OTAY CROSSINGS COMMERCE PARK

APPENDIX K

GEOTECHNICAL INVESTIGATION

to the

DRAFT SUPPLEMENTAL
ENVIRONMENTAL IMPACT REPORT

EIR 93-19-006Q, TM 5405RPL[7]
SCH No. 2006041039

Lead Agency:

County of San Diego
Department of Planning and Land Use
5201 Ruffin Road, Suite B
San Diego, California 92123
Contact: Robert Hingtgen
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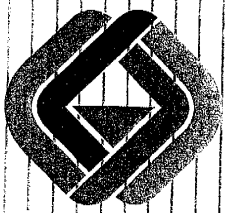
MAY 2010

GEOTECHNICAL INVESTIGATION

310 ACRE PROPERTY
ALTA ROAD AND OTAY MESA ROAD
SAN DIEGO COUNTY, CALIFORNIA



GEOCON
INCORPORATED

GEOTECHNICAL
CONSULTANTS

PREPARED FOR

J&D, LLC
SOLANA BEACH, CALIFORNIA

JULY 15, 2004

GEOCON
INCORPORATED

GEOTECHNICAL CONSULTANTS

Project No. 07149-22-02
July 15, 2004

J&D, LLC
462 Stevens Avenue, Suite 301
Solana Beach, California 92072

Attention: Mr. Judd Halenza

Subject: 310 ACRE PROPERTY
ALTA ROAD AND OTAY MESA ROAD
SAN DIEGO COUNTY, CALIFORNIA
GEOTECHNICAL INVESTIGATION

Gentlemen:

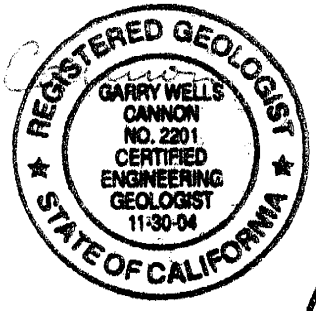
In accordance with your request and our Proposal No. LG-04106 dated March 9, 2004, we have performed a geotechnical investigation of the subject project in the Otay Mesa area of the County of San Diego, California. The accompanying report presents the results of our study and our conclusions and recommendations regarding the geotechnical aspects of developing the property as proposed.

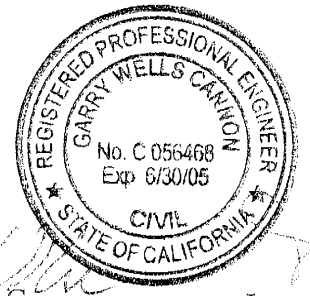
In our opinion, the site may be developed as planned provided the recommendations of this report are followed.

Should you have any questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED





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Attention: Mr. Mark Stevens

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GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of our geotechnical investigation for a 310-acre site located southeast of the intersection of Alta Road and Otay Mesa Road in the Otay Mesa area of San Diego County, California (see *Vicinity Map*, Figure 1). The purpose of the study was to provide information regarding the soil and geologic conditions encountered at the site, as well as any geotechnical constraints that may impact areas of proposed development. This report provides recommendations relative to the geotechnical engineering aspects of developing the property as currently proposed.

The scope of the investigation included performing a review of aerial photographs, topographic maps, previously published geotechnical investigations, and readily available published and unpublished geologic literature pertinent to the property. The scope also included performing a field investigation, laboratory testing to evaluate physical soil properties, engineering analyses, and preparation of this report.

The field investigation was conducted between March 25 and April 20, 2004 and consisted of a site reconnaissance, excavating 42 exploratory trenches, and performing 4 seismic-refraction traverses. The approximate locations of the trenches and seismic-refraction traverses are depicted on the attached *Site Plan/Geologic Map* (Figure 2). The exploratory trenches were excavated to sample and observe the general extent and condition of unconsolidated deposits (undocumented fill, topsoil/colluvium, and alluvium) and subsurface geologic units. Details of the field investigation are presented in Appendix A.

Laboratory tests were performed on selected soil samples collected during the field investigation to evaluate pertinent physical properties of the soil types encountered. The laboratory information was used in engineering analyses and to assist in providing recommendations for site grading and development. Details of the laboratory tests and a summary of the test results are presented in Appendix B.

As part of this study, the following information was reviewed:

1. 1953 stereoscopic aerial photographs of the site and surrounding areas (AXN-3M-24, 25).

2. U.S. Geological Survey, 1968, Otay Mesa *7.5 Minute Quadrangle Map,* photo revised 1975.

3. San Diego Association of Geologists, *Geology of Southwestern San Diego County, California, and Northwestern Baja California,* edited by Gregory T. Farrand, 1976.

4. Kennedy, Michael P. and Siang S. Tan, *Geology Of National City, Imperial Beach and Otay Mesa Quadrangles, Southern San Diego Metropolitan Area, California,* California Division of Mines and Geology, 1977.

5. *Landslide Hazards in the Southern Part of the San Diego Metropolitan Area, San Diego County, California* (Otay Mesa Quadrangle), California Division of Mines and Geology, Open File Report 95-03, 1995.

6. *Soil and Geologic Reconnaissance, Otay Mesa Alternate Gas Pipeline Alignment, Alternate Route 2C, San Diego County, California,* prepared by Geocon Incorporated, dated July 2, 2002 (Project No. 06701-22-08).

7. *Geotechnical Feasibility Study for J and D LLC Property,* prepared by Geocon Incorporated, dated August 26, 2003 (Project No. 07149-22-01).

8. *Untitled Conceptual Grading Plan*, Scale 1 inch equals 200 feet, prepared by Stevens Cresto Engineering, Incorporated, undated.

The *Geologic Map*, Figure 2, depicts the general configuration of the property, existing and proposed topography, mapped geologic contacts, and the approximate locations of the exploratory trenches and seismic-refraction traverses. The base map for Figure 2 consists of a copy of an untitled conceptual grading plan with an approximate scale of 1 inch equals 200 feet and contour interval of 2 feet (see Reference No. 8).

The conclusions and recommendations presented herein are based on an analysis of the data obtained from the field investigation, laboratory tests, and experience with similar soil and geologic conditions.

2. SITE AND PROJECT DESCRIPTION

The irregularly-shaped, approximately 310-acre site is located southeast of the intersection of Alta Road and Otay Mesa Road and extends south to the international border in San Diego County, California. The property is composed of former agricultural/ranching land which has been allowed to revert into a natural state.

The site is characterized by gently to steeply sloping terrain. Two south-trending drainages traverse the property, each with several small tributaries. Elevations vary from a high of approximately 660 feet above Mean Sea Level (MSL) in the northeast portion of the site to 480 feet MSL near the southern boundary. Vegetation consists of low weeds with scattered brush and trees. The property can be accessed by several dirt roads off Alta Road and Otay Mesa Road.

Our review of the referenced conceptual grading plan indicates that the site will be developed to receive six sheet-graded pads with four major interior roads. The extension of Otay Mesa Road and Alta Road are proposed along the north and west ends, respectively. In general, the grading will consist of cuts of up to 30 feet and fills with a maximum thickness of approximately 20 feet.

The locations and descriptions of the site and proposed improvements are based on a site reconnaissance, a review of the referenced plan, and our general understanding of the project as presently proposed. If project details vary significantly from those described, Geocon Incorporated should be retained to update and/or modify this report accordingly.

3. SOIL AND GEOLOGIC CONDITIONS

Three unconsolidated soil deposits and three geologic formations were encountered during the field investigation. The unconsolidated deposits encountered include undocumented fill, topsoil/colluvium, and alluvium. The geologic formations include; the Otay Formation, Unnamed Fanglomerate, and the Santiago Peak Volcanics. Each of the unconsolidated deposits and geologic formations is described below in order of increasing age. The lateral extent of each unit is depicted on the *Geologic Map* (Figure 2). Figure 3 present geologic cross-sections A-A′, B-B′, and C-C′.

3.1 Undocumented Fill (Qudf)

Undocumented fill was observed in the southeastern portion of the site. This surficial deposit consists of a large windrow of cobble- to boulder-size rock mixed with soil. We assume that this is an area where rocks were dumped following removal from the nearby agricultural/pasture fields. The undocumented fill is not considered adequate for the support of structural fill or settlement sensitive structures and will require remedial grading in the form of complete removal in areas receiving improvements. This material may be placed in deeper portions of fills provided it is placed in conformance with the recommendations presented in this report.

3.2 Topsoil (unmapped)

Topsoil blankets the site and typically consists of loose, unconsolidated, clayey sands and sandy clays. In general, the topsoil is not expected to exceed a thickness of 4 feet and will have an average thickness of about 2 feet. The topsoil is not considered adequate for the support of structural fill or settlement sensitive structures and will require remedial grading in the form of complete removal in areas receiving improvements. The soil excavated from this unit is suitable for use as structural fill.

3.3 Alluvium (Qal)

Alluvial deposits were observed in drainage bottoms and are estimated to range in thickness from 3 to 5 feet. The alluvial soils are characterized as soft to stiff, silty and sandy clay with zones of loose, clayey sand. The alluvium is not considered adequate for the support of structural fill or settlement sensitive structures and will require remedial grading in the form of complete removal in areas receiving improvements. The soil excavated from this unit is suitable for use as structural fill.

3.4 Unnamed Fanglomerate (Tfg)

Tertiary-age, Unnamed Fanglomerate Deposits were observed in the southwestern and southeastern portions of the site. The fanglomerate consists of dense, moderately cemented conglomeratic sandstones and sandy boulder conglomerates interbedded with the Otay Formation and overlying the Santiago Peak Volcanics. The Unnamed Fanglomerate is considered adequate for the support of structural fill or settlement sensitive structures; however, due to the presence of large cobbles and some cemented zones, special excavation equipment may be necessary. Special handling of the oversize cobble and boulders will likely be required as indicated hereinafter.

3.5 Otay Formation (To)

The western and central portions of the property are predominantly underlain by the Tertiary-age Otay Formation. The Otay Formation primarily consists of medium dense to dense, silty, fine to medium sand and fine sandy silt with silty and sandy clay. Cobble lenses of Unnamed Fanglomerate may interfinger with the Otay Formation. The upper portion of the Otay Formation exhibits moderate to high weathering and bioturbation and as such will not be suitable in its natural state for the support of structural loads and should be removed during grading to firm, unweathered Otay Formation. Localized lenses of bentonitic clays may be encountered during grading operations. Recommendations for handling bentonitic clays are presented in the grading section of this report. The unweathered Otay Formation exhibits low to medium expansion potential and should generally provide adequate bearing support characteristics in its natural state. Soils excavated from the weathered and unweathered Otay Formation are suitable for use as structural fill.

3.6 Santiago Peak Volcanics (Jsp)

Outcrops of the Jurassic-age Santiago Peak Volcanics were observed in the northeastern portions of the site. This formation, as observed at the site, is composed of slightly metamorphosed, moderately- to highly-jointed volcanic rock. With the exception of localized weathered, highly fractured or hydrothermally altered portions of the Santiago Peak Volcanics, it is expected that blasting or the use of specialized equipment will likely be necessary to excavate the portions of the project underlain by

this formation. Oversize rock generated by cuts in the Santiago Peak Volcanics will require special handling.

4. GROUNDWATER

No seeps or groundwater were observed in any of the exploratory trenches excavated on the site during this investigation. Isolated areas of standing water and saturated ground were observed in the bottoms of the major drainages, and more noticeable in the northern portion of the site. In addition, perched groundwater levels should be expected at the bottom of the existing drainage channels. Canyon subdrains are recommended in subsequent sections of this report. Groundwater levels should be expected to fluctuate seasonally and may affect site grading. If grading operations are performed during or shortly after the rainy season, saturated conditions and extensive drying operations should be expected.

5. GEOLOGIC HAZARDS

5.1 Faulting and Seismicity

Based on the site reconnaissance, exploratory trenches, and a review of published geologic maps and reports, the site is not located on any known active or potentially active fault trace. In order to estimate the distance of known faults to the site, the computer program *EQFAULT* (Blake, 1989, updated 2000) was utilized. The program calculates the distance from the site within a specified search radius to known active California faults that have been digitized in an earthquake catalog.

The analysis indicated that ten faults lie within a 62-mile (100-kilometer) radius of the site. The fault name, distance, and seismic parameters are presented in Table 5.1. The Rose Canyon Fault Zone is the closest source for potential ground motion. The Rose Canyon Fault is located approximately 14 miles (22.5 km) west of the site and is considered the dominant source due to its proximity. The Rose Canyon Fault is postulated as having the potential to generate a Maximum Magnitude Earthquake of 7.2. The "maximum magnitude earthquake" is defined as the maximum earthquake that appears capable of occurring under the presently known tectonic framework (*California Division of Mines and Geology Notes*, Number 43). The estimated peak site acceleration based on attenuation relations developed by Sadigh, *et al.* (1997), was determined to be 0.20g.

TABLE 5.1
FAULTING AND SEISMICITY

Fault	Approximate Distance From Site (miles)	Estimated Maximum Earthquake Magnitude	Estimated Peak Site Acceleration (g)
Rose Canyon Fault Zone	14	7.2	0.20
Coronado Bank	20	7.6	0.18
Elsinore-Julian	42	7.1	0.06
Elsinore-Coyote Mountain	43	6.8	0.05
Earthquake Valley	45	6.5	0.04
Newport-Inglewood (offshore)	51	7.1	0.05
Elsinore-Temecula	57	6.8	0.03
San Jacinto-Borrego	61	6.6	0.03
San Jacinto-Coyote Creek	61	6.8	0.03
Laguna Salada	61	7.0	0.04

It is our opinion that the site could be subjected to moderate to severe ground shaking in the event of an earthquake along any of the faults listed on Table 5.1 or other faults in the southern California/northern Baja California region. However, we do not consider the site to possess any greater seismic risk than that of the surrounding developments. While listing maximum earthquake magnitudes and peak accelerations is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including the frequency and duration of motion and the soil conditions underlying the site. We recommend that seismic design of future structures be performed in accordance with the California Building Code (CBC) guidelines and/or those currently adopted by the County of San Diego.

5.2 Landslides

No evidence of landsliding was observed on the property during the field investigation or our aerial photograph review.

5.3 Liquefaction

The potential for liquefaction during a strong earthquake is limited to loose, unconsolidated sandy soil located below the water table. Due to the relatively high density and the lack of a permanent, shallow groundwater table, the risk of seismically induced soil liquefaction occurring at the property is very low.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 No soil or geologic conditions were encountered that would preclude the development of the property as proposed, provided the recommendations of this report are followed.

6.1.2 The field investigation indicates that the site is underlain by undocumented fill soils, topsoil, alluvial soils, Otay Formation, Unnamed Fanglomerate, and Santiago Peak Volcanics. No groundwater was encountered in the field investigation. Canyon subdrains are proposed in the existing drainages.

6.1.3 Subsurface conditions observed may be extrapolated to reflect general soil and geologic conditions; however, variations in subsurface conditions between trench locations should be anticipated.

6.1.4 The undocumented fill soils (minor amounts), the topsoils, the alluvial soils, and the weathered upper sections of the Otay Formation are not considered suitable for the support of fill or structural loads in their present condition and will require remedial grading. Removal depths of between approximately 2 and 5 feet should be expected over most of the property.

6.1.5 The soils of the Otay Formation should provide adequate support characteristics in its natural state and where placed as properly compacted fill.

6.1.6 Highly expansive soils will be encountered within the topsoil and alluvium and occasionally in the Otay Formation. Highly expansive soils should be placed in deeper portions of the fill areas. There are sufficient low expansive soils available for capping purposes on site to mitigate the adverse impact of expansive soils.

6.1.7 Cuts in excess of approximately 4 feet in the Santiago Peak Volcanics will likely require blasting and special handling. Heavy ripping may be necessary within the Unnamed Fanglomerate deposit. The oversize rock should be placed in deeper portions of the fill in accordance with Section 6 of Appendix C.

6.1.8 No significant geologic hazard that would adversely affect the proposed project, other than seismic shaking and expansive soils, were observed or are known to exist on the site.

6.1.9 In general, the undisturbed soils are expected to exhibit low erosion potential. However, fill areas or areas stripped of native vegetation will require special consideration to reduce the erosion potential. In this regard, desilting basins, improved surface drainage and early planting of erosion-resistant ground covers are recommended.

6.1.10 Following removal and recompacted as described herein, proposed structures can be supported of conventional shallow footings with slab-on-grade floors.

6.2 Soil and Excavation Characteristics

6.2.1 The majority of the soil and sedimentary units on the site can generally be excavated with light to moderate effort with conventional heavy-duty grading equipment. Highly-cemented zones within the Otay Formation and the Unnamed Fanglomerate may require very heavy ripping and could generate oversized rock. Oversize rocks should be placed in accordance with Section 6 of Appendix C.

6.2.2 Rippability characteristics of the Santiago Peak Volcanics were evaluated by means of four seismic-refraction traverses conducted in selected areas of expected maximum cuts. Results of the seismic-refraction traverses indicate that the Santiago Peak Volcanics are non-rippable below an average depth of approximately 4 feet and will require blasting for excavation. Rock rippability is a function of natural weathering processes that can vary vertically and horizontally over short distances depending upon jointing, fracturing and/or mineralogical discontinuities within the rock.

6.2.3 Rippability for trenching equipment is typically less than that of a bulldozer; therefore particular attention should be paid to the refusal depths encountered in the exploratory trenches. Based on trench refusal depths, refusal of trenching equipment could occur as shallow as 2 feet in the Santiago Peak Volcanics. Refusal was also encountered in the Unnamed Fanglomerate. Considering this condition, it would be prudent to consider undercutting pads and streets underlain by Santiago Peak Volcanics and the Unnamed Fanglomerate deposit and replacing the rock with compacted fill to facilitate foundation and shallow underground utility installation. Line blasting may be required for deeper utilities.

6.2.4 Blasting should be conducted such that blasted rock fragments are smaller than 2 feet in dimension to facilitate handling and placement. We recommend that blasting and excavation of hard rock areas occur early in the grading operation to allow for placement of blast rock in the deeper portions of the fill areas.

6.2.5 The clayey soils of the Otay Formation, the clayey portion of the undocumented fill soils, the topsoils, and the alluvial deposits are considered to have a high to very high expansive potential (Expansion Index [EI] greater than 91) as defined by Uniform Building Code (UBC) Table No. 18-I-B. The sandy soils of the Otay Formation and the unnamed fanglomerate possess low to medium expansive potential. Excavation and compaction difficulties may be experienced if grading operations are performed when the clayey soils are very wet or very dry. Extensive moisture-conditioning operations may be required if either case is encountered. In addition, due to the high silt and calcium carbonate content of the soils of the Otay Formation, extensive mixing and moisture conditioning should be expected.

6.3 Subdrains

6.3.1 The geologic units encountered on the site exhibit permeability characteristics that could be susceptible under certain conditions to groundwater seepage and perching. The construction of canyon subdrains is recommended to mitigate the potential for adverse impacts associated with hydrocompaction and seepage conditions. Figure 2 depicts the approximate subdrain location for each of the canyons. Figure 4 depicts a typical canyon subdrain detail.

6.3.2 The final segment (low end) of each subdrain should consist of non-perforated drainpipe. At the non-perforated/perforated interface, a seepage cutoff wall should be constructed on the toe of the downslope side of the junction in accordance with Figure 5. If the subdrain should discharge into an existing open drainage channel a permanent head wall structure should be constructed in accordance with Figure 6.

6.3.3 The final grading plans should indicate the location of the proposed subdrain. Upon completion of the subdrain installation, the project civil engineer should survey the subdrain locations prior to fill placement and provide an as-built grading plan depicting the subdrain locations.

6.4 Grading

6.4.1 All grading should be performed in accordance with the *Recommended Grading Specifications* contained in Appendix C and the County of San Diego Grading Ordinances. Where the recommendations of Appendix C conflict with this report, the recommendations of this report should take precedence.

6.4.2 Earthwork should be observed by and compacted fill tested by representatives of Geocon Incorporated.

6.4.3 Prior to commencing grading, a preconstruction conference should be held at the site with the owner or developer, grading contractor, civil engineer, and geotechnical engineer in attendance. Special soil handling and the grading plans can be discussed at that time.

6.4.4 Site preparation should begin with the removal of all deleterious material and vegetation. The depth of removal should be such that material exposed in cut areas or soil to be used as fill is relatively free of organic matter. Any existing underground improvements not projected to remain should be removed and the resulting depression(s) properly backfilled in accordance with the procedures described herein. Material generated during stripping and site demolition should be exported from the site.

6.4.5 All potentially compressible surficial soils (undocumented fill, topsoil, alluvial deposits, and weathered Otay Formation) within areas of planned grading should be removed to firm ground prior to placing fill and/or structural loads. Topsoil thickness is expected to average approximately 2 to 3 feet, alluvium in the drainage channels is estimated to be approximately 4 to 5 feet thick, and the upper approximately 3 feet of the Otay Formation is disturbed. The actual extent of unsuitable soil removals should be determined in the field by the geotechnical engineer or engineering geologist. Overly wet surficial materials will require drying or mixing with drier soils to facilitate proper compaction.

6.4.6 Refusal to a backhoe was encountered at depths as shallow as 2 feet in the Santiago Peak Volcanics and Unnamed Fanglomerate Deposit and interpretation of seismic refraction data indicates non-rippable material at 2 to 8 feet below the ground surface. Consideration should be given to undercutting areas underlain by the Santiago Peak Volcanics and Unnamed Fanglomerate Deposits to facilitate foundation and utility excavations.

6.4.7 After all unsuitable soils and deleterious material have been removed, areas planned to receive structural fill soils and/or settlement-sensitive improvements should be scarified to a depth of approximately 12 inches, moisture conditioned to 1 to 3 percent above optimum moisture content, and compacted to a minimum relative compaction of 90 percent (ASTM D 1557-02).

6.4.8 Following removals, the site should be brought to final subgrade elevations with structural fill compacted in layers. In general, soils native to the site are suitable for re-use as fill if free from vegetation, debris and other deleterious material. Highly expansive soils and oversize rock should be placed in deeper portions of the fill. Layers of fill should be no

thicker than will allow for adequate bonding and compaction. Fill lifts of approximately 8 inches thick should be adequate for this project. All fill and backfill should be compacted to at least 90 percent of the maximum dry density at a moisture content ranging from 1 to 3 percent above optimum, as determined in accordance with ASTM Test Procedure D 1557-02. Fill soils placed at moisture contents outside this range of moisture content may be considered unacceptable at the discretion of the geotechnical engineer. The outer 15 feet of fill slopes should be composed of properly compacted granular soil.

6.4.9 In order to reduce the potential for differential settlement, transitional pads where permanent buildings are planned within a lot, the cut portion of a cut-fill transition pad within the building envelope be undercut at least 3 feet below ultimate finish-pad grade and replaced with properly compacted "low" to "medium" expansive fill soils. Selective undercutting may also be necessary if hard rock, concretions, or cemented zones are exposed at or near finish grade.

