APPENDIX I
GEOTECHNICAL REPORT

GEOTECHNICAL REPORT
PROPOSED LANDFILL EXPANSION

SCHOLL CANYON LANDFILL

MARCH 2012

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1.0 INTRODUCTION

This report presents geotechnical analyses and recommendations by **G**eo**L**ogic **A**ssociates (**GLA**) in support of a proposed expansion of the Scholl Canyon Landfill (SCLF) in the City of Glendale, California. The SCLF is a Class III landfill operated by the Sanitation Districts of Los Angeles County (Sanitation Districts) through a Joint Powers Agreement between the Sanitation Districts, the County of Los Angeles, and the City of Glendale (City). As part of that agreement, the Sanitation Districts and the City are pursuing the preparation of an Environmental Impact Report for the permitting and evaluation of the additional fill volume at the SCLF site.

1.1 Site Description

The SCLF is located in the San Rafael Hills in Glendale, California just north of the Ventura Freeway (State Route 134; Figure 1-1). The landfill has been constructed by filling of two steeply sloping, sinuous canyons: the east-west trending Scholl Canyon on the south and an unnamed tributary on the north (Plate 1). The landfill site is situated on 535 acres, of which 322 acres on the south side of the site is currently permitted for active landfilling.

The two canyons have been incised into bedrock and have become infilled with shallow alluvial/colluvial soils prior to start of the landfill operations. Original drainage patterns consisted of two streams within the existing canyons which conveyed runoff from the surrounding slopes. Some grading of these canyons occurred prior to waste placement, as shown in Plate 1. To date, waste has been placed directly on the graded alluvium/colluvium/bedrock ground surface within the canyons without conventional compacted clay and/or synthetic liners. The placement of landfill waste has largely displaced/interrupted these original drainage courses. Current drainage generally consists of sheet flow to engineered collection devices for ultimate conveyance off-site.

Landfill operations began in about 1961 at the base of Scholl Canyon and then proceeded to an unnamed tributary canyon towards the north. Waste material was placed in both canyons concurrently. Waste operations were completed in the northerly canyon in about 1975 when the canyon was filled to capacity. This canyon was subsequently developed as the Scholl Canyon Golf Course and is currently maintained by the City of Glendale. Since then, landfilling within the area of Scholl Canyon has continued on an essentially uninterrupted basis to date.

Scholl Canyon Park at the confluence of Scholl Canyon and the unnamed northern tributary canyon is located within the SCLF facility boundaries at the toe of the landfill. The park facilities in the immediate vicinity of the landfill include asphaltic concrete access and parking facilities, park buildings, and associated infrastructure.

Due to concerns about possible leachate contamination of water bearing strata of the Los Angeles River flood plain to the west, separate cement-bentonite trench subsurface barriers were installed across each of the two canyons within Scholl Canyon Park in 1987 (Plate 2). These subsurface barriers were installed through alluvium and from 5 to 24 feet into weathered bedrock. In addition, numerous monitoring and extraction wells were installed between 1987 and 1998. Groundwater is pumped from extraction wells on the upstream side of the subsurface barriers for treatment, and groundwater levels are recorded in piezometers and monitoring wells both upstream and downstream of the subsurface barriers.

1.2 Description of Proposed Expansion Alternatives

The Sanitation Districts have identified two alternatives for future expansion of the existing landfill operations. Alternative 1 consists of a vertical expansion within the existing waste footprint (Plate 3), and Alternative 2 consists of both a vertical and lateral expansion (Plate 4). Alternative 1 will allow for about 11.5 million cubic yards (5.5 million tons) of additional capacity and extend the life of the landfill by about 13 years (assuming a baseline disposal rate of 1,400 tons per day). The proposed configuration associated with Alternative 2 will allow for 16.5 million cubic yards (8.0 million tons) of additional capacity, which would extend the life of the landfill by 19 years.

Proposed waste placement associated with the Alternative 1 configuration is predominantly confined to the placement of refuse and daily cover. The lateral expansion of the landfill associated with Alternative 2, however, will require substantial excavation grading on the north side of the existing waste fill to develop floor grades, placement of landfill liner and leachate collection systems, and modifications to the existing debris/sedimentation basin and drainage channel along the north side of the existing waste fill below Glen Oaks Boulevard. This work would involve the creation of a cut slope descending from Glen Oaks Boulevard as well as the removal of existing soil stockpiles in this area.

1.3 Scope of Evaluation

GLA was retained by the Sanitation Districts to perform investigations and analyses and to make recommendations in support of a proposed expansion of the SCLF. **GLA**'s investigation specifically concerns stability of proposed landfill slopes, stability of the proposed Alternative 2 cut slopes, and assessment of the potential for liquefaction of alluvial sediments at the toe of the landfill in Scholl Canyon Park. This report presents the results of these efforts and presents conclusions and recommendations intended to facilitate the proposed expansion.

Beginning in 2007, **GLA** has performed numerous tasks, including: an extensive review of background geological, hydrogeological, and geotechnical reports and data; site reconnaissance; geologic mapping in the vicinity of the Alternative 2 lateral expansion; a subsurface investigation within Scholl Canyon Park; geologic, hydrogeologic, and geotechnical interpretations; a deterministic seismic hazard evaluation; liquefaction assessment; dynamic settlement calculations of alluvium within Scholl Canyon Park; slope stability and seismic deformation analyses of landfill slopes; kinematic and stability analyses of proposed bedrock cut slopes; development of recommendations; attendance at internal meetings; and documentation of the above in this report.

2.0 FIELD INVESTIGATIONS

2.1 Previous Investigations by Others

GLA reviewed regulatory compliance documents and reports made available by the Sanitation Districts concerning numerous geologic, hydrogeologic, and geotechnical investigations conducted at the SCLF site by previous consultants throughout the history of the landfill development. Field work for these investigations has included geologic mapping, geophysics, and subsurface exploration. Boring locations and geologic structure mapping obtained from these investigations that pertain to the **GLA** scope of work are shown on Plates 2 and 5 of this report. Selected boring logs by others are presented in Appendix A. The complete list of reports reviewed by **GLA** is presented in the references section of this report.

In addition to general site geologic, hydrogeologic, and geotechnical characterization, **GLA** reviewed these reports with a focus on the geology of the proposed cut slope north of the existing waste fill (Alternative 2) and the subsurface conditions near the toe of the active landfill in Scholl Canyon Park as they relate to the potential for liquefaction in this area.

2.2 Current Investigation

GLA performed cone penetration test (CPT) soundings in Scholl Canyon Park and geologic mapping in the vicinity of the proposed Alternative 2 bedrock cut slope for this investigation.

2.2.1 Cone Penetration Testing

In November 2007, **GLA** supervised advancement of three CPT soundings by Gregg Drilling within the area of Scholl Canyon Park just west and down-canyon of the SCLF for the purpose of evaluating subsurface conditions and assessing liquefaction susceptibility (Plate 2). CPT-1 to CPT-3 were advanced to refusal at depths ranging from 18 to 38 feet. CPT logs as interpreted by **GLA** are presented in Figures 2-1 to 2-3 showing tip resistance, sleeve friction, and pore water pressure. Note that the magnitude and relatively-constant pore pressure shown in these logs is more indicative of moist soils responding to CPT penetration than of saturated soils. CPT logs by Gregg Drilling are presented in Appendix B. A discussion of subsurface conditions in the vicinity of these CPT soundings is presented in Section 3.5.1

2.2.2 Geologic Mapping

GLA provided geologic mapping services for the area of the proposed northerly cut slope associated with the Alternative 2 lateral expansion. The results of these investigations are discussed in Sections 3.5.2 and 6.2.

3.0 GEOLOGY, HYDROGEOLOGY, AND SUBSURFACE CONDITIONS

3.1 Regional Geology

The SCLF is located in the Transverse Ranges Geomorphic Province of California. The landfill is located within Scholl Canyon of the San Rafael Hills which comprise the southeastern part of the Verdugo Mountains. Thought separated from the San Gabriel Mountains by the La Canada Valley, the Verdugo Mountains are composed of many of the same rock types and are essentially an extension of the San Gabriel Mountains Terrane. This area marks the southeastern border of the San Fernando Valley and the northwestern border of the San Gabriel Valley.

The Verdugo Mountains are composed of many individual rock types, including Precambrian gneiss, Mesozoic plutonic rocks, Tertiary sedimentary and hypabyssal intrusive rocks, which are all juxtaposed along many complex faults, intrusive boundaries, and non-conformable sedimentary deposition. Crystalline basement rocks typical of the San Gabriel Mountains Terrane make up the preponderance of the San Rafael Hills along with fewer small exposures of overlying sedimentary rocks. The extreme southern portion of the Verdugo Mountains south of the Verdugo fault are comprised predominantly of Tertiary sedimentary rocks typical of the Los Angeles Basin and Santa Monica Mountains.

The Transverse Ranges are uplifted along a left-stepping bend on the San Andreas fault. Numerous east-west oriented faults accommodate some of the compression with a significant reverse sense of motion and some incidental lateral slip. The Verdugo Mountains are separated from the San Gabriel Mountains by the Sierra Madre Fault System. The Verdugo fault separates the southern side of the Verdugo Mountains from the Santa Monica Mountains. Although past evidence suggested that the Verdugo fault had at least 3,300 feet of vertical offset, other researchers suggest the fault motion is primarily strike-slip. See Section 4.0 for further discussion of active faults and seismicity.

3.2 Local Geology

The San Rafael Hills, which represent the southeastern portion of the Verdugo Mountains, are an area of high relief exposing Tertiary sedimentary rocks south of the Verdugo fault and igneous and metamorphic rocks to the north. The SCLF is located within Scholl Canyon, a westward draining tributary of the Los Angeles River within the San Rafael Hills. The project area within the landfill property is underlain primarily of early Cretaceous Wilson Diorite. Precambrian gneiss and Precambrian to Paleozoic siliceous metamorphic rocks and large dikes of Tertiary hypabyssal igneous rocks are exposed on the slopes above the landfill property. Smaller localized, late-stage intrusive pegmatite and aplitic dikes are also found throughout the Precambrian gneiss and Wilson Diorite.

Geologic exposures are limited primarily to road cuts and cut slopes along the perimeter of the landfill. Mapping of the rock types shows a slight variation in rock compositions ranging from weakly to moderately well-foliated diorite to granodiorite of the Wilson Diorite. Foliation within the Wilson Diorite is expressed as banding caused by the preferential alignment of micaceous minerals and the segregation of alternating bands of more mafic segregations of hornblende and biotite against more plagioclase and quartz rich bands. The Precambrian gneiss is composed of a fine- to medium-grained, moderately to well foliated, biotite and hornblende rich potassium feldspar gabbro to diorite with minor amounts of quartz.

Although shown as an intrusive contact by Dibblee (1989), the Wilson Diorite is locally in fault and intrusive contact with Precambrian gneiss on the slopes above the proposed project cut slopes.

The rock in the upper 10 to 50 feet of the native ground surface is moderately oxidized with many feldspar and iron-rich minerals weathered to clay and iron oxide minerals. Oxidation and weathering of the rock is very pronounced within 10 feet of the native ground surface with colluvial soils approximately two feet thick overlying shallow dipping slopes.

Rock outcrops observed in cut slopes north of the existing waste fill are slightly to moderately fractured, with fractures typically spaced from four inches to three feet apart. Although minor faults were observed on existing cut slopes and road cuts, they are few in number relative to the joints and fractures and can only be mapped for short distances due to colluvial soil cover and minor offset. Many of the faults and shears observed in the field do not appear to have generated gouge in appreciable quantities. Most joints and fractures show little or no accumulation of weathering products and have a rough appearance with apertures that are small or are completely closed.

3.3 Structural Geology

The geologic history of the San Rafael Hills is very complex with many stages of igneous rock emplacement ranging from the Precambrian to the Tertiary with multiple episodes of orogeny. The primary areas of concern for the structural geologic site characterization of the proposed Alternative 2 cut slope were rock ripability, slope stability, and groundwater flow. Rock foliation and discontinuities were measured in the field and compiled on a geologic map during this and previous site investigations, as shown on Plates 2 and 5.

Most of the discontinuities in the rock are joints showing no discernible offset and rough surfaces. Orientations of the foliation, joints, faults, and shears measured in this and a previous investigation of this area (Van Beveren & Butelo, 2006) are depicted on the geologic map of the proposed Alternative 2 cut slope (Plate 5).

3.4 Site Hydrogeology

Groundwater flow at the SCLF site generally follows topography and is primarily within unconsolidated alluvium along the pre-development canyon bottom, with significantly lesser flows in the colluvium and weathered bedrock along the slopes and the fractured bedrock beneath (Sanitation Districts, 1988). Given the topography of the SCLF site and drainage improvements for the landfill and adjacent golf course, groundwater recharge from seasonal precipitation within Scholl Canyon occurs primarily in undeveloped ridges and slopes surrounding the landfill. Bedrock fracture flow is constrained by the tight joint spacing, which limits recharge. Only minor seepage was observed in bucket auger Boring 2 advanced in the area of the proposed Alternative 2 cut slope (Van Beveren & Butelo, 2006). The measured depth to groundwater in Monitoring Well M19B, which is about 500 feet north of this area, was 130 feet. Springs and seeps were not observed on any of the native slopes around the proposed north cut slope, although a seep was observed by **GLA** on the lower portion of a cut slope beneath a swale descending from a green and fairway of the golf course. The upper portions of the slope were dry and suggest that fractures, though tight, are capable of draining away excess pore pressure from precipitation and golf course irrigation.

Much of the focus of hydrogeologic studies conducted for the SCLF site has been in the area downgradient of the landfill in Scholl Canyon Park where two subsurface barriers were installed in 1987 to limit off-site water quality impacts from the landfill. Numerous soil borings, piezometers, and monitoring wells were installed in this area prior to construction of these barriers (Plate 2). Since about 1999, pumping of extraction wells upgradient of Subsurface Barrier #1 in Scholl Canyon has dropped groundwater levels generally to below the top of bedrock in this area (Figure 3-1), though the base of the alluvium is occasionally saturated. Extraction wells in the vicinity of Subsurface Barrier #1 are set to start pumping when groundwater rises to elevation 945, which is just above or below the top of bedrock for the various extraction wells this area (Sanitation Districts, 2010).

Due to the low recharge, site drainage improvements, and ongoing groundwater pumping, **GLA** does not anticipate that the SCLF waste fill is saturated to any appreciable extent across the site.

3.5 Subsurface Conditions

The SCLF was constructed by filling two existing canyons. Due to site grading related to landfilling operations, it is anticipated that the bulk of the landfill is founded predominantly on bedrock materials while portions of the refuse located along the axis of the original canyon bottom has likely been placed on shallow colluvial and deeper alluvial soils. For this investigation, subsurface conditions are primarily of engineering interest at the toe of the existing landfill in Scholl Canyon Park and at the proposed Alternative 2 cut slope area north of the existing waste fill and south of Glen Oaks Boulevard.

3.5.1 Scholl Canyon Park

As a result of investigations related to characterization of landfill leachate migration and subsequent construction of subsurface barriers and installation of monitoring and extraction wells, an extensive amount of subsurface exploration by others has been performed in the area of Scholl Canyon Park at the western toe of the existing waste fill. In addition, three CPT soundings were advanced for this investigation (Section 2.2.1). Subsurface conditions near the toe of the landfill generally consist of varying depths of alluvial materials overlying bedrock. Alluvial depths are highly variable, ranging from less than 5 feet along the flanks of the canyon to about 40 feet along the canyon axis (EarthTech, 1988). Alluvium generally consists of loose to very dense sand, silty sand, silty sand with gravel, gravelly sand, cobbles, and minor amounts of clayey sand.

3.5.2 Proposed Alternative 2 Cut Slope

The area of the proposed lateral landfill expansion associated with Alternative 2 was previously evaluated by another consultant (Van Beveren & Butelo, 2006). Field work for that investigation consisted of advancing two bucket auger borings to a depth of 50 feet and field mapping of bedrock surface exposures. **GLA** supplemented this previous investigation by performing a site reconnaissance and mapping existing cut slopes and native exposures of bedrock to determine lithology and structure of the underlying bedrock. Specifically, mapping was focused on identifying discontinuities such as foliation, joints, faults, and shears and recording the orientation of each feature. In addition, the location of each feature was also recorded using a hand-held global positioning system (GPS) device.

Based upon the available information, the subsurface conditions in this area include uncontrolled stockpiled earth fill (i.e. fill placed without engineering oversight and compaction controls), colluvium, and granitic bedrock. Colluvium is more prevalent on shallow dipping slopes and within drainage swales. The colluvial materials consist of a thin veneer of loamy sand with silt derived from weathering of the underlying crystalline bedrock. Bedrock in the proposed north cut slope area consists of quartz diorite. While boring logs indicate bedrock weathering to a depth of 20 to 30 feet, at least the upper 50 feet is moderately weathered as indicated by the ability to drill and sample with a truck-mounted 24-inch diameter bucket auger. Mapping of geologic structures for this investigation by **GLA** is consistent with the previous investigation (Van Beveren & Butelo, 2006). The predominant geologic discontinuities in this slope area consist of joints and fractures. Joints and fractures are generally spaced approximately four inches to three feet apart. Foliation is weakly to moderately expressed in most outcrops.

A discussion of discontinuity data for the proposed Alternative 2 bedrock cut slope from this and a previous investigation is presented in Section 6.2.

4.0 SEISMIC HAZARD EVALUATION

The seismic hazard evaluation described below is intended to provide an updated seismic design basis for engineering analyses conducted for the proposed SCLF expansion in accordance with California Code of Regulations Title 27 (Title 27).

4.1 Regional Faulting

The SCLF is located in the Los Angeles region, an area of high seismicity that has a documented history of strong earthquakes. Active local and regional faults of potential major significance to the SCLF area include the Verdugo fault, the Raymond fault, the Sierra Madre fault, the Hollywood fault, the Elysian Park fault, and the Puente Hills fault (Figure 4-1). Source parameters, source-to-site distances, and estimated ground motions from these faults are discussed below in Section 4.3.

4.2 Historic Earthquakes

The project vicinity has experienced strong shaking from earthquakes during historic times, notably the 1971 San Fernando earthquake on the San Fernando section of the Sierra Madre fault, the 1987 Whittier Narrows earthquake on the Puente Hills fault, and the 1994 Northridge earthquake on the Northridge fault. Table 4-1 presents a list of historic earthquakes greater than M_w 5.0 within 100 km of the site and the estimated rock-site peak horizontal ground acceleration (PHGA) at the SCLF site associated with these events based on the now-outdated attenuation relationship Abrahamson & Silva (1997). This list of historic earthquakes was performed with the computer program EQSEARCH (Blake, 2010), which has not been updated with the more-recent Next Generation Attenuation (NGA) relationships.[1] As such, the estimated PHGAs should be viewed as approximate. For the five events with the largest estimated ground motion, the PHGA's were recalculated using the NGA relationships, which were used for design ground motion calculations as described below.

4.3 Design Earthquake Ground Motions

4.3.1 Design Basis

Title 27 requires that stability analyses performed for a Class III landfill be based on the expected peak ground acceleration at the site associated with the maximum probable earthquake (MPE). The MPE has been defined by the California Division of Mines and Geology (now known as the California Geological Survey) as the "maximum earthquake that is likely to occur during a 100-year interval" (CDMG, 1975). There has been a recent trend by some of the Regional Water Quality Control Boards (RWQCB), however, to

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[1] Earthquake Spectra, Volume 24, Number 1, Earthquake Engineering Research Institute, 2008; note that selected NGA relations are used by the USGS for the National Seismic Hazard Maps.

require the use of the maximum credible earthquake (MCE) in such analyses. The MCE is defined as "… the maximum earthquake that appears capable of occurring under the presently known tectonic framework." (CDMG, 1975). At the Sanitation Districts' direction, ground motion parameters for the SCLF site have been estimated for an MCE event.

4.3.2 Methodology

Although probabilistic seismic hazard assessments are gaining wider acceptance and form the basis for current building codes, deterministic seismic hazard evaluations (DSHA) are more commonly used for solid waste landfills and dams in areas of high seismicity, such as coastal California. In fact, the California Division of Safety of Dams utilizes a deterministic methodology to develop ground motion parameters for all dam safety evaluations (Fraser, 2002). Accordingly, the seismic hazard assessment for the SCLF described herein is deterministically based.

As earthquake vibrations radiate out from a causative fault, their intensity and frequency content are altered as they pass through geologic materials. Acceleration response spectra (ARS), which graphically present the intensity of vibrations across a range of periods (*period = 1/frequency*), can be used to characterize earthquake shaking (see Figure 4-2). Note that the PHGA is the spectral acceleration at a very low (or zero) period.

Generally speaking, past ground motion characterizations for slope stability evaluations have focused solely on PHGA. More recently, practical methods for incorporating the ground response at the fundamental period of vibration of a potential slide mass have been developed (e.g. Bray and Travasarou, 2007). Since seismically-induced permanent displacements of a slide mass are correlated more closely with higher periods of vibration than the PHGA, ground motions have been characterized herein using ARS curves, which as mentioned above, include the PHGA.

GLA used the average of four NGA-based attenuation relationships to estimate the 5-percent damped bedrock motion ARS curves for an MCE-event on all faults in the USGS/CGS 2008 Fault Model (Wills et al., 2008) within a 100 km radius of the SCLF site. The four NGA relationships used were: Abrahamson & Silva (2008), Boore & Atkinson (2008), Campbell and Bozorgnia (2008), and Chiou & Youngs (2008). These deterministic calculations were performed with the computer program EZ-FRISK (Risk Engineering, Inc., 2010). For the faults most significant to the SCLF site, these calculations were manually verified using fault data from the USGS/CGS 2008 Fault Model (i.e. trace endpoint coordinates, dip angle, maximum magnitude, and rupture depth and width), a spreadsheet coded with the NGA relations, and source-to-site distances based on the SCLF site coordinates and determined using AutoCAD (Autodesk, 2011).

The SCLF site latitude/longitude coordinates used for these calculations[2] were taken from the State's CalRecycle Solid Waste Information System database; this location corresponds roughly to edge of the existing/proposed waste fill southwest of the debris/sedimentation basin. NGA ground motion calculations are presented in Appendix C-1.

Since the NGA relationships depend on the shear wave velocity in the upper 30 meters of the soil or rock profile ($V_{S\text{-}30}$), this parameter was estimated to be approximately 500 m/s (1,640 ft/s) based on geophysical measurements performed in and near Scholl Canyon Park as part of a geologic investigation for the subsurface leachate barriers (Woodward-Clyde Consultants, 1986). Shear wave velocity calculations are presented in Appendix C-2.

4.3.3 Design Ground Motions

The results of these DSHA analyses show that the seismic risk at the site is generally controlled by the nearby Verdugo fault, a reverse fault dipping about 55 degrees to the northeast. The median PHGA, 0.2 second, and 1.0 second spectral accelerations for an MCE event on this fault and a $V_{S\text{-}30}$ = 500 m/s site condition are 0.67 g, 1.48 g, and 0.66 g, respectively. MCE-based ARS curves for the Verdugo and other notable faults are presented in Figure 4-2. A summary of site spectral accelerations, source-to-site distances, and other NGA input parameters for MCE events on the locally significant and regionally notable faults is presented in Table 4-2. NGA calculations are presented in Appendix C-1.

4.4 Fault Surface Rupture

No evidence of surface traces of active faults[3] at the Scholl Canyon project site have been identified as part of this investigation or previous geologic and faulting studies. Furthermore, the site does not lie within or anywhere near a State of California Alquist-Priolo Earthquake Special Studies Zone (i.e. A-P Zone). A-P Zones are established by the State Geologist to regulate construction of buildings for human occupancy within narrow zones adjacent to active faults.

The deterministic seismic hazard assessment discussed above includes ground motion estimates from a postulated M_w 6.9 earthquake on the "Verdugo fault" per the USGS/CGS 2008 Fault Model. The Verdugo fault trace in this model actually comprises the Verdugo-Eagle Rock-San Rafael fault system, a northeast-dipping fault system that runs along the southwest base of the Verdugo Mountains and the San Rafael Hills. As shown on Figure 4-1, the San Rafael fault is the southernmost, northwest-striking segment of the "Verdugo fault," the Eagle Rock fault is the

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[2] Latitude/Longitude (34.1575, -118.19556) = Northing/Easting (1879757, 6502504) NAD83 SPCC Zone V.

[3] An active fault is defined in the Alquist-Priolo Act as having experienced displacement within the Holocene period (i.e. in the last 10,000 years).

next segment of this fault to the north, which strikes almost east-west, and the Verdugo fault proper is the remainder of the fault heading to the northwest.

At the closest point, the simplified, USGS/CGS 2008 Fault Model fault trace of the Verdugo (Eagle Rock) fault lies just south of the SCLF site along the ridge between the site and the freeway to the south. The actual mapped trace of the Eagle Rock fault, which is more accurately located than the straight-line segments of the USGS/CGS 2008 Fault Model, lies just south of the nearby Ventura Freeway. Similarly, mapped traces of the San Rafael fault lie just north of the freeway and southeast of the site in the vicinity of the Eagle Rock.

While the Verdugo fault proper is considered by the State of California to be Holocene-active, the Eagle Rock and San Rafael faults are considered as having last experienced fault displacement in the Late Quaternary period (i.e. within the past 700,000 years). So while the entire Verdugo-Eagle Rock-San Rafael fault system per the USGS/CGS 2008 Fault Model is considered in the ground motion estimates for this investigation, the southern portion of this fault system (i.e. the Eagle Rock and San Rafael faults) is not considered active. Furthermore, no evidence for surface rupture has been observed along Eagle Rock and San Rafael faults (Weber et al., 1980). As such, the probability of earthquake surface rupture affecting the SCLF site is considered very low.

5.0 LIQUEFACTION SUSCEPTIBILITY

Liquefaction is a phenomenon whereby loose, sandy soils below the water table loose strength in response to the cyclic build up of earthquake-induced groundwater pore pressures. In severe cases, liquefied soils can lose nearly all strength, causing slope failures, ground distortion and settlement, and damage to overlying structures.

5.1 Liquefaction Assessment

An assessment of liquefaction triggering at the site using CPT-based procedures was performed by averaging the results from three different methods. These analyses were based on an MCE event on the nearby Verdugo fault (magnitude M_w 6.9, PHGA =0.67 g). Spreadsheets showing the results of these calculations for the three CPTs performed within Scholl Canyon Park at the toe of the waste fill (Plate 2) are presented in Appendix D-1. Spreadsheets showing the results of alternative SPT-based liquefaction assessment calculations for SPTs performed in Scholl Canyon Park as part of previous investigations are presented in Appendix D-2. The liquefaction factor of safety results for the three CPT-based methods is presented on Figures 5-1 to 5-3.

5.1.1 Liquefaction Triggering Assessment Methods

The liquefaction potential at the SCLF site was evaluated in general accordance with the recommendations of the 1996 National Center for Earthquake Engineering Research (NCEER) and 1998 NCEER/National Science Foundation Workshops on Evaluation of Liquefaction Resistance of Soils (Youd, et al., 2001). This procedure has been verified with case history data down to depths of about 15 m (49 ft.), which encompasses the vast majority of reported liquefaction cases. In addition to Youd, et al. (2001), liquefaction triggering assessments were carried out by two other, more recent methods, and the final liquefaction factors of safety, FS_{LIQ}, were averaged for all three methods. The first of these two additional methods is Moss, et al. (2006), which is essentially the method outlined by Professor Raymond Seed of the University of California at Berkeley in his “Queen Mary” lecture (Seed, et al., 2003). The third method is Idriss and Boulanger (2008) which was recently published in an Earthquake Engineering Research Institute monograph.

Due to its economy and the advantage of a continuous profile that this technique provides, CPT-based procedures are becoming the more preferred method of liquefaction triggering assessment within the geotechnical engineering profession. As with SPT-based approaches, CPT-based procedures divide the liquefaction resistance by demand to arrive at a factor of safety against liquefaction, FS_{LIQ}. The demand is calculated from the site PHGA and is corrected for earthquake magnitude. Based on the site-specific ground motion analyses from this investigation (Section 4), a PHGA of 0.67 g and an MCE event magnitude of M_w 6.9 were used as inputs to the liquefaction assessment.

CPT data are generally acquired on every 5 cm (2 inches) of penetration. Boulanger, et al. (1997) recommend 0.6 m (2 ft.) as a reasonable interval over which to average CPT data for development of CPT-based liquefaction correlations. This thickness corresponded to the thickness of liquefiable layers experiencing significant deformations in that study, and it also corresponds approximately to the measurement interval for the SPT, which is widely used in liquefaction assessment. While using data from every 5 cm of CPT penetration might overstate the risk of liquefaction, we felt that averaging data over an interval of 2 feet might miss potentially liquefiable strata. Accordingly, a 0.5-foot running average of CPT data was used in this investigation for all three liquefaction assessment methods.

Due to pumping from extraction wells upstream of Subsurface Barrier #1 in Scholl Canyon Park (Figure 3-1 and Section 3.4), groundwater was assumed to be at elevation 940 in CPT-1 and CPT-2 and elevation 950 in CPT-3.

