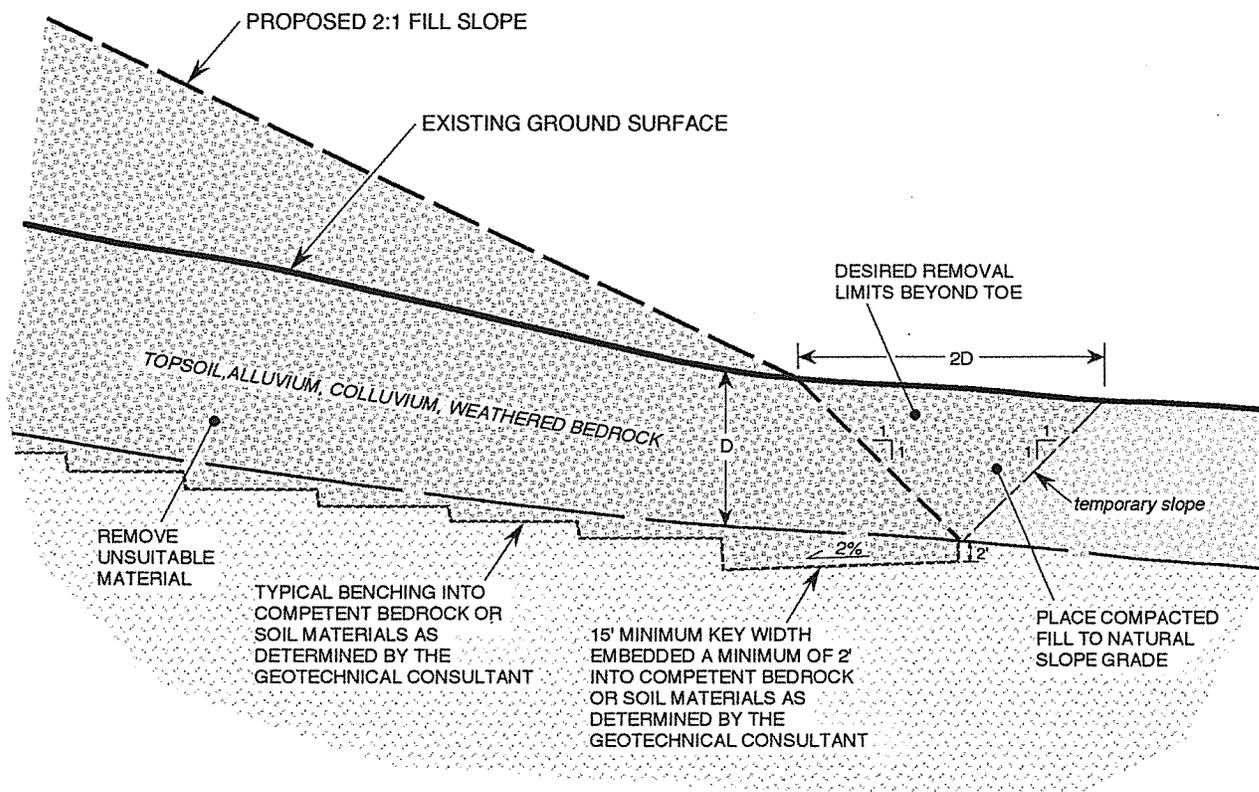
GREATER THAN 6 FEET .....

**DEPTH OF OVEREXCAVATION (D)**

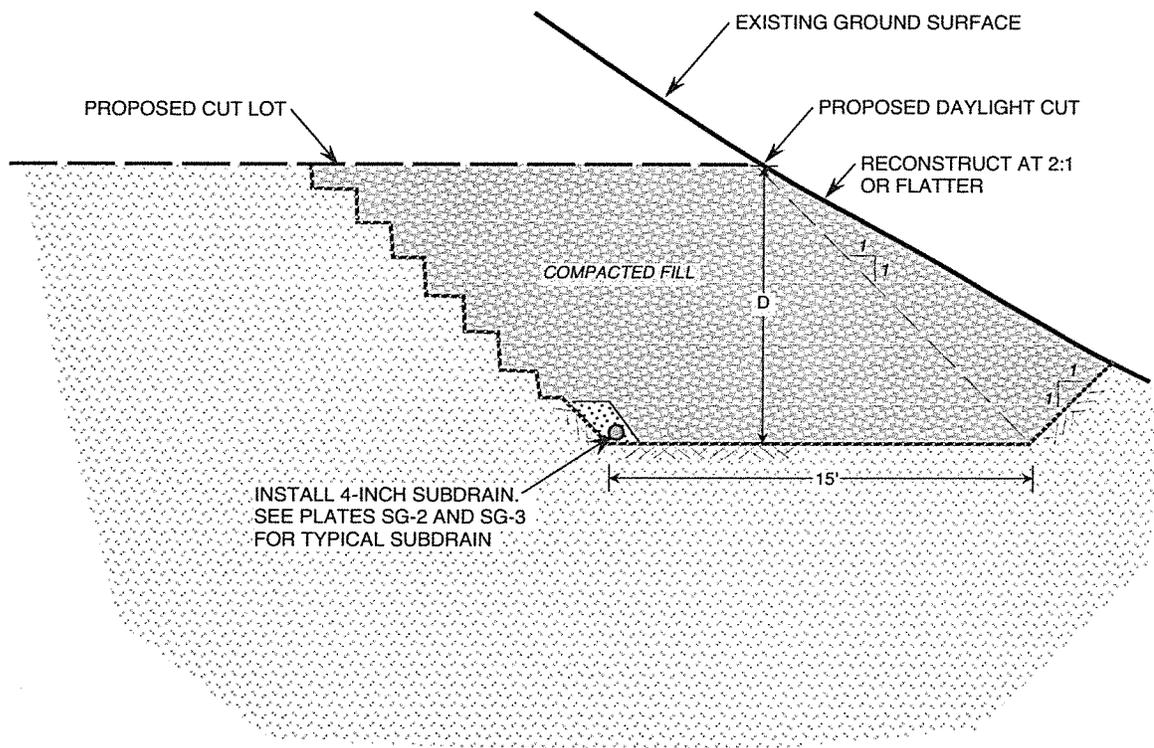
EQUAL DEPTH

3 FEET

1/2 THE THICKNESS OF DEEPEST FILL PLACED WITHIN THE "FILL" PORTION (F) TO 15 FEET MAXIMUM



D = RECOMMENDED DEPTH OF REMOVAL  
PER GEOTECHNICAL REPORT



**NOTE:**

1. "D" SHALL BE 10 FEET MINIMUM OR AS DETERMINED BY SOILS ENGINEER.