6.4.10 The upper 5 feet of all building pads (cut or fill) and 2 feet in pavement areas should be composed of properly compacted or undisturbed formational "low" to "medium" expansive soils. Fill soils with a high expansion potential should be placed in the deeper fill areas and properly compacted. "Low" to "medium" expansive soils are defined as those soils that have an Expansion Index of 90 or less when tested in accordance with UBC Table 18-I-B. Rocks greater than 12 inches in maximum dimension should not be placed in accordance with Section 6 of Appendix C.

6.4.11 Highly expansive soils should not be placed within the upper 5 feet of finished pad grade. Bentonite (if encountered) with "very high" expansive potential (EI greater than 130) should not be placed within 10 feet of finish grade. Similarly, cut lots containing highly expansive soils within 5 feet of finish grade should be undercut 5 feet and capped with low to medium expansive materials.

6.4.12 Where bentonitic clays are present within 10 feet of finish grade on cut lots, this condition should be evaluated on an individual lot basis and mitigative measures will be provided in updated geotechnical reports once building location and anticipated structural loading are determined.

6.5 Bulking and Shrinkage

6.5.1 Estimates of embankment bulking and shrinkage factors are typically based on comparing laboratory compaction tests with the density of the material in its natural state as encountered in the test borings. It should be emphasized that variations in existing soil density, as well as

in compacted fill densities, render shrinkage value estimates very approximate. As an example, the contractor can compact the fill soils to any relative compaction of 90 percent or higher of the maximum laboratory density. Thus, the contractor has approximately a 10 percent range of control over the fill volume. Based on our experience on nearby sites, in our opinion the following shrinkage factors can be used as a basis for estimating how much the on-site soils may shrink or swell (bulk) when excavated from their existing state and placed as compacted fills.

TABLE 6.5
SHRINKAGE AND BULK FACTORS

Soil Unit	Shrink/Bulk Factor
Undocumented Fill Soil (sandy portion)	15 percent Shrink
Topsoil and Alluvium	10 to 15 percent Shrink
Otay Formation	5 to 10 percent Bulk
Unnamed Fanglomerate	10 to 15 percent Bulk
Santiago Peak Volcanics	15 to 20 percent Bulk

6.6 Seismic Design Criteria

6.6.1 For seismic design, the following table summarizes site-specific design criteria per the 2000 CBC. The values listed on Table 6.6 are for Type A and B faults.

TABLE 6.6
SEISMIC DESIGN PARAMETERS

Parameter	Value	CBC Reference
Seismic Zone Factor	0.40	Table 16-I
Soil Profile Type	S_C	Table 16-J
Seismic Coefficient, C_a	0.40	Table 16-Q
Seismic Coefficient, C_v	0.56	Table 16-R
Near-Source Factor, N_a	1.0	Table 16-S
Near Source Factor, N_v	1.0	Table 16-T
Seismic Source	A/B	Table 16-U

6.7 Foundations

6.7.1 The following recommendations are for one- or two-story structures and assume that the grading operations will be performed as indicated in this report. The project is suitable for

the use of continuous strip footings, isolated spread footings, or appropriate combinations thereof. Continuous footings for one- and/or two-story structures should be at least 12 inches wide and should extend at least 18 inches below lowest adjacent pad grade into properly compacted fill soils or competent formational materials. Isolated spread footings should be at least 2 feet wide and extend at least 18 inches below lowest adjacent grade. Figure 7 presents a construction detail depicting the depth to lowest adjacent grade. Minimum continuous footing reinforcement for one- and/or two-story structures should consist of four No. 4 steel reinforcing bars placed horizontally in the footings, two near the top and two near the bottom. Recommendations for reinforcement of isolated spread footings should be provided by the project structural engineer.

6.7.2 The recommended dimensions and steel reinforcement presented above are based on soil characteristics only and are not intended to be in lieu of reinforcement necessary to satisfy structural loading. Actual reinforcement of the foundations should be designed by the project structural engineer.

6.7.3 The recommended allowable bearing capacity for foundations designed as recommended above is 2,500 pounds per square foot (psf) and 4,000 psf for 18-inch-deep footings founded in compacted fill and formational materials, respectively. The values presented above are for dead plus live loads and may be increased by one-third when considering transient loads due to wind or seismic forces.

6.7.4 Foundation excavations should be observed by the geotechnical engineer (a representative of Geocon Incorporated) prior to the placement of reinforcing steel and concrete to verify that the exposed soil conditions are consistent with those anticipated. If unanticipated soil conditions are encountered, foundation modifications may be required.

6.7.5 Footings located within 7 feet of the top of slopes are not recommended. However, footings that must be located within this zone should be extended in depth such that the outer bottom edge of the footing is at least 7 feet horizontally inside the face of the slope.

6.8 Concrete Slabs-on-Grade

6.8.1 Interior concrete slabs-on-grade for office usage should be at least 5 inches thick and should be underlain by at least 4 inches of clean sand. Where moisture-sensitive floor coverings are planned, a visqueen moisture barrier should be provided and placed at the mid-point within the 4-inch sand cushion. Where heavy concentrated floor loads or light to medium forklift loads are anticipated, the slab thickness should be increased to 6 inches and underlain by 4 inches of Class 2 base rock material compacted to 95 percent relative

compaction. If heavy forklift loads are anticipated, the slab thickness should be increased to 7 inches and should be underlain by at least 6 inches of Class 2 base rock material. The allowable soil bearing pressure under slabs with medium expansive soils is 1,500 pounds per square foot.

6.8.2 Minimum reinforcement of slabs-on-grade placed on low to medium expansive soil should consist of No. 3 reinforcing bars placed at 18 inches on center in both horizontal directions. The concrete slabs-on-grade should also be provided with dowels extended from the slabs to footings and walls.

6.8.3 The concrete slab-on-grade recommendations are minimums based on soil support characteristics only. It is recommended that the project structural engineer evaluate the structural requirements of the concrete slabs for supporting equipment and storage loads.

6.8.4 All exterior concrete flatwork not subject to vehicular traffic should conform to the following recommendations. Slab panels in excess of 8 feet square should be at least 4 inches thick and should be reinforced with 6x6-W2.9/W2.9 (6x6-6/6) welded wire mesh to reduce the potential for cracking. In addition, all concrete flatwork should be provided with crack-control joints to reduce and/or control shrinkage cracking. Crack-control spacing should be determined by the project structural engineer based upon the slab thickness and intended usage. Criteria of the American Concrete Institute (ACI) should be taken into consideration when establishing crack-control spacing. Subgrade soils for exterior slabs should be compacted in accordance with criteria presented in the grading section of this report. The subgrade soils should not be allowed to dry prior to placing concrete.

6.8.5 The recommendations presented herein are intended to reduce the potential for cracking of slabs and foundations as a result of differential movement due to medium-expansive soils. However, even with the incorporation of these recommendations, foundations and slabs-on-grade will still exhibit some cracking. The occurrence of concrete shrinkage cracks is independent of the soil supporting characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, the use of crack control joints, and proper concrete placement and curing. Crack-control joints should be spaced at intervals no greater than 12 feet. Literature provided by the Portland Cement Association (PCA) and American Concrete Institute (ACI) present recommendations for proper concrete mix, construction and curing practices, and should be incorporated into project construction.

6.9 Retaining Walls and Lateral Loads

6.9.1 Retaining walls that are allowed to rotate more than 0.001H (where H equals the height of the retaining position of the wall) and having a level backfill surface should be designed for an active soil pressure equivalent to the pressure exerted by a fluid with a density of 35 pounds per cubic foot (pcf). Where the backfill will be inclined at no steeper than 2:1 (horizontal:vertical), an active soil pressure of 50 pcf is recommended. These soil pressures assume that the backfill materials within an area bounded by the wall and a 1:1 plane extending upward from the base of the wall possesses an Expansion Index of less than 50. Where backfill materials do not conform to the above criteria, Geocon Incorporated should be consulted for additional recommendations.

6.9.2 Where walls are restrained from movement at the top, an additional uniform pressure of 7H psf (where H equals the height of the retaining wall portion of the wall in feet) should be added to the active soil pressure presented above. For retaining walls subject to vehicular loads within a horizontal distance equal to two-thirds of the wall height, a surcharge equivalent to 2 feet of fill soil (240 psf) should be added to the loading diagram.

6.9.3 All retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and should be waterproofed as required by the project architect. The use of drainage openings through the base of the wall (weep holes, etc.) is not recommended where the seepage could be a nuisance or otherwise adversely impact the property adjacent to the base of the wall. The above recommendations assume a properly compacted granular (Expansion Index less than 50) backfill material with no hydrostatic forces or imposed surcharge load. If conditions different than those described are anticipated, Geocon Incorporated should be contacted for additional recommendations. A typical retaining wall drainage detail is provided on Figure 8.

6.9.4 In general, wall foundations having a minimum depth and width of 1 foot may be designed for an allowable soil bearing pressure of 2,000 psf, provided the soil within 3 feet below the base of the wall has an Expansion Index of less than 90. The proximity of the foundation to the top of a slope steeper than 3:1 could impact the allowable soil bearing pressure. Therefore, Geocon Incorporated should be consulted where such a condition is anticipated.

6.9.5 For resistance to lateral loads, an allowable passive earth pressure equivalent to a fluid with a density of 300 pcf and 400 psf is recommended for footings or shear keys poured neat against properly compacted granular fill soils and undisturbed formational materials, respectively. The allowable passive pressure assumes a horizontal surface extending at least 5 feet or three times the surface generating the passive pressure, whichever is greater.

The upper 12 inches of material not protected by floor slabs or pavement should not be included in the design for lateral resistance. An allowable friction coefficient of 0.35 may be used for resistance to sliding between soil and concrete. This friction coefficient may be combined with the allowable passive earth pressure when determining resistance to lateral loads.

6.10 Slope Stability

6.10.1 Slope stability analyses using laboratory shear strength information and experience with similar soil conditions in nearby areas indicate that 2:1 (horizontal:vertical) fill slopes constructed of on-site granular materials should have calculated factors of safety of at least 1.5 under static conditions for both deep-seated failure and shallow sloughing conditions for heights of 33 feet. Figure 10 presents slope stability calculations. The 2:1 cut slopes are expected to be excavated predominantly in the Otay Formation. Based on the calculations presented on Figure 11 and experience with similar conditions, 2:1 cut slopes to the planned heights should possess a factor of safety of at least 1.5 with respect to slope stability if free of adversely oriented bedding, joints or fractures. Slope stability calculations for deep-seated and surficial stability conditions are presented on Figures 10 through 13.

6.10.2 Keying and benching operations during grading of the slopes should be performed in accordance with Appendix C. Due to the presence of highly weathered Otay Formation at some locations, keying operations may extend deeper than normal (on the order of 3 to 5 feet).

6.10.3 Cut slopes within the Otay Formation may require further evaluation due to the possible presence of claystone and siltstone lenses. Stability fills may be necessary to prevent surficial sloughage of the slope faces. The potential presence of bentonitic clay lenses and the associated slope stability considerations can be addressed at the time of grading.

6.10.4 We recommend that all cut slope excavations be observed during grading by an engineering geologist to check that soil and geologic conditions do not differ significantly from those anticipated.

6.10.5 The outer 15 feet (or a distance equal to the height of the slope, whichever is less) of fill slopes should be composed of properly compacted granular "soil" fill to reduce the potential for surficial sloughing. In general, soils with an Expansion Index of less than 90 or at least 35 percent sand size particles should be acceptable as "granular" fill. Slopes should be compacted by backrolling with a loaded sheepsfoot roller at vertical intervals not

to exceed 4 feet and should be track-walked at the completion of each slope such that the fill soils are uniformly compacted to at least 90 percent relative compaction to the face of the finished slope.

6.10.6 All slopes should be landscaped with drought-tolerant vegetation having variable root depths and requiring minimal landscape irrigation. In addition, all slopes should be drained and properly maintained to reduce erosion. Slope planting should generally consist of drought-tolerant plants having a variable root depth. Slope watering should be kept to a minimum to just support the plant growth.

6.11 Preliminary Pavement Recommendations

6.11.1 The following recommendations are for preliminary purposes and are provided for interior streets, light vehicle traffic, and parking areas. The final pavement section design will depend upon soil conditions exposed at subgrade elevation and the results of additional Resistance Value (R-Value) tests following grading. The Traffic Indices are estimates and will require evaluation of traffic loads by the project civil engineer. The following preliminary pavement section recommendations are for the on-site low to medium expansive soils. Sections are presented for flexible (asphalt concrete) pavement:

TABLE 6.11
PRELIMINARY PAVEMENT RECOMMENDATIONS
(R-VALUE = 25)

Location	Traffic Index	Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
Parking Stalls (automobiles)	4.5	3	5
Interior Streets (light vehicular traffic)	5.5	3	8
Interior Streets (heavy vehicular traffic)	7.0	4	10.5

6.11.2 Pavement subgrade soils should be scarified, moisture conditioned, and recompacted to a minimum of 95 percent relative compaction as determined by ASTM D 1557-02. The depth of compaction should be at least 12 inches. Class 2 base course material should be moisture conditioned to near optimum moisture content and compacted to a minimum of 95 percent relative compaction as determined by ASTM D 1557-02.

6.11.3 Class 2 base should conform to Section 26-1.02B of the *Standard Specifications for the State of California Department of Transportation (Caltrans)*. The asphalt concrete should

conform to Section 203-6 of the *Standard Specifications for Public Works Construction (Greenbook).*

6.11.4 The performance of asphalt concrete pavement is highly dependent upon providing positive surface drainage away from the edge of the pavement. Ponding of water on or adjacent to the pavement may result in pavement distress and subgrade failure. In addition, the surface drainage within planters should be such that ponding will not occur. Perimeter curbs adjacent to landscaped areas should extend to at least 12 inches below subgrade elevation to act as a cutoff to moisture migration.

6.12 Minimum Resistivity, pH and Water-Soluble Sulfate

6.12.1 Laboratory test results indicate very low sulfate content with negligible sulfate exposure ratings according to California Building Code Table No. 19-A-4. Minimum resistivity test results indicated a moderate corrosion potential with respect to buried metals. Tests results are presented on Table B-V. These tests were performed on samples selected at random and may not be representative of the actual corrosive potential of all the soils that will be exposed during the phases of grading and construction.

6.12.2 Geocon Incorporated does not practice in the field of corrosion engineering. Therefore, if corrosion-sensitive improvements are planned, it is recommended that further evaluation by a corrosion engineer be performed to incorporate the necessary precautions to avoid premature corrosion concrete or buried metal in direct contact with the soils.

6.13 Site Drainage and Moisture Protection

6.13.1 Adequate drainage is critical to reduce the potential for differential soil movement, erosion, and subsurface seepage. Under no circumstances should water be allowed to pond adjacent to footings. The site should be graded and maintained such that surface drainage is directed away from structures and the top of slopes into swales or other controlled drainage devices. Roof and pavement drainage should be directed into conduits that carry runoff away from the proposed structure.

6.13.2 Landscaping planters adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. We recommend that subdrains to collect excess irrigation water and transmit it to drainage structures or impervious above-grade planter boxes be used. In addition, where landscaping is planned adjacent to the pavement, a cutoff wall along the edge of the pavement that extends at least 12 inches below the subgrade should be constructed.

6.14 Grading Plan Review

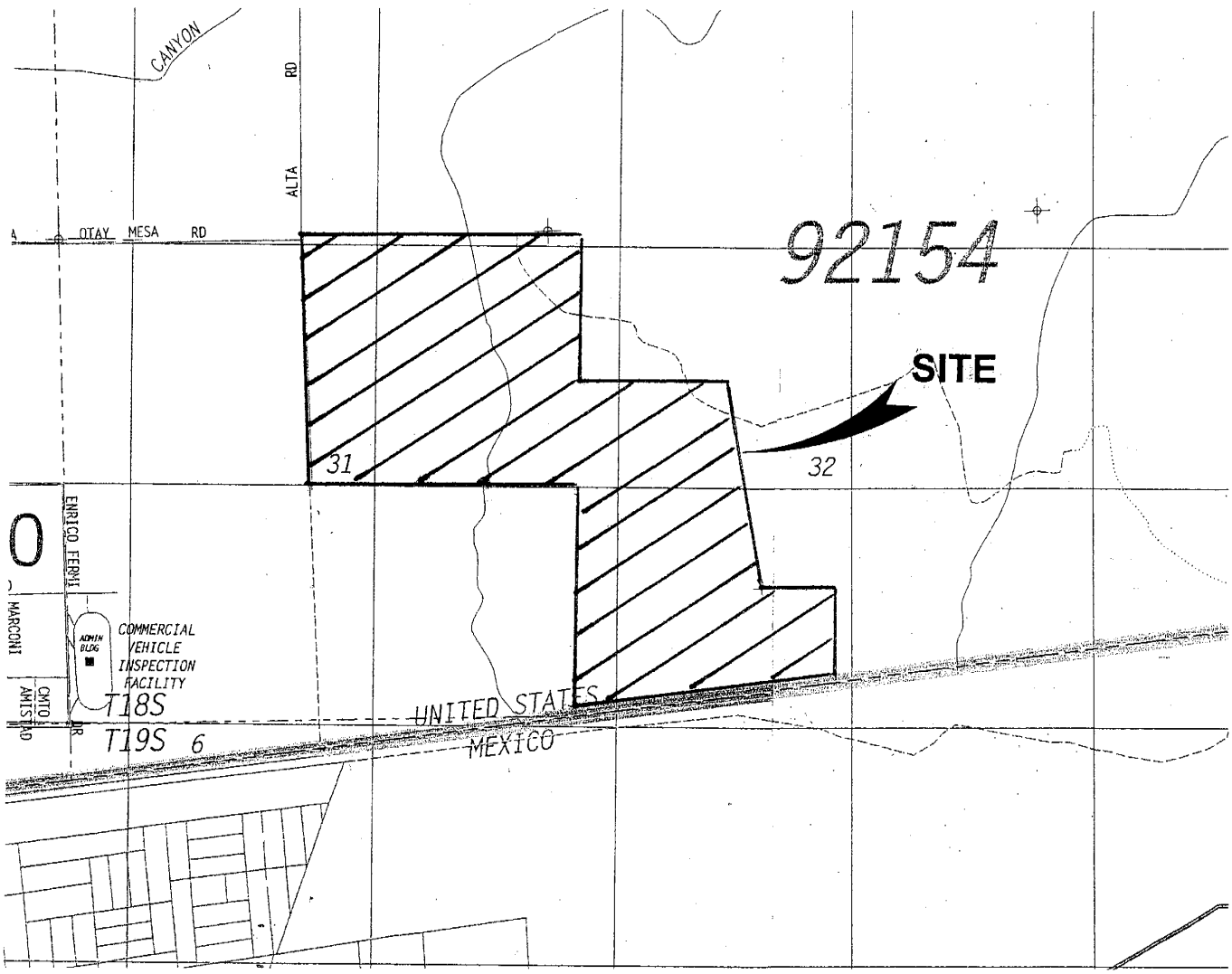
6.14.1 The geotechnical engineer or engineering geologist should review the Grading Plans prior to finalization to verify their compliance with the recommendations of this report and determine the need for additional investigation, comments, recommendations, and/or analysis.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Incorporated should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon Incorporated.

2. This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.



SOURCE: 2004 THOMAS BROTHER MAP
SAN DIEGO COUNTY, CALIFORNIA

N

NO SCALE

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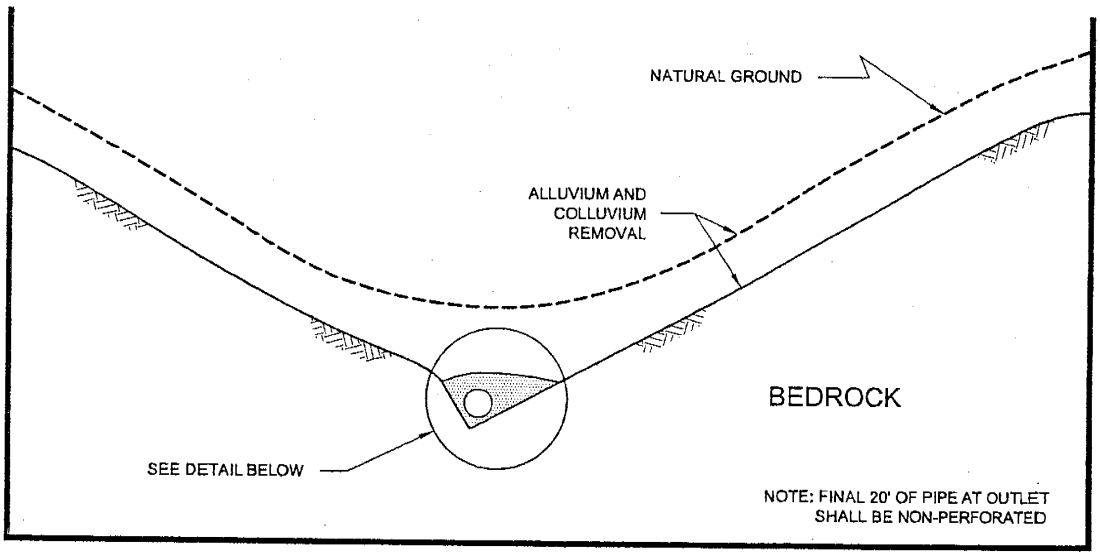
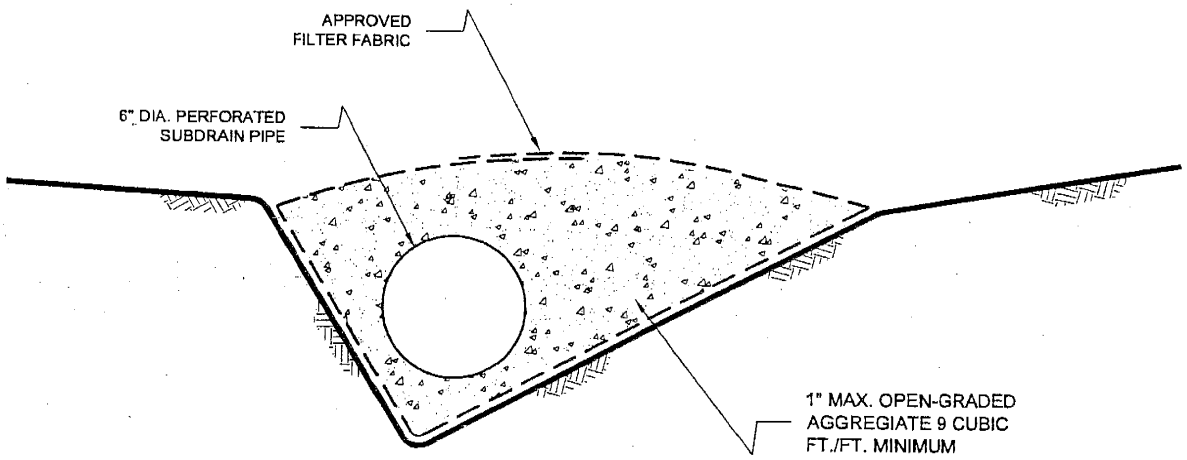
VICINITY MAP

310 ACRE PROPERTY
ALTA ROAD AND OTAY MESA ROAD
SAN DIEGO COUNTY, CALIFORNIA

DATE 7-15-04 | PROJECT NO. 07149-22-02 | FIG. 1





NOTES:

1.....SUBDRAIN PIPE SHOULD BE 6-INCH MINIMUM DIAMETER, PERFORATED, THICK WALLED SCHEDULE 40 PVC, SLOPED TO DRAIN AT 1 PERCENT MINIMUM AND CONNECTED TO STORM DRAIN SYSTEM OR APPROVED OUTLET.