5.1.2 Liquefaction Triggering Assessment Results

The results of the liquefaction assessment are presented on Figures 5-1 to 5-3 in the form of plotted average FS_{LIQ} values for each CPT boring. These figures present FS_{LIQ} irrespective of groundwater level. Due to ongoing pumping upstream of Subsurface Barrier #1 within Scholl Canyon Park, however, most of the potentially-liquefiable soils in this area are above the lowered groundwater surface; thus, these soils would not be expected to liquefy under the design earthquake event. Since the sandy alluvial soils in this area would appear to be liquefiable where they are below groundwater, however, and since the top of bedrock encountered in borings in the vicinity of Subsurface Barrier #1 is occasionally below the lowered groundwater elevation of 940 (Section 3.4), the base of the alluvium downstream and just upstream of the this barrier has been assumed to have liquefied for the purposes of the slope stability evaluation (Section 6.1 and Cross Section A-A’ in Appendix E-2).

A guidance document for implementing California seismic regulations suggests that a FS_{LIQ} value of 1.3 is appropriate for “assessing hazards related to flow failure potential for large magnitude earthquake events….” (Martin and Lew, 1999). As such, if groundwater pumping upstream of Subsurface Barrier #1 were to be stopped, alluvial soils in this area would potentially liquefy during the design earthquake event.

5.2 Discussion of Potential Liquefaction Effects

Ongoing pumping upstream of Subsurface Barrier #1 within Scholl Canyon Park is expected to prevent or minimize any significant ground surface distortion as a result of potential liquefaction at the toe of the SCLF within Scholl Canyon Park by largely depriving these sediments of the groundwater necessary for liquefaction. In the very unlikely event of high groundwater, such as due to a cessation of pumping and the design earthquake occurring simultaneously, surface manifestations of liquefaction at the SCLF, such as differential settlement and sand boils, would generally be confined to Scholl Canyon Park. Since the aerial extent of potentially liquefiable alluvium is confined to the relatively narrow channel of the pre-development creek, this potential worst-case liquefaction scenario is not expected to cause significant stability failures of the waste mass, and in no case would any potential liquefaction-related failure extend very far up the landfill slope. Further discussion of potential liquefaction-related stability failures is presented in Section 6.

5.3 Potential Seismically-Induced Settlement

Analyses were performed to estimate the magnitude of potential seismically-induced dynamic settlements within the sandy alluvial soils near the toe of the landfill in the vicinity of Scholl Canyon Park during the design earthquake (MCE magnitude M_w 6.9, PHGA =0.67 g). These analyses were performed with the computer program CLiq (Geologismiki, 2011) using data from CPT-1 and CPT-2 (Figures 2-1 and 2-2; Plate 2). CLiq calculates the sum of dynamic settlements of potentially-liquefiable saturated soils and non-saturated soils by the methods of Ishihara and Yoshimine (1992) and Robertson (2009), respectively. Liquefaction triggering in CLiq is based on the recommendations of Youd et al. (2001).

The calculated dynamic settlement of the saturated and non-saturated sandy soils in each of the three CPTs (to the total depth of exploration) are as follows:

- CPT-1: Estimated Dynamic Settlement = <1 inch
- CPT-2: Estimated Dynamic Settlement = 2-1/2 inches
- CPT-3: Estimated Dynamic Settlement= <1/4 inch

Dynamic settlement calculations are presented in Appendix D-3.

The above calculated dynamic settlements should be considered approximate, and localized settlements two or three times these magnitudes could be anticipated during the design event. Settlements of this magnitude would not be expected to significantly impact the waste fill, however, since such deformations are easily tolerated by an unlined landfill. Distress to drainage or pumping facilities in this area due to dynamic settlements may occur, however. If groundwater pumping upstream of Subsurface Barrier #1 were to be stopped allowing groundwater to rise substantially, higher dynamic settlements of alluvial soils in this area during the design earthquake event may be expected.

6.0 SLOPE STABILITY EVALUATION

GLA evaluated the stability of proposed landfill slopes (Alternatives 1 and 2) and proposed cut slopes in bedrock (Alternative 2). In addition to static analyses, estimates of potential seismically-induced permanent deformations were made based on an MCE event on the nearby Verdugo fault (magnitude M_w 6.9, PHGA =0.67 g). The stability evaluation for landfill slopes also included consideration of potential liquefaction of alluvial deposits near the toe of the existing waste fill in Scholl Canyon Park during the MCE design event. Given the potential failure modes unique to each type of slope, proposed waste fill and bedrock cut slopes were evaluated separately using different methods, as discussed below.

6.1 Limit-Equilibrium Slope Stability Analyses of Landfill Slopes

GLA analyzed the stability of the proposed Alternative 1 and Alternative 2 landfill slopes under conventional limit-equilibrium methods for static and pseudo-static conditions to confirm compliance with Title 27 slope stability requirements.

Cross Sections A-A’ to H-H’ were located and generated by **GLA** to evaluate critical landfill geometries and conditions both expansion alternatives (Plates 3 and 4). Cross Section A-A’, which considers waste fill stability for Alternatives 1 and 2 both with and without potential liquefaction of alluvium at the base of the SCLF in Scholl Canyon Park, was located approximately along the axis of the pre-development canyon in the Scholl Canyon Park area to ensure that stability evaluations for the liquefaction condition considered the worst case. Since a landfill liner is not present at Cross Sections B-B’ and C-C’ (and G-G’ for Alternative 1), analyses at these locations only evaluate potential stability failures through the waste mass. Since a landfill liner will be on the depressed floor and slopes of the Alternative 2 lateral expansion area, Cross Sections D-D’ to H-H’ were located in this area to ensure that the most critical potential failures through the waste fill then along the landfill liner were considered. The geometry of Sections A-A’ to H-H’ is presented in Appendix E-1, and slope stability analysis results showing these cross sections and materials considered are presented in Appendix E-2.

Except for potential liquefaction of alluvium at the toe of the landfill in Scholl Canyon Park, foundation-type failures were not considered since critical failures at the edges of the existing and proposed waste fill are generally founded on bedrock or compacted soil, which would be less critical than potential failures through the waste fill and along a liner (or just through the waste fill).

6.1.1 Methodology

GLA used the Morgenstern-Price method within the limit-equilibrium slope stability software SLOPE/W (version 7.17; GEO-SLOPE International, 2010) to analyze the two-dimensional stability of proposed landfill slopes. Slope stability Cross Sections A-A’ to H-H’ were developed to consider critical potential failure geometries (Plates 3 and 4).

A variety of search procedures were utilized to determine the critical potential failure surface. Some of the individual analyses took advantage of a slip surface optimization procedure within SLOPE/W wherein the lowest factor-of-safety potential slip surface at the end of standard limit equilibrium iterations is further iterated on a segment-wise basis to find potentially lower factor-of-safety (and often non-circular) slip surfaces. Use of this procedure will always result in a factor-of-safety that is as low or lower than if it had not been used (i.e. it is conservative).

6.1.2 Material Properties

The materials involved in the proposed landfill slopes include: municipal solid waste (MSW) fill, compacted clay/synthetic liner materials, and alluvial soils (non-liquefied and liquefied). Material parameters required for analyses include unit weight and shear strength parameters (friction angle & cohesion and/or shear-normal strength function); these parameters are summarized on Table 6-1.

6.1.2.1 *Municipal Solid Waste*

A unit weight of 80 pcf was assumed for municipal solid waste (MSW) based on Zekkos et al. (2006). The static and dynamic shear strengths of MSW were based on Bray et al. (2009). This shear strength model uses a curved shear-normal functional representation, as shown in Figure 6-1. For comparison to more traditional shear strength parameters, a linear approximation of these functions would result in friction angle and cohesion parameters of about 32 degrees and 500 pounds per square foot (static) and 36.5 degrees and 600 pounds per square foot (dynamic).

6.1.2.2 *Landfill Liner*

The proposed Alternative 1 expansion consists entirely of placement of new MSW over existing MSW within the unlined footprint of the existing waste fill (Plate 3). As such, stability analyses for this alternative do not include liner materials.

The portion of the proposed Alternative 2 waste fill outside the MSW footprint as it existed on October 9, 1993 will receive a base liner in accordance with Title 27. This proposed base liner, which lies at the north end of the proposed Alternative 2 lateral expansion, will be depressed below existing grades to enhance stability (Plate 4). Per direction from the Sanitation Districts, the proposed Alternative 2 base liner sections are as follows:

- Floor Liner (from top to bottom): non-woven geotextile; an 80-mil double-sided textured HDPE membrane; and a compacted clay liner over the subgrade;
- Slope Liner (from top to bottom): single-sided geocomposite drain with geonet side down; non-woven geotextile; an 80-mil double-sided textured HDPE

membrane; a needle-punched, reinforced geosynthetic clay liner (GCL); and a 40-mil double-sided textured HDPE membrane over the subgrade.

Per the Sanitation Districts, the liner materials, including the clay source for the floor liner, are expected to be the same as were used for development of Phase 2B at the Calabasas Landfill. At the Sanitation Districts' direction, **GLA** used large deformation shear strength data from this previous project to develop separate shear-normal strength envelopes for the floor and slope liners (Figure 6-2). For comparison to more traditional shear strength parameters, a linear approximation of the floor and slope shear-normal functions would result in friction angle and cohesion parameters of 16.4 degrees and 365 pounds per square foot (floor) and 10.8 degrees and 175 pounds per square foot (slope).

The slope liner contains a GCL encapsulated between two HDPE membranes to prevent hydration. It is common practice in California, including for the Calabasas Landfill Phase 2B project, to take the shear strength of a liner section containing an encapsulated GCL as the average of two series of tests run under hydrated and unhydrated conditions. **GLA** conservatively subtracted one standard deviation from these averages for the slope liner section for development of the shear-normal strength functions. Note that for all Calabasas Landfill Phase 2B tests, sliding of the slope liner section occurred between the geonet and the non-woven geotextile.

6.1.2.3 *Non-Liquefied Alluvium*

The shear strength parameters for non-liquefied alluvium were estimated based primarily on correlations of in-situ cone penetration test (CPT) soundings conducted for this investigation and Standard Penetration Test (SPT) from previous investigations at the SCLF site. Since a potential failure surface through the alluvium would pass through looser and denser materials, use of strength correlations based on just under the average penetration resistances is appropriate. After throwing out all SPT blow counts over 50 from borings in the Scholl Canyon Park area, the average N-value for alluvial soils was about 23. Converting normalized CPT tip resistances in alluvium (q_{c1N}) for CPT-1 and CPT-2 into normalized $(N_1)_{60}$ blow counts per Lunne et al. (1997) resulted in an average value of about 20, which is reasonably consistent with the SPT average. Note that since CPT-3 was advanced somewhat off of the axis of the pre-development canyon and, thus, had higher tip resistances, this CPT was not used for development of alluvium shear strengths. Using the above values, the "average" alluvium in the Scholl Canyon Park area is medium dense with an approximate friction angle of 35 to 40 degrees (Meyerhoff, 1956). Given the presence of silty sand as well as gravel and cobbles in this alluvium, **GLA** conservatively modeled the shear strength of non-liquefied alluvium with a friction angle of 34 degrees and a cohesion of 100 pounds per square foot.

6.1.2.4 *Liquefied Alluvium*

The shear strength parameters for liquefied alluvium were estimated based primarily on correlations of in-situ cone penetration test (CPT) soundings and correlations by Seed and Harder (1990) and Olsen and Stark (2002) as modified by Stark (2008) as shown on Figure 6-3. The former correlation was utilized by converting normalized CPT tip resistances to normalized $(N_1)_{60}$ blow counts as discussed above. Note also that shear strengths were only calculated for CPT intervals in which the liquefaction factor of safety (FS_{LIQ}) was found to be 1.1 or less (Section 5.1.2), ensuring that the post-liquefaction shear strength would not be unduly influenced by denser, potentially non-liquefiable soils. The post-liquefaction shear strengths thus calculated are presented on Figures 6-4 and 6-5 for CPT-1 and CPT-2, respectively. Based on these correlation results, an undrained residual post-liquefaction shear strength of alluvium was estimated to be 400 pounds per square foot.

6.1.3 Groundwater

As discussed in Section 3.4, **GLA** does not anticipate that the SCLF waste fill is saturated to any appreciable extent across the site. A groundwater potentiometric surface within the waste mass, therefore, was not considered. In the context of slope stability analyses for the case of potential liquefaction, however, groundwater at the base of the alluvium downstream and just upstream of Subsurface Barrier #1 near the toe of the landfill within Scholl Canyon Park was assumed to be present, as discussed in Section 5.1.2. Since pumping from extraction wells upgradient of this barrier generally maintains groundwater in this area below the base of the alluvium (Figure 3-1), this assumption is conservative.

6.1.4 Static Stability and Seismic Deformation Analysis Results

The results of static stability and MCE-based seismic deformation analyses are discussed below, summarized in Table 6-2, and presented in Appendices E-2 and E-3, respectively.

Note that many liquefaction case histories have found that liquefaction-related slope failures tend to occur some minutes or even hours after the earthquake shaking has stopped due to the time required for pore pressure and shear stress redistribution to occur. Analyses for this investigation considered both static stability and potential seismically-induced permanent deformations of the waste mass along Cross Section A-A’ with liquefied alluvium conditions at the toe of the landfill in Scholl Canyon Park. Since there may not be earthquake inertial forces during the most critical time for slope stability (i.e. post-liquefaction), these analyses are conservative.

6.1.4.1 *Static Stability Analyses of Proposed Landfill Slopes*

The results of static stability analyses of proposed landfill slopes based on the methods and parameters presented above are presented in Table 6-2 for both proposed alternatives and a variety of conditions. The static factor of safety of all proposed slopes is greater than 1.5, indicating that they meet the static stability requirements of Title 27. Landfill slope stability calculations are presented in in Appendix E-2.

6.1.4.2 *Seismic Deformation Analyses of Proposed Landfill Slopes*

Title 27 regulations for a Class III landfill require that further analyses should be done to demonstrate that the proposed design will be functional during the MPE event if the pseudo-static analysis indicates a factor-of-safety less than 1.5. As discussed above in Section 4.3.1, the more conservative MCE event has been adopted as the design basis for the proposed SCLF expansion project at the Sanitation Districts' direction. The MCE design earthquake for this project is a moment magnitude M_w 6.9 event on the Verdugo fault which would result in an estimated peak horizontal ground acceleration (PHGA) at the SCLF site of 0.67 g (Figure 4-2).

Accordingly, the procedure developed by Bray and Travasarou (2007) was used to estimate the magnitude of potential seismically-induced permanent displacement during the MCE. This procedure is an extension of the commonly-used Bray and Rathje (1998) procedure. For this newer procedure, a nonlinear sliding block model and a much larger database of ground motions were used to capture the dynamic performance of dams, natural slopes, and soil and waste fills. The procedure was further validated through a reexamination of 16 dam and waste fill case histories. Significantly, the procedure captures the dynamic response of the fill materials through their fundamental period of vibration. The seismic input parameter is not the oft-used peak ground acceleration, but rather the value of spectral acceleration at a multiple of the fundamental period of the sliding mass. In this way, the procedure provides better predictive performance than previous procedures, including Bray and Rathje (1998).

The results of the seismically-induced permanent displacement calculations for Cross Sections A-A' through H-H' indicate tolerable displacements of under 6 inches for the MCE design event for all conditions. Within the industry, 6 to 12 inches of displacement is considered the maximum tolerable deformation for landfills with synthetic liner components. As such, the dynamic stability of the proposed landfill slopes is in compliance with the requirements of Title 27. Calculations of potential seismically-induced permanent deformation for landfill slopes are presented in in Appendix E-3. Note that dynamic displacements were not calculated for slopes that were obviously non-critical based on the static factor of safety and the deformation results of other, more-critical analyses.

6.2 Kinematic and Wedge Stability Analyses of Alternative 2 Bedrock Cut Slopes

A statistical analysis of discontinuity data (joints, shears, faults, or other planes of weakness) for the proposed Alternative 2 bedrock cut slope was performed utilizing stereographic projection techniques. Significant discontinuity planes thus identified were evaluated for their ability to move out of the slope with kinematic analyses. Finally, factors of safety were calculated for potential single-plane and wedge failures, as discussed below.

6.2.1 Geologic Model

As described in detail in Section 3.2 above, bedrock exposed in the Alternative 2 lateral expansion area consists of weakly foliated Cretaceous Wilson Diorite with minor intrusive aplite dikes interspersed throughout. The foliation observed in the Wilson Diorite exposed on the slopes in the proposed expansion area is not particularly prone to breakage or jointing. Most bedrock discontinuities consist of fractures or joints showing no discernible offset or anomalous weathering products and do not preferentially follow foliation. Rocks are slightly to moderately fractured, with fractures typically spaced from four inches to three feet apart. Although minor faults were observed on existing cut slopes and road cuts, they are few in number relative to the joints and fractures and can only be mapped for short distances due to colluvial soil cover and minor offset. Many of the faults and shears observed in the field do not appear to have generated gouge in appreciable quantities. Most joints and fractures show little or no accumulation of weathering products and have a rough appearance with apertures that are small or are completely closed. The geology of the expansion area and bedrock structural data is shown on Plate 5.

Orientation data for representative discontinuities around the proposed Alternative 2 bedrock cut area were recorded in the field and located on a geologic map along with data compiled from other consultants from earlier studies (Van Beveren & Butelo, 2006). A compilation of all discontinuity orientations and locations is presented on Table 6-3.

Lower hemisphere, equal-area stereonet plots of discontinuities and proposed slope configurations were created using the computer software Dips (version 5.108; Rocscience, 2009). The Dips program was also used to perform statistical analyses on the discontinuity data to determine the density of clusters of points. A stereonet plot of the discontinuity data is shown on Figure 6-6, including the poles to the planes for 81 mapped discontinuities. Figure 6-7 shows the same data points with color contours representing the statistical density of point clusters. Planes and poles to planes for the ten point clusters with four percent or greater cluster density are shown on Figure 6-8, with each of these major discontinuity clusters numbered for easy identification. Though Hoek and Bray (1981) recommend that discontinuities with six percent cluster density or greater be considered in stability evaluations, **GLA** conservatively used a lower four percent threshold to increase the number of discontinuities considered in stability analyses to ten. A tabulation of the orientations for each of these ten major discontinuity planes is included on Table 6-4.

6.2.2 Modes of Failure

Because discontinuities within a rock mass preferentially control potential slope movements, traditional limit-equilibrium methods of slope stability analyses are inappropriate for evaluation of stability for jointed rock cut slopes. Kinematic analyses, which evaluate the ability of a rock block to move out of the slope, are more appropriate. Such analyses are based on two likely types of failure mechanisms: single-planar and multi-planar.

Single-planar discontinuities that daylight within a proposed slope face with a dip direction within 20 degrees of the dip direction of the slope (Hoek and Bray, 1981) have the potential to fail if the friction on that plane is insufficient to maintain stability. Concave slopes require lateral bounding discontinuities for planar failures to occur. On a convex slope (e.g. the projection of a ridge), failures are more likely to develop without lateral bound discontinuities. The intersection of two or more planar surfaces may form a wedge that has the potential to fail if the plunge of the intersection of the two planes plunges at a lower angle than the plunge of the slope face (i.e. daylighting).

In the discussion of stability analyses for single- and multi-planar modes, the convention for naming the slopes adopted herein is based on the dip angle and azimuthal dip direction of the slope face. For example, the slope with a dip of 34 degrees (i.e. 1.5:1; horizontal:vertical) and a dip azimuth of 97 degrees is designated "34-97" (Plate 5).

6.2.3 Kinematic Analyses of Bedrock Discontinuities

A kinematic evaluation of bedrock structural conditions was performed for the proposed Alternative 2 bedrock cut area. The analysis is qualitative in that it evaluates the freedom for potential rock blocks to move out of the slope (or not) based on the orientation of discontinuities within the rock mass with respect to the orientation of a given slope face. Single-planar blocks or wedges formed by the intersection of two or more planes have the possibility of sliding if they plunge in the same direction as but less steeply than the cut slope face. This evaluation indicates whether or not the block or wedge daylights on the slope. In such cases, single- or multi-plane stability analyses were performed, as discussed below.

6.2.4 Bedrock Discontinuity Shear Strength

Bedrock discontinuity shear strengths used to calculate the factor of safety against block failures were based on the California State Division of Mines and Geology (now the California Geological Survey) Seismic Hazards Report for the Pasadena 7.5-minute

Quadrangle. The average discontinuity shear strength for crystalline bedrock reported therein was a friction angle of 38 degrees and a cohesion of 500 pounds per square foot (CDMG, 1998). These values were used for the single- and multi-planar rock slope stability analyses discussed below.

6.2.5 Analyses of Potential Single-Plane Failures

Potential single-plane slope failures are much less likely to occur than multi-plane failures since a “release” at the edges of the rock failure mass exists only for convex slopes. Nonetheless, kinematic stability analyses considering the potential for failure along any individually mapped discontinuity was performed for each of the five slope geometries of the proposed Alternative 2 cut slope. Using lower hemisphere, equal-area stereographic projection techniques, a circle corresponding to the daylight window for each slope was plotted on a stereonet showing all of the 81 mapped discontinuities (see Appendix E-4). A potential for failure is considered when the pole to the plane of any discontinuity occurs within 20 degrees of the slope dip direction (Hoek and Bray, 1981). Discontinuities that fall within the daylight window but have a dip direction greater than 20 degrees from the dip direction of the slope are not considered likely to fail without the aid of other intersecting discontinuities (which would make the block a wedge).

Of the five cut slope geometries, two of them had no potential for failure since no points met the criteria of both being within the daylight window and having a dip direction less than 20 degrees from the dip direction of the slope (Table 6-5).

Three of these slopes had points that did meet these potential failure criteria. The slope with a dip of 34 degrees and an azimuth 97 degrees (a.k.a. “34-97”) has three discontinuities that daylight on the slope. Of these, only one has a dip direction within 20 degrees of the slope dip direction. This discontinuity dips within 15 degrees of the dip direction of the slope and, thus, has the potential to fail. Using the simplified formula [FS=Tan(Phi)/Tan(alpha)] where the friction angle (Phi) is 38 degrees and the discontinuity dips approximately 15 degrees yields a factor of safety of 2.9 (Table 6-5 and Appendix E-4). Cohesion is conservatively ignored in these calculations, and the apparent discontinuity dip in the direction of the slope (alpha) has been conservatively assumed to be the actual dip of the discontinuity.

The two similarly oriented slopes (27-150) and (27-147) each have only one discontinuity that dips within 20 degrees of the slope face dip direction. The calculated factors of safety against failure for these slopes are both 3.7 based on the simplified formula with Phi=38 degrees and alpha=12 degrees (Table 6-5 and Appendix E-4).

6.2.6 Analyses of Potential Wedge Failures

The intersection of two or more planes daylighting on a slope forms a wedge. Stability analyses were performed for each potential wedge formed by the intersection of two major discontinuity planes (Table 6-4) and a proposed cut slope face under drained and saturated conditions using the computer program Swedge (version 5.014; Rocscience, 2011). Swedge utilizes the wedge block geometry, rock discontinuity shear strength, and groundwater pore pressure conditions to calculate the forces both resisting and driving movement using the method of Hoek and Bray (1981).

The proposed northern cut slope at the SCLF is comprised of a convex arc of five connected southeast- to southwest-facing slopes up to 150 feet high and ranging in steepness from 2:1 (horizontal:vertical) to 1.4:1 (Plate 5). Wedge block analyses assumed a worst-case condition were the wedge is scaled to a slope height of 150 feet, thus allowing the blocks to extend back distances beyond the constraints of the actual topography, in most cases.

The results of the wedge stability analyses are summarized on Table 6-6. This table shows the calculated factor of safety against failure for each wedge formed by the intersection of major planes daylighting on the slope face. There is no evidence of high groundwater within the rock mass that would be excavated for the proposed Alternative 2 cut slopes; in fact, there is evidence to the contrary. Nevertheless, results are given for both drained conditions (no pore pressure) and for fully-saturated conditions (fractures full to the ground surface). All slope and wedge combinations are stable under drained conditions, with factors of safety greater than 1.5 (and typically much greater). Under fully-saturated conditions, only four slope and wedge combinations have calculated factors of safety less than 1.5. For these four slope/wedge combinations, however, decreasing the degree of saturation from 100 percent to between 75 and 92 percent resulted in factors of safety in excess of 1.5. Stability calculations and a graphical portrayal of each 150-foot-high, worst-case potential wedge are presented in Appendix E-5.

The wedge formed by planes 2 and 9 on the slope dipping 36 degrees at azimuth 140 degrees (36-140) has a fully-saturated factor of safety of 0.88. The factor of safety is 1.0 for when the wedge is analyzed with the fractures 96 percent full and 1.5 when the analyzed with the fractures only 86 percent full. The wedge formed by the intersection of planes 10 and 9 on the same slope has a calculated factor of safety of 0.0 under saturated conditions, meaning the pore pressure conditions result in a loss of contact on both wedge faces. The same wedge at 87 percent saturation has a factor of safety of 1.0 and a factor of safety of 1.5 when only 75 percent saturated. Other slope/wedge combinations and the degree of saturation required to achieve factor of safety of 1.5 are presented in Table 6-6.

Restating from above, all slopes are regarded to be stable with a factor of safety in excess of 1.5 if fractures remain at or below 75 percent saturation. Based on both field reconnaissance and the body of hydrogeological reporting and data for the SCLF site, the probability of all fractures up to the full height of the analyzed slopes becoming anywhere near 75 percent saturated is very, very low.

7.0 CONCLUSIONS

As the investigation and analyses described herein show, the proposed expansion alternatives for the SCLF (Alternative 1 and Alternative 2) are feasible and can be completed in compliance with Title 27 regulations.

Although the site is located in a seismically active area and would experience strong ground motions during the MCE design event, calculated displacements of the waste mass, including cases involving synthetic liner components and potential liquefaction of alluvium at the toe of the waste fill, are tolerable (i.e. less than 6 inches) and in compliance with Title 27.

Notwithstanding the fact that there are no structures proposed for human occupancy and that landfilling operations are generally not subject to the California Building Code, the proposed project does not create substantial risks to life and property due to earthquake fault rupture, seismic ground shaking, seismic ground failure, liquefaction, landslides, unstable geologic units, or expansive soils.

8.0 RECOMMENDATIONS

8.1 Earthwork

GLA recommends that subgrade to receive landfill liner be proof-rolled, with soft, yielding material replaced with compacted fill. While most of the earthwork required for Alternative 2 is excavation (cut), any fill placed beneath sections of the landfill to be lined should be compacted to 90% relative compaction (ASTM D 1557).

Stockpiled soil that has been placed in the swale northeast of the proposed Alternative 2 debris/sedimentation basin is proposed to be excavated to construct the Alternative 2 cut slopes in this area. Final design of this excavation should ensure that a thin veneer cover of this uncontrolled fill is not left on the slope; rather these materials should be excavated down to competent native material.

8.2 Cut Slopes

If it is determined that the City of Glendale hillside grading code is applicable, a variance may be required for cut slopes that exceed 100 feet in height without a 30-foot wide slope bench.

The rock mass that would be excavated for the proposed Alternative 2 cut slopes appears to be at least locally rippable to a depth of 50 feet based on the ability of bucket auger borings to be advanced in this location and frequency of joints observed in other nearby rock cuts. Since the depth of the proposed cut slope excavation exceeds 150 feet, geophysics and/or deeper borings in this area are recommended to assess the rippability of bedrock at depth.

In-grading observation and mapping of the proposed Alternative 2 cut slope excavation should be performed by a certified engineering geologist to ensure that any potential adversely-oriented discontinuities or other potential stability issues are identified and mitigated, if necessary.

Although the stability of bedrock cut slopes proposed for Alternative 2 appears to be adequate, measures to prevent erosion or excessive groundwater infiltration would be prudent. To these ends, brow drains or other methods to prevent concentrated flow onto cut slopes should be employed and irrigation of the proposed cut slopes should be limited to only what is required to promote stabilizing vegetation.

8.3 Potential for Liquefaction

The potential for significant adverse impacts due to stability failures and/or excessive settlements related to potential liquefaction of alluvium at toe of the SCLF within Scholl Canyon Park is considered very low due to the limited extent of these materials along the axis of the pre-development canyon and the ongoing pumping upstream of Subsurface Barrier #1 which generally holds groundwater levels at or below bedrock in this area. In the very unlikely event of high groundwater, such as due to a cessation of pumping and the design earthquake occurring simultaneously, potential liquefaction and dynamic settlements could cause damage to drainage and groundwater pumping facilities in this area. Although the risk of such damage is very low, in-situ mitigation would be required to substantially eliminate this risk.

9.0 CLOSURE

This report is based on the data and analyses described herein. **G**eo-**L**ogic **A**ssociates should be notified of any conditions that differ from those described herein since this may require a re-evaluation of the data, conclusions and recommendations presented. This report has been prepared in accordance with generally accepted geotechnical practices, and makes no other warranties, either expressed or implied, as to the professional data presented in it.

This report has not been prepared for use by other parties and projects other than those named or described above. It may not contain sufficient information for other parties or other purposes.

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TABLES

Table 4-1
Peak Ground Acceleration from Historic Earthquakes at the SCLF Site[1]
Geotechnical Report: Landfill Expansion
Scholl Canyon Landfill
Glendale, CA

Date	Latitude/ Longitude	EQ Mag., Mw	Site PGA per A&S, '97	Site PGA per NGA avg [2]	Approx. Source-to-Site Distance		Comments
					(mi)	(km)	
7/11/1855	34.1, 118.1	6.3	0.359	0.24	6.7	10.9	
10/1/1987	34.061, 118.079	5.9	0.151	0.14	9.4	15.2	Whittier Narrows EQ (Puente Hills fault)
1/17/1994	34.213, 118.537	6.7	0.110	0.13	19.9	32.0	Northridge EQ (Northridge fault)
2/9/1971	34.411, 118.401	6.4	0.090	0.08	21.1	33.9	San Fernando EQ (Sierra Madre-San Fernando fault)
10/4/1987	34.073, 118.098	5.3	0.086	0.09	8.1	13.0	aftershock of Whittier Narrows EQ
7/16/1920	34.08, 118.26	5.0	0.082		6.5	10.4	
12/8/1812	34.37, 117.65	7.0	0.071		34.4	55.4	
12/16/1858	34, 117.5	7.0	0.059		41.2	66.4	
6/28/1991	34.262, 118.002	5.4	0.053		13.2	21.2	
9/3/1905	34, 118.3	5.3	0.052		12.4	20.0	
09/24/1827	34, 119	7.0	0.051		47.3	76.1	
04/4/1893	34.3, 118.6	6.0	0.047		25.1	40.4	
2/9/1971	34.411, 118.401	5.8	0.046		21.1	33.9	
2/9/1971	34.411, 118.401	5.8	0.046		21.1	33.9	
07/22/1899	34.3, 117.5	6.5	0.045		40.9	65.8	
11/27/1852	34.83, 118.75	7.0	0.043		56.1	90.3	
08/28/1889	34.2, 117.9	5.5	0.043		17.1	27.6	
01/10/1856	34, 118.25	5.0	0.043		11.3	18.2	
09/23/1827	34, 118.25	5.0	0.043		11.3	18.2	
03/26/1860	34, 118.25	5.0	0.043		11.3	18.2	
3/11/1933	33.617, 117.967	6.3	0.039		39.5	63.6	
3/20/1994	34.231, 118.475	5.3	0.035		16.7	26.9	
07/30/1894	34.3, 117.6	6.0	0.031		35.4	57.0	
2/9/1971	34.308, 118.454	5.2	0.029		18.0	29.0	
12/25/1903	34, 118	5.0	0.028		15.6	25.1	
2/9/1971	34.411, 118.401	5.3	0.026		21.1	33.9	
7/23/1923	34, 117.25	6.3	0.025		55.2	88.8	
1/17/1994	34.326, 118.698	5.6	0.023		30.9	49.8	
11/14/1941	33.783, 118.25	5.4	0.022		26.0	41.9	
10/2/1933	33.783, 118.133	5.4	0.022		26.1	42.0	
1/17/1994	34.301, 118.565	5.2	0.021		23.3	37.5	
11/19/1918	34, 118.5	5.0	0.020		20.5	33.0	
8/4/1927	34, 118.5	5.0	0.020		20.5	33.0	
2/21/1973	34.065, 119.035	5.9	0.019		48.4	77.9	
1/19/1994	34.379, 118.711	5.5	0.019		33.1	53.3	
5/15/1910	34, 118.6	6.0	0.018		55.5	89.2	
3/11/1933	33.683, 118.05	5.5	0.018		33.8	54.4	
7/29/2008	33.953, 117.761	5.3	0.018		28.6	46.0	
3/13/1933	34, 118.7	5.3	0.018		28.9	46.4	
1/29/1994	34.305, 118.579	5.1	0.018		24.1	38.8	
3/11/1933	33.85, 118.267	5.0	0.018		21.6	34.8	
12/19/1880	34, 118.8	6.0	0.017		59.7	96.0	
2/28/1990	34.14, 117.7	5.2	0.016		28.3	45.6	
8/31/1930	33.95, 118.632	5.2	0.016		28.8	46.3	
12/14/1912	34, 118.9	5.7	0.015		47.3	76.1	
8/23/1952	34.519, 118.198	5.0	0.015		25.0	40.2	
9/12/1970	34.27, 117.54	5.4	0.014		38.2	61.5	
1/19/1994	34, 118.10	5.1	0.014		28.5	45.9	
3/11/1933	33.75, 118.083	5.1	0.014		28.9	46.4	
3/11/1933	33.75, 118.083	5.1	0.014		28.9	46.4	
1/18/1994	34, 118.11	5.2	0.013		32.4	52.2	
4/26/1997	34.369, 118.672	5.1	0.013		30.9	49.7	
07/22/1899	34.2, 117.4	5.5	0.012		45.5	73.3	
3/11/1933	34, 118.12	5.1	0.012		32.4	52.2	
3/11/1933	33.7, 118.067	5.1	0.012		32.4	52.2	
3/11/1933	33.75, 118.083	5.0	0.012		28.9	46.4	
3/11/1933	34, 118.13	5.0	0.012		28.9	46.4	
1/19/1989	33.919, 118.627	5.0	0.012		29.7	47.7	
5/31/1938	33.699, 117.511	5.5	0.011		50.4	81.1	
1/1/1979	34, 118.14	5.0	0.011		31.4	50.6	
6/26/1995	34.394, 118.669	5.0	0.011		31.6	50.8	

Notes:

1) Search parameters: Site Coordinates: 34.1575, -118.1956; Start Date: 1800; End Date: 2010; Search Radius: 62.1 mi (100.0 km); Attenuation Relation: Abrahamson & Silva (1995b/1997) horiz.- rock; Uncertainty: median; Assumed Source Type: SS=strike-slip Table above only presents data for Mw 5.0 or larger EQs and for site peak ground accelerations of 0.01 g or larger.

2) Spectral accelerations represent the average value determined with four Next Generation Attenuation Relationships: Abrahamson & Silva 2008; Boore & Atkinson 2008, Campbell and Bozorgnia 2008, and Chiou & Youngs 2008; NGA-based PGAs only determined for top-five PGAs.

Table 4-2
Ground Motion Summary for Significant Faults at the SCLF Site
Geotechnical Report: Proposed Landfill Expansion
Scholl Canyon Landfill
Glendale, CA

Fault Name	Fault Characteristics and Geometry (USGS/CGS 2008 Fault Model)						Source-to-Site Distance [2]			Spectral Acceleration (g) [3] for V_{S-30} = 500 m/s Site		
	MCE Magnitude (Mw)	Style [1]	Dip, δ	Dip Dir.	Depth to Top of Rupture, Z_{TOR} (km)	Ruture Width, W (km)	R_{rup} (km)	R_{JB} (km)	R_x (km)	PGA, Sa @ 0.0 sec	Sa @ 0.2 sec	Sa @ 1.0 sec
Verdugo	6.90	R	55	NE	0	18	0.60	0.00	0.74	0.67	1.48	0.66
Puente Hills	7.10	R	25	NE	5	18	10.64	0.00	14.45	0.61	1.42	0.54
Elysian Park-Upper	6.70	R	50	NE	0	3	9.51	0.00	9.90	0.52	1.21	0.42
Raymond	6.80	LL-R-O	79	NW	0	0	4.79	1.83	4.88	0.43	0.99	0.40
Sierra Madre	7.20	R	53	NE	0	0	5.88	5.88	-5.88	0.38	0.87	0.38
Hollywood	6.70	LL-R-O	70	NW	0	0	5.32	5.32	5.32	0.35	0.80	0.30

Notes: 1) Style of Faulting: SS = Strike/Slip; R = Reverse, LL-R-O = Left-Lateral Reverse-Oblique

2) Source-to-Site Distance:

R_{rup} = *closest horizontal distance to the surface projection of the rupture plane;*

R_{JB} = *closest three-dimensional distance to the rupture plane; and*

R_x = *horizontal distance from the top edge of the rupture, measured perpendicular to the surface projection of the fault (i.e. to the strike of the fault).*

3) Spectral accelerations represent the average value determined with four Next Generation Attenuation Relationships: Abrahamson & Silva (2008), Boore & Atkinson (2008), Campbell and Bozorgnia (2008), and Chiou & Youngs (2008).

Table 6-1
Slope Stability Material Property Summary
Geotechnical Report: Proposed Landfill Expansion
Scholl Canyon Landfill
Glendale, CA

<table>
<tr><th>Material</th><th>Unit Weight (pcf)</th><th>Friction Angle (degrees)</th><th>Cohesion, c (psf)</th><th>Source</th></tr>
<tr><td rowspan="2">Municipal Solid Waste Fill (static)</td><td rowspan="2">80</td><td colspan="2">Shear-Normal Function (Figure 6-1); c/ϕ approximation below</td><td rowspan="2">Zekkos et al. (2006);
Bray et al. (2009)</td></tr>
<tr><td>32</td><td>500</td></tr>
<tr><td rowspan="2">Municipal Solid Waste Fill (dynamic)</td><td rowspan="2">80</td><td colspan="2">Shear-Normal Function (Figure 6-1); c/ϕ approximation below</td><td rowspan="2">Zekkos et al. (2006);
Bray et al. (2009)</td></tr>
<tr><td>36.5</td><td>600</td></tr>
<tr><td rowspan="2">Proposed Floor Liner (non-woven geotextile/DS textured HDPE)</td><td rowspan="2">100*</td><td colspan="2">Shear-Normal Function (Figure 6-2); c/ϕ approximation below</td><td rowspan="2">LASAN lab data for Calabasas Landfill Phase 2B</td></tr>
<tr><td>16.4</td><td>365</td></tr>
<tr><td rowspan="2">Proposed Slope Liner (DS Geocomposite/non-woven geotextile/textured HDPE/GCL/DS textured HDPE)</td><td rowspan="2">100*</td><td colspan="2">Shear-Normal Function (Figure 6-2); c/ϕ approximation below</td><td rowspan="2">LASAN lab data for Calabasas Landfill Phase 2B</td></tr>
<tr><td>10.8</td><td>175</td></tr>
<tr><td>Non-Liquefied Alluvium</td><td>120</td><td>34</td><td>100</td><td>Meyerhoff (1956)</td></tr>
<tr><td>Liquefied Alluvium</td><td>120</td><td>0</td><td>400</td><td>Seed and Harder (1990); Olsen and Stark (2002); Stark (2008)</td></tr>
</table>

* Value does not significantly affect analysis results

Table 6-2
Summary of Slope Stability Analyses
Geotechnical Report: Proposed Landfill Expansion
Scholl Canyon Landfill
Glendale, CA

Case	File Name	Static Factor of Safety	Yield Accel., ky	Seismically-Induced Permanent Displacement (inches)
Cross Section A-A' Alternatives 1 & 2, Upper Slope Failure Through MSW	SectionA_0006.gsz	1.90	N/A	N/A
Cross Section A-A' Alternatives 1 & 2, Entire Slope, Potentially Liquefiable Soils Near Toe	SectionA_0021.gsz SectionA_0021_S01.gsz	1.99	0.362	0.9
Cross Section A-A' Alternatives 1 & 2, Toe Failure, Potentially Liquefiable Soils Near Toe	SectionA_0031.gsz SectionA_0031_S01.gsz	3.07	0.406	5.3
Cross Section B-B' Alternative 1 & 2, Unlined	SectionB_0001.gsz	2.09	N/A	N/A
Cross Section C-C' Alternative 1, Unlined	SectionC_0001.gsz	2.09	N/A	N/A
Cross Section C-C' Alternative 2, Unlined	SectionC_0011.gsz	2.06	N/A	N/A
Cross Section D-D' Alternative 2, MSW/Liner	SectionD_0020.gsz SectionD_0020_S01.gsz	1.70	0.217	5.0
Cross Section E-E' Alternative 2, MSW/Liner	SectionE_0010.gsz SectionE_0010_S01.gsz	2.02	0.333	1.8
Cross Section F-F' Alternative 2, MSW/Liner	SectionF_0320.gsz SectionF_0320_S02.gsz	1.59	0.226	5.6
Cross Section G-G' Alternative 1, Unlined	SectionG_0001.gsz SectionG_0001_S01.gsz	2.35	0.488	0.6
Cross Section G-G' Alternative 2, Failure Through MSW	SectionG_0020.gsz SectionG_0020_S01.gsz	2.32	0.52	2.2
Cross Section H-H' Alternative 2, Left Slope Failure, MSW/Liner	SectionH_0010.gsz SectionH_0010_S01.gsz	2.02	0.328	3.3
Cross Section H-H' Alternative 2, Right Slope Failure, MSW/Liner	SectionH_0020.gsz SectionH_0020_S01.gsz	1.84	0.299	3.6

Table 6-3
Bedrock Discontinuity Data
Geotechnical Report: Proposed Landfill Expansion
Scholl Canyon Landfill
Glendale, CA

Discontinuity Type	Orientation*		Location	
	Dip	Strike	Easting	Northing
Foliation	20	275	6503641	1881553
Foliation	27	298	6503499	1881223
Foliation	35	302	6503468	1881326
Foliation	79	59	6503578	1881097
Foliation	50	187	6503630	1881792
Foliation	82	261	6503627	1881587
Foliation	28	262	6503583	1881126
Joint	54	290	6503698	1881823
Joint	56	295	6504032	1881441
Joint	68	296	6504092	1881515
Joint	49	301	6503600	1881755
Joint	79	309	6504064	1881340
Joint	55	311	6503718	1881162
Joint	56	312	6503733	1881633
Joint	72	336	6503640	1881522
Joint	88	356	6503826	1881894
Joint	82	4	6504014	1881297
Joint	78	6	6504102	1881342
Joint	80	6	6504080	1881492
Joint	80	7	6503793	1881866
Joint	85	9	6504113	1881435
Joint	67	12	6504042	1881597
Joint	80	15	6503928	1881277
Joint	68	38	6503598	1881823
Joint	42	53	6504078	1881539
Joint	83	62	6503685	1881793
Joint	58	81	6503499	1881392
Joint	62	95	6503465	1881290
Joint	85	100	6503923	1881434
Joint	66	107	6503911	1881310
Joint	78	124	6503664	1881167
Joint	81	131	6503799	1881204
Joint	30	160	6504149	1881349
Joint	56	173	6503491	1881265
Joint	69	187	6503548	1881707
Joint	25	188	6503749	1881176
Joint	75	191	6503675	1881203
Joint	70	199	6504018	1881355
Joint	84	202	6503711	1881191
Joint	85	202	6503760	1881648
Joint	82	212	6504029	1881534
Joint	70	219	6503613	1881136
Joint	90	92	6503531	1881699
Joint	90	289	6503650	1881766
Joint	90	169	6503655	1881824
Joint	90	27	6504159	1881358
Joint	90	251	6504035	1881328
Joint	90	202	6504009	1881453
Joint	90	250	6504072	1881380
Fault	85	192	6503156	1881260
Fault	27	297	6503230	1881593
Fault	23	253	6503447	1881640
Fault	46	39	6503147	1881242
Fault	14	102	6503136	1881052
Foliation	12	165	6503201	1881668
Foliation	77	168	6503159	1881247
Foliation	79	358	6502793	1880651
Foliation	64	3	6502737	1880644
Joint	77	144	6503164	1881261
Joint	88	231	6503165	1881275
Joint	85	103	6503149	1881273
Joint	68	229	6503168	1881272
Joint	27	164	6503355	1881728
Joint	71	6	6503356	1881710
Joint	79	82	6503222	1881562
Joint	67	108	6503231	1881583
Joint	84	98	6503143	1881300
Joint	49	137	6503148	1881104
Joint	6	324	6502732	1881205
Joint	73	98	6502841	1880649
Joint	76	167	6502830	1880645
Joint	76	97	6502809	1880633
Joint	68	167	6502801	1880625
Joint	87	84	6502749	1880650
Joint	89	107	6502713	1880642
Joint	70	49	6502715	1880633
Joint	82	77	6502666	1880623
Joint	83	163	6503099	1880863
Joint	83	65	6503105	1880876
Joint	5	51	6503089	1880867
Joint/Shear	31	61	6503211	1881552

* Attitudes expressed as azimuth dip direction and plunge.

Table 6-4
Major Bedrock Discontinuity Planes
Geotechnical Report: Proposed Landfill Expansion
Scholl Canyon Landfill
Glendale, CA

	Orientation			
Plane #	Dip Azimuth	Plunge	Strike	Dip
1	100	83	N10E	83SE
2	66	85	N24W	85NE
3	7	77	N83W	77NE
4	168	81	N78E	81SE
5	203	85	N67W	85SW
6	284	88	N14E	88NW
7	301	54	N31E	54NW
8	284	25	N14E	25NW
9	174	27	N84E	27SE
10	256	86	N14W	86SW

Table 6-5
Summary of Single-Plane Rock Discontinuity Stability Analyses
Geotechnical Report: Proposed Landfill Expansion
Scholl Canyon Landfill
Glendale, CA

Slope	Daylighted Discontinuity		Dip Angle Difference	Failure Potential	Factor of Safety
	Dip Angle	Azimuth Direction			
36-140	30	160	20	No	NA
	25	188	48	No	NA
	14	102	38	No	NA
	12	165	25	No	NA
	27	164	24	No	NA
34-97	14	102	15	Yes	2.9
	12	165	68	No	NA
	5	51	46	No	NA
27-150	14	102	48	No	NA
	12	165	15	Yes	3.7
27-147	14	102	45	No	NA
	12	165	18	Yes	3.7
36-214	25	188	26	No	NA
	23	253	39	No	NA
	12	165	49	No	NA

Table 6-6
Summary of Rock Wedge Stability Analyses
Geotechnical Report: Proposed Landfill Expansion
Scholl Canyon Landfill
Glendale, CA

Slope	Planes	Factor of Safety		Saturation Percent	
		Drained	Saturated	1.5 FS	1.0 FS
36-140	2-9	2.55	0.88	86%	96%
	3-9	12.22	9.45	--	--
	5-9	5.44	3.85	--	--
	10-9	2.66	0	75%	87%
34-97	1-8	60.22	0.77	92%	97%
	3-9	12.21	9.46	--	--
	5-9	5.56	3.69	--	--
27-150	2-9	5.22	4.11	--	--
	3-9	12.44	9.12	--	--
	5-9	5.79	3.35	--	--
27-147	2-9	5.54	5.49	--	--
	3-9	12.41	9.17	--	--
	5-9	5.75	3.41	--	--
	6-8	3.46	2.33	--	--
36-214	1-9	26.15	20.76	--	--
	4-9	26.15	20.76	--	--
	6-9	3.46	2.33	--	--
	7-9	3.37	2.18	--	--
	8-9	3.46	2.33	--	--
	8-4	3.34	0.81	86%	96%
	7-8	10.2	7.43	--	--

FIGURES

GRAPHIC SCALE

2000 0 2000 4000

(in feet)

1 inch = 4000 ft.

N

FIGURE 1–1

SITE LOCATION MAP

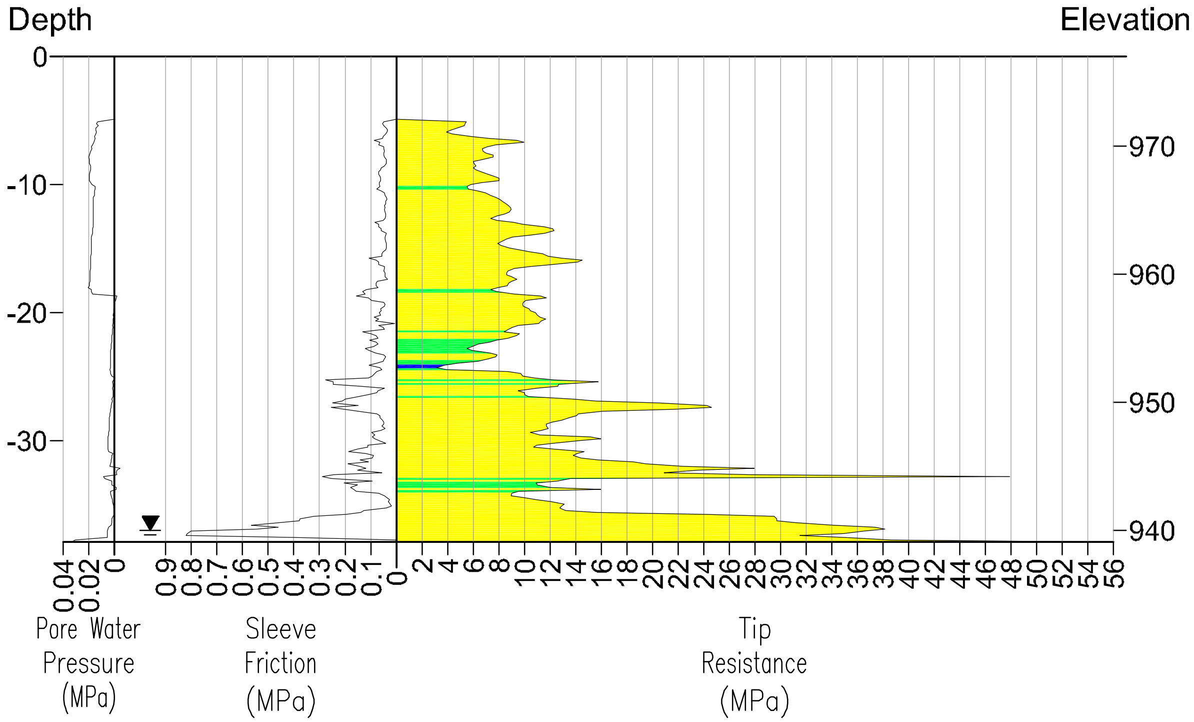
PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

REFERENCE: USGS 7.5–MINUTE PASADENA, CA QUADRANGLE

DRAWN BY:	VL	DATE:	MARCH 2012	JOB NO.	2007–138

CPT-1



EXPLANATION:

▼ APPROXIMATE GROUNDWATER ELEVATION

CPT 'SOIL BEHAVIOR':

🟨 CLEAN SAND TO SILTY SAND

🟩 SILTY SAND TO SANDY SILT

🟦 CLAYEY SILT TO SILTY CLAY

FIGURE 2–1

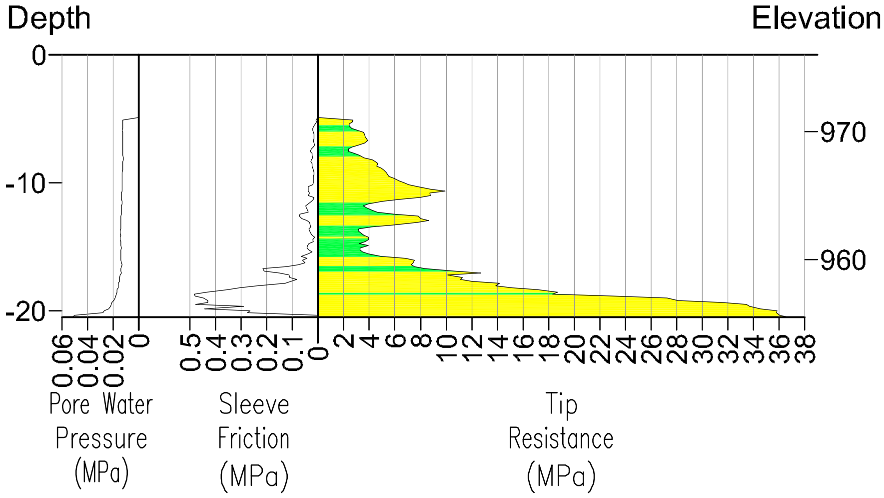
CONE PENETRATION TEST LOG: CPT–1

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY:	VL	DATE:	MARCH 2012	JOB NO.	2007–138

CPT-2



EXPLANATION:

CPT 'SOIL BEHAVIOR':

🟨 CLEAN SAND TO SILTY SAND

🟩 SILTY SAND TO SANDY SILT

FIGURE 2–2

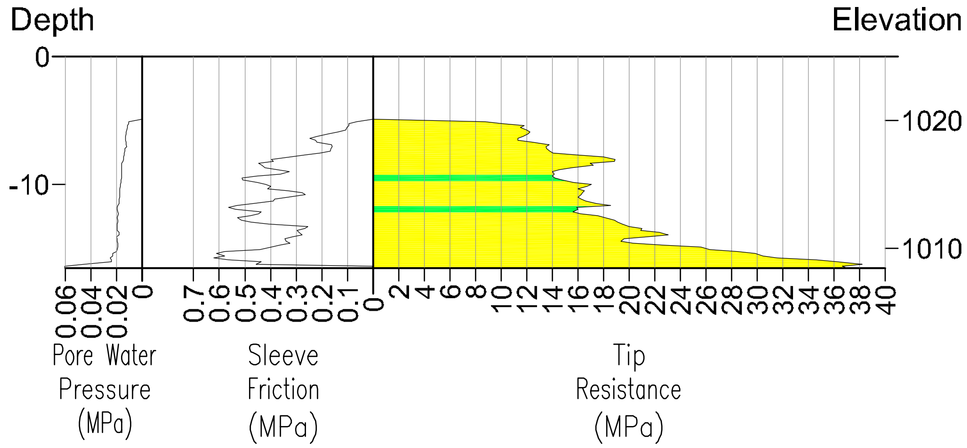
CONE PENETRATION TEST LOG: CPT–2

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: VL | DATE: MARCH 2012 | JOB NO. 2007–138

CPT-3



EXPLANATION:

CPT 'SOIL BEHAVIOR':

🟨	CLEAN SAND TO SILTY SAND
🟩	SILTY SAND TO SANDY SILT

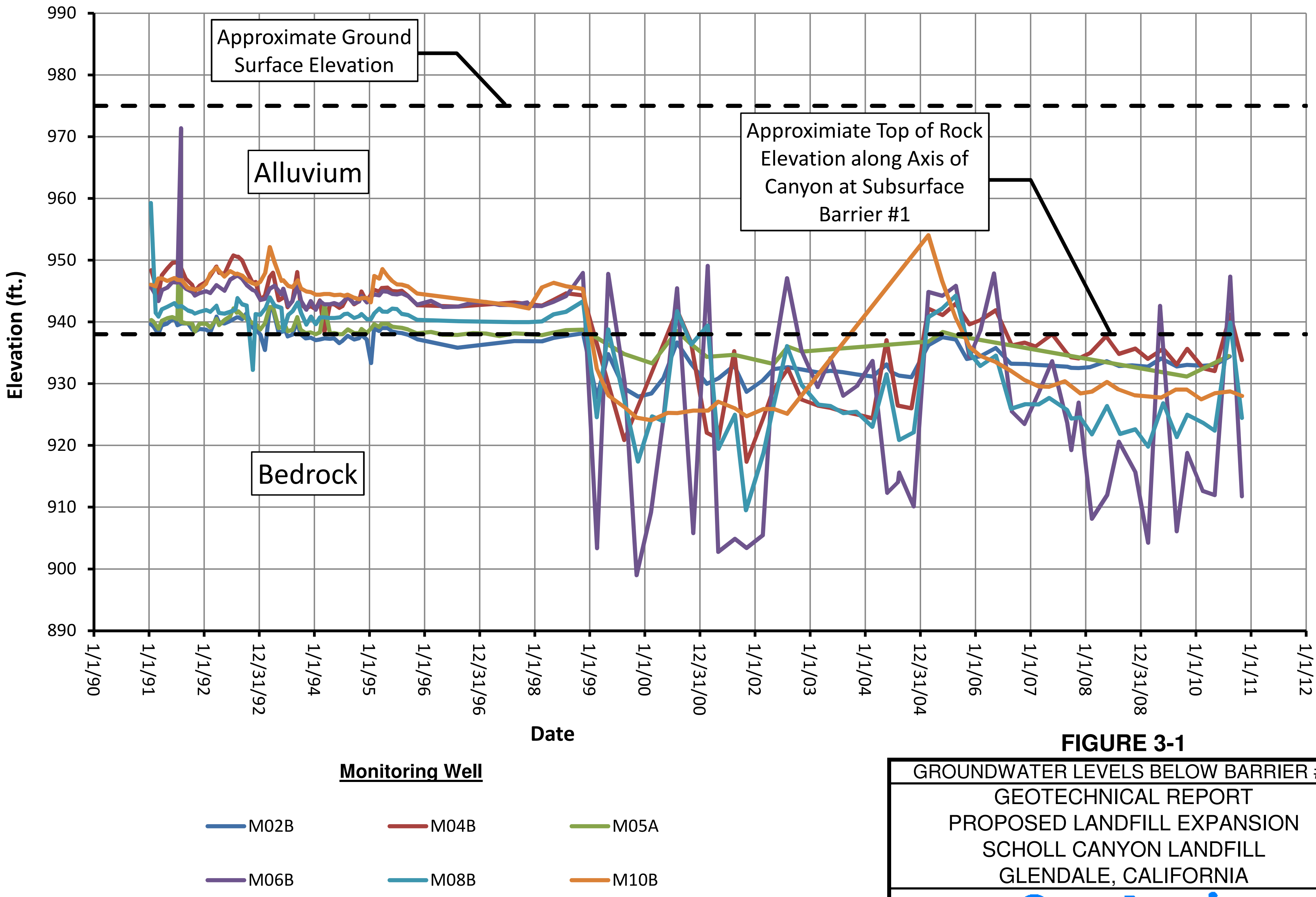
FIGURE 2–3

CONE PENETRATION TEST LOG: CPT–3

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: VL	DATE: MARCH 2012	JOB NO. 2007–138