2.....FILTER FABRIC TO BE MIRAFI 140N OR EQUIVALENT

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TYPICAL CANYON SUBDRAIN DETAIL

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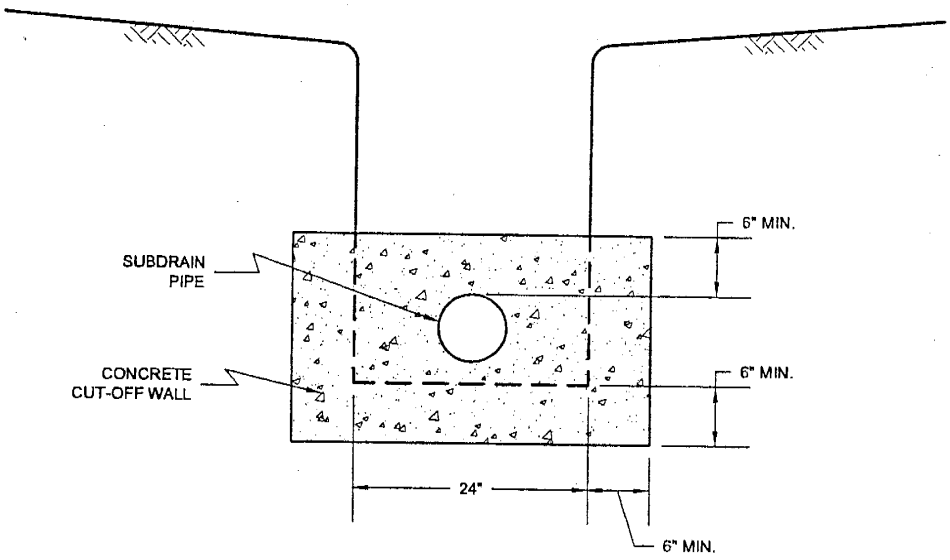
SAN DIEGO COUNTY, CALIFORNIA

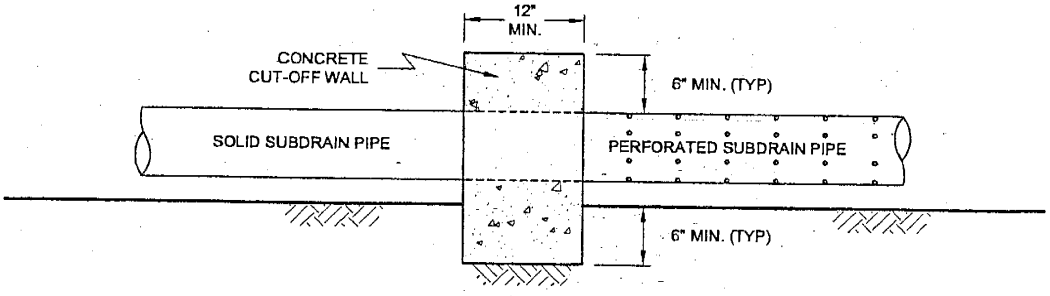
DATE 7-15-04	PROJECT NO. 07149-22-02	FIG. 4

FRONT VIEW



NO SCALE

SIDE VIEW



NO SCALE

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RECOMMENDED SUBDRAIN CUT OFF WALL

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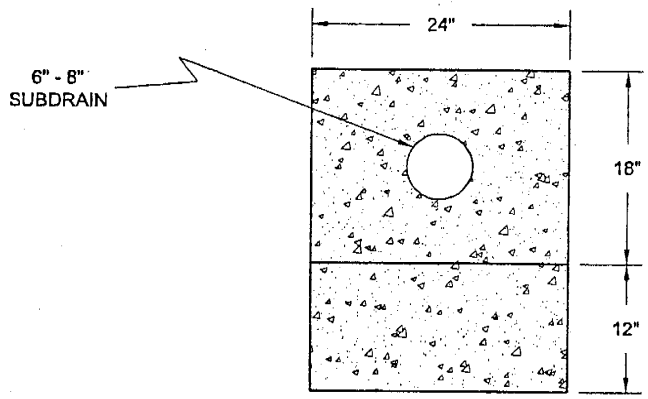
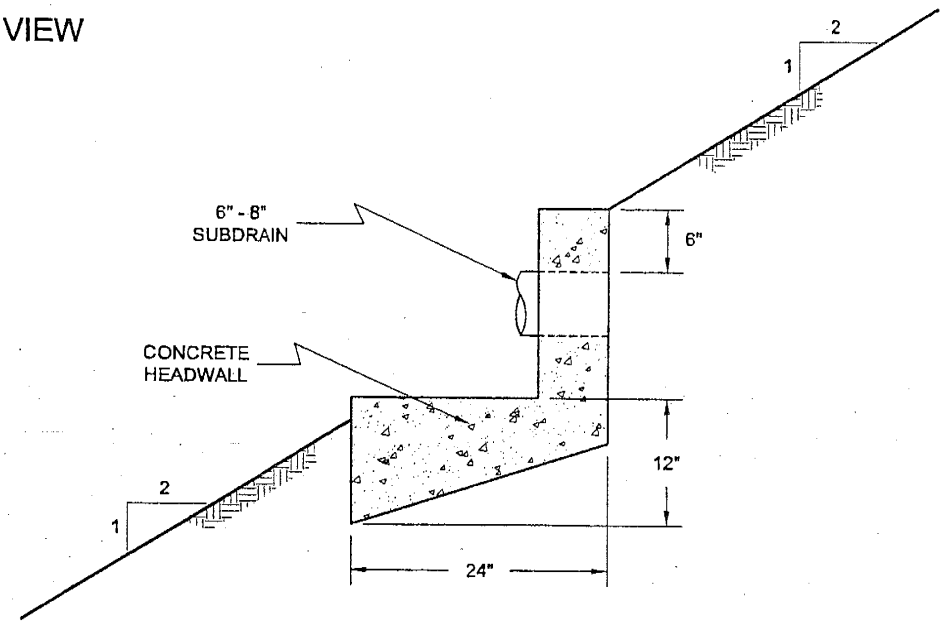
DATE 7-15-04 | PROJECT NO. 07149-22-02 | FIG. 5

FRONT VIEW



NO SCALE

SIDE VIEW



NOTE: HEADWALL SHOULD OUTLET AT TOE OF FILL SLOPE OR INTO CONTROLLED SURFACE DRAINAGE

NO SCALE

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SUBDRAIN OUTLET HEADWALL DETAIL

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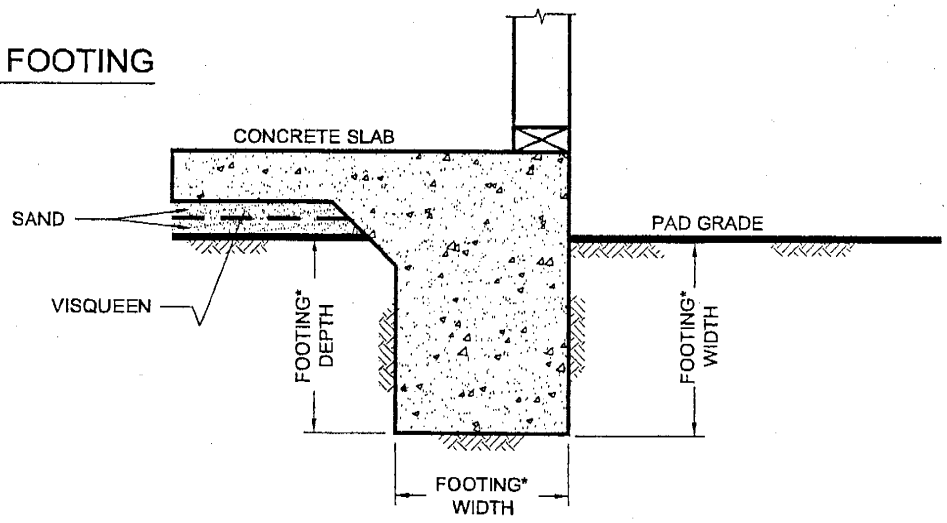
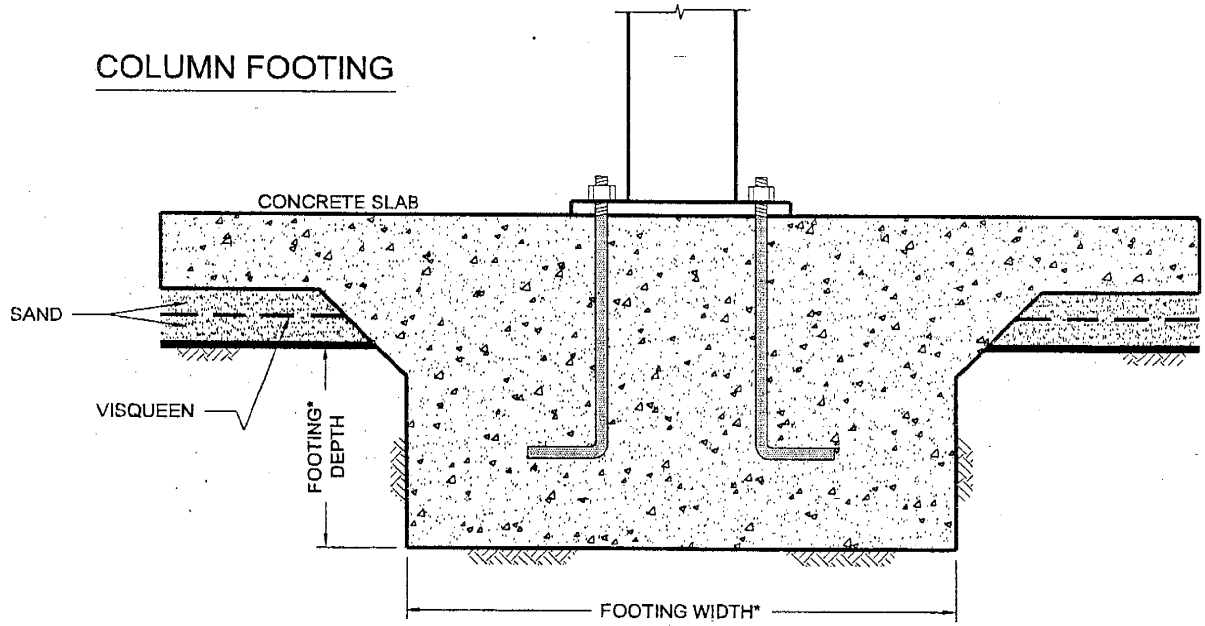
SAN DIEGO COUNTY, CALIFORNIA

DATE 7-15-04	PROJECT NO. 07149-22-02	FIG. 6

WALL FOOTING



COLUMN FOOTING



NO SCALE

*....SEE REPORT FOR FOUNDATION WITDH AND DEPTH RECOMMENDATION

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WALL/COLUMN FOOTING DIMENSION DETAIL

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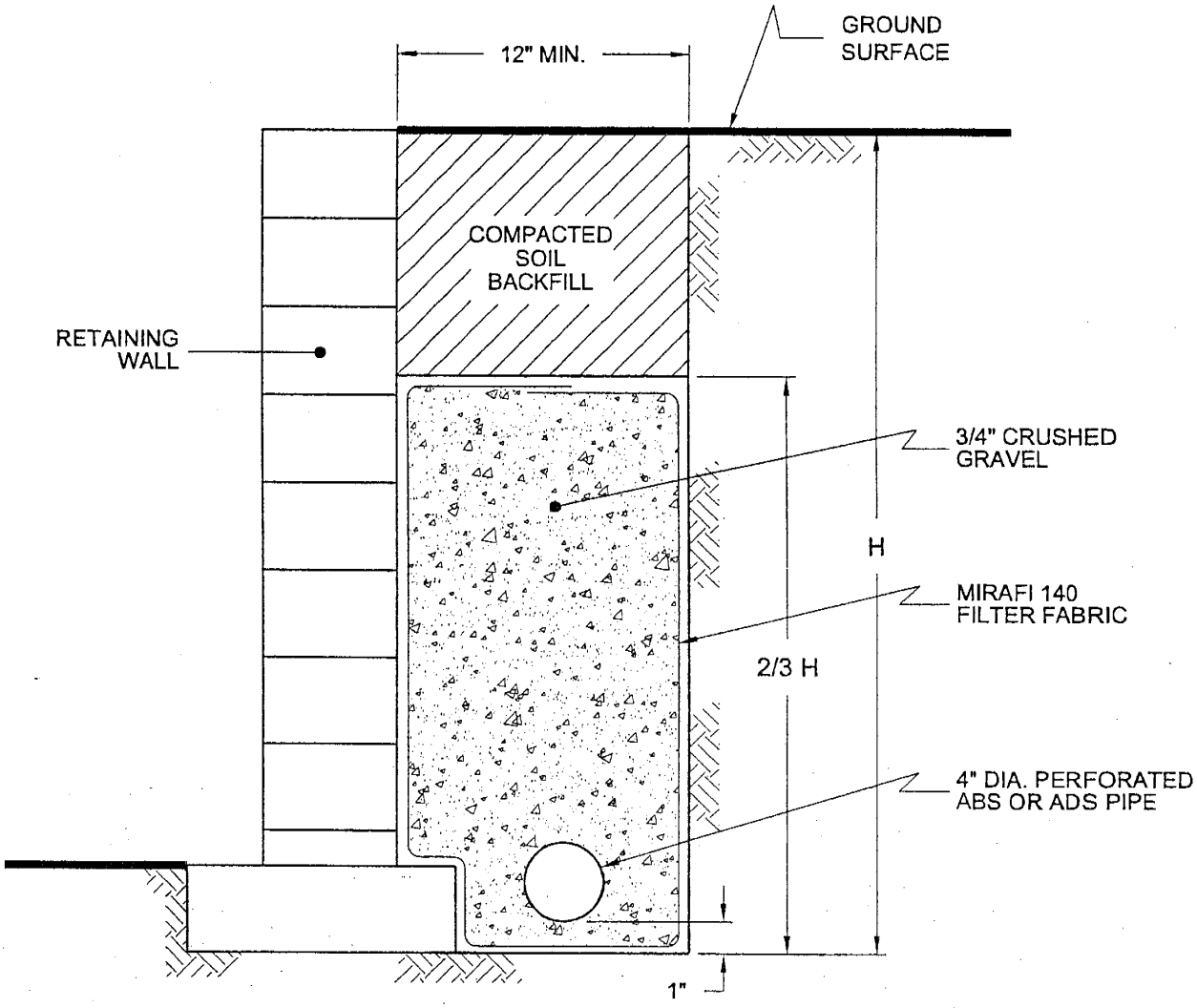
DATE 7-15-04 | PROJECT NO. 07149-22-02 | FIG. 7



NOTES:

1.....PIPE TO DRAIN AT A MINIMUM GRADIENT OF 1% AND CONNECTED TO A SUITABLE OUTLET

NO SCALE

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RETAINING WALL DRAINAGE DETAIL

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SAN DIEGO COUNTY, CALIFORNIA

DATE 7-15-04 | PROJECT NO. 07149-22-02 | FIG. 8

ASSUMED CONDITIONS:

Slope Height	H	= 20	feet
Slope Inclination	2:1 (Horizontal :Vertical)		
Total Unit Weight of Soil	γ_t	= 118.6	pounds per cubic foot
Angle of Internal Friction	ϕ	= 30	degrees
Apparent Cohesion	C	= 800	pounds per square foot
No Seepage Forces			

ANALYSIS:

$\gamma_{c\phi} = \frac{\gamma H \tan\phi}{C}$ Equation (3-3), Reference 1

$FS = \frac{N_{cf} C}{\gamma H}$ Equation (3-2), Reference 1

$\gamma_{c\phi} = 1.7$ Calculated Using Eq. (3-3)

$N_{cf} = 11.5$ Determined Using Figure 10, Reference 2

$FS = 3.9$ Factor of Safety Calculated Using Eq. (3-2)

REFERENCES:

(1) Janbu, N., Stability Analysis of Slopes with Dimensionless Parameters, Harvard Soil Mechanics, Series No. 46, 1954.

(2) Janbu, N., Discussion of J. M. Bell, Dimensionless Parameters for Homogeneous Earth Slopes, Journal of Soil Mechanics and Foundation Design, No. SM6, November 1967.

FILL SLOPE STABILITY ANALYSIS

310 ACRE PROPERTY
ALTA ROAD AND OTAY MESA ROAD
SAN DIEGO COUNTY, CALIFORNIA

FIGURE 9

ASSUMED CONDITIONS:

Slope Height	H	= 30	feet
Slope Inclination	2:1 (Horizontal :Vertical)		
Total Unit Weight of Soil	γ_t	= 115.4	pounds per cubic foot
Angle of Internal Friction	ϕ	= 32	degrees
Apparent Cohesion	C	= 600	pounds per square foot
No Seepage Forces			

ANALYSIS:

$\gamma_{c\phi} = \frac{\gamma H \tan\phi}{C}$ Equation (3-3), Reference 1

$FS = \frac{N_{cf} C}{\gamma H}$ Equation (3-2), Reference 1

$\gamma_{c\phi}$ = 3.6 Calculated Using Eq. (3-3)

N_{cf} = 16 Determined Using Figure 10, Reference 2

FS = 2.8 Factor of Safety Calculated Using Eq. (3-2)

REFERENCES:

(1) Janbu, N., Stability Analysis of Slopes with Dimensionless Parameters, Harvard Soil Mechanics, Series No. 46, 1954.

(2) Janbu, N., Discussion of J. M. Bell, Dimensionless Parameters for Homogeneous Earth Slopes, Journal of Soil Mechanics and Foundation Design, No. SM6, November 1967.

CUT SLOPE STABILITY ANALYSIS

310 ACRE PROPERTY
ALTA ROAD AND OTAY MESA ROAD
SAN DIEGO COUNTY, CALIFORNIA

FIGURE 10

ASSUMED CONDITIONS:

Slope Height	H	=	Infinite	
Depth of Saturation	Z	=	3	feet
Slope Inclination	2:1	(Horizontal:Vertical)		
Slope Angle	i	=	26.6	degrees
Unit Weight of Water	γ_w	=	62.4	pounds per cubic foot
Total Unit Weight of Soil	γ_t	=	118.6	pounds per cubic foot
Angle of Internal Friction	ϕ	=	30	degrees
Apparent Cohesion	C	=	800	pounds per square foot

Slope saturated to vertical depth Z below slope face.
Seepage forces parallel to slope face

ANALYSIS:

$$FS = \frac{C + (\gamma_t - \gamma_w) Z \cos^2 i \tan \phi}{\gamma_t Z \sin i \cos i} = 6.2$$

REFERENCES:

(1) Haefeli, R. *The Stability of Slopes Acted Upon by Parallel Seepage,* Proc. Second International Conference, SMFE, Rotterdam, 1948, 1, 57-62.

(2) Skempton, A. W., and F. A. Delory, *Stability of Natural Slopes in London Clay*, Proc. Fourth International Conference, SMFE, London, 1957, 2, 378-81.

SURFICIAL FILL SLOPE STABILITY ANALYSIS

310 ACRE PROPERTY
ALTA ROAD AND OTAY MESA ROAD
SAN DIEGO COUNTY, CALIFORNIA

FIGURE 11

ASSUMED CONDITIONS:

Slope Height	H	=	Infinite	
Depth of Saturation	Z	=	3	feet
Slope Inclination	2:1	(Horizontal:Vertical)		
Slope Angle	i	=	26.6	degrees
Unit Weight of Water	γ_w	=	62.4	pounds per cubic foot
Total Unit Weight of Soil	γ_t	=	115.4	pounds per cubic foot
Angle of Internal Friction	ϕ	=	32	degrees
Apparent Cohesion	C	=	600	pounds per square foot

Slope saturated to vertical depth Z below slope face.
Seepage forces parallel to slope face

ANALYSIS:

$$FS = \frac{C + (\gamma_t - \gamma_w) Z \cos^2 i \tan \phi}{\gamma_t Z \sin i \cos i} = 4.9$$

REFERENCES:

(1) Haefeli, R. *The Stability of Slopes Acted Upon by Parallel Seepage,* Proc. Second International Conference, SMFE, Rotterdam, 1948, 1, 57-62.

(2) Skempton, A. W., and F. A. Delory, *Stability of Natural Slopes in London Clay*, Proc. Fourth International Conference, SMFE, London, 1957, 2, 378-81.

SURFICIAL CUT SLOPE STABILITY ANALYSIS

310 ACRE PROPERTY
ALTA ROAD AND OTAY MESA ROAD
SAN DIEGO COUNTY, CALIFORNIA

FIGURE 12

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

The field investigation was performed between March 25 and April 20, 2004 and consisted of performing a site reconnaissance, excavating 42 exploratory trenches, and conducting 4 seismic-refraction traverses at the approximate locations shown on Figure 2. The trenches were excavated using a Case 580 Super L rubber tire backhoe. Bulk and chunk samples were obtained from the excavations.

The soil conditions encountered in the trenches were visually examined, classified and logged in general accordance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D 2488). The logs of the exploratory trenches are presented on Figures A-1 through A-42. The logs depict the various soil types encountered and indicate the depths at which samples were obtained.

The seismic refraction traverses were conducted with a Bison, 2-channel seismograph unit. The traverses were approximately 100 feet in length and were performed in both a forward and reverse direction. Typically, the depth evaluated by a seismic survey is on the order of one-third of the traverse length which generally correlates to 30 feet for a 100 foot traverse. The approximate locations of the seismic refraction traverses are shown on the *Geologic Map* (Figure 2). The results of the seismic survey and interpretation are presented in Table A-I.