Note: See Plate 2 for Monitoring Well Locations

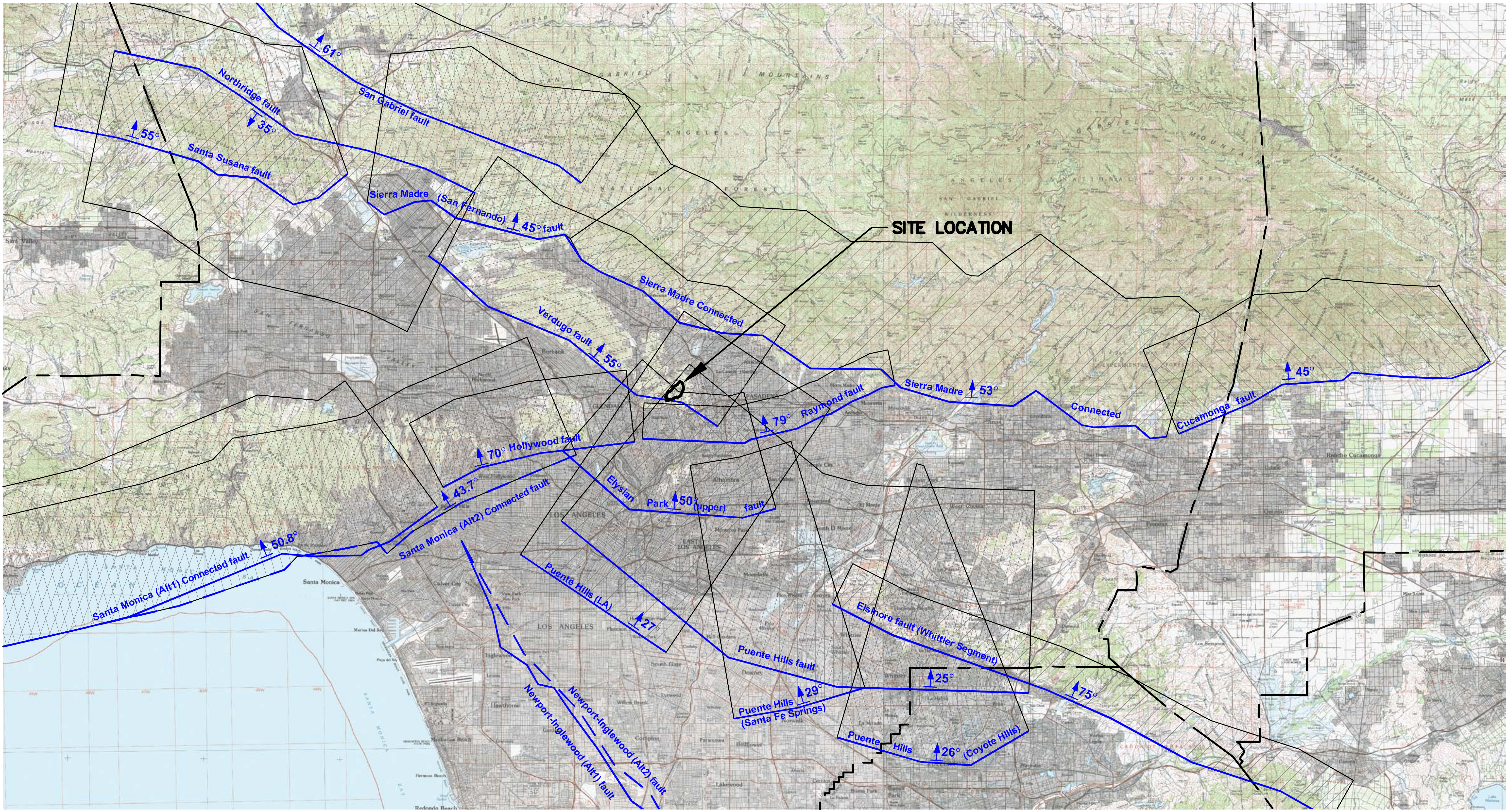
FIGURE 3-1

GROUNDWATER LEVELS BELOW BARRIER #1

GEOTECHNICAL REPORT
PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: **RMW**	DATE: **MARCH 2012**	JOB NO.: **2007-138**



EXPLANATION:

COUNTY LINE

Newport-Inglewood (Alt2) fault
Newport-Inglewood (Alt1) fault
STRIKE–SLIP FAULT SURFACE TRACE

Elysian Park 50° (upper) fault
REVERSE/THRUST FAULT:
FAULT TRACE, DIP, DIP DIRECTION, AND
AERIAL EXTENT OF DIPPING FAULT PLANE

GRAPHIC SCALE
5 0 5 10 MILES
1 inch = 5 miles

N

REFERENCE: USGS 30X60 MINUTES LONG BEACH, LOS ANGELES,
SAN BERNARDINO, AND SANTA ANA, CA QUADRANGLES

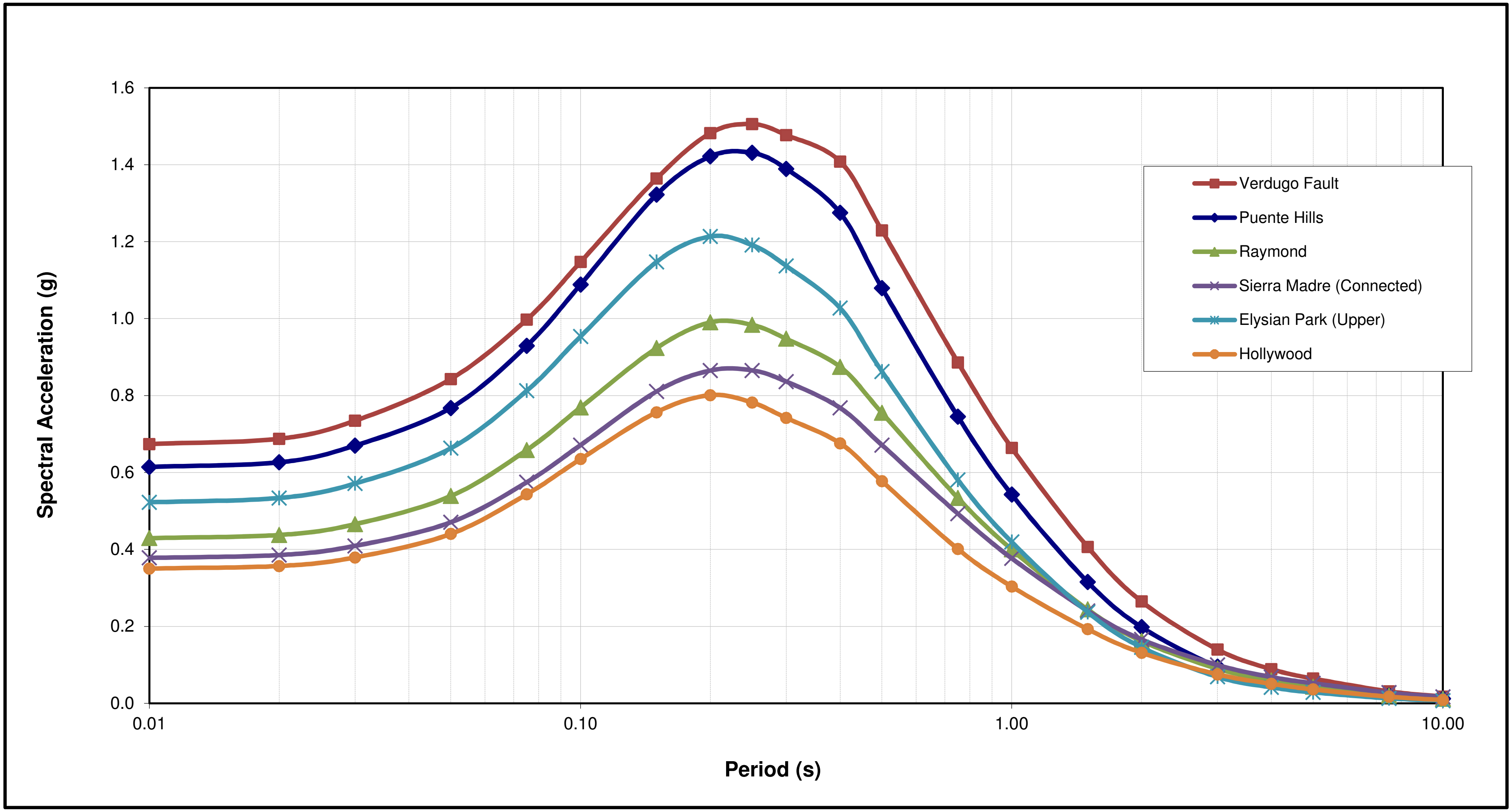
FIGURE 4–1

REGIONAL FAULT MAP

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: VL | DATE: MARCH 2012 | JOB NO. 2007–138



Average[1] Site-Specific Deterministic Horizontal Bedrock[2] Acceleration Response Spectra for MCE Event on Selected Faults

	Verdugo	Puente Hills	Elysian Pk Up	Raymond	Sierra Madre	Hollywood
Avg. PGA =	0.67 g	0.61 g	0.52 g	0.43 g	0.38 g	0.35 g
Avg. Sa(t=0.2s) =	1.48 g	1.42 g	1.21 g	0.99 g	0.87 g	0.80 g
Avg. Sa(t=1.0s) =	0.66 g	0.54 g	0.42 g	0.40 g	0.38 g	0.30 g
MCE Mag., Mw =	6.9	7.1	6.7	6.8	7.2	6.7

[1] *Geometric Mean of four Next Generation Attenuation Relations, EERI, 2008; Idriss (2008) excluded.*

[2] *Vs-30 ≈ 500 m/s based on site-specific geophysical surveys.*

FIGURE 4-2

ACCELERATION RESPONSE SPECTRA FOR SELECTED FAULTS

GEOTECHNICAL REPORT
PROPOSED EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: **RMW** | DATE: **MARCH 2012** | JOB NO.: **2007-0138**

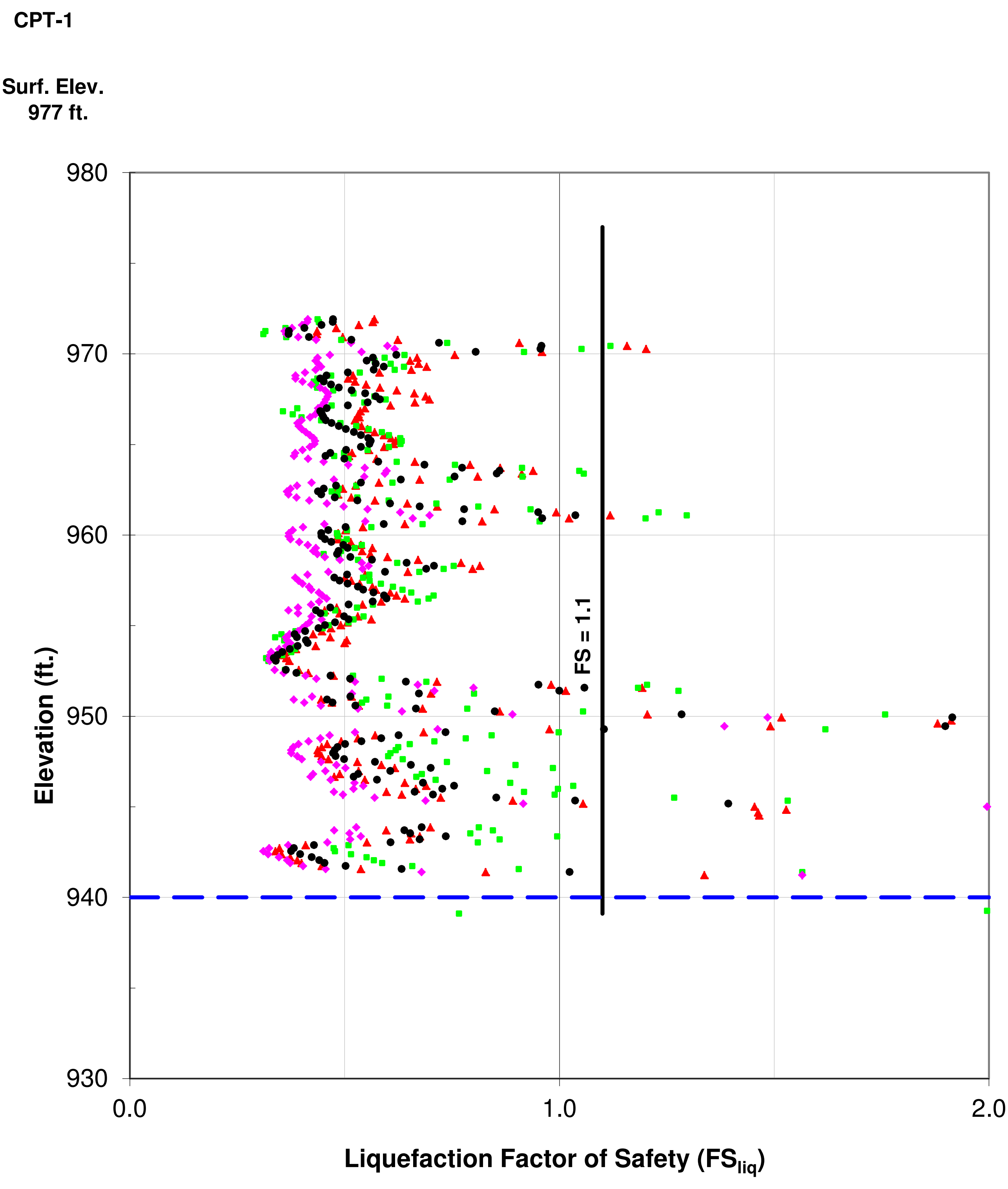


FIGURE 5-1

LIQUEFACTION FACTOR OF SAFETY: CPT-1

GEOTECHNICAL REPORT
PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: **RMW**	DATE: **MARCH 2012**	JOB NO.: **2007-138**

CPT-2

Surf. Elev.
976 ft.

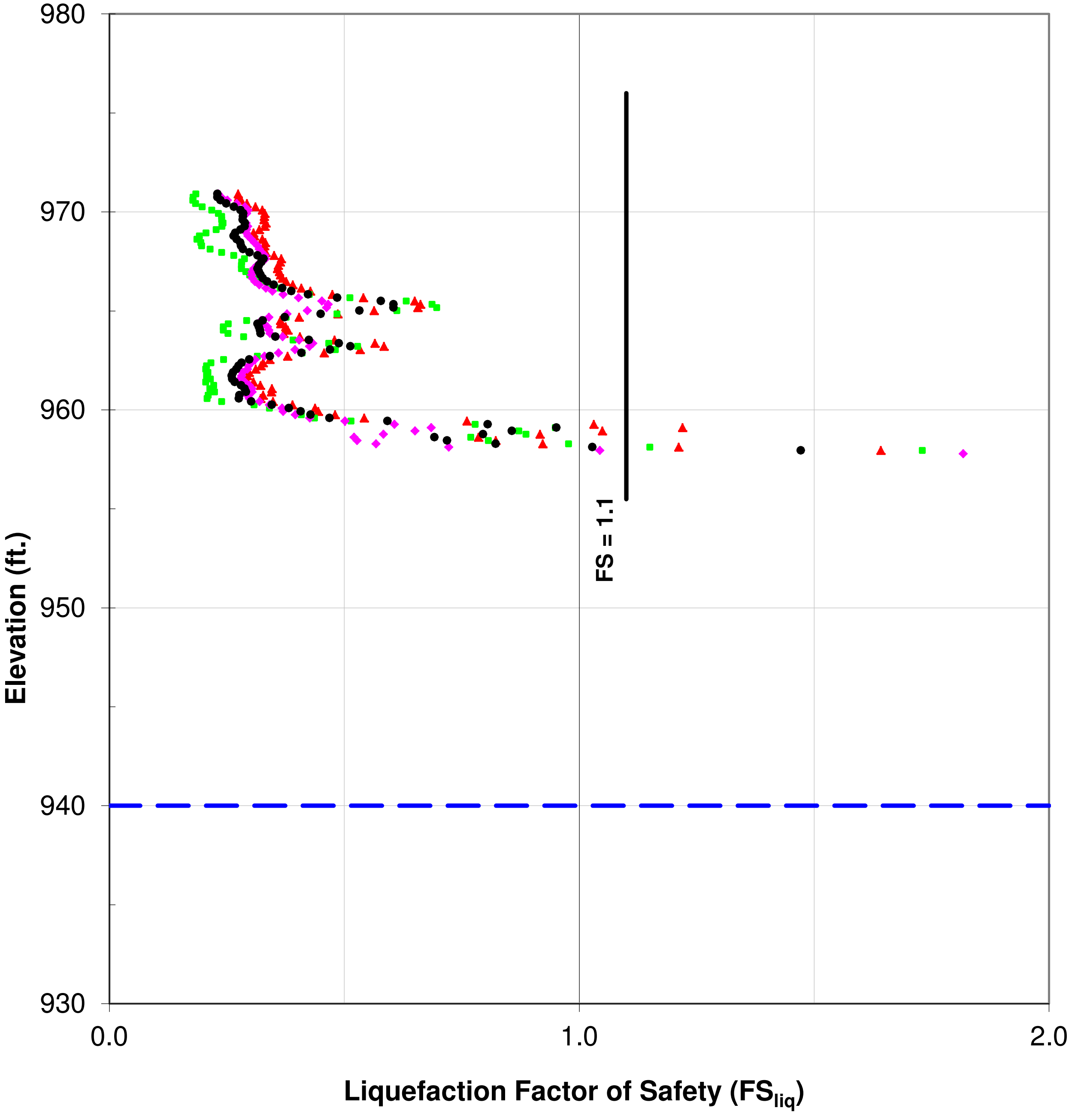


FIGURE 5-2

LIQUEFACTION FACTOR OF SAFETY: CPT-2

GEOTECHNICAL REPORT
PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic ASSOCIATES

DRAWN BY:	RMW	DATE:	MARCH 2012	JOB NO.:	2007-138

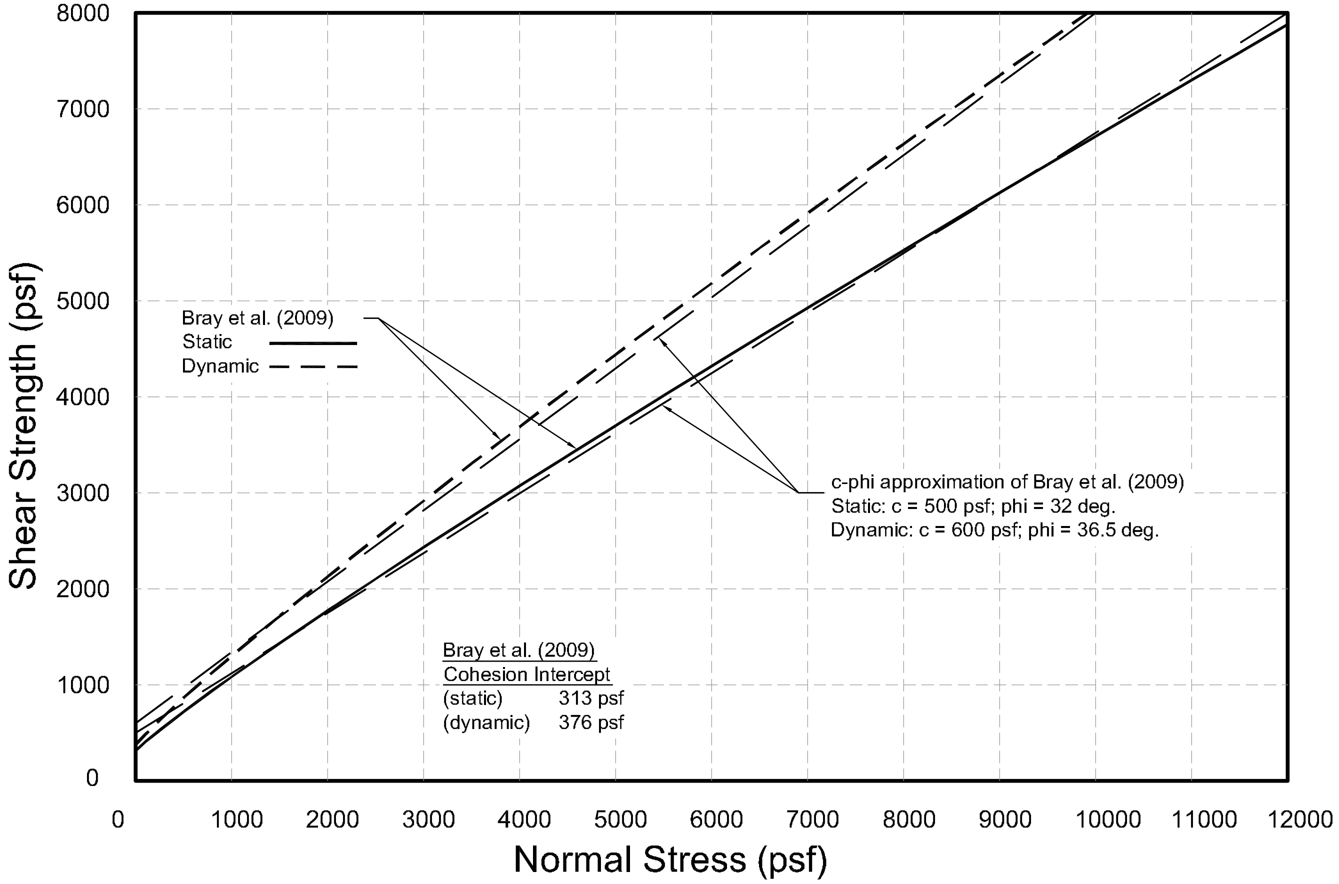
FIGURE 5-3

LIQUEFACTION FACTOR OF SAFETY: CPT-3

GEOTECHNICAL REPORT
PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: **RMW**	DATE: **MARCH 2012**	JOB NO.: **2007-138**



Reference: Bray, Jonathan D., Dimitrios Zekkos, Edward Kavazanjian Jr., George A. Athanasopoulos, and Michael F. Riemer, 2009, “Shear Strength of Municipal Solid Waste,” Journal of Geotechnical and Geoenvironmental Engineering, ASCE, June, Vol. 135, No. 6.

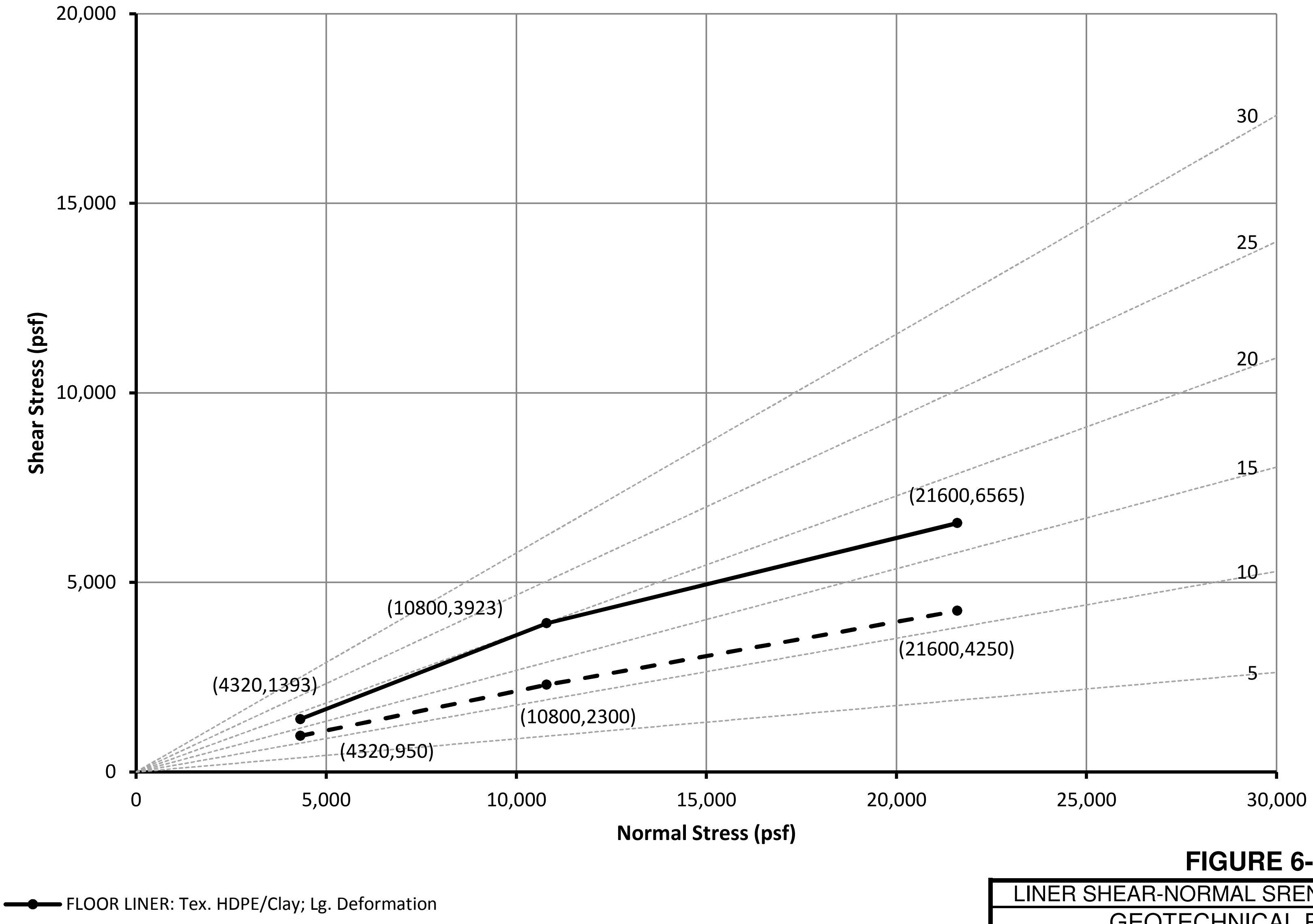
FIGURE 6–1

SHEAR STRENGTH OF MUNICIPAL SOLID WASTE

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: VL | DATE: MARCH 2012 | JOB NO. 2007–138



Shear-normal strength functions based on lab data from Calabasas Landfill Phase 2B provided by LASAN

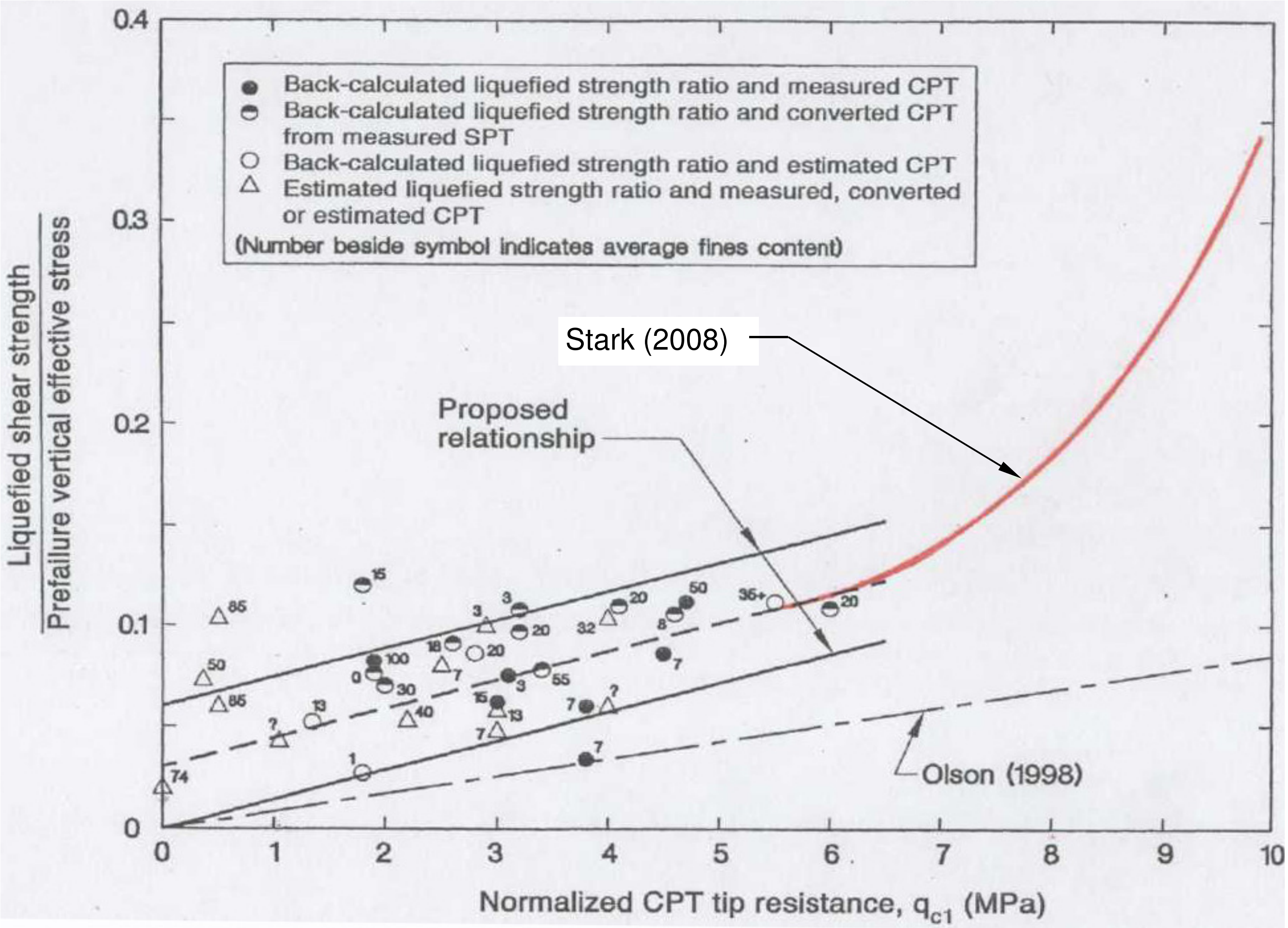
FIGURE 6-2

LINER SHEAR-NORMAL SRENGTH FUNCTIONS

GEOTECHNICAL REPORT
PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: **RMW**	DATE: **MARCH 2012**	JOB NO.: **2007-138**



Reference: Olson and Stark (2002) and Stark (2008)

FIGURE 6-3

LIQUEFIED SAND SHEAR STRENGTH RATIO

GEOTECHNICAL REPORT
PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: **RMW**	DATE: **MARCH 2012**	JOB NO.: **2007-138**

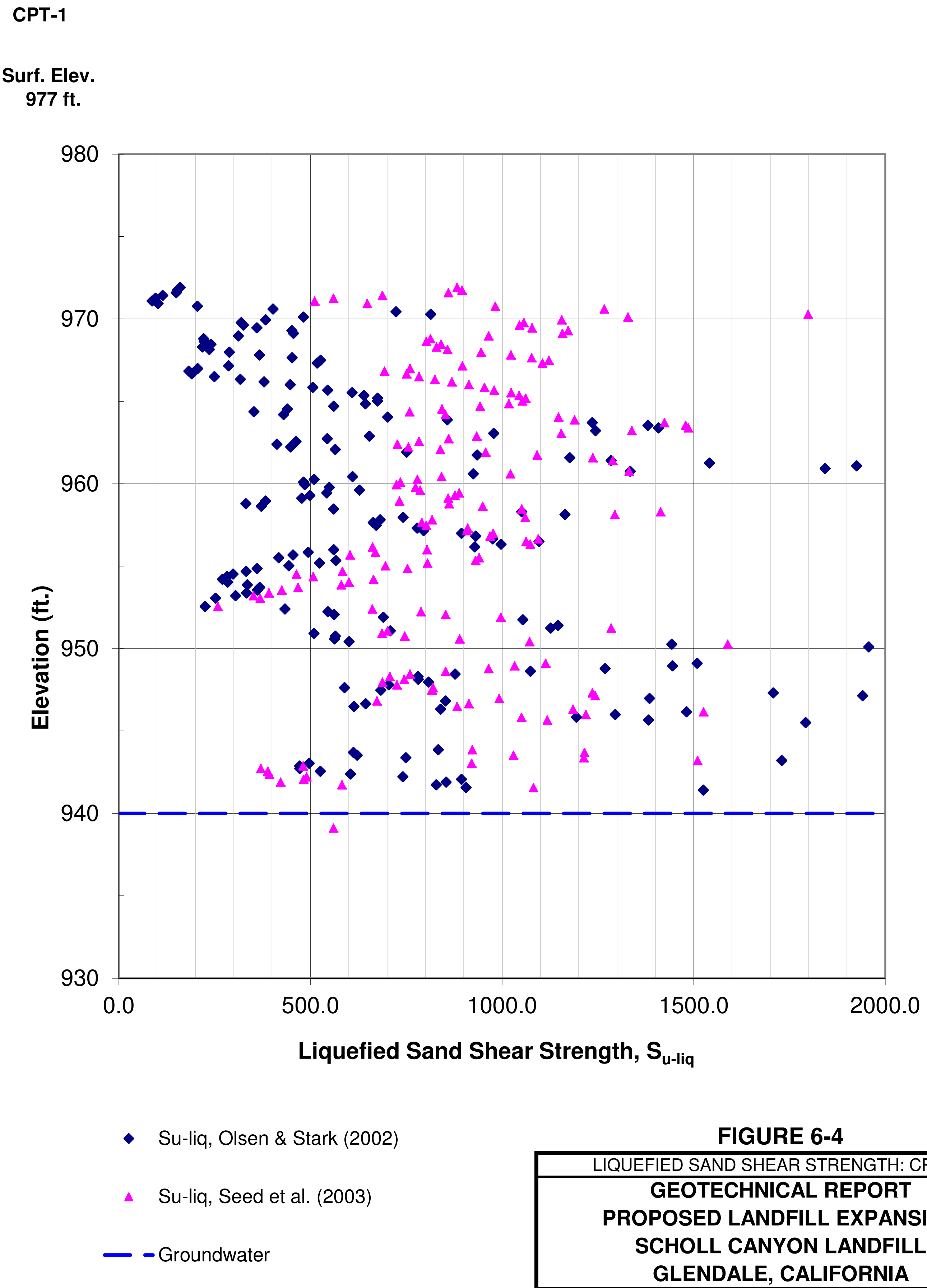


FIGURE 6-4

LIQUEFIED SAND SHEAR STRENGTH: CPT-1

GEOTECHNICAL REPORT
PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

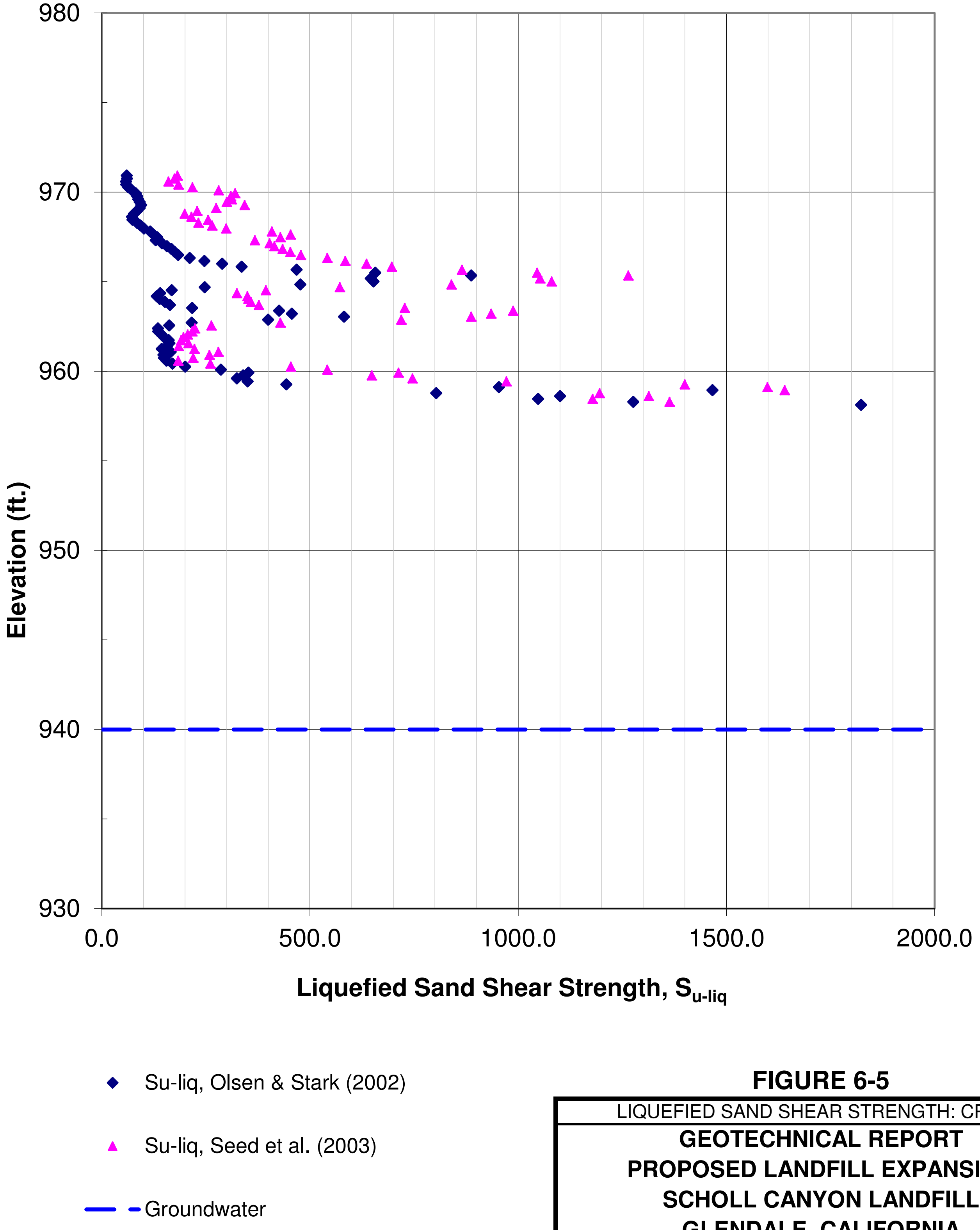
Geo-Logic ASSOCIATES

DRAWN BY:	RMW	DATE: MARCH 2012		JOB NO.:	2007-138

Olsen & Stark (2002) Su-liq extended per Stark (2008)

CPT-2

Surf. Elev.
976 ft.



Olsen & Stark (2002) Su-liq extended per Stark (2008)

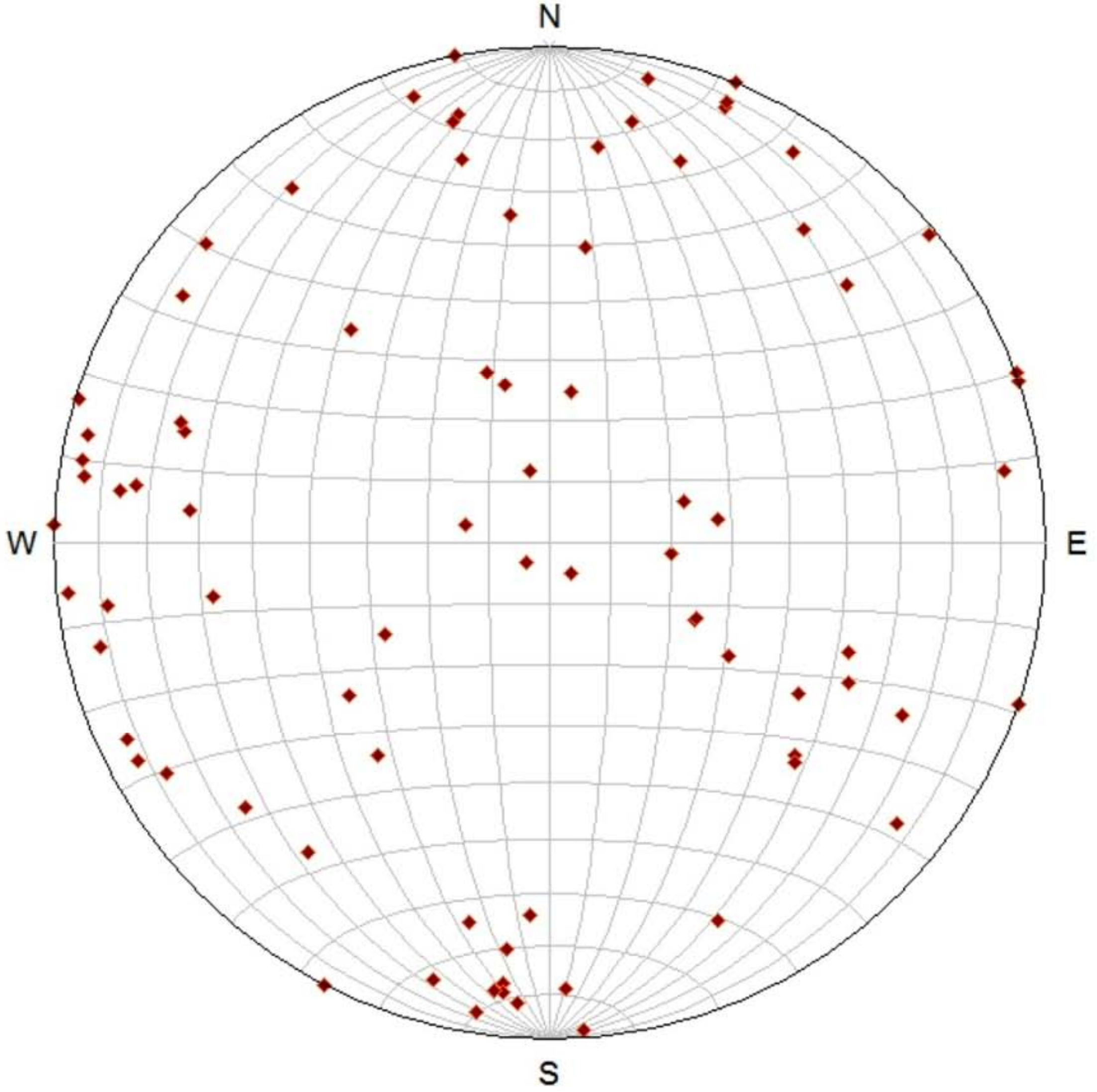
FIGURE 6-5

LIQUEFIED SAND SHEAR STRENGTH: CPT-2

GEOTECHNICAL REPORT
PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: **RMW**	DATE: MARCH **2012**	JOB NO.: **2007-138**



◆ Poles

Equal Area
Lower Hemisphere
81 Poles
81 Entries

FIGURE 6–6

STEREONET PLOT OF DISCONTINUITIES

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic ASSOCIATES

DRAWN BY:	VL	DATE:	MARCH 2012	JOB NO.	2007-138

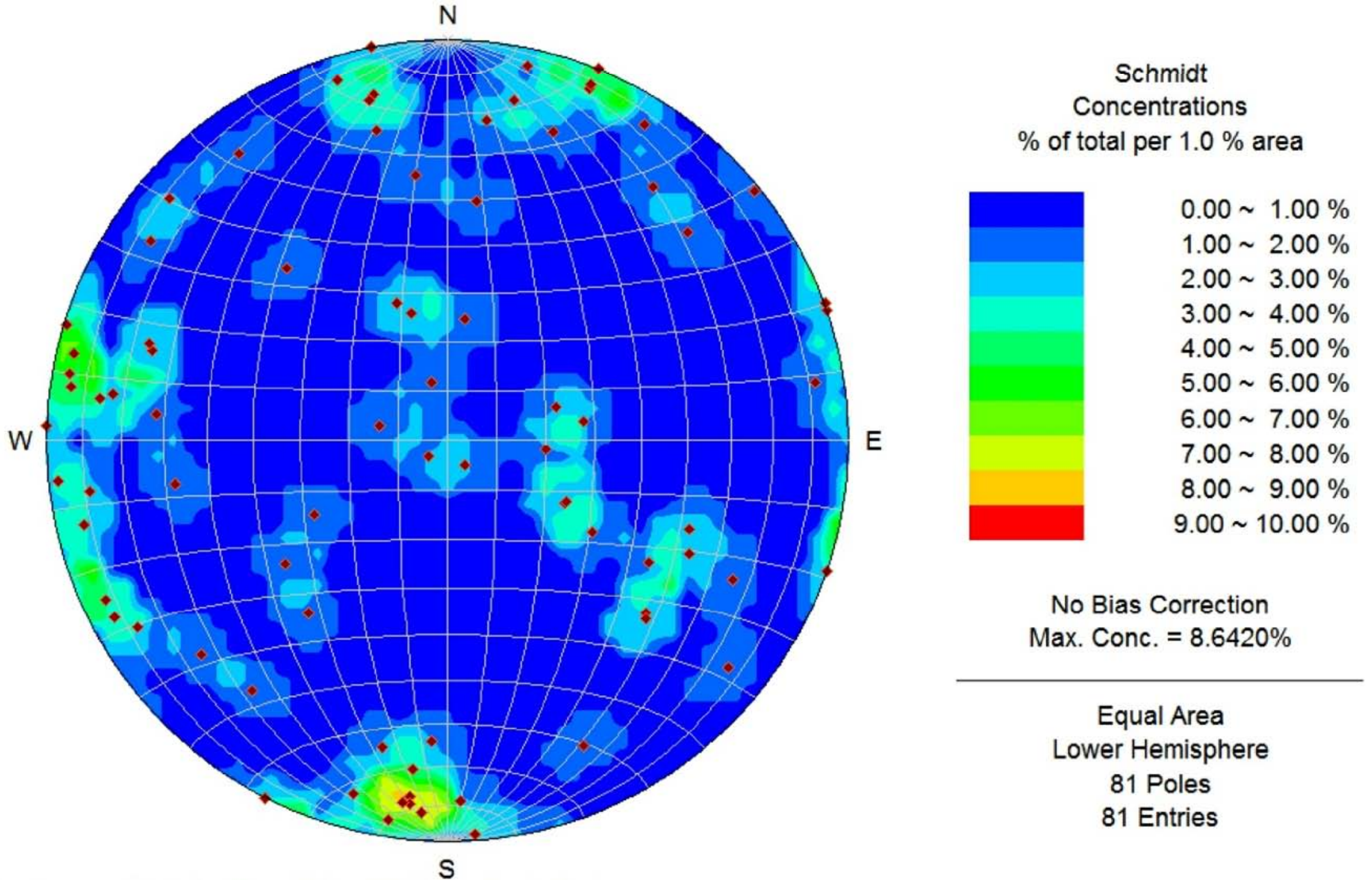


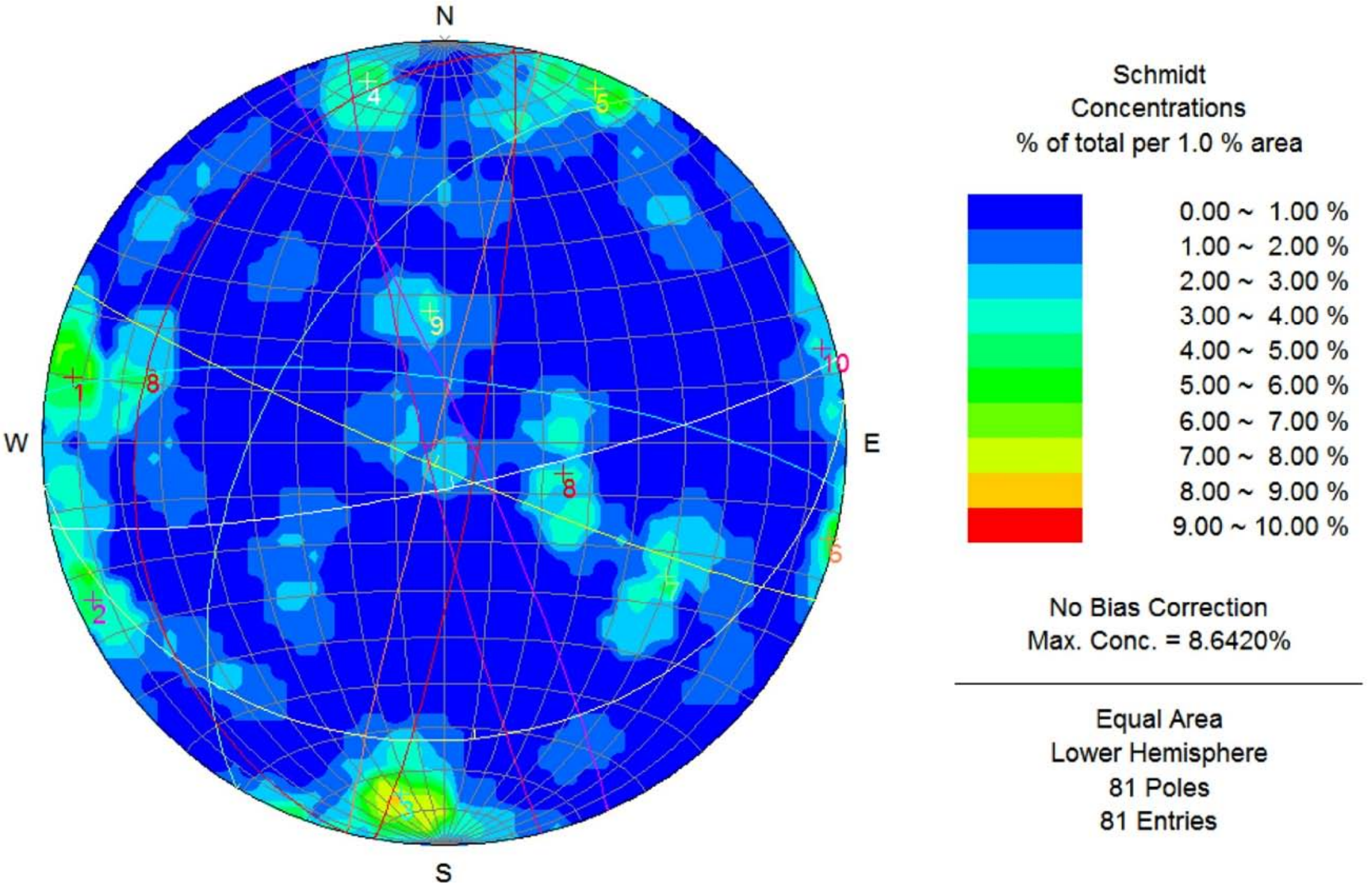
FIGURE 6–7

CONTOUR PLOT OF DISCONTINUITIES

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY:	VL	DATE:	MARCH 2012	JOB NO.	2007–138



No Bias Correction
Max. Conc. = 8.6420%

Equal Area
Lower Hemisphere
81 Poles
81 Entries

FIGURE 6–8

PLANES BASED ON DATA CLUSTERS

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY:	VL	DATE:	MARCH 2012	JOB NO.	2007–138

PLATES

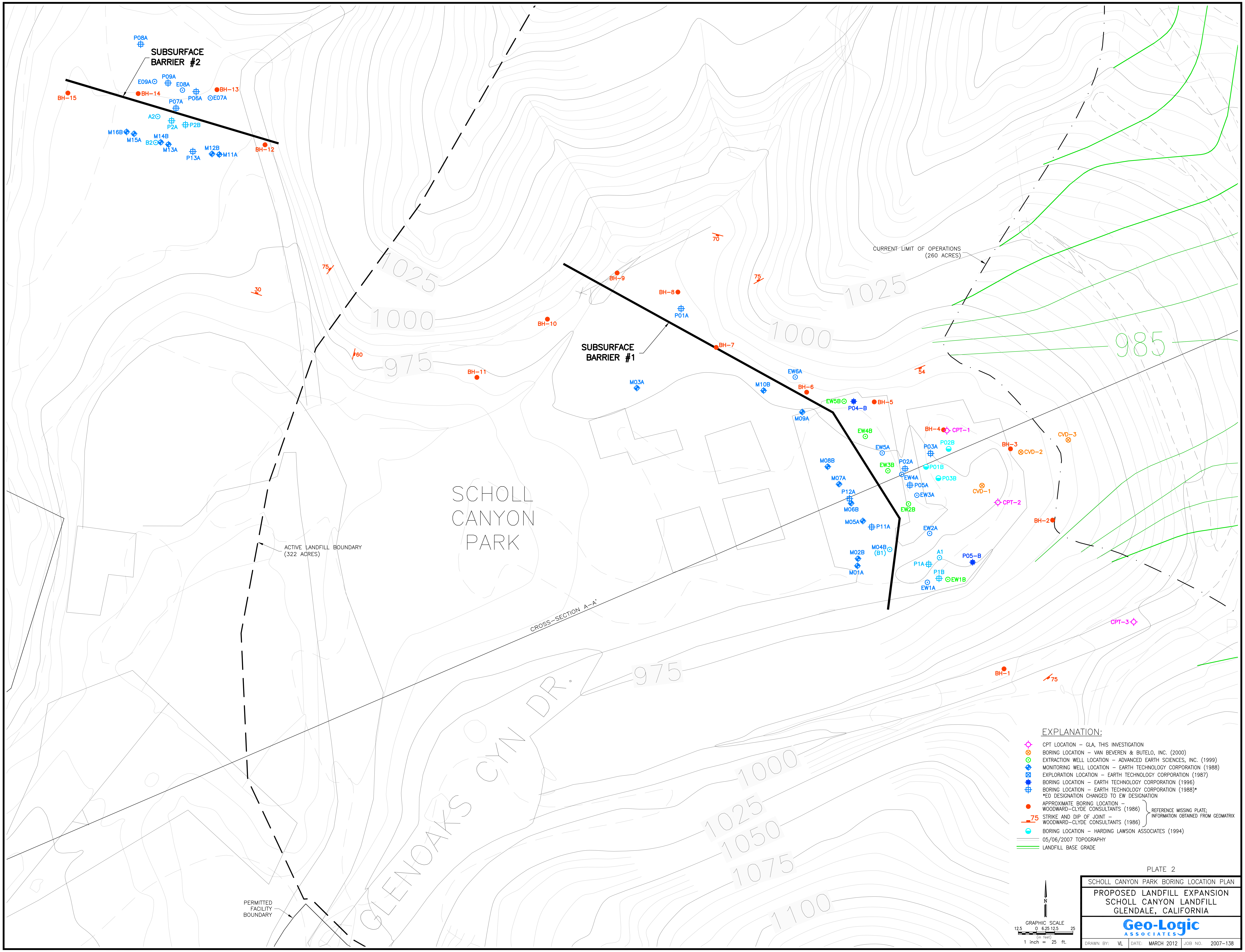
PLATE 1

PRE-DEVELOPMENT AND LANDFILL BASE GRADES

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: VL	DATE: MARCH 2012	JOB NO. 2007-138



EXPLANATION:

⌖	CPT LOCATION – GLA, THIS INVESTIGATION
⊗	BORING LOCATION – VAN BEVEREN & BUTELO, INC. (2000)
⊙	EXTRACTION WELL LOCATION – ADVANCED EARTH SCIENCES, INC. (1999)
⊕	MONITORING WELL LOCATION – EARTH TECHNOLOGY CORPORATION (1988)
⊠	EXPLORATION LOCATION – EARTH TECHNOLOGY CORPORATION (1987)
■	BORING LOCATION – EARTH TECHNOLOGY CORPORATION (1996)
⊞	BORING LOCATION – EARTH TECHNOLOGY CORPORATION (1988)* *EO DESIGNATION CHANGED TO EW DESIGNATION
●	APPROXIMATE BORING LOCATION – WOODWARD–CLYDE CONSULTANTS (1986)
75	STRIKE AND DIP OF JOINT – WOODWARD–CLYDE CONSULTANTS (1986)
◒	BORING LOCATION – HARDING LAWSON ASSOCIATES (1994)
═	05/06/2007 TOPOGRAPHY
═	LANDFILL BASE GRADE

REFERENCE MISSING PLATE; INFORMATION OBTAINED FROM GEOMATRIX

PLATE 2

SCHOLL CANYON PARK BORING LOCATION PLAN

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: VL | DATE: MARCH 2012 | JOB NO. 2007–138

PLATE 3

ALTERNATIVE 1

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: VL | DATE: MARCH 2012 | JOB NO. 2007–138

PLATE 4

ALTERNATIVE 2

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY:	VL	DATE:	MARCH 2012	JOB NO.	2007–138