PROJECT NO. 07149-22-02

TRENCH T 1

ELEV. (MSL.) 627 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	T1-1	CL-CH	**TOPSOIL** Stiff to hard, damp to moist, dark yellowish brown, CLAY, porous, fractured			
2	T1-2	ML	**OTAY FORMATION** Stiff to hard, damp to moist, very pale orange, SILT, very porous, abundant krotovina, weathered		79.7	14.0
4	T1-3					
	T1-4	SM	Medium dense, damp, yellowish gray, Silty, fine to medium SAND		106.0	8.6
6	T1-5					
	T1-6				104.2	13.2
8						
10						
12	T1-7				108.0	15.6
	T1-8					
14						
16			TRENCH TERMINATED AT 16 FEET			

Figure A-1,
Log of Trench T 1, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 07149-22-02

TRENCH T 2

ELEV. (MSL.) 610 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL-CH	**TOPSOIL** Soft, moist, dark yellowish brown, CLAY, abundant roots, porous			
2	T2-1			ML	**OTAY FORMATION** Stiff to hard, damp to moist, very pale orange, SILT, porous, krotovina		83.3	12.8
4					Medium dense, damp, yellowish gray, Silty, fine to medium SAND			
6	T2-2 T2-3						129.6	4.7
8	T2-4			SM			110.0	9.6
10								
12					TRENCH TERMINATED AT 12 FEET			

Figure A-2,
Log of Trench T 2, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 3

ELEV. (MSL.) 585 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	T3-1			CH	**TOPSOIL** Soft, moist to wet, dark yellowish brown, CLAY, porous, abundant roots			
2				CL-CH	**OTAY FORMATION** Soft, moist, very pale orange, CLAY			
4				CL	Stiff, moist, very pale orange to yellowish gray, CLAY, krotovina			
6	T3-2 T3-3							
8								
10	T3-4						98.8	18.7
12								
14					TRENCH TERMINATED AT 14 FEET			

Figure A-3,
Log of Trench T 3, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 4

ELEV. (MSL.) 574 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL-CH	**TOPSOIL** Soft, moist to wet, dark yellowish brown, CLAY, porous, abundant roots			
2								
				CL-CH	**OTAY FORMATION** Soft, moist, very pale brown CLAY, numerous krotovina			
4	T4-1				Stiff to hard, moist, very pale brown, CLAY		91.8	10.0
6	T4-2			CL			94.7	15.3
8					Dense, moist, yellowish gray to pale brown, Silty, fine to medium SAND			
	T4-3			SM			124.7	8.9
10								
12					TRENCH TERMINATED AT 12 FEET			

Figure A-4,
Log of Trench T 4, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 5

ELEV. (MSL.) 536 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T5-1			CH	**ALLUVIUM** Very soft, moist to wet, dark yellowish brown, CLAY, abundant carbonate, numerous roots			
2								
4				CL	Stiff, moist, moderate yellowish brown, CLAY with Sand, abundant carbonate, porous			
	T5-2						101.4	13.4
6	T5-3							
8				SM	**OTAY FORMATION** Dense, moist, yellowish gray, Silty SAND, porous			
10	T5-4						103.5	21.1
					TRENCH TERMINATED AT 11 FEET			

Figure A-5,
Log of Trench T 5, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 6

ELEV. (MSL.) 528 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL-CH	**ALLUVIUM** Soft, moist to wet, dark yellowish brown, CLAY			
2								
				ML	**OTAY FORMATION** Hard, dry, pinkish gray, SILT, porous, weathered			
4								
				SM	Dense, moist, yellowish gray, Silty SAND			
6								
					TRENCH TERMINATED AT 7 FEET			

Figure A-6,
Log of Trench T 6, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◥ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 07149-22-02

TRENCH T 7

ELEV. (MSL.) 548 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ALLUVIUM**			
				CL	Soft, moist, dark yellowish brown, CLAY with Sand, porous			
2	T7-1				Medium dense, moist, moderate yellowish brown, Silty SAND, porous			
	T7-2			SM				
4					**OTAY FORMATION**			
	T7-3				Stiff, moist, pale orange, CLAY, porous			
6	T7-4			CH			86.2	22.1
8					Dense, moist, yellowish gray, Silty SAND			
	T7-5			SM				
10					TRENCH TERMINATED AT 10 FEET			

Figure A-7,
Log of Trench T 7, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 8

ELEV. (MSL.) 558 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ALLUVIUM** Soft, moist to wet, dark yellowish brown, CLAY, porous, abundant roots in upper 1 foot			
2				CL				
4					**OTAY FORMATION** Stiff, moist, pale orange CLAY, porous			
6	T8-1			CL			97.8	13.7
					Medium dense, moist, yellowish gray, Silty SAND			
8				SM				
10					TRENCH TERMINATED AT 10 FEET			

Figure A-8,
Log of Trench T 8, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 9

ELEV. (MSL.) 565 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ALLUVIUM** Soft, moist, dark yellowish brown, CLAY			
2				CL-CH	-Becomes stiff, abundant carbonate, porous			
4				SM	Medium dense, moderate yellowish brown, Silty SAND, porous			
6								
8	T9-1				**OTAY FORMATION** Firm, moist, very pale orange, Clayey SAND/Sandy CLAY, porous		91.0	21.6
	T9-2			CL-SC				
	T9-3			SM	Medium dense, moist, yellowish gray, Silty SAND		107.5	19.4
10					TRENCH TERMINATED AT 10 FEET			

Figure A-9,
Log of Trench T 9, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 07149-22-02

TRENCH T 10

ELEV. (MSL.) 579 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ALLUVIUM** Soft, moist, dark yellowish brown, CLAY with Sand; numerous krotovina			
2				CL				
4								
6				SM	**OTAY FORMATION** Medium dense, moist, very pale olive and very pale orange, Silty SAND, porous			
8				SM	Becomes yellowish gray, Silty SAND			
					TRENCH TERMINATED AT 9 FEET			

Figure A-10,
Log of Trench T 10, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 11

ELEV. (MSL.) 586 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ALLUVIUM**			
					Soft to very soft, moist to wet, dark yellowish brown CLAY, porous			
2				CL-CH				
4								
	T11-1				**OTAY FORMATION**			
6	T11-2				Medium dense, moist, very pale brown, Silty SAND, porous, carbonate		91.5	20.7
				SM				
8	T11-3				-Yellowish gray, non-porous			
					TRENCH TERMINATED AT 9 FEET			

Figure A-11,
Log of Trench T 11, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 12

ELEV. (MSL.) 559 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	T12-1			SW-SC	**ALLUVIUM** Soft, moist, moderate to light brown, CLAY with Sand and gravel/well graded sand with clay and gravel, approximately 10 percent angular cobbles less than 10 inch diameter			
2								
4								
6					-Approximately 50 percent cobbles			
	T12-2			CL-CH	**OTAY FORMATION** Very hard, moist, pale brown, CLAY, cemented, shale appearance		95.1	23.9
8					TRENCH TERMINATED AT 8 FEET			

Figure A-12,
Log of Trench T 12, Page 1 of 1

07149-22-02.GPJ

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

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

PROJECT NO. 07149-22-02

TRENCH T 13

ELEV. (MSL.) 496 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T13-1			CL-CH	**TOPSOIL** Soft to firm, moist to very moist, dark brown, Silty CLAY, plastic			
2								
	T13-2			CH	**OTAY FORMATION** Hard, damp to moist, medium brown, CLAY, highly fractured, weathered, bentonitic			
4								
	T13-3			CH	Hard, damp, light brown, CLAY, highly fractured, bentonitic, carbonate on some partings			
6								
	T13-4			CL-CH	Hard, damp, orange brown, fine to very coarse, Sandy CLAY			
8					TRENCH TERMINATED AT 8 FEET			

Figure A-13,
Log of Trench T 13, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 14

ELEV. (MSL.) 480 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**ALLUVIUM** Firm, moist to very moist, dark brown, very fine Sandy, Silty CLAY			
2	T14-1			SC	Dense, moist to very moist, gravelly, Clayey, fine to very coarse SAND, trace cobble, sub-angular to sub-rounded			
4	T14-2			SC	**OTAY FORMATION** Very dense, damp, reddish orange and pale olive, Clayey, fine to very coarse SAND, carbonate			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-14,
Log of Trench T 14, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 15

ELEV. (MSL.) 483 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Firm, moist to very moist, dark brown, fine to medium Sandy CLAY			
2								
				SC	**OTAY FORMATION** Dense to very dense, moist, orange and pale olive, Clayey, fine to very coarse SAND			
4								
	T15-1							
6								
					TRENCH TERMINATED AT 7 FEET			

Figure A-15,
Log of Trench T 15, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◥ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 07149-22-02

TRENCH T 16

ELEV. (MSL.) 501 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Stiff, moist, medium brown, Silty CLAY, with very fine sand			
2				GW	**UNNAMED FANGLOMERATE** Very dense, moist, brown, Clayey, Sandy GRAVEL			
4								
6	T16-1			CH	**OTAY FORMATION** Very stiff to hard, green, CLAY, highly plastic, shiny partings			
					TRENCH TERMINATED AT 7 FEET			

Figure A-16,
Log of Trench T 16, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 17

ELEV. (MSL.) 443 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				SM	**TOPSOIL** Soft to firm, wet, brown, Silty CLAY			
2					**OTAY FORMATION** Firm to stiff, wet, brown, Gravelly CLAY, angular to sub-rounded clasts			
				CL				
4					Stiff to very stiff, wet, dark olive, CLAY, some pebble, shiny partings			
6	T17-1			CH				
8								
				SW	Dense, very moist, orange brown, Clayey, fine to coarse SAND with gravel			
					TRENCH TERMINATED AT 9 FEET			

Figure A-17,
Log of Trench T 17, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 18

ELEV. (MSL.) 490 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T18-1			CL	**TOPSOIL** Soft to firm, very moist to wet, dark brown, Silty CLAY			
2								
	T18-2			ML	**OTAY FORMATION** Firm, moist, light tan, very fine Sandy SILT, abundant carbonate			
4								
				ML	Firm to stiff, damp to moist, reddish tan, very fine Sandy SILT, laminated, abundant carbonate			
6								
				ML	Stiff, damp to moist, greenish tan, very fine Sandy SILT, laminated, abundant carbonate			
8								
					TRENCH TERMINATED AT 9 FEET			

Figure A-18,
Log of Trench T 18, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 19

ELEV. (MSL.) 511 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Soft to firm, very moist to wet, dark brown, Silty CLAY, sticky, abundant carbonate in lower portion			
2					-Gradational contact			
	T19-1			SM-ML	**OTAY FORMATION** Stiff, damp to moist, light olive tan, very fine Sandy SILT to Silty fine SAND, abundant carbonate in upper portion			
4								
6								
					TRENCH TERMINATED AT 7 FEET			

Figure A-19,
Log of Trench T 19, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 20

ELEV. (MSL.) 544 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Firm to stiff, moist to very moist, dark brown, Silty CLAY			
2								
				CL	Stiff, moist, dark brown, Silty CLAY, carbonate			
4					**OTAY FORMATION** Stiff, damp, light tan, Clayey SILT, with very fine sand, laminated, numerous krotovina in upper portion			
	T20-1			ML				
6								
					TRENCH TERMINATED AT 7 FEET			

07149-22-02.GPJ

Figure A-20,
Log of Trench T 20, Page 1 of 1

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 21

ELEV. (MSL.) 552 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T21-1			ML	**TOPSOIL** Soft to firm, moist, medium brown, Clayey, very fine Sandy SILT			
2					-Irregular sharp contact			
4				ML	**OTAY FORMATION** Firm, damp, light tan, very fine Sandy SILT with clay, highly fractured, carbonate, krotovina			
6								
					Stiff to very stiff, brownish tan, CLAY			
8	T21-2			CL				
					TRENCH TERMINATED AT 9 FEET			

Figure A-21,
Log of Trench T 21, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 22

ELEV. (MSL.) 515 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**ALLUVIUM** Firm, very moist, dark brown, Silty CLAY, trace sand			
2				ML-CL	**OTAY FORMATION** Stiff to hard, moist, light brown and olive, Silty CLAY to Clayey SILT, carbonate			
4	T22-1			CL	Firm to stiff, moist, orange brown, Silty CLAY, interbedded with hard, moist, olive, Silty CLAY, highly plastic, trace white bentonite			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-22,
Log of Trench T 22, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 23

ELEV. (MSL.) 554 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**ALLUVIUM** Soft, very moist, dark brown, Silty, fine to medium Sandy CLAY			
2	T23-1			SW-SC	Medium dense to dense, wet, dark brown, Clayey, gravelly fine to very coarse SAND, trace cobble			
4	T23-2			CL	**OTAY FORMATION** Fine to stiff, very moist to wet, olive green with white blebs, Silty CLAY			
				CL	Stiff to very stiff, very moist, olive green, Silty CLAY, laminated, blocky			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-23,
Log of Trench T 23, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 24

ELEV. (MSL.) 538 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**ALLUVIUM** Soft to firm, very moist to wet, dark brown, Silty Clay, trace gravel			
2				CL	Firm, very moist to wet, dark brown, Sandy CLAY with gravel			
4				CL	Firm to stiff, very moist to wet, dark brown with white blebs, fine Sandy CLAY, trace cobble			
6				CL	**OTAY FORMATION** Stiff, very moist, olive with white, CLAY, carbonate			
	T24-1			CL	Very stiff, moist to very moist, light olive brown, CLAY			
8					TRENCH TERMINATED AT 8 FEET			

Figure A-24,
Log of Trench T 24, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 25

ELEV. (MSL.) 554 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Soft to firm, moist, dark brown, Silty CLAY			
2				CL	**OTAY FORMATION** Hard, damp to moist, light brown, CLAY, layered (0.75-2 inches) blocky, cemented			
	T25-1							
4				CL	Hard, damp to moist, olive brown, CLAY, laminated			
				ML	Stiff to very stiff, moist, light tan, Clayey SILT			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-25,
Log of Trench T 25, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 26

ELEV. (MSL.) 579 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T26-1			ML-CL	**TOPSOIL** Soft to firm, moist, medium brown, Silty CLAY to Clayey SILT			
2								
	T26-2			SC	**OTAY FORMATION** Medium dense, moist, light tan, Silty, very fine SAND, numerous krotovina filled with dark brown Clayey, fine to medium SAND		120.6	8.9
4								
					Dense, damp, moist, light greenish tan, Silty, very fine SAND, to very fine Sandy SILT			
6	T26-3			SM-ML			110.1	6.2
8					TRENCH TERMINATED AT 8 FEET			

Figure A-26,
Log of Trench T 26, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 27

ELEV. (MSL.) 557 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				ML-CL	**TOPSOIL** Soft to firm, damp to moist, medium brown, Sandy, Silty CLAY to Sandy Clayey SILT			
2				ML	**OTAY FORMATION** Loose to dense, damp to moist, light tan, Sandy SILT, numerous krotovina filled with loose medium brown, Silty, very fine SAND			
4				SM	Dense to very dense, damp to moist, light tan, Silty, very fine SAND, trace clay			
6								
8					TRENCH TERMINATED AT 8 FEET			

Figure A-27,
Log of Trench T 27, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 28

ELEV. (MSL.) 560 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T28-1			CL	**TOPSOIL** Soft, moist, dark brown, Silty CLAY			
2				ML	Soft to firm, moist, light tan, Clayey SILT, heavily bioturbated			
4	T28-2			SM	**OTAY FORMATION** Firm to stiff, moist, light tan, Clayey SILT			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-28,
Log of Trench T 28, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 29

ELEV. (MSL.) 592 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T29-1			CL	**TOPSOIL** Soft to firm, moist, dark brown, Silty CLAY			
2				ML	**OTAY FORMATION** Firm to stiff, moist, light tan, Clayey SILT			
4	T29-2			ML	Hard, moist, light tan, Clayey SILT			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-29,
Log of Trench T 29, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 30 ELEV. (MSL.) 603 DATE COMPLETED 03-29-2004 EQUIPMENT CASE 580 SUPER L	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Soft, damp, red brown, Clayey SILT			
					Firm to stiff, moist, red brown, Silty CLAY			
2				CL				
					SANTIAGO PEAK VOLCANICS Highly weathered volcanic rock, degree of weathering, lessens with depth			
					TRENCH TERMINATED AT 3 FEET AT REFUSAL			

Figure A-30,
Log of Trench T 30, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 31

ELEV. (MSL.) 578 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T31-1			CL	**TOPSOIL** Soft, moist, dark brown, Silty, fine to medium Sandy CLAY, some gravel			
2				CL	Firm to stiff, dark brown with white blebs(calcium carbonate), Silty CLAY			
4	T31-2			CL	**OTAY FORMATION** Stiff, moist, medium brown, Silty CLAY			
				ML-CL	Very stiff, moist, light olive brown, Silty CLAY to Clayey SILT, laminated			
6								
8					TRENCH TERMINATED AT 8 FEET			

Figure A-31,
Log of Trench T 31, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 32

ELEV. (MSL.) 527 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				SC	**ALLUVIUM** Loose to medium dense, damp to moist, reddish brown, Clayey, very fine SAND			
2								
				SC-SW	Dense, moist, reddish brown, Clayey, fine to very coarse SAND, with cobble			
4								
6								
				CL	**OTAY FORMATION** Very stiff, moist, light greenish tan, Silty CLAY			
8					TRENCH TERMINATED AT 8 FEET			

Figure A-32,
Log of Trench T 32, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 33

ELEV. (MSL.) 515 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				ML-CL	**TOPSOIL** Soft to firm, damp, medium brown, Silty CLAY to Clayey SILT			
2				GW	**UNNAMED FANGLOMERATE** Dense, moist, yellowish brown, Clayey, fine to very coarse Sandy GRAVEL, with cobble			
4								
6					-Boulders to 24 inches, andesitic			
8								

Figure A-33,
Log of Trench T 33, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 34

ELEV. (MSL.) 528 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T34-1			CL	**TOPSOIL** Soft to firm, moist to very moist, dark brown to black, Silty CLAY, some fine sand			
2								
4	T34-2			CL	**OTAY FORMATION** Very stiff to hard, moist, olive, Silty CLAY, laminated			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-34,
Log of Trench T 34, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 35

ELEV. (MSL.) 680 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**TOPSOIL** Medium dense, moist, red brown, very fine Sandy SILT with gravel			
				CL	Stiff, moist to very moist, red brown, Silty CLAY with gravel, trace cobble			
2					**SANTIAGO PEAK VOLCANICS** Moderately to highly weathered, highly fractured rock			
					TRENCH TERMINATED AT 3.5 FEET AT REFUSAL			

Figure A-35,
Log of Trench T 35, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 36

ELEV. (MSL.) 596 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				ML	**TOPSOIL** Loose, damp, red brown, very fine Sandy SILT			
2					**SANTIAGO PEAK VOLCANICS** Moderate to highly weathered, highly fractured rock			
					TRENCH TERMINATED AT 2 FEET AT REFUSAL			

Figure A-36,
Log of Trench T 36, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 37

ELEV. (MSL.) 508 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**ALLUVIUM** Soft to firm, very moist, dark brown, Silty CLAY			
2					Very stiff, very moist, dark brown with red brown and yellow orange blebs (decomposed gravel), gravelly, fine to coarse Sandy CLAY			
	T37-1			CL				
4								
6				CL	**OTAY FORMATION** Very stiff to hard, very moist, olive green, Silty CLAY; with white blebs and strings (calcium carbonate)			
				CL	Very stiff to hard, very moist, light olive green, Silty CLAY			
8					TRENCH TERMINATED AT 8 FEET			

Figure A-37,
Log of Trench T 37, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 38

ELEV. (MSL.) 493 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**ALLUVIUM** Stiff, moist, dark brown, very fine Sandy CLAY			
2				SC-CL	Very stiff, moist to very moist, dark brown with red brown and yellow orange blebs (decomposed rock) gravelly, fine to very coarse Sandy CLAY to Clayey SAND			
4								
	T38-1			SM	**OTAY FORMATION** Very dense, moist, light olive green, Silty, fine SAND, cemented			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-38,
Log of Trench T 38, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 39

ELEV. (MSL.) 509 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Firm to stiff, moist, medium brown, very fine Sandy, Silty CLAY			
2				CL	Very stiff, moist, red brown, CLAY			
	T39-1				-Gradational contact			
4				SC-SW	**UNNAMED FANGLOMERATE** Dense, moist, red brown, gravelly, Clayey, fine to coarse SAND			
				GW	Very dense, white (calcium carbonate) and red brown, very fine to very coarse Sandy GRAVEL, with cobble, cemented			
					TRENCH TERMINATED AT 5.5 FEET Due to refusal			

Figure A-39,
Log of Trench T 39, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 40

ELEV. (MSL.) 534 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Firm, moist, medium brown, fine to medium Sandy CLAY			
2								
				CL	**OTAY FORMATION** Very stiff to hard, moist, red brown and olive layers, Silty, fine Sandy CLAY			
4								
	T40-1			ML-CL	Hard, moist, light tan, Silty CLAY to Clayey SILT			
6								
					TRENCH TERMINATED AT 7 FEET			

Figure A-40,
Log of Trench T 40, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 07149-22-02

TRENCH T 41

ELEV. (MSL.) 553 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				ML	**TOPSOIL** firm to stiff, moist, medium brown, Clayey SILT			
	T41-1			CL	Very stiff to hard, moist, red brown, Sandy CLAY with gravel			
2					**UNNAMED FANGLOMERATE** Very dense, moist, olive and yellow orange and red brown, Clayey, fine to coarse Sandy GRAVEL with some cobble			
	T41-2			GW				
4					TRENCH TERMINATED AT 5.5 FEET AT REFUSAL			

Figure A-41,
Log of Trench T 41, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 42

ELEV. (MSL.) 515 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Stiff to very stiff, moist, dark brown, Silty CLAY			
2	T42-1			GW	**UNNAMED FANGLOMERATE** Very dense, damp to moist, light brown, Clayey, fine to very coarse Sandy GRAVEL, with cobble, angular to sub-round			
4					TRENCH TERMINATED AT 4 FEET AT REFUSAL			

Figure A-42,
Log of Trench T 42, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

TABLE A-I
SEISMIC TRAVERSES

Seismic Traverse	Average Velocity (ft./sec.)			Average Depth (ft.)			Length of Traverse	Approximate Maximum Depth Explored
No.	V_1	V_2	V_3	D_1	D_2	D_3	(ft.)	(ft.)
S-1	2250	6560	9008	3	15	>30	100	30
S-2	3046	6273	--	8	>30	--	100	30
S-3	2577	8353	17143	5	10	>30	100	30
S-4	1327	5520	7733	2	10	>30	100	30

V_1 = Velocity in feet per second of first layer of materials
V_2 = Second layer velocities
V_3 = Third layer velocities
D_1 = Depth in feet to base of first layer
D_2 = Depth to base of second layer
D_3 = Depth to base of third layer

NOTE:

For mass grading, materials with velocities of less than 4500 feet per second (fps) are generally rippable with a D9 Caterpillar Tractor equipped with a single shank hydraulic ripper. Velocities of 4500 to 5500 fps indicate marginal ripping and blasting. Velocities greater than 5500 fps generally require blasting. For trenching, materials with velocities less than 3800 fps are generally rippable depending upon the degree of fracturing and the presence or absence of boulders. Velocities between 3800 and 4300 fps generally indicate marginal ripping, and velocities greater than 4300 fps generally indicate non-rippable conditions. The above velocities are based on a Caterpillar 235.

The reported velocities represent average velocities over the length of each traverse, and should not generally be used for subsurface interpretation greater than 100 feet from a traverse.

TABLE A-II
APPROXIMATE THICKNESS OF RIPPABLE ROCK

Traverse No.	Approximate Thickness (ft.)
S-1	3
S-2	8
S-3	5
S-4	2

APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in general accordance with the test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected relatively undisturbed chunk samples were tested for their in-place dry density and moisture content and shear strength. Selected bulk samples were tested for their maximum dry density and optimum moisture content, water-soluble sulfate, pH, resistivity, R-Value, and expansion characteristics. Portions of the bulk samples were remolded to selected densities and subjected to drained direct shear testing.

The results of our laboratory tests are presented in tabular form hereinafter. The in-place dry density and moisture characteristics are presented on the logs of exploratory trenches.