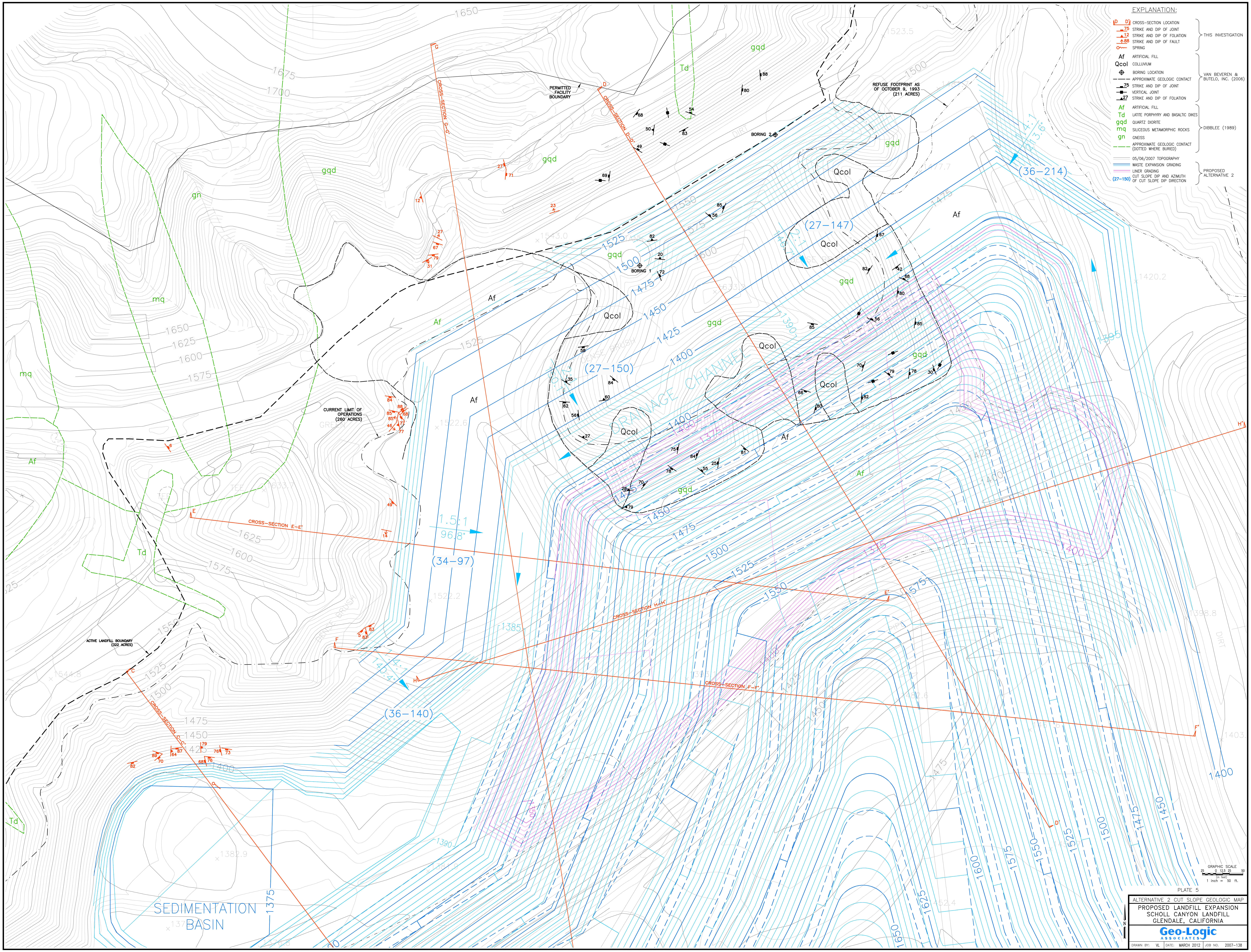


PLATE 5

ALTERNATIVE 2 CUT SLOPE GEOLOGIC MAP

PROPOSED LANDFILL EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: VL | DATE: MARCH 2012 | JOB NO. 2007–138

APPENDIX A

SELECTED BORING LOGS BY OTHERS

WOODWARD-CLYDE CONSULTANTS
1986

CORE LOG

Project No. 42174A **Field Log of Boring No.** BH-2 **Sheet** 1 **of** 4

BORING LOCATION see plan (~8 ft. N. of stake)		**ELEVATION AND DATUM**	
DRILLING AGENCY Datum	**DRILLER** D. Zuidema	**DATE STARTED** 7-7-86	**DATE FINISHED** 7-7-86
DRILLING EQUIPMENT Mobile Drill B-61		**COMPLETION DEPTH** 65.0'	**ROCK DEPTH** 29.0'
SIZE AND TYPE OF CASING Hollow stem auger		**NO OF SAMPLES** ¦ **DIST** 7	**UNDIST** ¦ **CORE**
DRILLING METHOD Hollow stem auger / rotary wash coring		**WATER** ¦ **FIRST**	**COMPL.** ¦ **24 HRS**
CORE BARREL	**LENGTH** 5' barrel 7.2' total ¦ **BIT** diamond	**LOGGED BY:** Waggoner	**CHECKED BY:**

DEPTH (FEET)	DESCRIPTION	ROCK CORE				SAMPLES				REMARKS
		Sketch	Run No.	Recov. ft.	RQD	No.	Type	Blow Count	Drilling Rate/Time	
	A.C.									Auger drilling ↓
	Dense, moist, medium brown silty SAND (sm) with some small gravel, contains fragments of extremely weathered granitic bedrock									
1										
2										
3										
4									0747	
							S	8		
5						1	P	14		
							T	20		
6										
7										
8									0752	
9							S	8		
						2	P	18		
10							T	15		
11										
12										
13									0759	
14	(locally clayey, also becomes greenish brown to locally red brown)					3	S P T	10 20 15		

LA/OR-0181-207

Project No. 42174A **Field Log of Boring No.** BH-2 **Sheet** 2 **of** 4

DEPTH (FEET)	DESCRIPTION	ROCK CORE Sketch	Run No.	Recov. ft.	RQD	SAMPLES No.	Type	Blow Count	Drilling Rate/ Time	REMARKS
						3	SPT			
16										
17										
18									0805	
19	(as above w/ whiteish rock fragments - pieces of only slightly weathered granitic rock, also some very [illegible] [illegible])					4	SPT	35 50/6"		
20										
21										
22										
23									0811	
24	▽ — soil becomes wet; silty sand as above (SM, with many fragments [illegible] [illegible] and very [illegible] [illegible] rock, color [illegible] to red. brown					5	SPT	45 42 45		
25										
26										
27										
28									0826	driller reports more firm drilling
29	Wet, greenish to yellowish brown silty SAND (sm) (disturbed material), with many extremely weathered rock fragments, micaceous (top of weathered bedrock in bottom of sample)					6	SPT	26 50/6"		
30										
31										
32										

Project No. 42174A Field Log of Boring No. BH-2 Sheet 3 of 4

DEPTH (FEET)	DESCRIPTION	ROCK CORE				SAMPLES				REMARKS
		Sketch	Run No.	Recov. ft.	RQD	No.	Type	Blow Count	Drilling Rate/Time	
34	dark olive green diorite, extremely weathered.					7	SPT	50/5"	0821 0827	Augered to 35'; prepare to core
35 36 37 38 39	olive gray diorite; highly to extremely weathered, highly fractured, friable - easily broken with fingers, iron oxide stain on fractures, some calcite fracture fillings		1	~1.1'/5.0' = 22%	0.0'/5.0' = 0%				0859 0915	Begin coring
40 41 42 43 44			2	0.0/5.0' = 0%	0.0/5.0' = 0%				0915 0921	Packer test
45 46 47 48 49 50	Whitish, hard, slightly weathered quartz diorite - recovered as gravel olive gray highly weathered diorite, some calcite fracture fillings		3	~2.0'/5.0 = 40%	0.0'/5.0 = 0%				1049 1058 1114	

Project No. 42174A Field Log of Boring No. BH-2 Sheet 4 of 4

DEPTH (FEET)	DESCRIPTION	ROCK CORE				SAMPLES				REMARKS
		Sketch	Run No.	Recov. ft.	ROD	No.	Type	Blow Count	Drilling Rate/Time	
52										
53	quartz diorite gravel, slightly weathered		4	~1.9'/50' = 38%	0.0'/5.0' = 1%					
54	olive gray diorite, highly weathered, highly fractured, friable, iron stained (as above)								1123	packer test
55									1217	
56										
57										
58	olive gray diorite as above		5	~2.0'/5.0' = 40%	0.0'/5.0' = 0%					
59									1223	
60									1240	
61										
62										
63			6	~1.2'/5.0' = 24%	0.0'/5.0' = 0%					
64	olive gray diorite as above → whitish quartz diorite; slightly to moderately weathered, highly fractured, hard, iron stain and some calcite fracture fillings								1256	packer test.
65	Bottom of boring - 65.0'									
66										
67										
68										

CORE LOG

Project No. 42174A   Field Log of Boring No. BH-3   Sheet 1 of 5

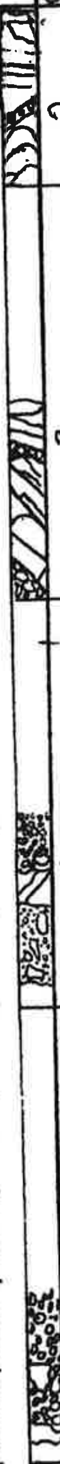
BORING LOCATION see plan (~1 ft. SW of stake)
ELEVATION AND DATUM
DRILLING AGENCY Datum   **DRILLER** D. Zuidema
DATE STARTED 7-7-86   **DATE FINISHED** 7-9-86
DRILLING EQUIPMENT Mobile Drill B-61
COMPLETION DEPTH 72.6'   **ROCK DEPTH** 24.0
SIZE AND TYPE OF CASING used hollow stem augers as casing
NO OF SAMPLES DIST 5   UNDIST 0   CORE
DRILLING METHOD hollow stem auger / rotary wash coring
WATER FIRST   COMPL.   24 HRS
CORE BARREL   **LENGTH** 5' inner / 7.2' outer   **BIT** diamond
LOGGED BY: Waggoner   **CHECKED BY**

DEPTH (FEET)	DESCRIPTION	ROCK CORE				SAMPLES				REMARKS
		Sketch	Run No.	Recov. ft.	RQD	No.	Type	Blow Count	Drilling Rate/Time	
	Moist, medium brown to greenish gray silty SAND (SM) with some gravel								0750	auger drilling ↓
1										
2										
3									0752	
4						1	SPT	9 9 8		
5										
6										
7	Moist, greenish gray silty sand (SM) with some gravel, locally slightly clayey									
8									0759	
9						2	SPT	8 10 12		
10										
11										
12										
13									0802	
14						3	SPT	7 7 8		

Project No. 42174A Field Log of Boring No. BH-3 Sheet 2 of 5

DEPTH (FEET)	DESCRIPTION	ROCK CORE Sketch	Run No.	Recov. ft.	RQD	SAMPLES No.	Type	Blow Count	Drilling Rate/Time	REMARKS
						3	SPT			
16										
17										driller reports firmer drilling
18									0808	
19						4	SPT	40 50/5½"		no sample recovered
20										
21										
22										
23									0915	
24	deeply weathered zone; greenish gray w/ white qtz. and [illegible] [illegible] (see sample)					5	SPT	30 50/4"		Augered to 25'; set up to core
25			1	~0.6'/5.0' = 12%	0.0'/5.0' = 0%				0825	Begin coring
26										
27										
28										
29	Greenish gray – olive green diorite (?); highly weathered, highly fractured, friable and weak to locally moderately hard, iron oxide stain on fractures, local calcite filling in fractures, weak to moderate foliation								0901	augers leaking - [illegible] some time [illegible]
30			2	~3.4'/5.0' = 68%	0.0'/5.0' = 0%				0916	leak w/ bentonite in annulus of augers
31										
32										

Project No. 42174A Field Log of Boring No. BH-3 Sheet 3 of 5

DEPTH (FEET)	DESCRIPTION	ROCK CORE Sketch	ROCK CORE Run No.	ROCK CORE Recov. ft.	ROCK CORE RQD	SAMPLES No.	SAMPLES Type	SAMPLES Blow Count	SAMPLES Drilling Rate/Time	REMARKS
	(granitic rock as above)									
34			2							
35									0926 1032	packer test
36										
37	"									
38			3	~ 2.1'/4.5' = 47%	0.0'/4.5' = 0%					
39									1045 1058	circulation blocked off. side wall of bit is wearing thin- mostly due to drilling w/ a bent rod
40										
41										
42	whitish, relatively fresh, highly fractured (?) quartz diorite (dike ?); core recovered as hard fragments of gravel		4	~ 2.1'/4.5' = 47%	0.0'/4.5' = 0%					
43	greenish gray to olive green diorite (?) highly weathered and fractured – as described above – Runs 1 + 2									
44									1112 1210	circulation [illegible] packer [illegible]
45										
46			5	~ 1.8'/5.0' = 36%	0.0'/5.0' = 0%					
47	whitish quartz diorite as at 42'									
48	greenish gray diorite as at ~ 43'								1222 0709	7-8-93 quit drilling – bit worn out 7-9-93 (new bit and reamer, removed bent rod from drill string
49										
50			6							

Project No. 42174A **Field Log of Boring No.** BH-3 **Sheet** 4 **of** 5

DEPTH (FEET)	DESCRIPTION	ROCK CORE Sketch	ROCK CORE Run No.	ROCK CORE Recov. ft.	ROCK CORE RQD	SAMPLES No.	SAMPLES Type	SAMPLES Blow Count	Drilling Rate/Time	REMARKS
52 53			6	0.0'/5.0' = 0%	0.0'/5.0' = 0%				0720	no recovery of core - possibly the core was very gravelly and fell out of the core barrel.
54 55 56 57	core recovered as a coarse gravel with sand and a few small chunks of core size sample - whitish to very light gray, slightly to moderately weathered, highly fractured to intensely fractured quartz diorite; minor iron stain on some fractures		7	~3.1'/3.8' = 82%	0.0'/3.8' = 0%				0848 0901	packer test driller reports harder rock circulation ceased
58 59 60 61 62	core recovered as in Run 7		8	~2.0'/5.0' = 40%	0.0'/5.0' = 0%				0918 0942	packer test
63 64 65 66 67	core recovered as angular gravel w/ no fines; gravel is a hard, fresh to very slightly weathered granite, fractures evident in gravel fragments are tight w/ only trace Fe stain.		9	~0.8'/5.0' = 16%	0.0'/5.0' = 0%				1105 1123	
68			10						1137	

Project No. 42174 A **Field Log of Boring No.** BH-5 **Sheet** 5 **of** 5

DEPTH (FEET)	DESCRIPTION	ROCK CORE				SAMPLES				REMARKS
		Sketch	Run No.	Recov. ft.	RQD	No.	Type	Blow Count	Drilling Rate/ Time	
70			10	~ 0.5'/4.8' = 10%	0.0'/4.8' = 0%					
71										
72	hard, fresh, angular fragments (¼"-1½") of quartz diorite, probably highly fractured.								1154	packer test
73	Bottom of boring = 72.6'									
74										
75										
76										
77										

LOG

Project No. 42174A **Field Log of Boring No.** BH-4 **Sheet** 1 **of** 3

BORING LOCATION SEE PLAN		ELEVATION AND DATUM	
DRILLING AGENCY DATUM	DRILLER D. ZUIDEMA	DATE STARTED 6-20-86	DATE FINISHED 6-20-86
DRILLING EQUIPMENT MOBILE DRILL B-61		COMPLETION DEPTH 40.2	ROCK DEPTH 29.0
SIZE AND TYPE OF CASING NONE		NO OF SAMPLES | DIST. 1	UNDIST. 8 | CORE
DRILLING METHOD HOLLOW STEM AUGER (8" ϕ)		WATER | FIRST 26.0	COMPL. | 24 HRS
CORE BARREL	LENGTH | BIT	LOGGED BY: J. WAGGONER	CHECKED BY:

DEPTH (FEET)	DESCRIPTION	ROCK CORE Sketch	Run No.	Recov. ft.	RQD	SAMPLES No.	Type	Blow Count	Drilling Rate/Time	REMARKS
	Grass and topsoil								0720	
1	medium dense, moist, gray brown silty SAND (sm); some gravel; locally brown to dark gray									
2										
3										
4										
5							☒	7	0723 0745	
						1	☒	5		mc= 8.2%
6							☒	11		
7										
						2	⧄			mc = 7.6 %
8										
9										
10							☒	7	0750 0751	
						3	☒	7		mc= 9.2 % DD = 98.8 pcf
11							☒	10		mA Sp.G. = 2.69
12										
13										
14	Medium dense, moist, light brown gravelly SAND (SP)									

Project No. 42174A **Field Log of Boring No.** BH-4 **Sheet** 2 **of** 3

DEPTH (FEET)	DESCRIPTION	ROCK CORE				SAMPLES				REMARKS
		Sketch	Run No.	Recov. ft.	RQD	No.	Type	Blow Count	Drilling Rate/Time	
						4	☒	11 15 14	0756	
16										
17										
18										
19										
20	soil becomes dense ↓					5	☒	11 18 16	0805	mc = 4.7 % DD = 110.9 pcf MA
21										
22										
23										
24										
25	Dense, moist, light gray gravelly SAND with some silt (SP-SM)					6	☒	11 17 18	0806 0810	MA
26										
27										
28	soil becomes wet ↓									
29	weathered bedrock (?)								0813	↓ becomes more firm to drilling
30						7	☒			water and soil flowed into augers and caused low blow counts and no sample was recovered
31										
32										

Project No. 42174A **Field Log of Boring No.** BH-4 **Sheet** 3 **of** 3

DEPTH (FEET)	DESCRIPTION	ROCK CORE				SAMPLES				REMARKS
		Sketch	Run No.	Recov. ft.	RQD	No.	Type	Blow Count	Drilling Rate/Time	
34										
35						8	☒	50/5"	0828	sample recovered in bag; drilling becomes very firm
36										
37										
38										
39										
40						9	☒	50/8"		sample recovered in bag
	Bottom of boring - 40.2 ft.									
41										
42										
	Water sample measurements: -7.6 mv 6.62 pH 14.5 ° C									
43										
44										
45										
46										
47										
48										
49										
50										

CORE LOG

Project No. 42174A **Field Log of Boring No.** BH-5 **Sheet** 1 **of** 3

BORING LOCATION see plan (~3 ft. N of stake)
DRILLING AGENCY Datum **DRILLER** D. Zuidema
DRILLING EQUIPMENT Mobile Drill B-61
SIZE AND TYPE OF CASING used hollow stem auger as casing
DRILLING METHOD hollow stem auger / rotary wash coring
CORE BARREL **LENGTH** 5.0' inner / 7.2' outer **BIT** diamond

ELEVATION AND DATUM
DATE STARTED 7-9-86 **DATE FINISHED** 7-9-86
COMPLETION DEPTH, 39.9 **ROCK DEPTH** 3.5'
NO OF SAMPLES **DIST.** 3 **UNDIST.** 0 **CORE**
WATER **FIRST** **COMPL.** **24 HRS**
LOGGED BY: J. Waggoner
CHECKED BY:

DEPTH (FEET)	DESCRIPTION	ROCK CORE Sketch	Run No.	Recov. ft.	RQD	SAMPLES No.	Type	Blow Count	Drilling Rate/Time	REMARKS
	Moist, dark olive green silty SAND (sm)									auger drilling
1										
2						1				bag sample
3										
4	(extremely weathered bedrock); light olive brown, moist, silty sand (sm), (as recovered in SPT sampler)					2	SPT	7 19 21		Appears to be bedrock; drilling another 5 ft. [illegible] core and [illegible] auger [illegible] for coring
5										
6										
7										
8										
9	(sample 3 is the same as above)					3	SPT	15 50/6"		
10									1419	Begin co[illegible]
11	cuttings = light olive green sand									
12										
13			2	0.0'/5.0' = 0%	0.0'/5.0' = 0%					
14									1427	Augers leaking at surface - packed annulus w/ bentonite

LA/OR-0181-207

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Project No. 42174A **Field Log of Boring No.** BH-5 **Sheet** 2 **of** 3

DEPTH (FEET)	DESCRIPTION	ROCK CORE				SAMPLES				REMARKS
		Sketch	Run No.	Recov. ft.	RQD	No.	Type	Blow Count	Drilling Rate/ Time	
	cuttings = light olive green sand								1431	
16										
17										
18			2	0.0'/5.0' = 0%	0.0'/5.0' = 0%					
19										
20									1457 1534	packer test.
21										
22										
23			3	0.0'/5.0' = 0%	0.0'/5.0' = 0%					
24										
25										
26										
27	core recovered as gravel and sand size fragments of granitic rock; whitish olive green, highly weathered and friable, easily crushed with fingers, intensely fractured									
28			4	~2.5'/4.9' = 59%	0.0'/4.9' = 0%					
29										
30									1544 1619	packer test
31										
32			5	~1.5'/5.0 = 30%	0.0/5.0 = 0%					

LA/OR-0181-200

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Project No. 42174A **Field Log of Boring No.** BH-5 **Sheet** 3 **of** 3

DEPTH (FEET)	DESCRIPTION	ROCK CORE				SAMPLES				REMARKS
		Sketch	Run No.	Recov. ft.	RQD	No.	Type	Blow Count	Drilling Rate/Time	
34	light olive green to white granitic rock as above – highly weathered, intensely fractured, friable, easily crushed with fingers		5						1628	
35									1636	
36										
37	bag sample of cuttings (5-4) = light olive green sand		6							
38										
39				0.0'/~~5.0~~5.0' = 0%	0.0/5.0 = 0%				1641	packer te
40	Bottom of boring = 39.9'									
41										
42										
43										
44										
45										
46										
47										
48										
49										
50										

LOG

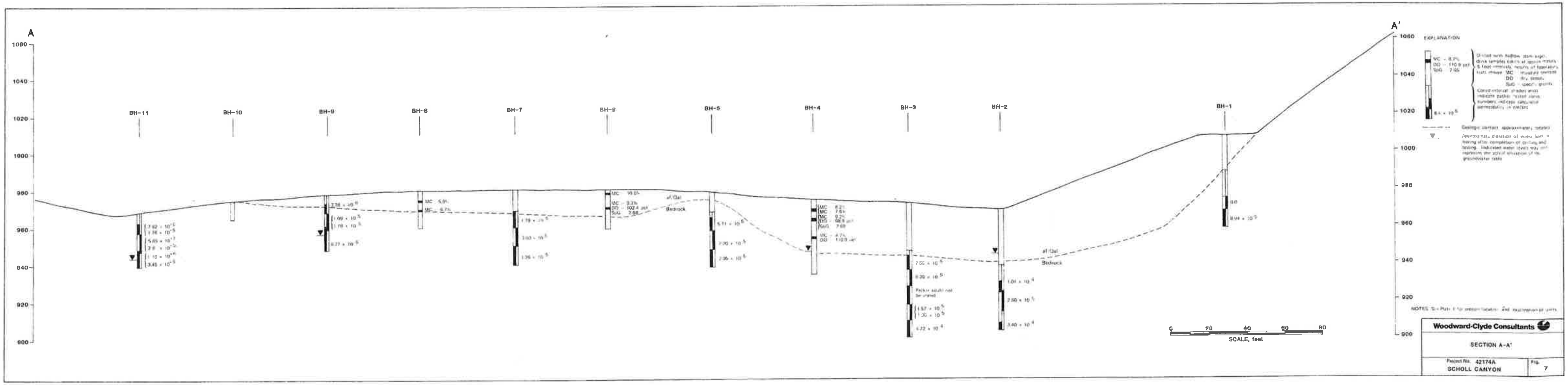
Project No. 42174A **Field Log of Boring No.** BH-6 **Sheet** 1 **of** 2

BORING LOCATION SEE PLAN
ELEVATION AND DATUM
DRILLING AGENCY DATUM **DRILLER** D. ZUIDEMA
DATE STARTED 6-18-86 **DATE FINISHED** 6-18-86
DRILLING EQUIPMENT MOBILE DRILL B-61
COMPLETION DEPTH 20.3 **ROCK DEPTH** 14.0±
SIZE AND TYPE OF CASING NONE
NO OF SAMPLES **DIST.** 2 **UNDIST.** 4 **CORE**
DRILLING METHOD HOLLOW STEM AUGER (8" ϕ)
WATER **FIRST** **COMPL.** **24 HRS**
CORE BARREL **LENGTH** **BIT**
LOGGED BY: J. WAGGONER **CHECKED BY**

DEPTH (FEET)	DESCRIPTION	ROCK CORE Sketch	Run No.	Recov. ft.	RQD	SAMPLES No.	Type	Blow Count	Drilling Rate/Time	REMARKS
	Moist, brown silty SAND (sm) and grass								1325	
1	Moist, olive gray silty SAND (sm) with gravel									
2						1				mc = 10%
3										
4	Dense, moist, brown silty SAND (sm) with gravel									slighty hard drilling
5						2		14 19 23	1328	
6										
7										
8										
9										
10	becomes very dense					3		14 17 35	1330	MA Sp.G. = 2.657 mc = 9.3% DD = 102.4 pcf
11										
12										
13										
14	? ? weathered bedrock									

Project No. 42174A **Field Log of Boring No.** BH-6 **Sheet** 2 **of** 2

DEPTH (FEET)	DESCRIPTION	ROCK CORE				SAMPLES				REMARKS
		Sketch	Run No.	Recov. ft.	RQD	No.	Type	Blow Count	Drilling Rate/ Time	
	Medium brown to gray brown diorite; extremely weathered, highly fractured to crushed, falls apart when removed from drive sampler and yields a silty sand (sm); moist, very dense (from blow counts)					4	☒	20 30 40	1348	
16										
17										
18						5	⧅			
19	,,								1350	← slightly more difficult drilling
	whitish quartz diorite, highly weathered, highly fractured to crushed					6	☒	50/3.5		sample 6 fell apart and was put in a plastic bag.
20										
	Bottom of boring – 20.3'									
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										



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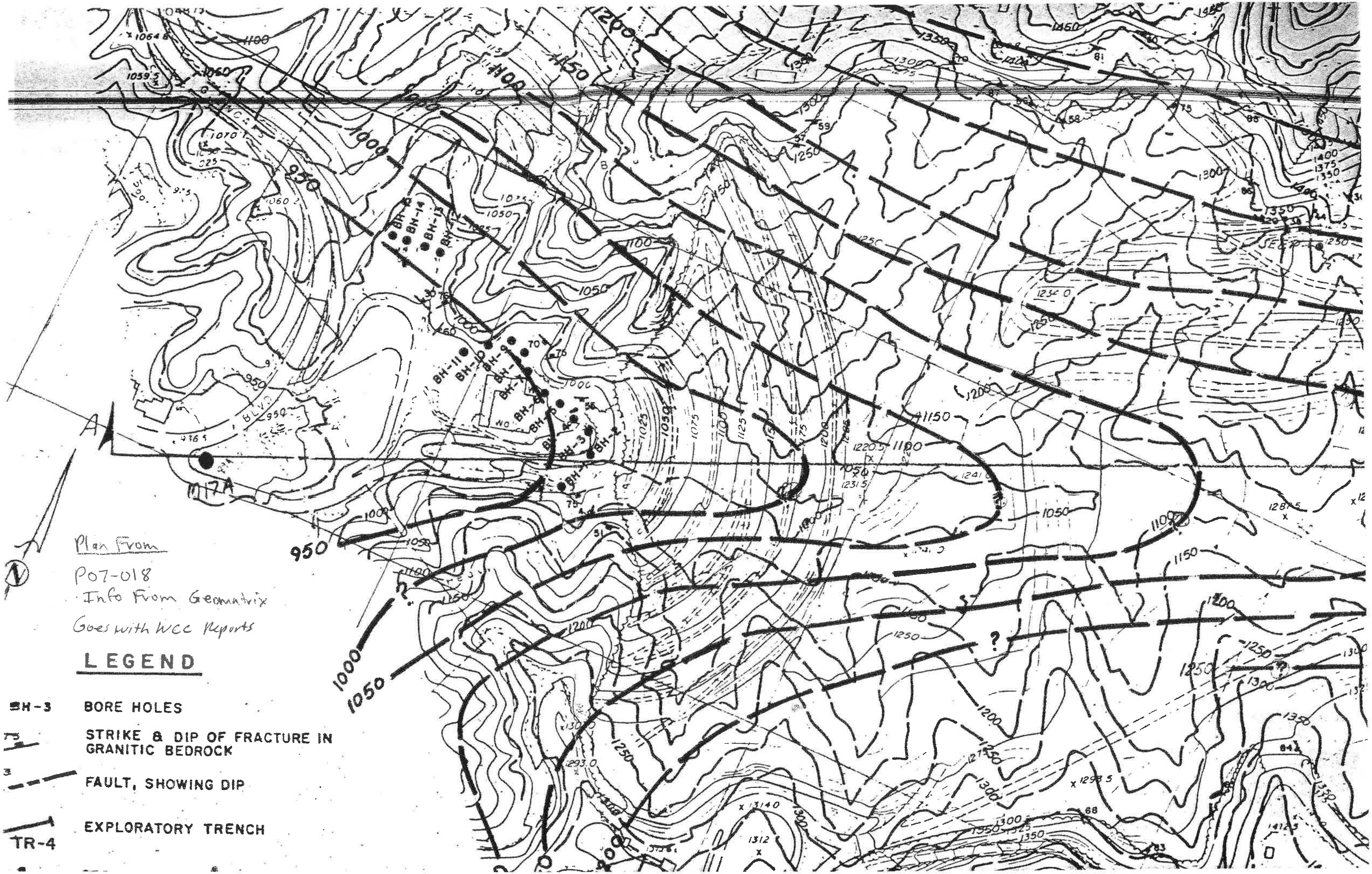
SECTION A-A'

Project No. 42174A
SCHOLL CANYON

Fig. 7



Plan From
P07-018
·Info From Geomatrix
Goes with WCC Reports

THE EARTH TECHNOLOGY CORPORATION
1987

[redacted] Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON

PROJECT NUMBER: 87-613-0001

WELL LOCATION: SCHOLL CANYON PARK, AREA 1

LOGGED BY: D.H. RANDELL

DEPTH TO WATER (FEET FTOC): 24.10 12/5/86

DRILLING CO.: PIONEER DRILLING

DRILLER: GUADALUPE

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: SPLITSPOON

SAMPLING INTERVAL (FEET): 5/SOIL CHANGE

TOTAL DEPTH DRILLED (FEET): 31

CASING TYPE: PVC SCHEDULE 40

CASING DIAMETER (INCHES I.D.): 4

SCREEN TYPE: MACHINE SLOT, 4 ROW, 22 COLUMNS/6"

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 29.5 TO 26.5

CASING INTERVAL (FEET): 26.5 TO 0.25

FILTER PACK: LONESTAR #2/12 MONTEREY-TYPE SAND

FILTER INTERVAL (FEET): 30 TO 25.5

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 25.5 TO 22.5

GROUT TYPE: PORTLAND I-II LOW ALKALI CEMENT

PERCENT BENTONITE IN GROUT: 5

GROUT INTERVAL (FEET): 22.5 TO 2

WELLHEAD: FLUSH-MOUNTED, SCREW-LOCK CHRISTY BOX 1/2" ABOVE GRADE.

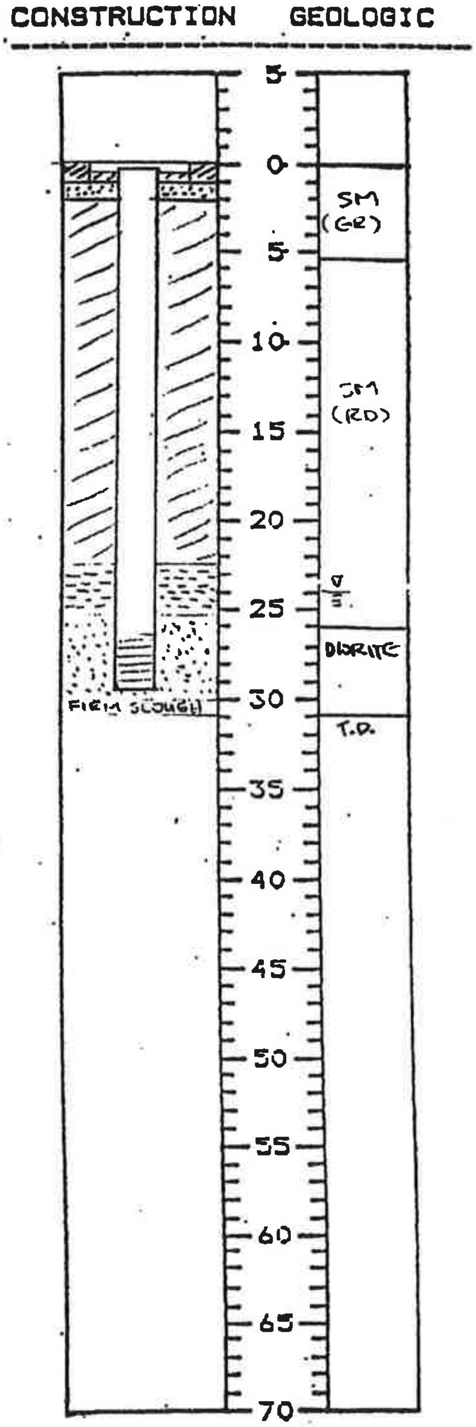
COMMENTS: CHRISTY BOX PLACED ON 1-FOOT BED OF MONTEREY #3 SAND, WITH 2 8-INCH STEEL DRAIN PIPES EMBEDDED IN CONCRETE, PVC SLIPCAP SCREWED TO BOTTOM, PVC TOP SLIPCAP, 8" PILOT HOLE, REAMED TO 30' WITH 10" HSA.

WELL NUMBER: A1 (#2)

DRILLING PROGRESS

DATE	START	FINISH
11/26/86	7:35	9:07

WELL SKETCH
(DEPTH IN FEET)



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BORING LOG

Project Name: SCHOLL CANYON LANDFILL PUMPING TESTS

Project Number: 87-613-0001 Field Log of Boring Number: A1 (#2) Sheet 1 of 2

Boring Location: SCHOLL CANYON PARK, AREA 1	Elevation and Datum:
Drilling Agency: PIONEER DRILLING Driller: GUADALUPE	Date Started: 11/26/86 Date Finished: 11/26/86
Drilling Equipment: MOBILE DRILL B-61	Completion Depth (feet): 31 Rock Depth (feet): 26
Method of Drilling: HOLLOW STEM AUGER	Number of Samples: 7 Dist.: 7 Undist.: – – Core: – –
Borehole Size: 10 INCH	Water Depth (ft): 24.10 12/5/86 First: 25 Compl.: – – 24 hrs. – –
Type of Perforation Backfill: 0.02 INCH SCREEN SLOT SIZE, LONESTAR #2/12 FILTER PACK	Logged By: D. H. RANDELL Checked by:
Type of Seal: VOLCLAY BENTONITE TABLETS 1/4"	

Depth (feet)	Description	Graphic Log Lithology	OVA (ppm)	Samples Number	Type	Blow Count	Drilling Rate/Time	Remarks
	0–1" ASPHALTIC CONCRETE SILTY SAND, GEN'LY W. GRADED, MPS 3/4", g5, S90, F5, SUBANG, DK RD TO BR, NO ODOR, DRY TO SL MOIST, LOOSE, HOMOGENEOUS, NO HCL, NO CEMENT, SM.	SM (GR)					7:35	START DRILLING BKGROUND OVA 90 ppm
5	SAME AS ABOVE		0	1		7 2	7:47	5.5' COLOR CHANGE TO RD M.C. = 7½ % DRY WT., 26gm SIEVE/HYDROMETER ANALYSIS
	SILTY SAND, GEN'LY W. GRADED, MPS 2", g5, S85, F10, ANG, LT RD, EARTHY ODOR, SL MOIST, MED. DENSE, HOMOGENEOUS, NO HCL, NO CEMENT, SM.							8' GRAVEL MPS 2"
10	SAME AS ABOVE		320	2		14 7	8:09	BOREHOLE OVA >1000ppm ADDED NITROGEN GAS 7:58.
15	SAME AS ABOLE	SM (RD)	460	3		4 10	8:14	14' DRILL CHATTER BOREHOLE OVA >1000 ppm ADDED NITROGEN GAS 8:10. SIEVE/HYDROMETER ANALYSIS
20	SAME AS ABOVE		500	4		13 41	8:21	M.C. = 7 % DRY WT, 26gm
25	SAME AS ABOLE, DIORITE, LT BR TO BR, ABUN. FERROMAG MIN'L'S, V. HIGHLY WEATHERED, NO APPARENT STRUCTURE.		200	5		22 59	8:32	FIRST WATER 25' ROCK AT 26'. PHOTO 12(DEEPEST) 13(SHALLOW)
	DIORITE SAME AS AT 26', SOME FOLIATION VISABLE, IRREGULAR ALTERNATIONS OF FERROMAG MINERALS AND IRON-STAINING, CLAYEY, HIGHLY WEATHERED, MICA, FOLIATION DIPPING 30°.	DIORITE	140	6		>70	8:48	PHOTO 14, 9"/70
	DIORITE SAME AS AT 26', NO APPARENT STRUCTURE, V. CLAYEY, HIGHLY WEATHERED.		40	7		>70	9:07	PHOTO 15, 5"/70
30								

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BORING LOG

Project name: SCHOLL CANYON LANDFILL PUMPING TESTS

Project Number: 87-613-0001 **Field Log of Boring Number:** A1 (#2) **Sheet** 2 **of** 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
		DIORITE						
	TOTAL DEPTH 31'							
35								
40								
45								
50								
55								
60								
65								
70								

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON LANDFILL

WELL NUMBER: A1 ABANDONED

PROJECT NUMBER: 87-613-0001

WELL LOCATION: SCHOLL CANYON PARK, AREA 1

LOGGED BY: D.H. RANDELL

DEPTH TO WATER (FEET ~~FTOC~~ GRADE): 25 FIRST MEASURE

DRILLING CO.: PIONEER DRILLING

DRILLER: GUADALUPE

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 8"

SAMPLING METHOD: SPLITSPOON

SAMPLING INTERVAL (FEET): 5/SOIL CHANGE

TOTAL DEPTH DRILLED (FEET): 28

CASING TYPE: ABANDONED

CASING DIAMETER (INCHES O.D.): —

SCREEN TYPE: —

SLOT SIZE (INCHES): —

SCREENED INTERVAL (FEET): — TO —

CASING INTERVAL (FEET): — TO —

FILTER PACK: —

FILTER INTERVAL (FEET): — TO —

BENTONITE SEAL (FORM): —

BENTONITE INTERVAL (FEET): — TO —

GROUT TYPE: PORTLAND I-II LOW ALKALI CEMENT

PERCENT BENTONITE IN GROUT: 5

GROUT INTERVAL (FEET): 28 TO 0

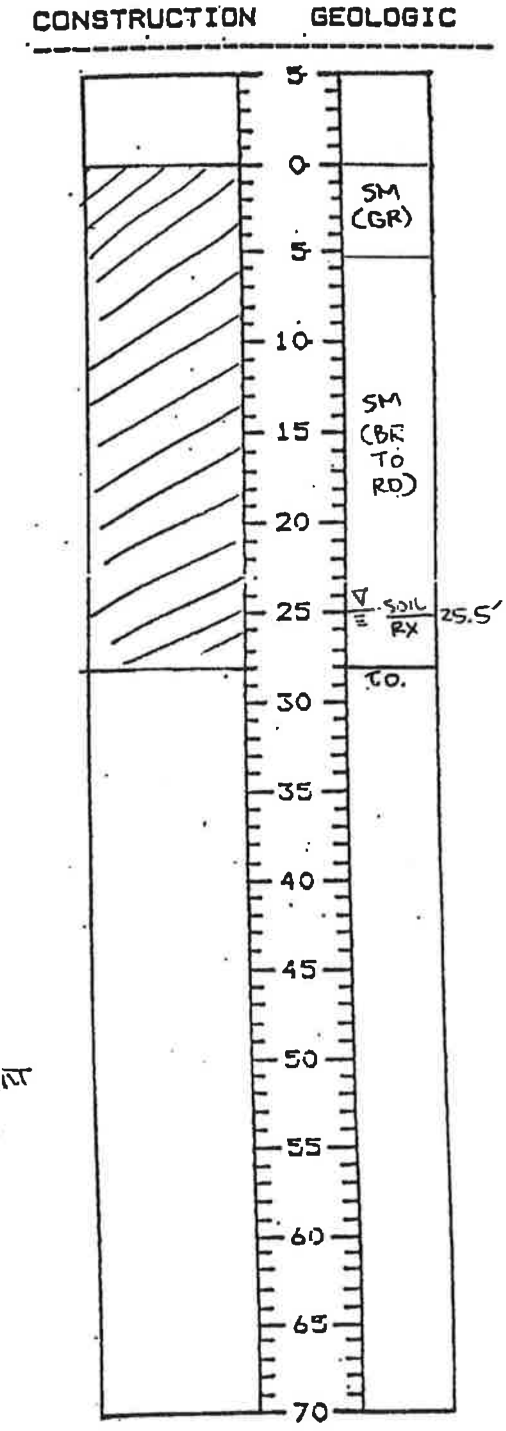
WELLHEAD: NONE INSTALLED.

COMMENTS: WATER AT 25', ROCK AT 25.5'. ABANDON BY GROUTING TO SURFACE

DRILLING PROGRESS

DATE	START	FINISH
11/18/86	7:57	8:24

WELL SKETCH
(DEPTH IN FEET)



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BORING LOG

Project Name: SCHOLL CANYON LANDFILL PUMPING TESTS

Project Number: 87-613-0001 **Field Log of Boring Number:** A 1 ABANDONED **Sheet** 1 **of** 1

Boring Location: SCHOLL CANYON PARK, AREA 1	**Elevation and Datum:**
Drilling Agency: PIONEER DRILLING **Driller:** GUADALUPE	**Date Started:** 11/18/86 **Date Finished:** 11/18/86
Drilling Equipment: MOBILE DRILL B-61	**Completion Depth (feet)** 28 **Rock Depth: (feet)** 25.5
Method of Drilling: HOLLOW STEM AUGER	**Number of Samples:** 5 **Dist.:** 5 **Undist.:** — **Core:** —
Borehole Size: 8"	**Water Depth (ft):** **First:** 25 **Compl.:** — **24 hrs.** —
Type of Perforation Backfill: ABANDONED	**Logged By:** D.H. RANDELL **Checked by:**
Type of Seal: CEMENT/BENTONITE GROUT	

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	4" ASPHALTIC CONCRETE						7:57	
	SILTY SAND, MPS 1½", g10, s75, f15, ANG, SL MOIST, MED. DENSE, GR, HOMOGENEOUS, NO HCL, NO CEMENT, SM.	SM (GR)						2-3' SOME GRAVEL
5	SAME AS ABOVE		220	1	⧄	10 5	8:01	
	SILTY SAND, MPS 2", g5, s85, f10, ANG, SL. MOIST, BR-GR, MED DENSE, HOMOGENEOUS, NO HCL, NO CEMENT, SM							
10	SAME AS ABOVE		220	2	⧄	4 11	8:05	
15	SAME AS ABOVE, MPS 1", RO-BR.	SM (RO)	300	3	⧄	4 10	8:10	
20	SAME AS ABOVE		60	4	⧄	8 18	8:16	
								24' HARD DRILLING
25	SAME AS ABOVE, V. MOIST TO WET.		20	5	⧄	61	8:29	FIRST WATER 25'
	DIORITE, COMPLETELY WEATHERED, LT BR, CLAYEY, SOME ALIGNMENT OF DARK MINERALS.	DIORITE						26' ROUGH DRILLING BUT SMOOTHING OUT
	TOTAL DRILLED DEPTH 28'							
30								

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON

PROJECT NUMBER: 87-613-0001

WELL LOCATION: SCHOLL CANYON PARK, AREA I

LOGGED BY: D.H. RANDELL

DEPTH TO WATER (FEET FTOC): 24.15 12/5/86

DRILLING CO.: PIONEER DRILLING

DRILLER: GUADALUPE

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: SPLITSPOON

SAMPLING INTERVAL (FEET): 5/SOIL CHANGE

TOTAL DEPTH DRILLED (FEET): 31

CASING TYPE: PVC SCHEDULE 40

CASING DIAMETER (INCHES I.D.): 2

SCREEN TYPE: MACHINE SLOT, 4 ROW, 22 COLUMNS/6"

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 30.5 TO 20.5

CASING INTERVAL (FEET): 20.5 TO 0.25

FILTER PACK: LONESTAR #2/12 MONTEREY-TYPE SAND

FILTER INTERVAL (FEET): 31 TO 16

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 16 TO 13

GROUT TYPE: PORTLAND I-II LOW ALKALI CEMENT

PERCENT BENTONITE IN GROUT: 5

GROUT INTERVAL (FEET): 13 TO 2

WELLHEAD: FLUSH-MOUNTED SCREW-LOCK CHRISTY BOX, 1/3" ABOVE GRADE.

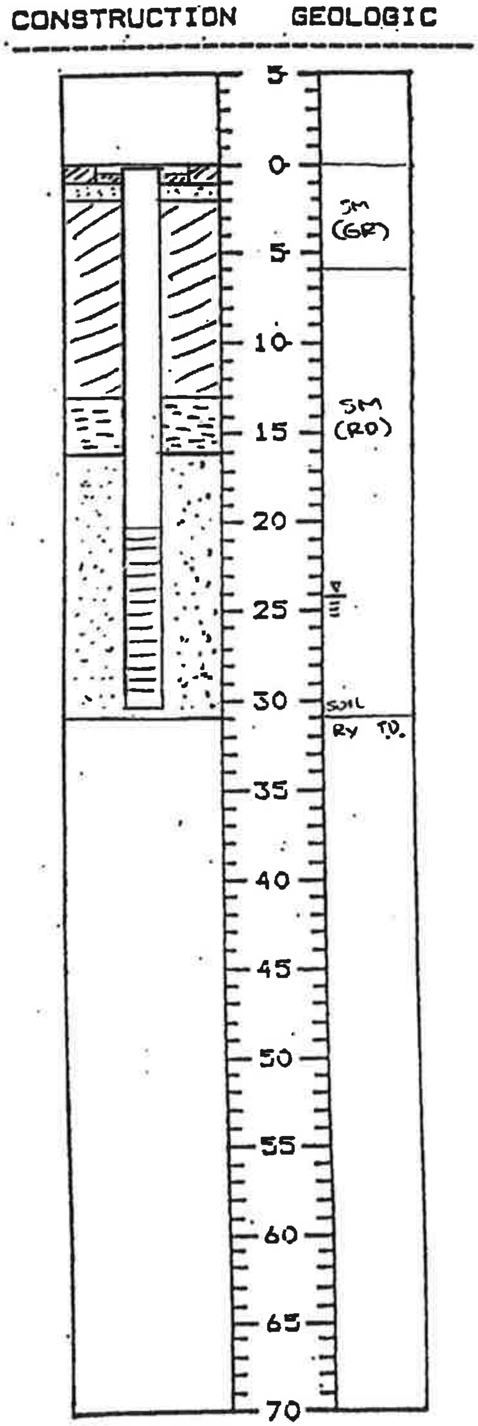
COMMENTS: CHRISTY BOX PLACED ON 1-FOOT BED OF MONTEREY #3 SAND, WITH 2 8-INCH STEEL DRAIN PIPES EMBEDDED IN CONCRETE, PVC SLIPCAP SCREWED TO BOTTOM, PVC TOP SLIP CAP, 8" PILOT HOLE, REAMED TO 31' WITH 10" HSA.

WELL NUMBER: PIA

DRILLING PROGRESS

DATE	START	FINISH
11/10/86	8:30a	10:33

WELL SKETCH
(DEPTH IN FEET)



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BORING LOG

Project Name: SCHOLL CANYON LANDFILL PUMPING TESTS

Project Number: 87-613-0001 **Field Log of Boring Number:** P1A **Sheet** 1 **of** 2

Boring Location: SCHOLL CANYON PARK, AREA 1		**Elevation and Datum:**	
Drilling Agency: PIONEER DRILLING	**Driller:** GUADALUPE	**Date Started:** 11/10/86	**Date Finished:** 11/10/86
Drilling Equipment: MOBILE DRILL B-61		**Completion: Depth (feet)** 31	**Rock Depth: (feet)** 31
Method of Drilling: HOLLOW STEM AUGER		**Number of Samples:** 6 **Dist.:** 6	**Undist.:** — **Core:** —
Borehole Size: 10 INCH		**Water Depth (ft):** 24.15 12/5/86 **First:** 25'	**Compl.:** — **24 hrs.** —
Type of Perforation Backfill: 0.02 INCH SCREEN SLOT SIZE LONESTAR #2/12 FILTER PACK		**Logged By:** D.H. RANDELL	**Checked by:**
Type of Seal: VOLCLAY BENTONITE TABLETS 1/4"			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	4" ASPHALTIC CONCRETE						8:30	OVA PUMP NOT WORKING
	SILTY SAND W/SOME CLAY, GEN'LY W. GRADED, MPS 2", g5, s60, f35, ANG, DK GR, SL. EARTHY ODOR, SL MOIST, LOOSE, HOMOGENEOUS, NO HCL, NO CEMENT, SM.	SM (GR)						
5	SAME AS ABOVE		—	1	⧄	4 10	8:37	M.C.= 7.2 %, 26gM
	SILTY SAND W/SOME CLAY, GEN'LY W. GRADED, MPS 1/2", g10, s50, f40, SUBANG, RD, SL. EARTHY ODOR, SL. MOIST, MED. DENSE, HOMOGENEOUS, NO HCL, NO CEMENT, SM.							
10	SAME AS ABOVE		—	2	⧄	7 18	8:46	M.C.= 6.9 %, 26gM
15	SAME AS ABOVE, MPS 1 1/2", LESS RD,	SM (RD)	—	3	⧄	5 14	8:57	
								18' HARDER DRILLING
20	SAME AS ABOVE, MPS 1", GRAVEL IS HIGHLY WEATHERED, MED. DENSE (SM TO SM-SC).		—	4	⧄ NR	10 24	9:06	
								24' HARDER DRILLING
25	SAME AS ABOVE, MPS 2", V. MOIST, V. DENSE, (SM TO SM-SC).		—	5	⧄	20 72	9:12	M.C. = 8.8 %, 26gM. 25' FIRST WATER
								28'-29' HARDER DRILLING
30	SEE NEXT PAGE							

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BORING LOG

Project name: SCHOLL CANYON LANDFILL PUMPING TESTS

Project Number: 87-613-0001 **Field Log of Boring Number:** PIA **Sheet** 2 **of** 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
		SM (BD)	1	6	N	>40	10:33	DRILL CHATTER, BOUNCING, HARD DRILLING. 3"/40
	TOTAL DEPTH DRILLED 31'	DIORITE						
	DIORITE, COMPLETELY WEATHERED, LT. BR TO BR, OBSERVED AS CLAYEY, GRANULAR MATERIAL NO STRUCTURE OBSERVED.							
35								
40								
45								
50								
55								
60								
65								
70								

Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON

PROJECT NUMBER: 87-613-0001

WELL LOCATION: SCHOLL CANYON PARK, AREA 1

LOGGED BY: D.H. RANDELL

DEPTH TO WATER (FEET FTOC): 23.72 12/5/86

DRILLING CO.: PIONEER DRILLING

DRILLER: GUADALUPE

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: SPLITSPOON

SAMPLING INTERVAL (FEET): 5/SOIL CHANGE

TOTAL DEPTH DRILLED (FEET): 32.5

CASING TYPE: PVC SCHEDULE 40

CASING DIAMETER (INCHES I.D.): 2

SCREEN TYPE: MACHINE SLOT, 4 ROW, 22 COLUMNS/6"

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 30 TO 20

CASING INTERVAL (FEET): 20 TO 0.25

FILTER PACK: LONESTAR #2/12 MONTEREY-TYPE SAND

FILTER INTERVAL (FEET): 31.5 TO 16

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 16 TO 13

GROUT TYPE: PORTLAND I-II LOW ALKALI CEMENT

PERCENT BENTONITE IN GROUT: 5

GROUT INTERVAL (FEET): 13 TO 2

WELLHEAD: FLUSH-MOUNTED SCREW-LOCK CHRISTY BOX, 1/2" ABOVE GRADE.

COMMENTS: CHRISTY BOX PLACED ON 1-FOOT BED OF MONTEREY #3 SAND, WITH 2 8-INCH STEEL DRAIN PIPES EMBEDDED IN CONCRETE, PVC THREADED END CAP, PVC TOP SLIP CAP, 8" PILOT HOLE, REAMED TO 31.5' WITH 10" HSA.

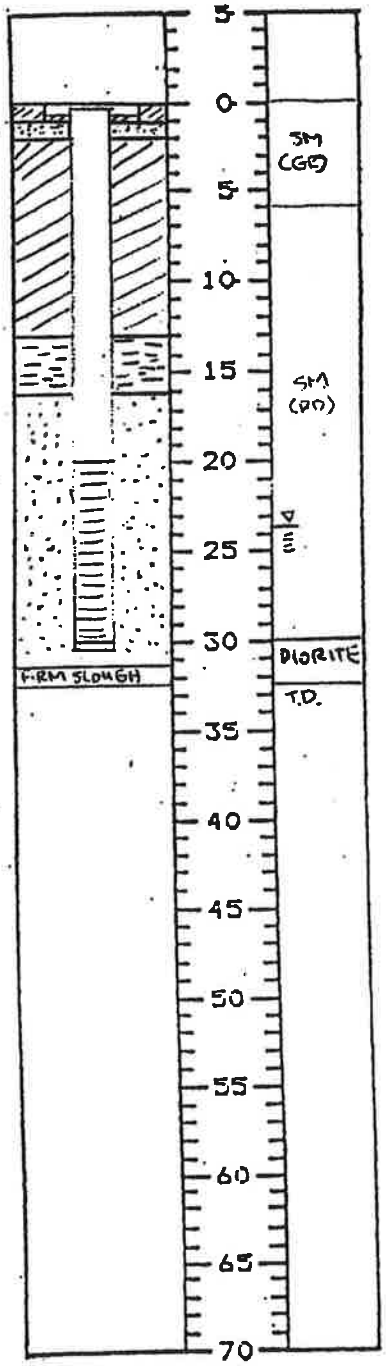
WELL NUMBER: P1B

DRILLING PROGRESS

DATE	START	FINISH
11/11/86	8:30	9:50

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



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BORING LOG

Project Name: SCHOLL CANYON LANDFILL PUMPING TESTS

Project Number: 87-613-0001 **Field Log of Boring Number:** P1B **Sheet** 1 **of** 2

Boring Location: SCHOLL CANYON PARK, AREA 1	**Elevation and Datum:**
Drilling Agency: PIONEER DRILLING **Driller:** GUADALUPE	**Date Started:** 11/11/86 **Date Finished:** 11/11/86
Drilling Equipment: MOBILE DRILL B-61	**Completion: Depth (feet)** 32.5 **Rock Depth: (feet)** 30
Method of Drilling: HOLLOW STEM AUGER	**Number of Samples:** 7 **Dist.:** 7 **Undist.:** — **Core:** —
Borehole Size: 10 INCH	**Water Depth (ft):** 23.72 11/5/86 **First:** 25' **Compl.:** — **24 hrs.** —
Type of Perforation Backfill: 0.02 INCH SCREEN SLOT SIZE LONE STAR #2/12 FILTER PACK	**Logged By:** D.H. RANDELL **Checked by:**
Type of Seal: NOLCLAY BENTONITE TABLETS 1/4".	

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	4" ASPHALTIC CONCRETE						8:30	OVA LOW ON HYDROGEN. READINGS ERRATIC.
	SILTY SAND, GEN'LY W. GRADED, MPS 1/2", 95, 580, 415, SUBANG, DKGR, SL. EARTHY ODOR, SL. MOIST, MED DENSE, HOMOGENEOUS, NO HCL, NO CEMENT, SM.	SM (GR)						
5	SAME AS ABOVE		—	1	⧄	4 12	8:37	M.C.=7.9 %, 26gM
	SILTY SAND, GEN'LY W. GRADED, MPS 2", 95, 580, 415, SUBANG, RO, SL EARTHY ODOR, SL MOIST, MED DENSE, HOMOGENEOUS, NO HCL, NO CEMENT, SM.							
10	SAME AS ABOVE		—	2	⧄	11 5	8:45	
15	SAME AS ABOVE, MED SAND	SM (RD)	—	3	⧄	7 16	8:57	
20	SAME AS ABOVE, DENSE TO V. DENSE, MED. SAND.		—	4	⧄	>36	9:08	HARD DRILLING, 6"/37
	— GRAVEL 21'-23'							
								24' DRILLCHATTER
25	SAME AS ABOVE, WITH GRAVEL, V. MOIST TO WET, DENSE TO V. DENSE		—	5	⧄	>33	9:17	HAMMER BOUNCING, 4"/33 FIRST WATER AT 25'
	— GRAVEL TO 2½" at 26'							M.C.= 8.7.%, 13gm
30	SEE NEXT PAGE							

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BORING LOG

Project name: SCHOLL CANYON LANDFILL PUMPING TESTS

Project Number: 87-613-0001 **Field Log of Boring Number:** P1B **Sheet** 2 **of** 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	DIORITE, LT BR TO BR, V. HIGHLY WEATHERED, OBSERVED AS CLAYEY, GRANULAR MATERIAL, NO APPARENT STRUCTURE.	DIORITE	–	6	⧄	>45	9:40	6"/45
	→ TOTAL DRILLED DEPTH 32.5'		–	7	⧄	>50	9:50	6"/50
	DIORITE, LT. BR. TO GRN, HIGHLY WEATHERED, FRIABLE, FOLIATION W/ 40° DIP, IRON-STAINED BAND 1/2" THICK.							
35	"							
40								
45								
50								
55								
60								
65								
70								

Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON LANDFILL

PROJECT NUMBER: 87-613-0001

WELL LOCATION: SCHOLL CANYON PARK, AREA 1

LOGGED BY: D.H. RANDELL

DEPTH TO WATER (FEET FTOC): 23.94 12/18/86

DRILLING CO.: DATUM EXPLORATION, INC.