TABLE B-I
SUMMARY OF LABORATORY DIRECT SHEAR TEST RESULTS
ASTM D 3080

Sample No.	Dry Density (pcf)	Moisture Content (%)	Unit Cohesion (psf)	Angle of Shear Resistance (degrees)
T1-5*	97.9	17.4	600	32
T2-3**	104.8	13.2	800	30
T26-3*	110.3	5.9	500	35

*Soil samples remolded to in situ dry density and moisture content of chunk samples.

**Soil sample remolded to approximately 90 percent of the maximum dry density at near-optimum moisture content.

TABLE B-II
SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D 1557

Sample No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% dry wt.)
T1-5	Light gray, Silty, fine to medium SAND	109.5	16.6
T2-3	Gray brown, Clayey, fine to medium SAND	116.8	12.9
T3-1	Dark gray brown, Sandy CLAY	108.1	16.9
T5-1	Dark gray brown, Sandy CLAY	120.0	11.4
T31-2	Gray brown, Silty, fine to medium SAND	99.0	21.0
T38-1	Gray yellowish brown, Silty, fine SAND	106.9	17.3

TABLE B-III
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829

Sample No.	Moisture Content		Dry Density (pcf)	Expansion Index
	Before Test (%)	After Test (%)		
T2-3	12.5	25.6	101.6	31
T3-1	17.9	41.5	89.6	140
T5-1	12.9	31.2	101.8	135
T17-1	13.2	28.2	99.6	95
T31-2	16.8	39.2	89.4	70
T37-1	12.4	29.2	102.0	108
T38-1	15.0	27.2	93.3	25

TABLE B-IV
SUMMARY OF LABORATORY WATER-SOLUBLE SULFATE TEST RESULTS
CALIFORNIA TEST METHOD NO. 417

Sample No.	Water-Soluble Sulfate Content (%)	Exposure
T1-5	0.014	Negligible

TABLE B-IV
SUMMARY OF LABORATORY pH AND RESISTIVITY TEST RESULTS
CALIFORNIA TEST NO. 643

Sample No.	pH	Minimum Resistivity (ohm-centimeters)
T16-1	6.6	317

TABLE B-IV
SUMMARY OF LABORATORY R-VALUE TEST RESULTS
ASTM D 2844

Sample No.	R-Value
T1-8	25
T3-3	10
T29-2	40

APPENDIX C

APPENDIX C

RECOMMENDED GRADING SPECIFICATIONS

FOR

310 ACRE PROPERTY
ALTA ROAD AND OTAY MESA ROAD
SAN DIEGO COUNTY, CALIFORNIA

PROJECT NO. 07149-22-02

RECOMMENDED GRADING SPECIFICATIONS

1. GENERAL

1.1. These Recommended Grading Specifications shall be used in conjunction with the Geotechnical Report for the project prepared by Geocon Incorporated. The recommendations contained in the text of the Geotechnical Report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict.

1.2. Prior to the commencement of grading, a geotechnical consultant (Consultant) shall be employed for the purpose of observing earthwork procedures and testing the fills for substantial conformance with the recommendations of the Geotechnical Report and these specifications. It will be necessary that the Consultant provide adequate testing and observation services so that he may determine that, in his opinion, the work was performed in substantial conformance with these specifications. It shall be the responsibility of the Contractor to assist the Consultant and keep him apprised of work schedules and changes so that personnel may be scheduled accordingly.

1.3. It shall be the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and the approved grading plans. If, in the opinion of the Consultant, unsatisfactory conditions such as questionable soil materials, poor moisture condition, inadequate compaction, adverse weather, and so forth, result in a quality of work not in conformance with these specifications, the Consultant will be empowered to reject the work and recommend to the Owner that construction be stopped until the unacceptable conditions are corrected.

2. DEFINITIONS

2.1. **Owner** shall refer to the owner of the property or the entity on whose behalf the grading work is being performed and who has contracted with the Contractor to have grading performed.

2.2. **Contractor** shall refer to the Contractor performing the site grading work.

2.3. **Civil Engineer** or **Engineer of Work** shall refer to the California licensed Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying and verifying as-graded topography.

2.4. **Consultant** shall refer to the soil engineering and engineering geology consulting firm retained to provide geotechnical services for the project.

2.5. **Soil Engineer** shall refer to a California licensed Civil Engineer retained by the Owner, who is experienced in the practice of geotechnical engineering. The Soil Engineer shall be responsible for having qualified representatives on-site to observe and test the Contractor's work for conformance with these specifications.

2.6. **Engineering Geologist** shall refer to a California licensed Engineering Geologist retained by the Owner to provide geologic observations and recommendations during the site grading.

2.7. **Geotechnical Report** shall refer to a soil report (including all addenda) which may include a geologic reconnaissance or geologic investigation that was prepared specifically for the development of the project for which these Recommended Grading Specifications are intended to apply.

3. MATERIALS

3.1. Materials for compacted fill shall consist of any soil excavated from the cut areas or imported to the site that, in the opinion of the Consultant, is suitable for use in construction of fills. In general, fill materials can be classified as *soil* fills, *soil-rock* fills or *rock* fills, as defined below.

3.1.1. **Soil fills** are defined as fills containing no rocks or hard lumps greater than 12 inches in maximum dimension and containing at least 40 percent by weight of material smaller than 3/4 inch in size.

3.1.2. **Soil-rock fills** are defined as fills containing no rocks or hard lumps larger than 4 feet in maximum dimension and containing a sufficient matrix of soil fill to allow for proper compaction of soil fill around the rock fragments or hard lumps as specified in Paragraph 6.2. **Oversize rock** is defined as material greater than 12 inches.

3.1.3. **Rock fills** are defined as fills containing no rocks or hard lumps larger than 3 feet in maximum dimension and containing little or no fines. Fines are defined as material smaller than 3/4 inch in maximum dimension. The quantity of fines shall be less than approximately 20 percent of the rock fill quantity.

3.2. Material of a perishable, spongy, or otherwise unsuitable nature as determined by the Consultant shall not be used in fills.

3.3. Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9 and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

3.4. The outer 15 feet of *soil-rock* fill slopes, measured horizontally, should be composed of properly compacted *soil* fill materials approved by the Consultant. *Rock* fill may extend to the slope face, provided that the slope is not steeper than 2:1 (horizontal:vertical) and a soil layer no thicker than 12 inches is track-walked onto the face for landscaping purposes. This procedure may be utilized, provided it is acceptable to the governing agency, Owner and Consultant.

3.5. Representative samples of soil materials to be used for fill shall be tested in the laboratory by the Consultant to determine the maximum density, optimum moisture content, and, where appropriate, shear strength, expansion, and gradation characteristics of the soil.

3.6. During grading, soil or groundwater conditions other than those identified in the Geotechnical Report may be encountered by the Contractor. The Consultant shall be notified immediately to evaluate the significance of the unanticipated condition

4. CLEARING AND PREPARING AREAS TO BE FILLED

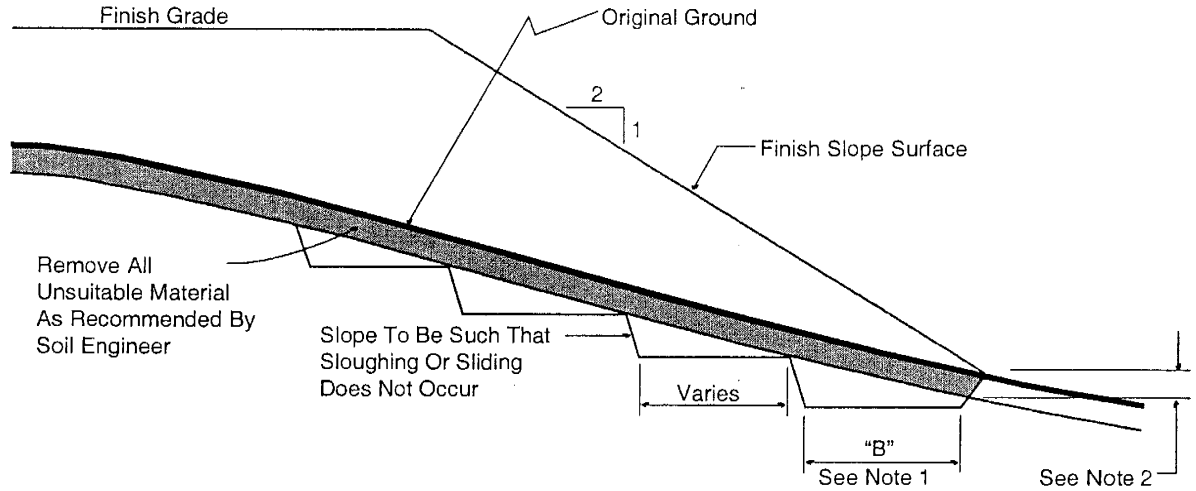
4.1. Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material and shall be performed in areas to be graded. Roots and other projections exceeding 1-1/2 inches in diameter shall be removed to a depth of 3 feet below the surface of the ground. Borrow areas shall be grubbed to the extent necessary to provide suitable fill materials.

4.2. Any asphalt pavement material removed during clearing operations should be properly disposed at an approved off-site facility. Concrete fragments which are free of reinforcing steel may be placed in fills, provided they are placed in accordance with Section 6.2 or 6.3 of this document.

4.3. After clearing and grubbing of organic matter or other unsuitable material, loose or porous soils shall be removed to the depth recommended in the Geotechnical Report. The depth of removal and compaction shall be observed and approved by a representative of the Consultant. The exposed surface shall then be plowed or scarified to a minimum depth of 6 inches and until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.

4.4. Where the slope ratio of the original ground is steeper than 6:1 (horizontal:vertical), or where recommended by the Consultant, the original ground should be benched in accordance with the following illustration.

TYPICAL BENCHING DETAIL



No Scale

DETAIL NOTES:

(1) Key width "B" should be a minimum of 10 feet wide, or sufficiently wide to permit complete coverage with the compaction equipment used. The base of the key should be graded horizontal, or inclined slightly into the natural slope.

(2) The outside of the bottom key should be below the topsoil or unsuitable surficial material and at least 2 feet into dense formational material. Where hard rock is exposed in the bottom of the key, the depth and configuration of the key may be modified as approved by the Consultant.

4.5. After areas to receive fill have been cleared, plowed or scarified, the surface should be disced or bladed by the Contractor until it is uniform and free from large clods. The area should then be moisture conditioned to achieve the proper moisture content, and compacted as recommended in Section 6.0 of these specifications.

5. COMPACTION EQUIPMENT

5.1. Compaction of *soil* or *soil-rock* fill shall be accomplished by sheepsfoot or segmented-steel wheeled rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers, or other types of acceptable compaction equipment. Equipment shall be of such a design that it will be capable of compacting the *soil* or *soil-rock* fill to the specified relative compaction at the specified moisture content.

5.2. Compaction of *rock* fills shall be performed in accordance with Section 6.3.

6. PLACING, SPREADING AND COMPACTION OF FILL MATERIAL

6.1. *Soil* fill, as defined in Paragraph 3.1.1, shall be placed by the Contractor in accordance with the following recommendations:

6.1.1. *Soil* fill shall be placed by the Contractor in layers that, when compacted, should generally not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to obtain uniformity of material and moisture in each layer. The entire fill shall be constructed as a unit in nearly level lifts. Rock materials greater than 12 inches in maximum dimension shall be placed in accordance with Section 6.2 or 6.3 of these specifications.

6.1.2. In general, the *soil* fill shall be compacted at a moisture content at or above the optimum moisture content as determined by ASTM D1557-00.

6.1.3. When the moisture content of *soil* fill is below that specified by the Consultant, water shall be added by the Contractor until the moisture content is in the range specified.

6.1.4. When the moisture content of the *soil* fill is above the range specified by the Consultant or too wet to achieve proper compaction, the *soil* fill shall be aerated by the Contractor by blading/mixing, or other satisfactory methods until the moisture content is within the range specified.

6.1.5. After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent. Relative compaction is defined as the ratio (expressed in percent) of the in-place dry density of the compacted fill to the maximum laboratory dry density as determined in accordance with ASTM D1557-00. Compaction shall be continuous over the entire area, and compaction equipment shall make sufficient passes so that the specified minimum relative compaction has been achieved throughout the entire fill.

6.1.6. Soils having an Expansion Index of greater than 50 may be used in fills if placed at least 3 feet below finish pad grade and should be compacted at a moisture content generally 2 to 4 percent greater than the optimum moisture content for the material.

6.1.7. Properly compacted *soil* fill shall extend to the design surface of fill slopes. To achieve proper compaction, it is recommended that fill slopes be over-built by at least 3 feet and then cut to the design grade. This procedure is considered preferable to track-walking of slopes, as described in the following paragraph.

6.1.8. As an alternative to over-building of slopes, slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Upon completion, slopes should then be track-walked with a D-8 dozer or similar equipment, such that a dozer track covers all slope surfaces at least twice.

6.2. *Soil-rock* fill, as defined in Paragraph 3.1.2, shall be placed by the Contractor in accordance with the following recommendations:

6.2.1. Rocks larger than 12 inches but less than 4 feet in maximum dimension may be incorporated into the compacted *soil* fill, but shall be limited to the area measured 15 feet minimum horizontally from the slope face and 5 feet below finish grade or 3 feet below the deepest utility, whichever is deeper.

6.2.2. Rocks or rock fragments up to 4 feet in maximum dimension may either be individually placed or placed in windrows. Under certain conditions, rocks or rock fragments up to 10 feet in maximum dimension may be placed using similar methods. The acceptability of placing rock materials greater than 4 feet in maximum dimension shall be evaluated during grading as specific cases arise and shall be approved by the Consultant prior to placement.

6.2.3. For individual placement, sufficient space shall be provided between rocks to allow for passage of compaction equipment.

6.2.4. For windrow placement, the rocks should be placed in trenches excavated in properly compacted *soil* fill. Trenches should be approximately 5 feet wide and 4 feet deep in maximum dimension. The voids around and beneath rocks should be filled with approved granular soil having a Sand Equivalent of 30 or greater and should be compacted by flooding. Windrows may also be placed utilizing an "open-face" method in lieu of the trench procedure, however, this method should first be approved by the Consultant.

6.2.5. Windrows should generally be parallel to each other and may be placed either parallel to or perpendicular to the face of the slope depending on the site geometry. The minimum horizontal spacing for windrows shall be 12 feet center-to-center with a 5-foot stagger or offset from lower courses to next overlying course. The minimum vertical spacing between windrow courses shall be 2 feet from the top of a lower windrow to the bottom of the next higher windrow.

6.2.6. All rock placement, fill placement and flooding of approved granular soil in the windrows must be continuously observed by the Consultant or his representative.

6.3. *Rock* fills, as defined in Section 3.1.3., shall be placed by the Contractor in accordance with the following recommendations:

6.3.1. The base of the *rock* fill shall be placed on a sloping surface (minimum slope of 2 percent, maximum slope of 5 percent). The surface shall slope toward suitable subdrainage outlet facilities. The *rock* fills shall be provided with subdrains during construction so that a hydrostatic pressure buildup does not develop. The subdrains shall be permanently connected to controlled drainage facilities to control post-construction infiltration of water.

6.3.2. *Rock* fills shall be placed in lifts not exceeding 3 feet. Placement shall be by rock trucks traversing previously placed lifts and dumping at the edge of the currently placed lift. Spreading of the *rock* fill shall be by dozer to facilitate *seating* of the rock. The *rock* fill shall be watered heavily during placement. Watering shall consist of water trucks traversing in front of the current rock lift face and spraying water continuously during rock placement. Compaction equipment with compactive energy comparable to or greater than that of a 20-ton steel vibratory roller or other compaction equipment providing suitable energy to achieve the required compaction or deflection as recommended in Paragraph 6.3.3 shall be

utilized. The number of passes to be made will be determined as described in Paragraph 6.3.3. Once a *rock* fill lift has been covered with *soil* fill, no additional *rock* fill lifts will be permitted over the *soil* fill.

6.3.3. Plate bearing tests, in accordance with ASTM D1196-93, may be performed in both the compacted *soil* fill and in the *rock* fill to aid in determining the number of passes of the compaction equipment to be performed. If performed, a minimum of three plate bearing tests shall be performed in the properly compacted *soil* fill (minimum relative compaction of 90 percent). Plate bearing tests shall then be performed on areas of *rock* fill having two passes, four passes and six passes of the compaction equipment, respectively. The number of passes required for the *rock* fill shall be determined by comparing the results of the plate bearing tests for the *soil* fill and the *rock* fill and by evaluating the deflection variation with number of passes. The required number of passes of the compaction equipment will be performed as necessary until the plate bearing deflections are equal to or less than that determined for the properly compacted *soil* fill. In no case will the required number of passes be less than two.

6.3.4. A representative of the Consultant shall be present during *rock* fill operations to verify that the minimum number of "passes" have been obtained, that water is being properly applied and that specified procedures are being followed. The actual number of plate bearing tests will be determined by the Consultant during grading. In general, at least one test should be performed for each approximately 5,000 to 10,000 cubic yards of *rock* fill placed.

6.3.5. Test pits shall be excavated by the Contractor so that the Consultant can state that, in his opinion, sufficient water is present and that voids between large rocks are properly filled with smaller rock material. In-place density testing will not be required in the *rock* fills.

6.3.6. To reduce the potential for "piping" of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant prior to commencing grading. The gradation of the graded filter material will be determined at the time the *rock* fill is being excavated. Materials typical of the *rock* fill should be submitted to the Consultant in a timely manner, to allow design of the graded filter prior to the commencement of *rock* fill placement.

6.3.7. All *rock* fill placement shall be continuously observed during placement by representatives of the Consultant.

7. OBSERVATION AND TESTING

7.1. The Consultant shall be the Owners representative to observe and perform tests during clearing, grubbing, filling and compaction operations. In general, no more than 2 feet in vertical elevation of *soil* or *soil-rock* fill shall be placed without at least one field density test being performed within that interval. In addition, a minimum of one field density test shall be performed for every 2,000 cubic yards of *soil* or *soil-rock* fill placed and compacted.

7.2. The Consultant shall perform random field density tests of the compacted *soil* or *soil-rock* fill to provide a basis for expressing an opinion as to whether the fill material is compacted as specified. Density tests shall be performed in the compacted materials below any disturbed surface. When these tests indicate that the density of any layer of fill or portion thereof is below that specified, the particular layer or areas represented by the test shall be reworked until the specified density has been achieved.

7.3. During placement of *rock* fill, the Consultant shall verify that the minimum number of passes have been obtained per the criteria discussed in Section 6.3.3. The Consultant shall request the excavation of observation pits and may perform plate bearing tests on the placed *rock* fills. The observation pits will be excavated to provide a basis for expressing an opinion as to whether the *rock* fill is properly seated and sufficient moisture has been applied to the material. If performed, plate bearing tests will be performed randomly on the surface of the most-recently placed lift. Plate bearing tests will be performed to provide a basis for expressing an opinion as to whether the *rock* fill is adequately seated. The maximum deflection in the *rock* fill determined in Section 6.3.3 shall be less than the maximum deflection of the properly compacted *soil* fill. When any of the above criteria indicate that a layer of *rock* fill or any portion thereof is below that specified, the affected layer or area shall be reworked until the *rock* fill has been adequately seated and sufficient moisture applied.

7.4. A settlement monitoring program designed by the Consultant may be conducted in areas of *rock* fill placement. The specific design of the monitoring program shall be as recommended in the Conclusions and Recommendations section of the project Geotechnical Report or in the final report of testing and observation services performed during grading.

7.5. The Consultant shall observe the placement of subdrains, to verify that the drainage devices have been placed and constructed in substantial conformance with project specifications.

7.6. Testing procedures shall conform to the following Standards as appropriate:

7.6.1. Soil and Soil-Rock Fills:

7.6.1.1. Field Density Test, ASTM D1556-00, *Density of Soil In-Place By the Sand-Cone Method.*

7.6.1.2. Field Density Test, Nuclear Method, ASTM D2922-96, *Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).*

7.6.1.3. Laboratory Compaction Test, ASTM D1557-00, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Pound Hammer and 18-Inch Drop.*

7.6.1.4. Expansion Index Test, ASTM D4829-95, *Expansion Index Test.*

7.6.2. Rock Fills

7.6.2.1. Field Plate Bearing Test, ASTM D1196-93 (Reapproved 1997) *Standard Method for Nonreparative Static Plate Load Tests of Soils and Flexible Pavement Components, For Use in Evaluation and Design of Airport and Highway Pavements.*

8. PROTECTION OF WORK

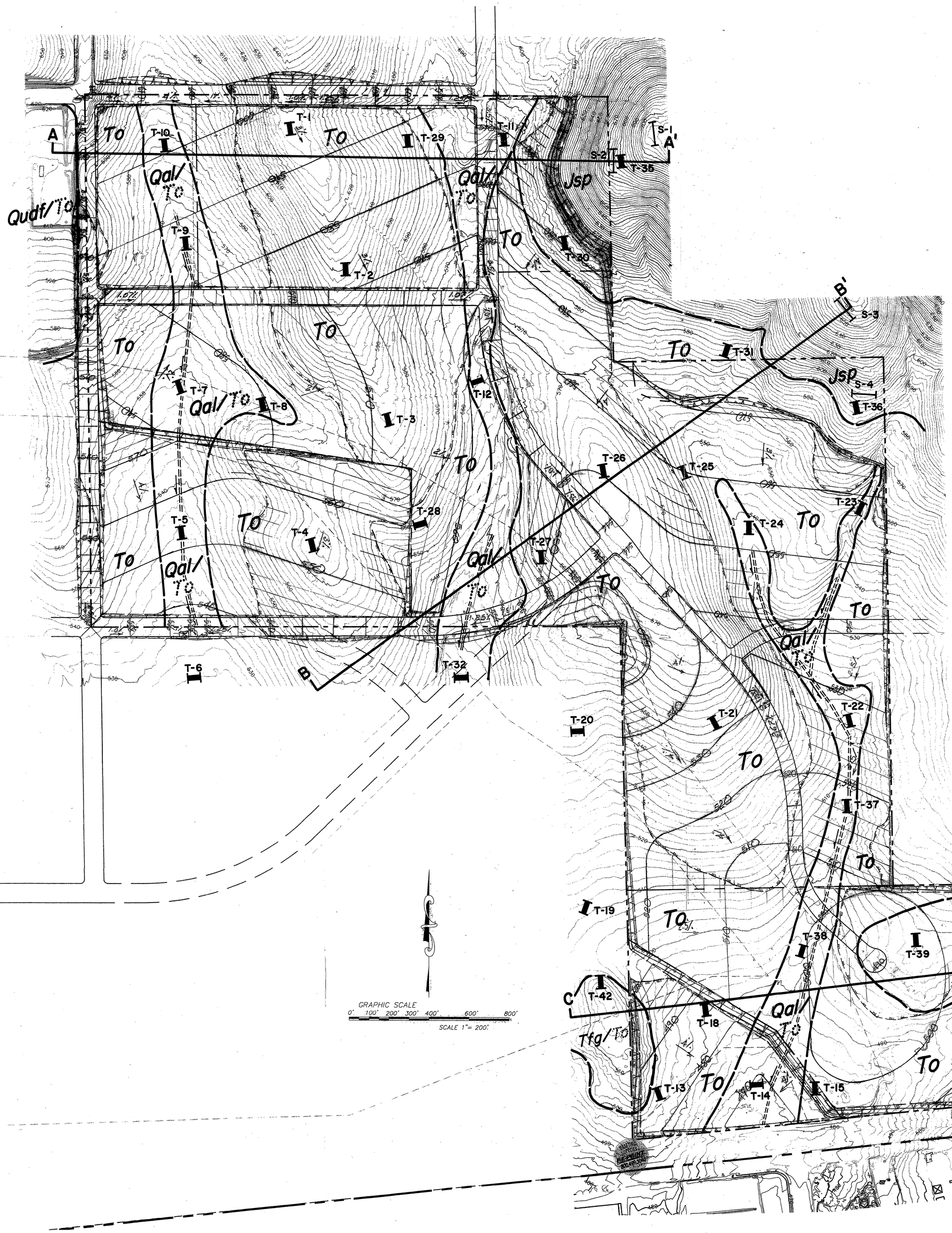
8.1. During construction, the Contractor shall properly grade all excavated surfaces to provide positive drainage and prevent ponding of water. Drainage of surface water shall be controlled to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control features have been installed. Areas subjected to erosion or sedimentation shall be properly prepared in accordance with the Specifications prior to placing additional fill or structures.

8.2. After completion of grading as observed and tested by the Consultant, no further excavation or filling shall be conducted except in conjunction with the services of the Consultant.

9. CERTIFICATIONS AND FINAL REPORTS

9.1. Upon completion of the work, Contractor shall furnish Owner a certification by the Civil Engineer stating that the lots and/or building pads are graded to within 0.1 foot vertically of elevations shown on the grading plan and that all tops and toes of slopes are within 0.5 foot horizontally of the positions shown on the grading plans. After installation of a section of subdrain, the project Civil Engineer should survey its location and prepare an *as-built* plan of the subdrain location. The project Civil Engineer should verify the proper outlet for the subdrains and the Contractor should ensure that the drain system is free of obstructions.

9.2. The Owner is responsible for furnishing a final as-graded soil and geologic report satisfactory to the appropriate governing or accepting agencies. The as-graded report should be prepared and signed by a California licensed Civil Engineer experienced in geotechnical engineering and by a California Certified Engineering Geologist, indicating that the geotechnical aspects of the grading were performed in substantial conformance with the Specifications or approved changes to the Specifications.



LEGEND

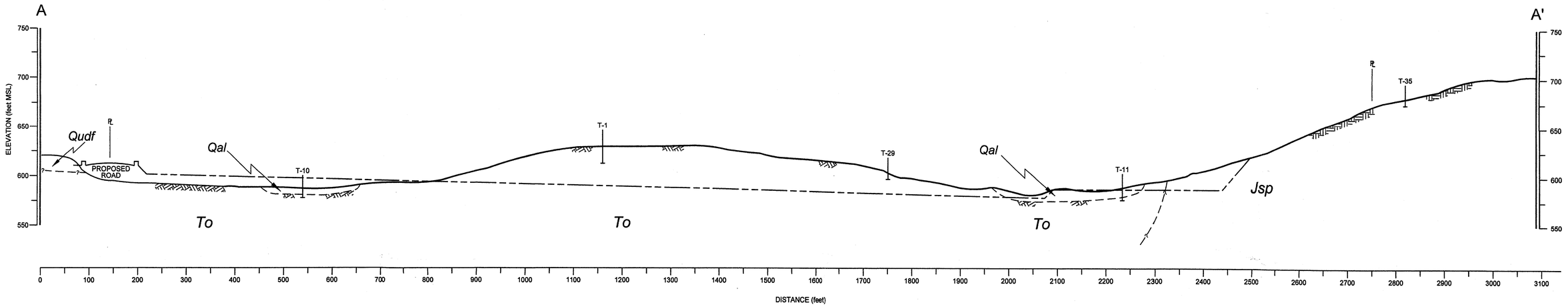
- Qudf ..... UNDOCUMENTED FILL
- Qal ..... ALLUVIUM
- Tfg ..... UNNAMED FANGLOMERATE
- To ..... OTAY FORMATION (Dotted Where Buried)
- Jsp ..... SANTIAGO PEAK VOLCANICS
- ..... APPROX. LOCATION OF GEOLOGIC CONTACT (Dotted Where Buried)
- T-42 ..... APPROX. LOCATION OF EXPLORATORY TRENCH
- S-4 ..... APPROX. LOCATION OF SEISMIC-REFRACTION TRAVERSE
- A A' ..... APPROX. LOCATION OF CROSS SECTION
- ..... APPROX. LOCATION OF SUBDRAIN

SITE PLAN / GEOLOGIC MAP

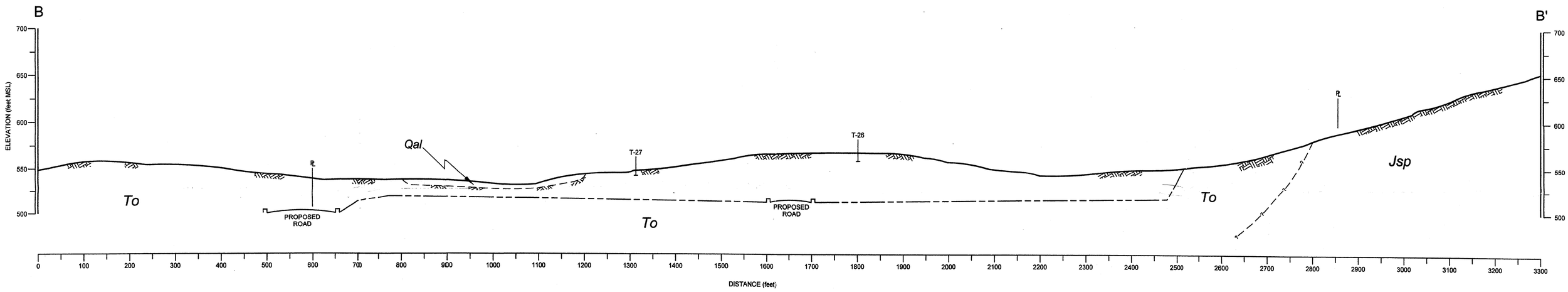
J & D LLC,
310 ACRE PROPERTY
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL CONSULTANTS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858 558-6900 - FAX 858 558-6159

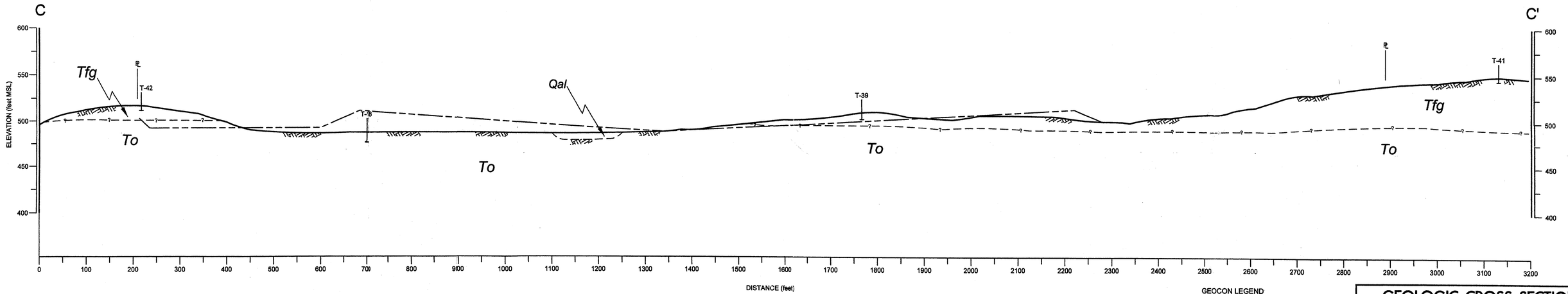
SCALE	1" = 200'
DATE	07-15-2004
PROJECT NO.	07149-22-02
FIGURE	2
SHEET	1 OF 1



CROSS SECTION A-A'
HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 50'



CROSS SECTION B-B'
HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 50'



CROSS SECTION C-C'
HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 50'

GEOCON LEGEND

- Qudf ..... UNDOCUMENTED FILL
- Qal ..... ALLUVIUM
- Tfg ..... UNNAMED FANGLOMERATE
- To ..... OTAY FORMATION
- EXISTING GRADE ELEVATION
- PROPOSED GRADE ELEVATION
- APPROX. LOCATION OF GEOLOGIC CONTACT

GEOLOGIC CROSS SECTIONS

J & D LLC
310 ACRE PROPERTY
SAN DIEGO COUNTY, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL CONSULTANTS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858 558-6900 - FAX 858 558-6159

SCALE	2:1	DATE	07-15-2004
PROJECT NO.	07149 - 22 - 02	FIGURE	3
SHEET	1 OF 1		

OTAY CROSSINGS COMMERCE PARK

APPENDIX K

GEOTECHNICAL INVESTIGATION

to the

DRAFT SUPPLEMENTAL
ENVIRONMENTAL IMPACT REPORT

EIR 93-19-006Q, TM 5405RPL[7]
SCH No. 2006041039

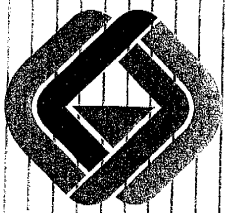
Lead Agency:

County of San Diego
Department of Planning and Land Use
5201 Ruffin Road, Suite B
San Diego, California 92123
Contact: Robert Hingtgen
(858) 694-3712

MAY 2010

GEOTECHNICAL INVESTIGATION

310 ACRE PROPERTY
ALTA ROAD AND OTAY MESA ROAD
SAN DIEGO COUNTY, CALIFORNIA



GEOCON
INCORPORATED

GEOTECHNICAL
CONSULTANTS

PREPARED FOR

J&D, LLC
SOLANA BEACH, CALIFORNIA

JULY 15, 2004

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

The field investigation was performed between March 25 and April 20, 2004 and consisted of performing a site reconnaissance, excavating 42 exploratory trenches, and conducting 4 seismic-refraction traverses at the approximate locations shown on Figure 2. The trenches were excavated using a Case 580 Super L rubber tire backhoe. Bulk and chunk samples were obtained from the excavations.

The soil conditions encountered in the trenches were visually examined, classified and logged in general accordance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D 2488). The logs of the exploratory trenches are presented on Figures A-1 through A-42. The logs depict the various soil types encountered and indicate the depths at which samples were obtained.

The seismic refraction traverses were conducted with a Bison, 2-channel seismograph unit. The traverses were approximately 100 feet in length and were performed in both a forward and reverse direction. Typically, the depth evaluated by a seismic survey is on the order of one-third of the traverse length which generally correlates to 30 feet for a 100 foot traverse. The approximate locations of the seismic refraction traverses are shown on the *Geologic Map* (Figure 2). The results of the seismic survey and interpretation are presented in Table A-I.

PROJECT NO. 07149-22-02

TRENCH T 1

ELEV. (MSL.) 627 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	T1-1			CL-CH	**TOPSOIL** Stiff to hard, damp to moist, dark yellowish brown, CLAY, porous, fractured			
2	T1-2			ML	**OTAY FORMATION** Stiff to hard, damp to moist, very pale orange, SILT, very porous, abundant krotovina, weathered		79.7	14.0
4	T1-3							
6	T1-4			SM	Medium dense, damp, yellowish gray, Silty, fine to medium SAND		106.0	8.6
8	T1-5							
10	T1-6						104.2	13.2
12	T1-7						108.0	15.6
14	T1-8							
16					TRENCH TERMINATED AT 16 FEET			

Figure A-1,
Log of Trench T 1, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 2

ELEV. (MSL.) 610 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL-CH	**TOPSOIL** Soft, moist, dark yellowish brown, CLAY, abundant roots, porous			
2	T2-1			ML	**OTAY FORMATION** Stiff to hard, damp to moist, very pale orange, SILT, porous, krotovina		83.3	12.8
4					Medium dense, damp, yellowish gray, Silty, fine to medium SAND			
	T2-2						129.6	4.7
6	T2-3							
8	T2-4			SM			110.0	9.6
10								
12					TRENCH TERMINATED AT 12 FEET			

Figure A-2,
Log of Trench T 2, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 3

ELEV. (MSL.) 585 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	T3-1			CH	**TOPSOIL** Soft, moist to wet, dark yellowish brown, CLAY, porous, abundant roots			
2				CL-CH	**OTAY FORMATION** Soft, moist, very pale orange, CLAY			
4				CL	Stiff, moist, very pale orange to yellowish gray, CLAY, krotovina			
6	T3-2 T3-3							
8								
10	T3-4						98.8	18.7
12								
14					TRENCH TERMINATED AT 14 FEET			

Figure A-3,
Log of Trench T 3, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 4

ELEV. (MSL.) 574 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL-CH	**TOPSOIL** Soft, moist to wet, dark yellowish brown, CLAY, porous, abundant roots			
2								
				CL-CH	**OTAY FORMATION** Soft, moist, very pale brown CLAY, numerous krotovina			
4	T4-1				Stiff to hard, moist, very pale brown, CLAY		91.8	10.0
6	T4-2			CL			94.7	15.3
8					Dense, moist, yellowish gray to pale brown, Silty, fine to medium SAND			
	T4-3			SM			124.7	8.9
10								
12					TRENCH TERMINATED AT 12 FEET			

Figure A-4,
Log of Trench T 4, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 5

ELEV. (MSL.) 536 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T5-1			CH	**ALLUVIUM** Very soft, moist to wet, dark yellowish brown, CLAY, abundant carbonate, numerous roots			
2								
4					Stiff, moist, moderate yellowish brown, CLAY with Sand, abundant carbonate, porous			
	T5-2			CL			101.4	13.4
6	T5-3							
8					**OTAY FORMATION** Dense, moist, yellowish gray, Silty SAND, porous			
10	T5-4			SM			103.5	21.1
					TRENCH TERMINATED AT 11 FEET			

Figure A-5,
Log of Trench T 5, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 6

ELEV. (MSL.) 528 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL-CH	**ALLUVIUM** Soft, moist to wet, dark yellowish brown, CLAY			
2								
				ML	**OTAY FORMATION** Hard, dry, pinkish gray, SILT, porous, weathered			
4								
				SM	Dense, moist, yellowish gray, Silty SAND			
6								
					TRENCH TERMINATED AT 7 FEET			

Figure A-6,
Log of Trench T 6, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 7

ELEV. (MSL.) 548 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**ALLUVIUM** Soft, moist, dark yellowish brown, CLAY with Sand, porous			
2	T7-1				Medium dense, moist, moderate yellowish brown, Silty SAND, porous			
	T7-2			SM				
4					**OTAY FORMATION** Stiff, moist, pale orange, CLAY, porous			
	T7-3							
6	T7-4			CH			86.2	22.1
8					Dense, moist, yellowish gray, Silty SAND			
	T7-5			SM				
10					TRENCH TERMINATED AT 10 FEET			

Figure A-7,
Log of Trench T 7, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 8

ELEV. (MSL.) 558 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ALLUVIUM** Soft, moist to wet, dark yellowish brown, CLAY, porous, abundant roots in upper 1 foot			
2				CL				
4					**OTAY FORMATION** Stiff, moist, pale orange CLAY, porous			
6	T8-1			CL			97.8	13.7
8				SM	Medium dense, moist, yellowish gray, Silty SAND			
10					TRENCH TERMINATED AT 10 FEET			

Figure A-8,
Log of Trench T 8, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 9

ELEV. (MSL.) 565 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
					ALLUVIUM Soft, moist, dark yellowish brown, CLAY			
2				CL-CH				
					-Becomes stiff, abundant carbonate, porous			
4					Medium dense, moderate yellowish brown, Silty SAND, porous			
6				SM				
	T9-1				**OTAY FORMATION** Firm, moist, very pale orange, Clayey SAND/Sandy CLAY, porous		91.0	21.6
8	T9-2			CL-SC				
	T9-3				Medium dense, moist, yellowish gray, Silty SAND		107.5	19.4
10				SM				
					TRENCH TERMINATED AT 10 FEET			

Figure A-9,
Log of Trench T 9, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 07149-22-02

TRENCH T 10

ELEV. (MSL.) 579 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ALLUVIUM**			
					Soft, moist, dark yellowish brown, CLAY with Sand; numerous krotovina			
2				CL				
4								
					OTAY FORMATION			
6				SM	Medium dense, moist, very pale olive and very pale orange, Silty SAND, porous			
					Becomes yellowish gray, Silty SAND			
8				SM				
					TRENCH TERMINATED AT 9 FEET			

Figure A-10,
Log of Trench T 10, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 11

ELEV. (MSL.) 586 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ALLUVIUM**			
					Soft to very soft, moist to wet, dark yellowish brown CLAY, porous			
2				CL-CH				
4								
	T11-1				**OTAY FORMATION**			
6	T11-2				Medium dense, moist, very pale brown, Silty SAND, porous, carbonate		91.5	20.7
				SM				
8	T11-3				-Yellowish gray, non-porous			
					TRENCH TERMINATED AT 9 FEET			

Figure A-11,
Log of Trench T 11, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 12

ELEV. (MSL.) 559 DATE COMPLETED 03-25-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	T12-1			SW-SC	**ALLUVIUM** Soft, moist, moderate to light brown, CLAY with Sand and gravel/well graded sand with clay and gravel, approximately 10 percent angular cobbles less than 10 inch diameter			
2								
4								
6					-Approximately 50 percent cobbles			
	T12-2			CL-CH	**OTAY FORMATION** Very hard, moist, pale brown, CLAY, cemented, shale appearance		95.1	23.9
8					TRENCH TERMINATED AT 8 FEET			

Figure A-12,
Log of Trench T 12, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 13

ELEV. (MSL.) 496 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T13-1			CL-CH	**TOPSOIL** Soft to firm, moist to very moist, dark brown, Silty CLAY, plastic			
2								
	T13-2			CH	**OTAY FORMATION** Hard, damp to moist, medium brown, CLAY, highly fractured, weathered, bentonitic			
4								
	T13-3			CH	Hard, damp, light brown, CLAY, highly fractured, bentonitic, carbonate on some partings			
6								
	T13-4			CL-CH	Hard, damp, orange brown, fine to very coarse, Sandy CLAY			
8					TRENCH TERMINATED AT 8 FEET			

Figure A-13,
Log of Trench T 13, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 14

ELEV. (MSL.) 480 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**ALLUVIUM** Firm, moist to very moist, dark brown, very fine Sandy, Silty CLAY			
2	T14-1			SC	Dense, moist to very moist, gravelly, Clayey, fine to very coarse SAND, trace cobble, sub-angular to sub-rounded			
4	T14-2			SC	**OTAY FORMATION** Very dense, damp, reddish orange and pale olive, Clayey, fine to very coarse SAND, carbonate			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-14,
Log of Trench T 14, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 15

ELEV. (MSL.) 483 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Firm, moist to very moist, dark brown, fine to medium Sandy CLAY			
2								
				SC	**OTAY FORMATION** Dense to very dense, moist, orange and pale olive, Clayey, fine to very coarse SAND			
4								
	T15-1							
6								
					TRENCH TERMINATED AT 7 FEET			

Figure A-15,
Log of Trench T 15, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 16

ELEV. (MSL.) 501 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Stiff, moist, medium brown, Silty CLAY, with very fine sand			
2				GW	**UNNAMED FANGLOMERATE** Very dense, moist, brown, Clayey, Sandy GRAVEL			
4								
6	T16-1			CH	**OTAY FORMATION** Very stiff to hard, green, CLAY, highly plastic, shiny partings			
					TRENCH TERMINATED AT 7 FEET			

Figure A-16,
Log of Trench T 16, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 17

ELEV. (MSL.) 443 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				SM	**TOPSOIL** Soft to firm, wet, brown, Silty CLAY			
2					**OTAY FORMATION** Firm to stiff, wet, brown, Gravelly CLAY, angular to sub-rounded clasts			
				CL				
4					Stiff to very stiff, wet, dark olive, CLAY, some pebble, shiny partings			
6	T17-1			CH				
8								
				SW	Dense, very moist, orange brown, Clayey, fine to coarse SAND with gravel			
					TRENCH TERMINATED AT 9 FEET			

Figure A-17,
Log of Trench T 17, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 18

ELEV. (MSL.) 490 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T18-1			CL	**TOPSOIL** Soft to firm, very moist to wet, dark brown, Silty CLAY			
2	T18-2			ML	**OTAY FORMATION** Firm, moist, light tan, very fine Sandy SILT, abundant carbonate			
4				ML	Firm to stiff, damp to moist, reddish tan, very fine Sandy SILT, laminated, abundant carbonate			
6				ML	Stiff, damp to moist, greenish tan, very fine Sandy SILT, laminated, abundant carbonate			
8					TRENCH TERMINATED AT 9 FEET			

Figure A-18,
Log of Trench T 18, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 19

ELEV. (MSL.) 511 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Soft to firm, very moist to wet, dark brown, Silty CLAY, sticky, abundant carbonate in lower portion			
2					-Gradational contact			
	T19-1			SM-ML	**OTAY FORMATION** Stiff, damp to moist, light olive tan, very fine Sandy SILT to Silty fine SAND, abundant carbonate in upper portion			
4								
6								
					TRENCH TERMINATED AT 7 FEET			

Figure A-19,
Log of Trench T 19, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 20

ELEV. (MSL.) 544 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Firm to stiff, moist to very moist, dark brown, Silty CLAY			
2								
				CL	Stiff, moist, dark brown, Silty CLAY, carbonate			
4					**OTAY FORMATION** Stiff, damp, light tan, Clayey SILT, with very fine sand, laminated, numerous krotovina in upper portion			
	T20-1			ML				
6								
					TRENCH TERMINATED AT 7 FEET			

Figure A-20,
Log of Trench T 20, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 21

ELEV. (MSL.) 552 DATE COMPLETED 03-26-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T21-1			ML	**TOPSOIL** Soft to firm, moist, medium brown, Clayey, very fine Sandy SILT			
2					-Irregular sharp contact			
4				ML	**OTAY FORMATION** Firm, damp, light tan, very fine Sandy SILT with clay, highly fractured, carbonate, krotovina			
6								
8	T21-2			CL	Stiff to very stiff, brownish tan, CLAY			
					TRENCH TERMINATED AT 9 FEET			

Figure A-21,
Log of Trench T 21, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 22

ELEV. (MSL.) 515 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**ALLUVIUM** Firm, very moist, dark brown, Silty CLAY, trace sand			
2				ML-CL	**OTAY FORMATION** Stiff to hard, moist, light brown and olive, Silty CLAY to Clayey SILT, carbonate			
4	T22-1			CL	Firm to stiff, moist, orange brown, Silty CLAY, interbedded with hard, moist, olive, Silty CLAY, highly plastic, trace white bentonite			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-22,
Log of Trench T 22, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 23

ELEV. (MSL.) 554 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	**ALLUVIUM** Soft, very moist, dark brown, Silty, fine to medium Sandy CLAY			
2	T23-1			SW-SC	Medium dense to dense, wet, dark brown, Clayey, gravelly fine to very coarse SAND, trace cobble			
4	T23-2			CL	**OTAY FORMATION** Fine to stiff, very moist to wet, olive green with white blebs, Silty CLAY			
6				CL	Stiff to very stiff, very moist, olive green, Silty CLAY, laminated, blocky			
					TRENCH TERMINATED AT 6 FEET			

Figure A-23,
Log of Trench T 23, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 24

ELEV. (MSL.) 538 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**ALLUVIUM** Soft to firm, very moist to wet, dark brown, Silty Clay, trace gravel			
2				CL	Firm, very moist to wet, dark brown, Sandy CLAY with gravel			
4				CL	Firm to stiff, very moist to wet, dark brown with white blebs, fine Sandy CLAY, trace cobble			
6				CL	**OTAY FORMATION** Stiff, very moist, olive with white, CLAY, carbonate			
	T24-1			CL	Very stiff, moist to very moist, light olive brown, CLAY			
8					TRENCH TERMINATED AT 8 FEET			

Figure A-24,
Log of Trench T 24, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 25

ELEV. (MSL.) 554 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Soft to firm, moist, dark brown, Silty CLAY			
2				CL	**OTAY FORMATION** Hard, damp to moist, light brown, CLAY, layered (0.75-2 inches) blocky, cemented			
	T25-1							
4				CL	Hard, damp to moist, olive brown, CLAY, laminated			
				ML	Stiff to very stiff, moist, light tan, Clayey SILT			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-25,
Log of Trench T 25, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 26

ELEV. (MSL.) 579 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T26-1			ML-CL	**TOPSOIL** Soft to firm, moist, medium brown, Silty CLAY to Clayey SILT			
2								
	T26-2			SC	**OTAY FORMATION** Medium dense, moist, light tan, Silty, very fine SAND, numerous krotovina filled with dark brown Clayey, fine to medium SAND		120.6	8.9
4								
	T26-3			SM-ML	Dense, damp, moist, light greenish tan, Silty, very fine SAND, to very fine Sandy SILT		110.1	6.2
6								
8					TRENCH TERMINATED AT 8 FEET			

Figure A-26,
Log of Trench T 26, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 27

ELEV. (MSL.) 557 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				ML-CL	**TOPSOIL** Soft to firm, damp to moist, medium brown, Sandy, Silty CLAY to Sandy Clayey SILT			
2				ML	**OTAY FORMATION** Loose to dense, damp to moist, light tan, Sandy SILT, numerous krotovina filled with loose medium brown, Silty, very fine SAND			
4				SM	Dense to very dense, damp to moist, light tan, Silty, very fine SAND, trace clay			
6								
8					TRENCH TERMINATED AT 8 FEET			

Figure A-27,
Log of Trench T 27, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 28

ELEV. (MSL.) 560 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T28-1			CL	**TOPSOIL** Soft, moist, dark brown, Silty CLAY			
2				ML	Soft to firm, moist, light tan, Clayey SILT, heavily bioturbated			
4	T28-2			SM	**OTAY FORMATION** Firm to stiff, moist, light tan, Clayey SILT			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-28,
Log of Trench T 28, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 29

ELEV. (MSL.) 592 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T29-1			CL	**TOPSOIL** Soft to firm, moist, dark brown, Silty CLAY			
2				ML	**OTAY FORMATION** Firm to stiff, moist, light tan, Clayey SILT			
4	T29-2			ML	Hard, moist, light tan, Clayey SILT			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-29,
Log of Trench T 29, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TRENCH T 30 ELEV. (MSL.) 603 DATE COMPLETED 03-29-2004 EQUIPMENT CASE 580 SUPER L	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**TOPSOIL** Soft, damp, red brown, Clayey SILT			
					Firm to stiff, moist, red brown, Silty CLAY			
2				CL	**SANTIAGO PEAK VOLCANICS** Highly weathered volcanic rock, degree of weathering, lessens with depth			
					TRENCH TERMINATED AT 3 FEET AT REFUSAL			

Figure A-30,
Log of Trench T 30, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 31

ELEV. (MSL.) 578 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T31-1			CL	**TOPSOIL** Soft, moist, dark brown, Silty, fine to medium Sandy CLAY, some gravel			
2				CL	Firm to stiff, dark brown with white blebs(calcium carbonate), Silty CLAY			
4	T31-2			CL	**OTAY FORMATION** Stiff, moist, medium brown, Silty CLAY			
				ML-CL	Very stiff, moist, light olive brown, Silty CLAY to Clayey SILT, laminated			
6								
8					TRENCH TERMINATED AT 8 FEET			

Figure A-31,
Log of Trench T 31, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 32

ELEV. (MSL.) 527 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				SC	**ALLUVIUM** Loose to medium dense, damp to moist, reddish brown, Clayey, very fine SAND			
2								
				SC-SW	Dense, moist, reddish brown, Clayey, fine to very coarse SAND, with cobble			
4								
6								
				CL	**OTAY FORMATION** Very stiff, moist, light greenish tan, Silty CLAY			
8					TRENCH TERMINATED AT 8 FEET			

Figure A-32,
Log of Trench T 32, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 33

ELEV. (MSL.) 515 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				ML-CL	**TOPSOIL** Soft to firm, damp, medium brown, Silty CLAY to Clayey SILT			
2				GW	**UNNAMED FANGLOMERATE** Dense, moist, yellowish brown, Clayey, fine to very coarse Sandy GRAVEL, with cobble			
4								
6					-Boulders to 24 inches, andesitic			
8								

Figure A-33,
Log of Trench T 33, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 34

ELEV. (MSL.) 528 DATE COMPLETED 03-29-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
	T34-1			CL	**TOPSOIL** Soft to firm, moist to very moist, dark brown to black, Silty CLAY, some fine sand			
2								
4	T34-2			CL	**OTAY FORMATION** Very stiff to hard, moist, olive, Silty CLAY, laminated			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-34,
Log of Trench T 34, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 35

ELEV. (MSL.) 680 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**TOPSOIL** Medium dense, moist, red brown, very fine Sandy SILT with gravel			
				CL	Stiff, moist to very moist, red brown, Silty CLAY with gravel, trace cobble			
2					**SANTIAGO PEAK VOLCANICS** Moderately to highly weathered, highly fractured rock			
					TRENCH TERMINATED AT 3.5 FEET AT REFUSAL			

Figure A-35,
Log of Trench T 35, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 36

ELEV. (MSL.) 596 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				ML	**TOPSOIL** Loose, damp, red brown, very fine Sandy SILT			
2					**SANTIAGO PEAK VOLCANICS** Moderate to highly weathered, highly fractured rock			
					TRENCH TERMINATED AT 2 FEET AT REFUSAL			

Figure A-36,
Log of Trench T 36, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 37

ELEV. (MSL.) 508 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**ALLUVIUM** Soft to firm, very moist, dark brown, Silty CLAY			
2					Very stiff, very moist, dark brown with red brown and yellow orange blebs (decomposed gravel), gravelly, fine to coarse Sandy CLAY			
	T37-1			CL				
4								
6				CL	**OTAY FORMATION** Very stiff to hard, very moist, olive green, Silty CLAY; with white blebs and strings (calcium carbonate)			
				CL	Very stiff to hard, very moist, light olive green, Silty CLAY			
8					TRENCH TERMINATED AT 8 FEET			

Figure A-37,
Log of Trench T 37, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 38

ELEV. (MSL.) 493 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**ALLUVIUM** Stiff, moist, dark brown, very fine Sandy CLAY			
2				SC-CL	Very stiff, moist to very moist, dark brown with red brown and yellow orange blebs (decomposed rock) gravelly, fine to very coarse Sandy CLAY to Clayey SAND			
4								
	T38-1			SM	**OTAY FORMATION** Very dense, moist, light olive green, Silty, fine SAND, cemented			
6					TRENCH TERMINATED AT 6 FEET			

Figure A-38,
Log of Trench T 38, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 39

ELEV. (MSL.) 509 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Firm to stiff, moist, medium brown, very fine Sandy, Silty CLAY			
2				CL	Very stiff, moist, red brown, CLAY			
	T39-1				-Gradational contact			
4				SC-SW	**UNNAMED FANGLOMERATE** Dense, moist, red brown, gravelly, Clayey, fine to coarse SAND			
				GW	Very dense, white (calcium carbonate) and red brown, very fine to very coarse Sandy GRAVEL, with cobble, cemented			
					TRENCH TERMINATED AT 5.5 FEET Due to refusal			

Figure A-39,
Log of Trench T 39, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 40

ELEV. (MSL.) 534 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Firm, moist, medium brown, fine to medium Sandy CLAY			
2				CL	**OTAY FORMATION** Very stiff to hard, moist, red brown and olive layers, Silty, fine Sandy CLAY			
4								
	T40-1			ML-CL	Hard, moist, light tan, Silty CLAY to Clayey SILT			
6								
					TRENCH TERMINATED AT 7 FEET			

Figure A-40,
Log of Trench T 40, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

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

PROJECT NO. 07149-22-02

TRENCH T 41

ELEV. (MSL.) 553 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				ML	**TOPSOIL** firm to stiff, moist, medium brown, Clayey SILT			
	T41-1			CL	Very stiff to hard, moist, red brown, Sandy CLAY with gravel			
2					**UNNAMED FANGLOMERATE** Very dense, moist, olive and yellow orange and red brown, Clayey, fine to coarse Sandy GRAVEL with some cobble			
	T41-2			GW				
4								
					TRENCH TERMINATED AT 5.5 FEET AT REFUSAL			

Figure A-41,
Log of Trench T 41, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

PROJECT NO. 07149-22-02

TRENCH T 42

ELEV. (MSL.) 515 DATE COMPLETED 03-30-2004

EQUIPMENT CASE 580 SUPER L

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
				CL	**TOPSOIL** Stiff to very stiff, moist, dark brown, Silty CLAY			
2	T42-1			GW	**UNNAMED FANGLOMERATE** Very dense, damp to moist, light brown, Clayey, fine to very coarse Sandy GRAVEL, with cobble, angular to sub-round			
4					TRENCH TERMINATED AT 4 FEET AT REFUSAL			

Figure A-42,
Log of Trench T 42, Page 1 of 1

07149-22-02.GPJ

SAMPLE SYMBOLS

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

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

TABLE A-I
SEISMIC TRAVERSES

Seismic Traverse	Average Velocity (ft./sec.)			Average Depth (ft.)			Length of Traverse	Approximate Maximum Depth Explored
No.	V_1	V_2	V_3	D_1	D_2	D_3	(ft.)	(ft.)
S-1	2250	6560	9008	3	15	>30	100	30
S-2	3046	6273	--	8	>30	--	100	30
S-3	2577	8353	17143	5	10	>30	100	30
S-4	1327	5520	7733	2	10	>30	100	30

V_1 = Velocity in feet per second of first layer of materials
V_2 = Second layer velocities
V_3 = Third layer velocities
D_1 = Depth in feet to base of first layer
D_2 = Depth to base of second layer
D_3 = Depth to base of third layer

NOTE:

For mass grading, materials with velocities of less than 4500 feet per second (fps) are generally rippable with a D9 Caterpillar Tractor equipped with a single shank hydraulic ripper. Velocities of 4500 to 5500 fps indicate marginal ripping and blasting. Velocities greater than 5500 fps generally require blasting. For trenching, materials with velocities less than 3800 fps are generally rippable depending upon the degree of fracturing and the presence or absence of boulders. Velocities between 3800 and 4300 fps generally indicate marginal ripping, and velocities greater than 4300 fps generally indicate non-rippable conditions. The above velocities are based on a Caterpillar 235.

The reported velocities represent average velocities over the length of each traverse, and should not generally be used for subsurface interpretation greater than 100 feet from a traverse.

TABLE A-II
APPROXIMATE THICKNESS OF RIPPABLE ROCK

Traverse No.	Approximate Thickness (ft.)
S-1	3
S-2	8
S-3	5
S-4	2

OTAY CROSSINGS COMMERCE PARK

APPENDIX K

GEOTECHNICAL INVESTIGATION

to the

DRAFT SUPPLEMENTAL
ENVIRONMENTAL IMPACT REPORT

EIR 93-19-006Q, TM 5405RPL[7]
SCH No. 2006041039

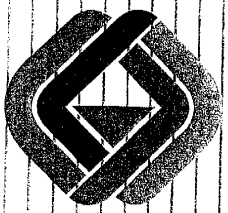
Lead Agency:

County of San Diego
Department of Planning and Land Use
5201 Ruffin Road, Suite B
San Diego, California 92123
Contact: Robert Hingtgen
(858) 694-3712

MAY 2010

GEOTECHNICAL INVESTIGATION

310 ACRE PROPERTY
ALTA ROAD AND OTAY MESA ROAD
SAN DIEGO COUNTY, CALIFORNIA



GEOCON
INCORPORATED

GEOTECHNICAL
CONSULTANTS

PREPARED FOR

J&D, LLC
SOLANA BEACH, CALIFORNIA

JULY 15, 2004

APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in general accordance with the test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected relatively undisturbed chunk samples were tested for their in-place dry density and moisture content and shear strength. Selected bulk samples were tested for their maximum dry density and optimum moisture content, water-soluble sulfate, pH, resistivity, R-Value, and expansion characteristics. Portions of the bulk samples were remolded to selected densities and subjected to drained direct shear testing.

The results of our laboratory tests are presented in tabular form hereinafter. The in-place dry density and moisture characteristics are presented on the logs of exploratory trenches.

TABLE B-I
SUMMARY OF LABORATORY DIRECT SHEAR TEST RESULTS
ASTM D 3080

Sample No.	Dry Density (pcf)	Moisture Content (%)	Unit Cohesion (psf)	Angle of Shear Resistance (degrees)
T1-5*	97.9	17.4	600	32
T2-3**	104.8	13.2	800	30
T26-3*	110.3	5.9	500	35

*Soil samples remolded to in situ dry density and moisture content of chunk samples.

**Soil sample remolded to approximately 90 percent of the maximum dry density at near-optimum moisture content.

TABLE B-II
SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D 1557

Sample No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% dry wt.)
T1-5	Light gray, Silty, fine to medium SAND	109.5	16.6
T2-3	Gray brown, Clayey, fine to medium SAND	116.8	12.9
T3-1	Dark gray brown, Sandy CLAY	108.1	16.9
T5-1	Dark gray brown, Sandy CLAY	120.0	11.4
T31-2	Gray brown, Silty, fine to medium SAND	99.0	21.0
T38-1	Gray yellowish brown, Silty, fine SAND	106.9	17.3

TABLE B-III
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829

Sample No.	Moisture Content		Dry Density (pcf)	Expansion Index
	Before Test (%)	After Test (%)		
T2-3	12.5	25.6	101.6	31
T3-1	17.9	41.5	89.6	140
T5-1	12.9	31.2	101.8	135
T17-1	13.2	28.2	99.6	95
T31-2	16.8	39.2	89.4	70
T37-1	12.4	29.2	102.0	108
T38-1	15.0	27.2	93.3	25

TABLE B-IV
SUMMARY OF LABORATORY WATER-SOLUBLE SULFATE TEST RESULTS
CALIFORNIA TEST METHOD NO. 417

Sample No.	Water-Soluble Sulfate Content (%)	Exposure
T1-5	0.014	Negligible

TABLE B-IV
SUMMARY OF LABORATORY pH AND RESISTIVITY TEST RESULTS
CALIFORNIA TEST NO. 643

Sample No.	pH	Minimum Resistivity (ohm-centimeters)
T16-1	6.6	317

TABLE B-IV
SUMMARY OF LABORATORY R-VALUE TEST RESULTS
ASTM D 2844

Sample No.	R-Value
T1-8	25
T3-3	10
T29-2	40

OTAY CROSSINGS COMMERCE PARK

APPENDIX K

GEOTECHNICAL INVESTIGATION

to the

DRAFT SUPPLEMENTAL
ENVIRONMENTAL IMPACT REPORT

EIR 93-19-006Q, TM 5405RPL[7]
SCH No. 2006041039

Lead Agency:

County of San Diego
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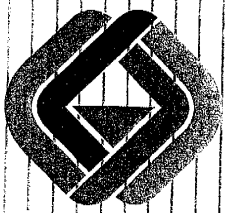
Contact: Robert Hingtgen
(858) 694-3712

MAY 2010

GEOTECHNICAL INVESTIGATION

310 ACRE PROPERTY
ALTA ROAD AND OTAY MESA ROAD
SAN DIEGO COUNTY, CALIFORNIA



GEOCON
INCORPORATED

GEOTECHNICAL
CONSULTANTS

PREPARED FOR

J&D, LLC
SOLANA BEACH, CALIFORNIA

JULY 15, 2004

APPENDIX C

APPENDIX C

RECOMMENDED GRADING SPECIFICATIONS

FOR

310 ACRE PROPERTY
ALTA ROAD AND OTAY MESA ROAD
SAN DIEGO COUNTY, CALIFORNIA

PROJECT NO. 07149-22-02

RECOMMENDED GRADING SPECIFICATIONS

1. GENERAL

1.1. These Recommended Grading Specifications shall be used in conjunction with the Geotechnical Report for the project prepared by Geocon Incorporated. The recommendations contained in the text of the Geotechnical Report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict.

1.2. Prior to the commencement of grading, a geotechnical consultant (Consultant) shall be employed for the purpose of observing earthwork procedures and testing the fills for substantial conformance with the recommendations of the Geotechnical Report and these specifications. It will be necessary that the Consultant provide adequate testing and observation services so that he may determine that, in his opinion, the work was performed in substantial conformance with these specifications. It shall be the responsibility of the Contractor to assist the Consultant and keep him apprised of work schedules and changes so that personnel may be scheduled accordingly.

1.3. It shall be the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and the approved grading plans. If, in the opinion of the Consultant, unsatisfactory conditions such as questionable soil materials, poor moisture condition, inadequate compaction, adverse weather, and so forth, result in a quality of work not in conformance with these specifications, the Consultant will be empowered to reject the work and recommend to the Owner that construction be stopped until the unacceptable conditions are corrected.

2. DEFINITIONS

2.1. **Owner** shall refer to the owner of the property or the entity on whose behalf the grading work is being performed and who has contracted with the Contractor to have grading performed.

2.2. **Contractor** shall refer to the Contractor performing the site grading work.

2.3. **Civil Engineer** or **Engineer of Work** shall refer to the California licensed Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying and verifying as-graded topography.

2.4. **Consultant** shall refer to the soil engineering and engineering geology consulting firm retained to provide geotechnical services for the project.

2.5. **Soil Engineer** shall refer to a California licensed Civil Engineer retained by the Owner, who is experienced in the practice of geotechnical engineering. The Soil Engineer shall be responsible for having qualified representatives on-site to observe and test the Contractor's work for conformance with these specifications.

2.6. **Engineering Geologist** shall refer to a California licensed Engineering Geologist retained by the Owner to provide geologic observations and recommendations during the site grading.

2.7. **Geotechnical Report** shall refer to a soil report (including all addenda) which may include a geologic reconnaissance or geologic investigation that was prepared specifically for the development of the project for which these Recommended Grading Specifications are intended to apply.

3. MATERIALS

3.1. Materials for compacted fill shall consist of any soil excavated from the cut areas or imported to the site that, in the opinion of the Consultant, is suitable for use in construction of fills. In general, fill materials can be classified as *soil* fills, *soil-rock* fills or *rock* fills, as defined below.

3.1.1. **Soil fills** are defined as fills containing no rocks or hard lumps greater than 12 inches in maximum dimension and containing at least 40 percent by weight of material smaller than 3/4 inch in size.

3.1.2. **Soil-rock fills** are defined as fills containing no rocks or hard lumps larger than 4 feet in maximum dimension and containing a sufficient matrix of soil fill to allow for proper compaction of soil fill around the rock fragments or hard lumps as specified in Paragraph 6.2. **Oversize rock** is defined as material greater than 12 inches.

3.1.3. **Rock fills** are defined as fills containing no rocks or hard lumps larger than 3 feet in maximum dimension and containing little or no fines. Fines are defined as material smaller than 3/4 inch in maximum dimension. The quantity of fines shall be less than approximately 20 percent of the rock fill quantity.

3.2. Material of a perishable, spongy, or otherwise unsuitable nature as determined by the Consultant shall not be used in fills.

3.3. Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9 and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

3.4. The outer 15 feet of *soil-rock* fill slopes, measured horizontally, should be composed of properly compacted *soil* fill materials approved by the Consultant. *Rock* fill may extend to the slope face, provided that the slope is not steeper than 2:1 (horizontal:vertical) and a soil layer no thicker than 12 inches is track-walked onto the face for landscaping purposes. This procedure may be utilized, provided it is acceptable to the governing agency, Owner and Consultant.

3.5. Representative samples of soil materials to be used for fill shall be tested in the laboratory by the Consultant to determine the maximum density, optimum moisture content, and, where appropriate, shear strength, expansion, and gradation characteristics of the soil.

3.6. During grading, soil or groundwater conditions other than those identified in the Geotechnical Report may be encountered by the Contractor. The Consultant shall be notified immediately to evaluate the significance of the unanticipated condition

4. CLEARING AND PREPARING AREAS TO BE FILLED

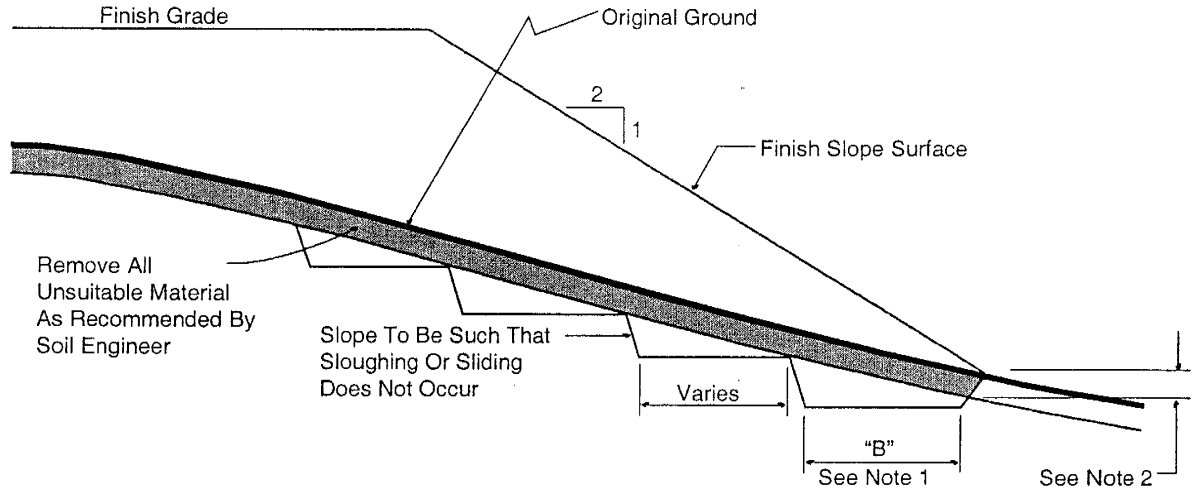
4.1. Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material and shall be performed in areas to be graded. Roots and other projections exceeding 1-1/2 inches in diameter shall be removed to a depth of 3 feet below the surface of the ground. Borrow areas shall be grubbed to the extent necessary to provide suitable fill materials.

4.2. Any asphalt pavement material removed during clearing operations should be properly disposed at an approved off-site facility. Concrete fragments which are free of reinforcing steel may be placed in fills, provided they are placed in accordance with Section 6.2 or 6.3 of this document.

4.3. After clearing and grubbing of organic matter or other unsuitable material, loose or porous soils shall be removed to the depth recommended in the Geotechnical Report. The depth of removal and compaction shall be observed and approved by a representative of the Consultant. The exposed surface shall then be plowed or scarified to a minimum depth of 6 inches and until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.

4.4. Where the slope ratio of the original ground is steeper than 6:1 (horizontal:vertical), or where recommended by the Consultant, the original ground should be benched in accordance with the following illustration.

TYPICAL BENCHING DETAIL



No Scale

DETAIL NOTES:

(1) Key width "B" should be a minimum of 10 feet wide, or sufficiently wide to permit complete coverage with the compaction equipment used. The base of the key should be graded horizontal, or inclined slightly into the natural slope.

(2) The outside of the bottom key should be below the topsoil or unsuitable surficial material and at least 2 feet into dense formational material. Where hard rock is exposed in the bottom of the key, the depth and configuration of the key may be modified as approved by the Consultant.

4.5. After areas to receive fill have been cleared, plowed or scarified, the surface should be disced or bladed by the Contractor until it is uniform and free from large clods. The area should then be moisture conditioned to achieve the proper moisture content, and compacted as recommended in Section 6.0 of these specifications.

5. COMPACTION EQUIPMENT

5.1. Compaction of *soil* or *soil-rock* fill shall be accomplished by sheepsfoot or segmented-steel wheeled rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers, or other types of acceptable compaction equipment. Equipment shall be of such a design that it will be capable of compacting the *soil* or *soil-rock* fill to the specified relative compaction at the specified moisture content.

5.2. Compaction of *rock* fills shall be performed in accordance with Section 6.3.

6. PLACING, SPREADING AND COMPACTION OF FILL MATERIAL

6.1. *Soil* fill, as defined in Paragraph 3.1.1, shall be placed by the Contractor in accordance with the following recommendations:

6.1.1. *Soil* fill shall be placed by the Contractor in layers that, when compacted, should generally not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to obtain uniformity of material and moisture in each layer. The entire fill shall be constructed as a unit in nearly level lifts. Rock materials greater than 12 inches in maximum dimension shall be placed in accordance with Section 6.2 or 6.3 of these specifications.

6.1.2. In general, the *soil* fill shall be compacted at a moisture content at or above the optimum moisture content as determined by ASTM D1557-00.

6.1.3. When the moisture content of *soil* fill is below that specified by the Consultant, water shall be added by the Contractor until the moisture content is in the range specified.

6.1.4. When the moisture content of the *soil* fill is above the range specified by the Consultant or too wet to achieve proper compaction, the *soil* fill shall be aerated by the Contractor by blading/mixing, or other satisfactory methods until the moisture content is within the range specified.

6.1.5. After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent. Relative compaction is defined as the ratio (expressed in percent) of the in-place dry density of the compacted fill to the maximum laboratory dry density as determined in accordance with ASTM D1557-00. Compaction shall be continuous over the entire area, and compaction equipment shall make sufficient passes so that the specified minimum relative compaction has been achieved throughout the entire fill.

6.1.6. Soils having an Expansion Index of greater than 50 may be used in fills if placed at least 3 feet below finish pad grade and should be compacted at a moisture content generally 2 to 4 percent greater than the optimum moisture content for the material.

6.1.7. Properly compacted *soil* fill shall extend to the design surface of fill slopes. To achieve proper compaction, it is recommended that fill slopes be over-built by at least 3 feet and then cut to the design grade. This procedure is considered preferable to track-walking of slopes, as described in the following paragraph.

6.1.8. As an alternative to over-building of slopes, slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Upon completion, slopes should then be track-walked with a D-8 dozer or similar equipment, such that a dozer track covers all slope surfaces at least twice.

6.2. *Soil-rock* fill, as defined in Paragraph 3.1.2, shall be placed by the Contractor in accordance with the following recommendations:

6.2.1. Rocks larger than 12 inches but less than 4 feet in maximum dimension may be incorporated into the compacted *soil* fill, but shall be limited to the area measured 15 feet minimum horizontally from the slope face and 5 feet below finish grade or 3 feet below the deepest utility, whichever is deeper.

6.2.2. Rocks or rock fragments up to 4 feet in maximum dimension may either be individually placed or placed in windrows. Under certain conditions, rocks or rock fragments up to 10 feet in maximum dimension may be placed using similar methods. The acceptability of placing rock materials greater than 4 feet in maximum dimension shall be evaluated during grading as specific cases arise and shall be approved by the Consultant prior to placement.

6.2.3. For individual placement, sufficient space shall be provided between rocks to allow for passage of compaction equipment.

6.2.4. For windrow placement, the rocks should be placed in trenches excavated in properly compacted *soil* fill. Trenches should be approximately 5 feet wide and 4 feet deep in maximum dimension. The voids around and beneath rocks should be filled with approved granular soil having a Sand Equivalent of 30 or greater and should be compacted by flooding. Windrows may also be placed utilizing an "open-face" method in lieu of the trench procedure, however, this method should first be approved by the Consultant.

6.2.5. Windrows should generally be parallel to each other and may be placed either parallel to or perpendicular to the face of the slope depending on the site geometry. The minimum horizontal spacing for windrows shall be 12 feet center-to-center with a 5-foot stagger or offset from lower courses to next overlying course. The minimum vertical spacing between windrow courses shall be 2 feet from the top of a lower windrow to the bottom of the next higher windrow.

6.2.6. All rock placement, fill placement and flooding of approved granular soil in the windrows must be continuously observed by the Consultant or his representative.

6.3. *Rock* fills, as defined in Section 3.1.3., shall be placed by the Contractor in accordance with the following recommendations:

6.3.1. The base of the *rock* fill shall be placed on a sloping surface (minimum slope of 2 percent, maximum slope of 5 percent). The surface shall slope toward suitable subdrainage outlet facilities. The *rock* fills shall be provided with subdrains during construction so that a hydrostatic pressure buildup does not develop. The subdrains shall be permanently connected to controlled drainage facilities to control post-construction infiltration of water.

6.3.2. *Rock* fills shall be placed in lifts not exceeding 3 feet. Placement shall be by rock trucks traversing previously placed lifts and dumping at the edge of the currently placed lift. Spreading of the *rock* fill shall be by dozer to facilitate *seating* of the rock. The *rock* fill shall be watered heavily during placement. Watering shall consist of water trucks traversing in front of the current rock lift face and spraying water continuously during rock placement. Compaction equipment with compactive energy comparable to or greater than that of a 20-ton steel vibratory roller or other compaction equipment providing suitable energy to achieve the required compaction or deflection as recommended in Paragraph 6.3.3 shall be

utilized. The number of passes to be made will be determined as described in Paragraph 6.3.3. Once a *rock* fill lift has been covered with *soil* fill, no additional *rock* fill lifts will be permitted over the *soil* fill.

6.3.3. Plate bearing tests, in accordance with ASTM D1196-93, may be performed in both the compacted *soil* fill and in the *rock* fill to aid in determining the number of passes of the compaction equipment to be performed. If performed, a minimum of three plate bearing tests shall be performed in the properly compacted *soil* fill (minimum relative compaction of 90 percent). Plate bearing tests shall then be performed on areas of *rock* fill having two passes, four passes and six passes of the compaction equipment, respectively. The number of passes required for the *rock* fill shall be determined by comparing the results of the plate bearing tests for the *soil* fill and the *rock* fill and by evaluating the deflection variation with number of passes. The required number of passes of the compaction equipment will be performed as necessary until the plate bearing deflections are equal to or less than that determined for the properly compacted *soil* fill. In no case will the required number of passes be less than two.

6.3.4. A representative of the Consultant shall be present during *rock* fill operations to verify that the minimum number of "passes" have been obtained, that water is being properly applied and that specified procedures are being followed. The actual number of plate bearing tests will be determined by the Consultant during grading. In general, at least one test should be performed for each approximately 5,000 to 10,000 cubic yards of *rock* fill placed.

6.3.5. Test pits shall be excavated by the Contractor so that the Consultant can state that, in his opinion, sufficient water is present and that voids between large rocks are properly filled with smaller rock material. In-place density testing will not be required in the *rock* fills.

6.3.6. To reduce the potential for "piping" of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant prior to commencing grading. The gradation of the graded filter material will be determined at the time the *rock* fill is being excavated. Materials typical of the *rock* fill should be submitted to the Consultant in a timely manner, to allow design of the graded filter prior to the commencement of *rock* fill placement.

6.3.7. All *rock* fill placement shall be continuously observed during placement by representatives of the Consultant.

7. OBSERVATION AND TESTING

7.1. The Consultant shall be the Owners representative to observe and perform tests during clearing, grubbing, filling and compaction operations. In general, no more than 2 feet in vertical elevation of *soil* or *soil-rock* fill shall be placed without at least one field density test being performed within that interval. In addition, a minimum of one field density test shall be performed for every 2,000 cubic yards of *soil* or *soil-rock* fill placed and compacted.

7.2. The Consultant shall perform random field density tests of the compacted *soil* or *soil-rock* fill to provide a basis for expressing an opinion as to whether the fill material is compacted as specified. Density tests shall be performed in the compacted materials below any disturbed surface. When these tests indicate that the density of any layer of fill or portion thereof is below that specified, the particular layer or areas represented by the test shall be reworked until the specified density has been achieved.

7.3. During placement of *rock* fill, the Consultant shall verify that the minimum number of passes have been obtained per the criteria discussed in Section 6.3.3. The Consultant shall request the excavation of observation pits and may perform plate bearing tests on the placed *rock* fills. The observation pits will be excavated to provide a basis for expressing an opinion as to whether the *rock* fill is properly seated and sufficient moisture has been applied to the material. If performed, plate bearing tests will be performed randomly on the surface of the most-recently placed lift. Plate bearing tests will be performed to provide a basis for expressing an opinion as to whether the *rock* fill is adequately seated. The maximum deflection in the *rock* fill determined in Section 6.3.3 shall be less than the maximum deflection of the properly compacted *soil* fill. When any of the above criteria indicate that a layer of *rock* fill or any portion thereof is below that specified, the affected layer or area shall be reworked until the *rock* fill has been adequately seated and sufficient moisture applied.

7.4. A settlement monitoring program designed by the Consultant may be conducted in areas of *rock* fill placement. The specific design of the monitoring program shall be as recommended in the Conclusions and Recommendations section of the project Geotechnical Report or in the final report of testing and observation services performed during grading.

7.5. The Consultant shall observe the placement of subdrains, to verify that the drainage devices have been placed and constructed in substantial conformance with project specifications.

7.6. Testing procedures shall conform to the following Standards as appropriate:

7.6.1. Soil and Soil-Rock Fills:

7.6.1.1. Field Density Test, ASTM D1556-00, *Density of Soil In-Place By the Sand-Cone Method.*

7.6.1.2. Field Density Test, Nuclear Method, ASTM D2922-96, *Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).*

7.6.1.3. Laboratory Compaction Test, ASTM D1557-00, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Pound Hammer and 18-Inch Drop.*

7.6.1.4. Expansion Index Test, ASTM D4829-95, *Expansion Index Test.*

7.6.2. Rock Fills

7.6.2.1. Field Plate Bearing Test, ASTM D1196-93 (Reapproved 1997) *Standard Method for Nonreparative Static Plate Load Tests of Soils and Flexible Pavement Components, For Use in Evaluation and Design of Airport and Highway Pavements.*

8. PROTECTION OF WORK

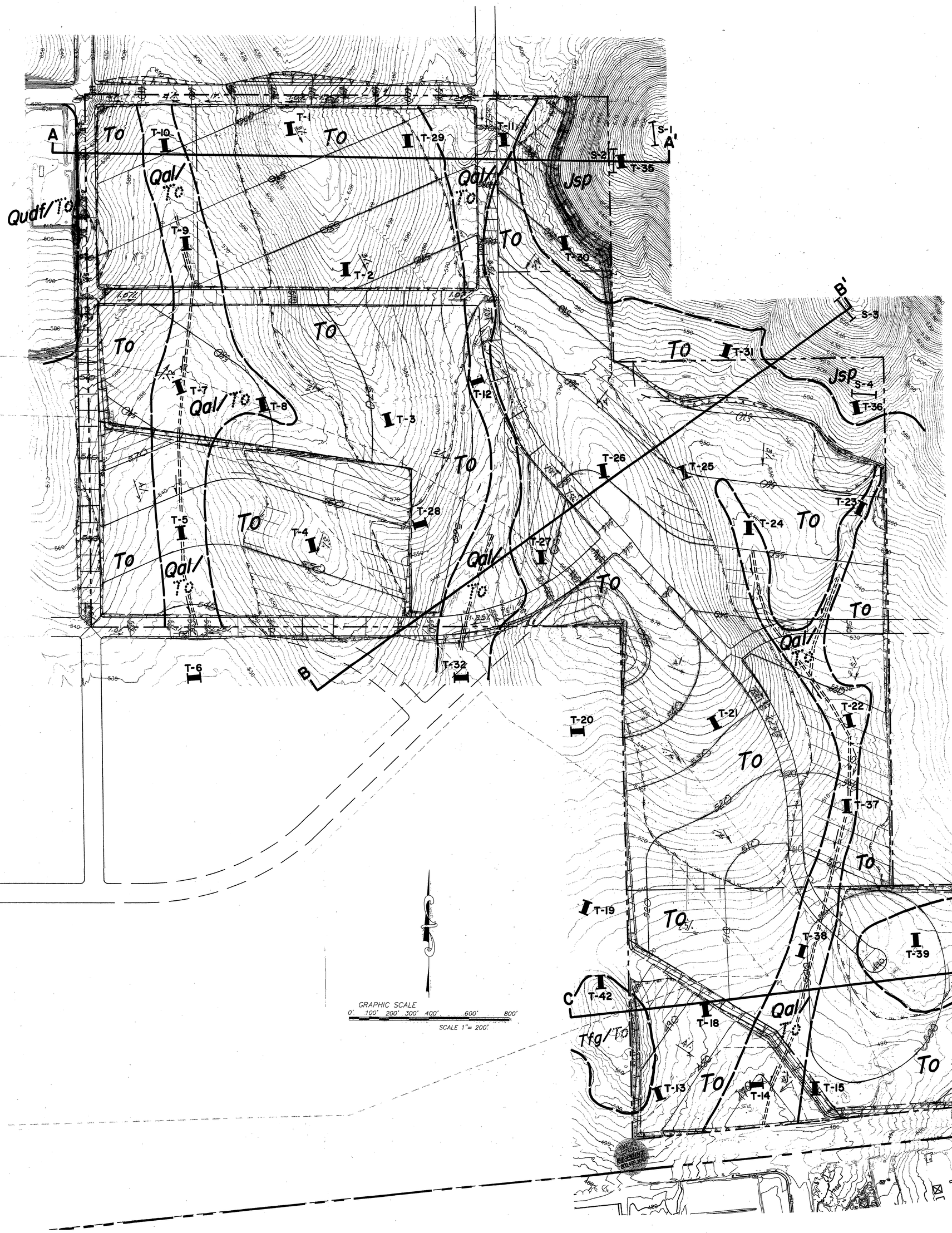
8.1. During construction, the Contractor shall properly grade all excavated surfaces to provide positive drainage and prevent ponding of water. Drainage of surface water shall be controlled to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control features have been installed. Areas subjected to erosion or sedimentation shall be properly prepared in accordance with the Specifications prior to placing additional fill or structures.

8.2. After completion of grading as observed and tested by the Consultant, no further excavation or filling shall be conducted except in conjunction with the services of the Consultant.

9. CERTIFICATIONS AND FINAL REPORTS

9.1. Upon completion of the work, Contractor shall furnish Owner a certification by the Civil Engineer stating that the lots and/or building pads are graded to within 0.1 foot vertically of elevations shown on the grading plan and that all tops and toes of slopes are within 0.5 foot horizontally of the positions shown on the grading plans. After installation of a section of subdrain, the project Civil Engineer should survey its location and prepare an *as-built* plan of the subdrain location. The project Civil Engineer should verify the proper outlet for the subdrains and the Contractor should ensure that the drain system is free of obstructions.

9.2. The Owner is responsible for furnishing a final as-graded soil and geologic report satisfactory to the appropriate governing or accepting agencies. The as-graded report should be prepared and signed by a California licensed Civil Engineer experienced in geotechnical engineering and by a California Certified Engineering Geologist, indicating that the geotechnical aspects of the grading were performed in substantial conformance with the Specifications or approved changes to the Specifications.



LEGEND

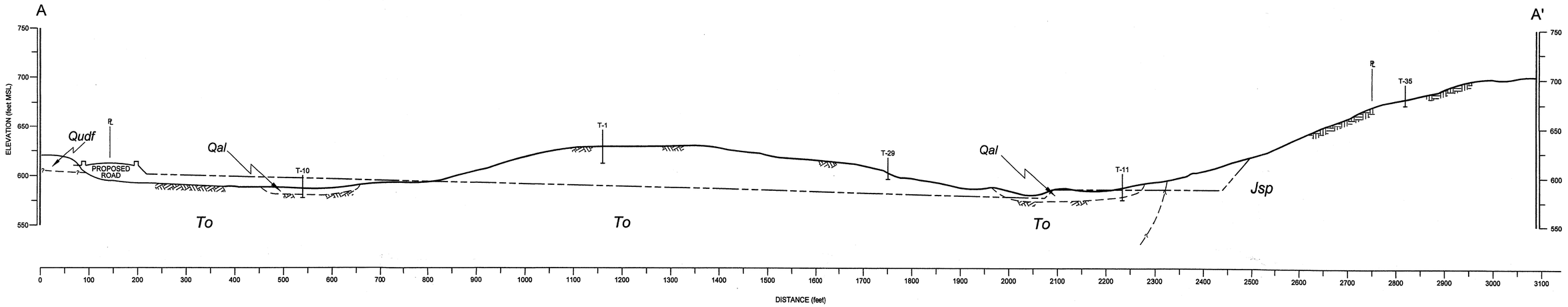
- Qudf ..... UNDOCUMENTED FILL
- Qal ..... ALLUVIUM
- Tfg ..... UNNAMED FANGLOMERATE
- To ..... OTAY FORMATION (Dotted Where Buried)
- Jsp ..... SANTIAGO PEAK VOLCANICS
- ..... APPROX. LOCATION OF GEOLOGIC CONTACT (Dotted Where Buried)
- T-42 ..... APPROX. LOCATION OF EXPLORATORY TRENCH
- S-4 ..... APPROX. LOCATION OF SEISMIC-REFRACTION TRAVERSE
- A A' ..... APPROX. LOCATION OF CROSS SECTION
- ..... APPROX. LOCATION OF SUBDRAIN

SITE PLAN / GEOLOGIC MAP

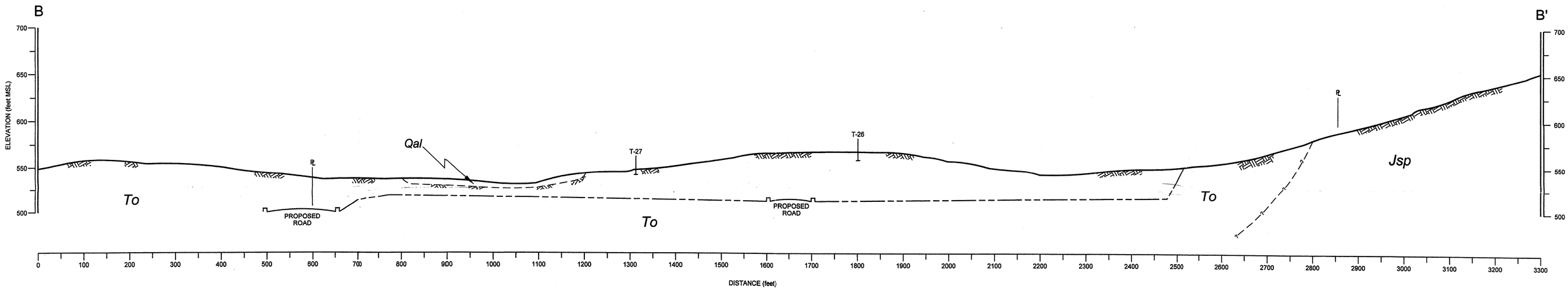
J & D LLC,
310 ACRE PROPERTY
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL CONSULTANTS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974
PHONE 858 558-6900 - FAX 858 558-6159

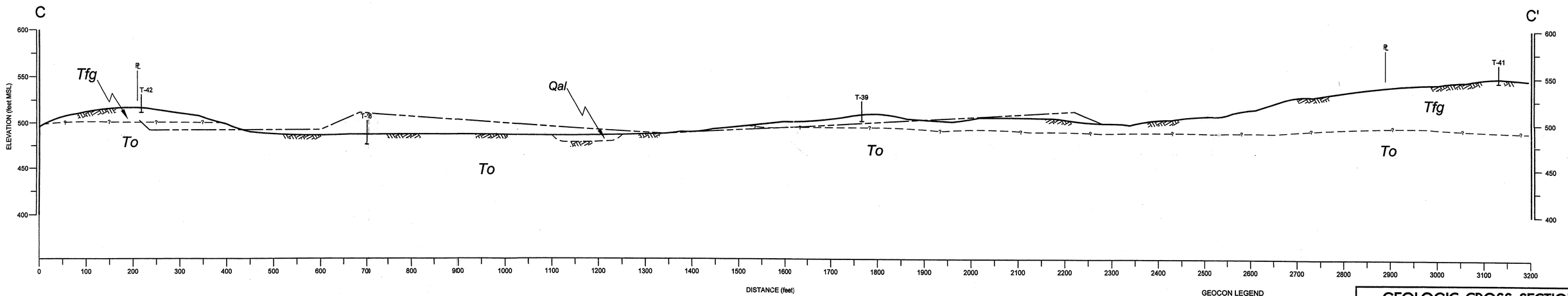
SCALE	1" = 200'
DATE	07-16-2004
PROJECT NO.	07149-22-02
FIGURE	2
SHEET	1 OF 1



CROSS SECTION A-A'
HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 50'



CROSS SECTION B-B'
HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 50'



CROSS SECTION C-C'
HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 50'

GEOCON LEGEND

- Qudf ..... UNDOCUMENTED FILL
- Qal ..... ALLUVIUM
- Tfg ..... UNNAMED FANGLOMERATE
- To ..... OTAY FORMATION
- ..... EXISTING GRADE ELEVATION
- ..... PROPOSED GRADE ELEVATION
- ..... APPROX. LOCATION OF GEOLOGIC CONTACT

GEOLOGIC CROSS SECTIONS

J & D LLC
310 ACRE PROPERTY
SAN DIEGO COUNTY, CALIFORNIA

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SCALE	2:1	DATE	07-15-2004
PROJECT NO.	07149 - 22 - 02	FIGURE	3
SHEET	1 OF 1		

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