DRILLER: DINO

RIG TYPE: MOBILE DRILL B-80

DRILLING METHOD: ROTARY WASH (WATER)

BOREHOLE DIAMETER (INCHES): 10 (9 7/8" BIT)

SAMPLING METHOD: GRAB / SPLITSPOON

SAMPLING INTERVAL (FEET): 10'/BEDROCK

TOTAL DEPTH DRILLED (FEET): 65

CASING TYPE: STAINLESS STEEL, ASTM A312/SA-312TP - 316L, HEAT 5467

CASING DIAMETER (INCHES I.D.): 4

SCREEN TYPE: STAINLESS STEEL AS ABOVE, WIREWOUND

SLOT SIZE (INCHES): 0.02"

SCREENED INTERVAL (FEET): 55.5 TO 45

CASING INTERVAL (FEET): 45 TO 0.25

FILTER PACK: LONESTAR #2/12 MONTEREY TYPE SAND

FILTER INTERVAL (FEET): 58 TO 41.5

BENTONITE SEAL (FORM): VOLCLAY BENTONITE TABLETS 1/4"

BENTONITE INTERVAL (FEET): 41.5 TO 35

GROUT TYPE: PORTLAND I-II LOW ALKALI CEMENT

PERCENT BENTONITE IN GROUT: 5

GROUT INTERVAL (FEET): 35 TO 2

WELLHEAD: FLUSH-MOUNTED, SCREW-LOCK CHRISTY BOX 1/2" ABOVE GRADE, RYER LOCKING CAP

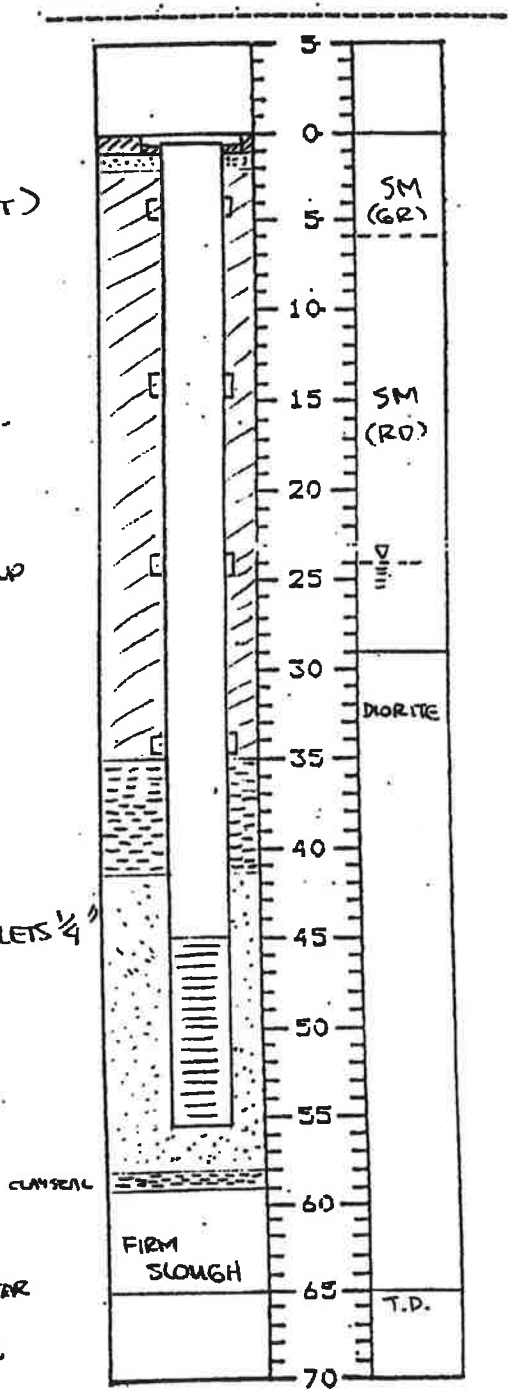
COMMENTS: CHRISTY BOX PLACED ON 1-FOOT BED OF LONESTAR #2/12 SAND, WITH 2 8-INCH STEEL DRAIN PIPES EMBEDDED IN CONCRETE, WELDED BOTTOM PLATE. SCREEN SECTION HAD 2" BLANK AT BOTTOM AND 4" BLANK AT TOP. (TOTAL 10.5'). CENTRALIZERS EVERY 10', STARTING AT 35' (BRAINARD-KILMAN BK T-4C)

WELL NUMBER: B1 (2)

DRILLING PROGRESS

DATE	START	FINISH
12/18/86	12:00 p	4:57 p

WELL SKETCH
(DEPTH IN FEET)



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BORING LOG

Project Name: SCHOLL CANYON LANDFILL PUMPING TESTS

Project Number: 87-613-0001 **Field Log of Boring Number:** B1 (2) **Sheet** 1 **of** 2

Boring Location: SCHOLL CANYON PARK, AREA 1		**Elevation and Datum:**	
Drilling Agency: DATUM EXPLORATION	**Driller:** DINO	**Date Started:** 12/8/86	**Date Finished:** 12/9/86
Drilling Equipment: MOBILE DRILL B-80		**Completion Depth (feet)** 65	**Rock Depth: (feet)** 29
Method of Drilling: ROTARY WASH (WATER)		**Number of Samples:** 2 **Dist.:** 2	**Undist.:** — **Core:** —
Borehole Size: 10"		**Water Depth (ft):** **First:** ~25	**Compl.:** — **24 hrs.** —
Type of Perforation Backfill: LONESTAR #2/12 FILTER PACK 0.02 STAINLESS STEEL 316L WIRE-WOUND		**Logged By:** D. H. RANDELL	**Checked by:**
Type of Seal: VOLCLAY BENTONITE TABLETS 1/4"			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Drilling Rate/Time	Remarks
	4" ASPHALTIC CONCRETE						12:03	START DRILL
	SILTY SAND, GEN'LY W. GRADED, ANG TO SUBANG, DK GR, NO ODOR, DRY TO SL. MOIST, LOOSE TO V. LOOSE, HOMOGENEOUS, NO HCL, NO CEMENT, SM.	SM						
5								
	SILTY SAND, GEN'LY W. GRADED, MPS 2", g5, s80, f15, ANG, LT RD, SL. MOIST, SL. EARTHY ODOR, MED. DENSE, HOMOGENEOUS, NO HCL, NO CEMENT, SM.							
10	SAME AS ABOVE	SM	—	1		5 19	12:22	1ST 8" = SOIL 2ND 10" = SLOUGH
15								
20	WASH CUTTINGS OBSERVED AS MED. SAND (+20), ANG TO SUBANG, SOME IRON-STAINING, LT BR AND WHITE, SOME BLACK GRAINS.	—	—	—	G	—	12:38	MR. PIRDY ON SITE 12:50
							12:55	22' DRILL CHATTER
25							12:58	25' LOST DRILLING WATER TO 13.5' BELOW GRADE. PROB. HIT GROUNDWATER.
								27' ADDING WATER TO MUD TANK. WATER METER READINGS WILL FOLLOW.
								28' 199.15 ft^3 HARD DRILLING
30	DIORITE, LT BR TO BR, HIGHLY WEATHERED, CLAYEY, MASSIVE, SOME IRON-STAINING.	DIORITE	—	2		33 >91	1:16	PHOTOGRAPHS 1 AND 2

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BORING LOG

Project name: SCHOLL CANYON LANDFILL PUMPING TESTS

Project Number: 87-613-0031 **Field Log of Boring Number:** B1 (2) **Sheet** 2 **of** 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	29' SAMPLE CONTINUED TO 30.5'							
35								
							1:39 1:55	39' HARD DRILLING ADDED HEAVIER DRILLCOLLAR
40								
							2:09	43' CONSTANT DRILL CHATTER
45	WASH CUTTINGS OBSERVED AS, MED. SAND (+20), ANG TO SUBANG, SAME AS AT 20'.	–	–	–	G	–	2:09	
							2:22	WATER METER 212.58 ft^3 GOOD CUTTINGS RETURN. MED SAND W/SILT
50							2:43 2:46	50' WATERMETER 215.74 ft^3 PHOTO 3 GEN'L RIG SHOT
							3:02	53' STEADY, HARD DRILLING WATER METER 218.75 ft^3
55							3:15	55' STEADY, HARD DRILLING CONSTANT CHATTER
							3:46	58' WATER METER 221.65 ft^3
60							4:19	60' WATER METER 223.13 ft^3
							4:40	62 WATER METER 229.58 ft^3
							4:57	64' WATER METER 231.42 ft^3
65	TOTAL DEPTH 65'							FINAL WATER METER 233.45 ft3, 5:14 FROM 60' TO 65' REPEATEDLY CIRCULATED TO REMOVE CUTTING. SUSPENDED CUTTING FALL INTO B'HOLE
70								

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ABANDONED

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON LANDFILL

WELL NUMBER: B1

PROJECT NUMBER: 87-613-0001

DRILLING PROGRESS

DATE	START	FINISH
11/20/86		

WELL LOCATION: SCHOLL CANYON PARK, AREA 1

LOGGED BY: D.H. RANDELL

DEPTH TO WATER (FEET FTOC): ~25' FIRST MEASURE

DRILLING CO.: PIONEER DRILLING

DRILLER: ELLIOTT

RIG TYPE: MOBILE DRILL B-80

DRILLING METHOD: AIR ROTARY

BOREHOLE DIAMETER (INCHES): NX CORE BIT

SAMPLING METHOD: NX WIRELINE CORE

SAMPLING INTERVAL (FEET): CONTINUOUS

TOTAL DEPTH DRILLED (FEET): 60'

CASING TYPE: SCHEDULE 40 PVC

CASING DIAMETER (INCHES I.D.): 10

SCREEN TYPE: –

SLOT SIZE (INCHES): –

SCREENED INTERVAL (FEET): – TO –

CASING INTERVAL (FEET): – TO –

FILTER PACK: –

FILTER INTERVAL (FEET): – TO –

BENTONITE SEAL (FORM): –

BENTONITE INTERVAL (FEET): – TO –

GROUT TYPE: PORTLAND I-II LOWALKALI CEMENT

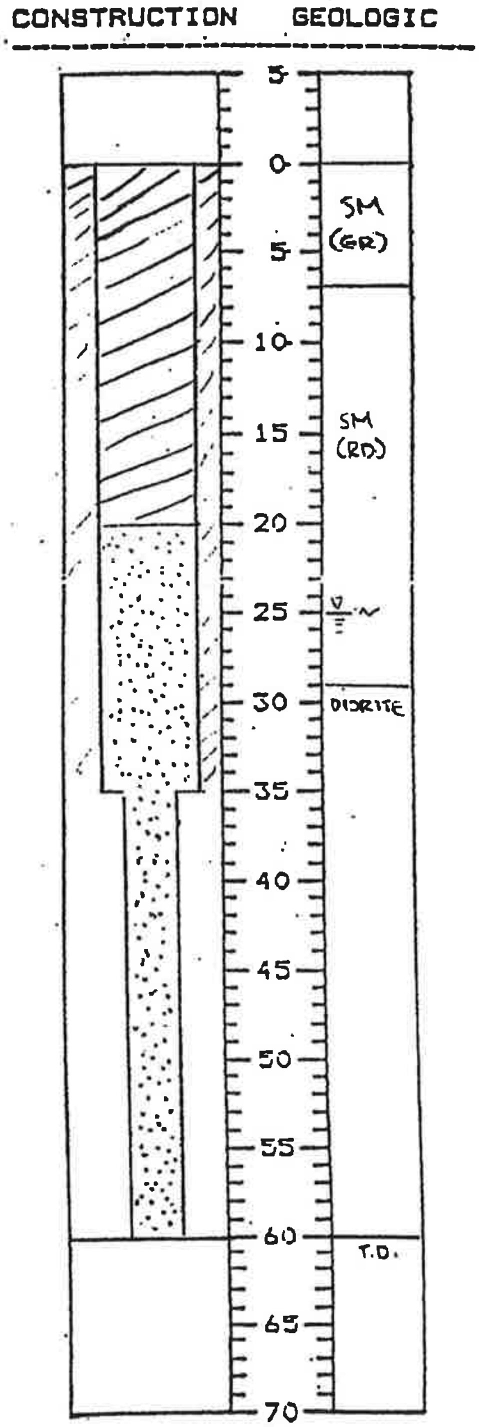
PERCENT BENTONITE IN GROUT: 5

GROUT INTERVAL (FEET): 20 TO 1

WELLHEAD: ABANDONED

COMMENTS:

WELL SKETCH (DEPTH IN FEET)



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ROCK CORE LOG

Client LA CTY SANITATION DISTRICT

Project SCHOLL CANYON LANDFILL

Project No. 87-613-0001

Hole Location SCHOLL CANYON PARK AREA 1

Hole No. B1 (ABANDONED)

Elevation

Hole Angle VERTICAL

Bearing —

Depth 60 FEET

Started 11/20/86

Finished 11/21/86

Core Boxes No. 1 **of** 2

Depth Water Table 25' (FIRST MEASURE)

On (Date) 11/20/86

Logged By D.H. RANDELL

Date 11/20-21/86

Drill Rig/Driller MOBILE DRILL B-80 PIONEER DRILLING ELLIOT VAN DE POPPE

Drilling Methods & Fluid AIR ROTARY

Core Barrel/Bit Data NX WIRELINE 10' NX DIAMOND CORE BIT

Checked by

Date

Page No. 1 **of** 6

Elevation	Depth	Core Loss Log	Total Core Recovery	R. Q. D.	Fracture Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
	0							0-9" ASPHACTIC CONCRETE		9:10 START DRILLING
	1							SILTY SAND, GEN'LY W. GRADED, MPS ½"-2", 9 5, 5 90, f 5, ANG TO SUBANG, DK GR, NO ODOR, DRY TO SL. MOIST, LOOSE TO V. LOOSE, HOMOGENOUS, NO HCL, NO CEMENT, SM		
								SAME AS ABOVE		3'
							SM (GR)			
	5									
								SAME AS ABOVE		9:24/7'
							SM (RD)	SILTY SAND, GEN'LY W. GRADED, ANG TO SUBANG, RD, SL. MOIST, LOOSE, HOMOGENEOUS, NO HCL, NO CEMENT, SM.		
	9									9:27/9'

F-3-1-1A 9/1/86

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ROCK CORE LOG

Client LA CTY SANITATION DISTRICT	**Project** SCHOLL CANYON LANDFILL	**Project No.** 87-613-0001
Hole Location SCHOLL CANYON PARK AREA 1	**Hole No.** B1 (ABANDONED)	**Elevation**
Checked by	**Date**	**Page No.** 2 OF 6

Elevation	Depth	Core Loss Log	Total Core Recovery	R. Q. D.	Fracture Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
	10									
							SM (RD)			
	15							SAME AS ABOVE		9:35/15' BOREHOLE OVA >1000 PPM, BKGRND OVA 40-100 PPM
								SAME AS ABOVE		
										9:42/19'
	20									

F-3-1-18 9/1/86

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ROCK CORE LOG

Client LA CTY SANITATION DISTRICT	**Project** SCHOLL CANYON LANDFILL	**Project No.** 87-613-0001
Hole Location SCHOLL CANYON PARK AREA I	**Hole No.** B1 (ABANDONED)	**Elevation**
Checked by	**Date**	**Page No.** 3 OF 6

Elevation	Depth	Core Loss Log	Total Core Recovery	R. Q. D.	Fracture Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
								SAME AS ABOVE, G TO 3"		9:52/22'
							SM (RD)			
	25							SAME AS ABOVE, WET		10:13/25' FIRSTWATER
										10:30/29'
							ROCK	DIORITE, COMPLETELY WEATHERED, LT BRN, IRON-STAINED, V. CLAYEY		29-34' NO CORING ATTEMPTED, SET CASING TO 34'. CORED TO 60'.
	30									
	31									

ROCK CORE LOG

Client LA CTY SANITATION DISTRICT

Project SCHOLL CANYON LANDFILL

Project No. 87-613-0001

Hole Location SCHOLL CANYON PARK AREA 1

Hole No. B1 (ABANDONED)

Elevation

Checked by

Date

Page No. 4 OF6

Elevation	Depth	Core Loss Log	Total Core Recovery	R. Q. D.	Fracture Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
										BEGIN CORING
	RUN 1 34-39	CL-UN	0	0		NO DATA AVAILABLE FROM SAMPLE	▨	DIORITE 34-39', FELDSPAR, QUARTZ, BIOTITE, FERROMAG MIN'LS, GRN AND WTE, MED. GRAINED, MED. HARDNESS, MOD. WEATHERED		CORE RUN 1 34-39' SAMPLE RECOVERED AS 12" OF GRAVEL AT LEAD END OF SAMPLER. 9:13/39'
	RUN 2 44-49	CL-UN	20%	0						CORE RUN 2 39-44' SAMPLE RECOVERED AS 1.9' OF SHORT CORE AND GRAVEL AT LEAD END OF SAMPLER

40

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ROCK CORE LOG

Client LA CTY SANITATION DISTRICT	**Project** SCHOLL CANYON LANDFILL	**Project No.** 87-613-0001
Hole Location SCHOLL CANYON PARK AREA I	**Hole No.** B1 (ABANDONED)	**Elevation**
Checked by	**Date**	**Page No.** 5 OF 6

Elevation	Depth	Core Loss Log	Total Core Recovery	R. Q. D.	Fracture Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
	RUN 2 39-44	CL-UN /	20%	0		3 JOINT PLANES; 50°, 60°, 90°, SMOOTH TO MED ROUGH, GEN'LY CLEAN, CLOSED, IRON-STAINED ON FACES CORE CRUMBLED ON CONTACT		DIORITE, 39-44', FELDSPAR, QUARTZ, BIOTITE, FERROMAG MINERALS, GRN, BLK, WTE, MED. GRAINED, MOD. HARD. SL. WEATHERED.		PHOTO 4 PHOTO 3 9:35/44'
	RUN 3 44-49	CL-UN	20%	59%		2 JOINT PLANES; 45°, 45°, MED. ROUGH, IRON-STAINED FACES, 1 JOINT FILLED WITH IRON-STAINED SAND AND SILT (~1MM THICK), OTHERWISE GENLY CLOSED, SOME CALCITE-JOINTS, FILLED COMPLETELY (HEALED), SOME WITH V. SMALL VOIDS.		DIORITE, 44-49', FELDSPAR, QUARTZ, BIOTITE, FERROMAG. MIN'LS, BLK, WTE, CALCITE VIENS (WTE), MED. GRAINED, MOD, HARD, SL. WEATHERED.		CORE RUN 3 44-49' SAMPLE RECOVERED AS 1.7' OF CORE AND GRAVEL AT LEAD END OF SAMPLER. PHOTO 6 PHOTO 5 9:55/49'
	RUN 4 49-54	CL-UN	47%	85%		2 JOINT PLANES; 40°, 65°, CLOSED, MED. ROUGH, IRON-STAINED FACES, SOME CALCITE VEINS AND JOINTS, FILLED BUT WITH SOME VOIDS.		DIORITE, 49-53', FELDSPAR, QUARTZ, BIOTITE, FERRO-MAG. MIN'LS, LT BRN, AND BLK AND WTE, MED GRAINED, MOD, HARD, SL. WEATHERED.		CORE RUN 4 49-54' SAMPLE RECOVERED AS 2.65' OF CORE WITH SOME GRAVEL AT LEAD END OF SAMPLER PHOTO 9 PHOTO 8

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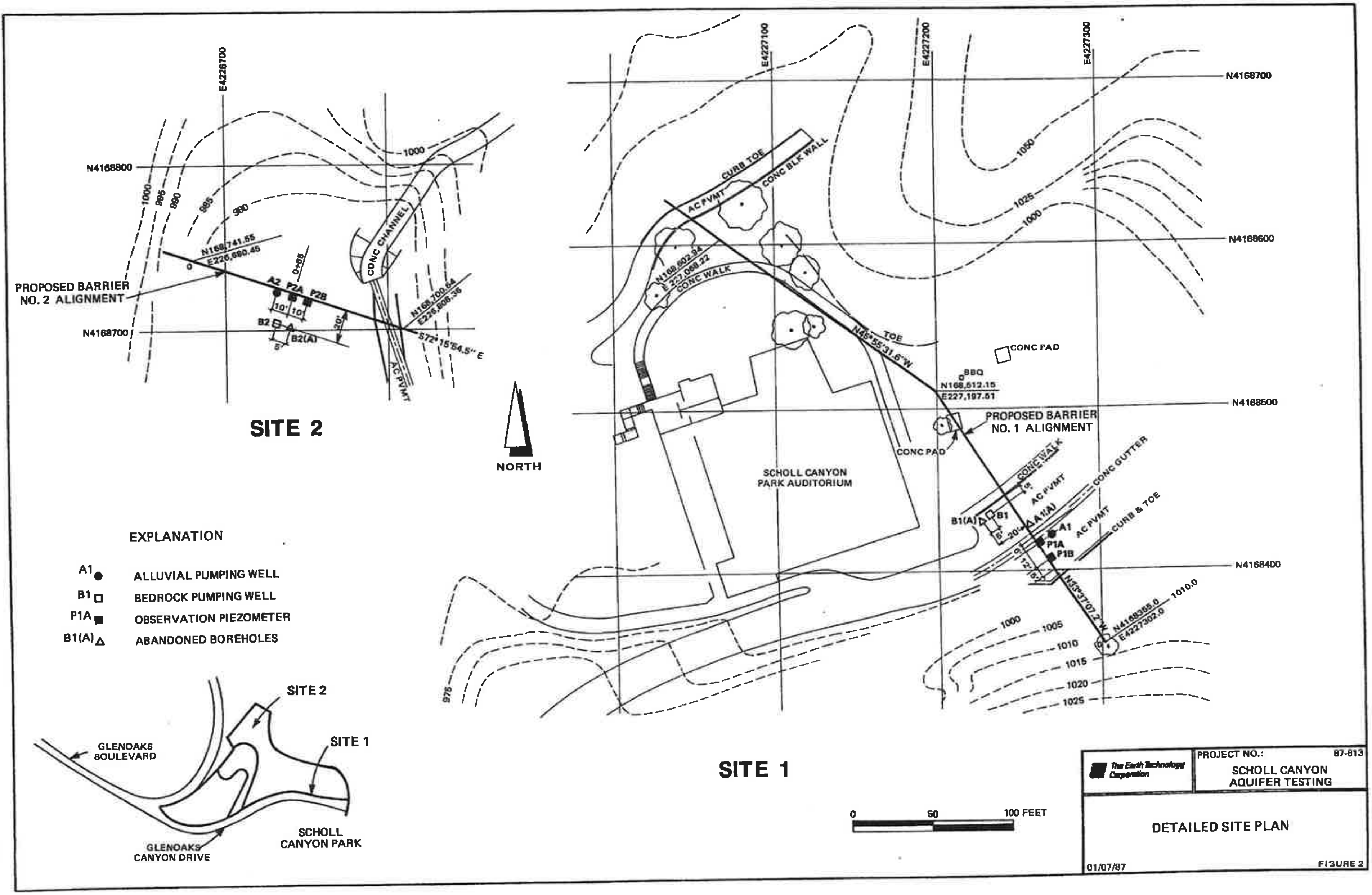
ROCK CORE LOG

Client LA. CTY SANITATION DISTRICT
Project SCHOLL CANYON LANDFILL
Project No. 87-613-0001
Hole Location SCHOLL CANYON PARK AREA 1
Hole No. B1 (ABANDONED)
Elevation
Checked by
Date
Page No. 6 OF 6

Elevation	Depth	Core Loss Log	Total Core Recovery	R. Q. D.	Fracture Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
	RUN 4 49-54	CL-UN	47%	85%		CORE CRUMBLED ON CONTACT	▨		↓	PHOTO 7 10:25/54'
	RUN 5 54-60	CL-UN	0	0		NO DATA AVAILIBLE FROM SAMPLE	▨	DIORITE 54'-60', FELDSPAR, QUARTZ, FERROMAG MIN'L, BIOTITE, BLK ANDIGE, MED GRAINED, MOD. HARD. TO HARD, SL. WEATHERED		CORE RUN 5 54-60' SAMPLE RECOVERED AS 0.7' OF GRAVEL AT LEAD END OF SAMPLER. PHOTO 10 10:45/60'
						TOTAL DEPTH 60'				



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PROJECT NO.: 87-813

SCHOLL CANYON AQUIFER TESTING

DETAILED SITE PLAN

01/07/87

FIGURE 2

THE EARTH TECHNOLOGY CORPORATION
1988

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WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER I,

LOGGED BY: JOHN SKALBECK

DEPTH TO WATER (FEET) PUMPING

DRILLING CO.: DATUM EXPLORATION

DRILLER: RON PAYTON

RIG TYPE: EARTHDRILL 45

DRILLING METHOD: BUCKET AUGER

BOREHOLE DIAMETER (INCHES): 24

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 35.5

WELL COMPLETION DEPTH (FEET): 34.5

CASING TYPE: PVC CLASS 125

CASING DIAMETER (INCHES I.D.): 12

SCREEN TYPE: PVC CLASS 125, MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 19 TO 33.6

CASING INTERVAL (FEET): +2 TO 19

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 14.1 TO 35.0

BENTONITE SEAL (FORM): VOLCLAY TABLETS ¼"

BENTONITE INTERVAL (FEET): 10.3 TO 14.1

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 5 TO 10.3

WELLHEAD:

COMMENTS: *CENTRALIZERS AS INDICATED.

5.7' OF CASING CUT OFF BEFORE 9-4-87

WELL NUMBER: E01A

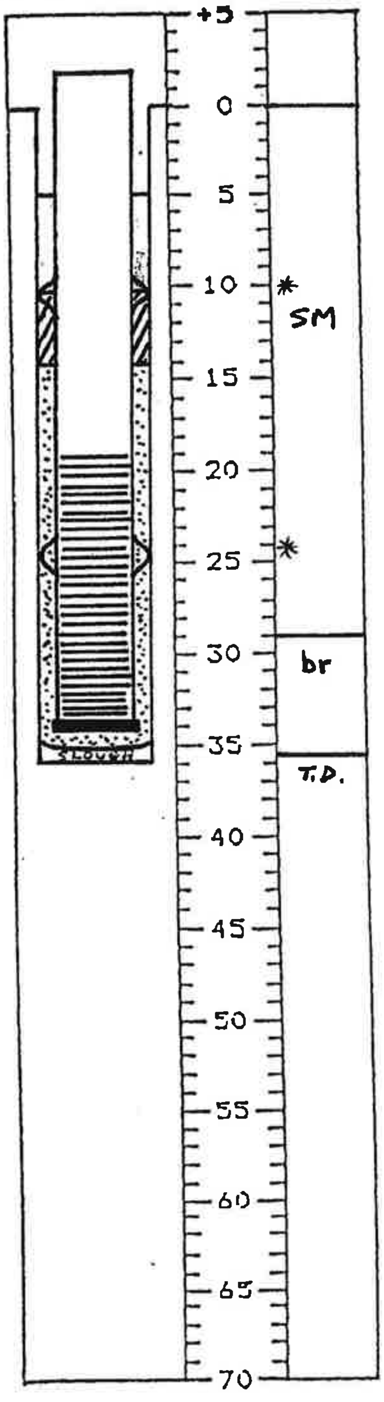
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
6-29-87	1418	6-30-7, 0915 BENTONITE
7-6-87		1530 GROUT

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



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BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: E01A Sheet 1 of 2

Boring Location: BARRIER 1,

Elevation and Datum:

Drilling Agency: DATUM EXPLORATION

Driller: R. PAYTON

Date Started: 6-29-87

Date Finished: 6-29-87

Drilling Equipment: EARTHDRILL 45

Completion Depth (feet): 35.5

Rock Depth: (feet) 29

Method of Drilling: BUCKET AUGER

Number of Samples: — Dist.: — Undist.: — Core: —

Borehole Size: 24-INCH

Water Depth (ft): First: 22 Compl.: 24 hrs.

Type of Perforation Backfill: LONESTAR # 2/12 SAND

Type of Seal: BENTONITE TABLETS 1/4" VOLCLAY GROUT

Logged By: J. SKALBECK

Checked by: G. GUACCI, R.G. 3566

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	SILTY SAND (SM) - BLK, MINOR CLAY						1146	START DRILLING W/ 24" BUCKET
5								
	BLK - BR							
	DK BR, FINE GRAINED, SOME CLAY							
10	LT BR, FINE TO MEDIUM GRAINED						1154 1322	STOPPED DRILLING RESUMED DRILLING
15								
20	BRN GR, SOME GRAVEL TO 2"							
	FINE TO COARSE GRAINED						1351	
25								
	GRAVELLY SAND (SW) OR WEATHERED BEDROCK						1351	
30	SEE NEXT PAGE - BEDROCK							

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BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** E01A **Sheet** 2 **of** 2

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	GRANODIORITE						1357	
								HOLE SLOUGHING
35								
	TOTAL DEPTH DRILLED 35.5'						1418	FINISHED DRILLING
40								
45								
50								
55								
60								
65								
70								

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WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: DEAN BAXLEY

DEPTH TO WATER (FEET) PUMPING

DRILLING CO.: DATUM EXPLORATION

DRILLER: RON PAYTON

RIG TYPE: EARTHDRILL 45

DRILLING METHOD: BUCKET AUGER

BOREHOLE DIAMETER (INCHES): 24

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 34.0

WELL COMPLETION DEPTH (FEET): 23.5

CASING TYPE: PVC CLASS 125

CASING DIAMETER (INCHES I.D.): 12

SCREEN TYPE: PVC CLASS 125, MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 13.2 TO 23.2

CASING INTERVAL (FEET): +2 TO 13.2

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 8.9 TO 23.4

BENTONITE SEAL (FORM): VOLCLAY TABLETS ½" & ¼"

BENTONITE INTERVAL (FEET): 6.3 TO 8.9

GROUT TYPE: NONE

PERCENT BENTONITE IN GROUT: —

GROUT INTERVAL (FEET): — TO —

WELLHEAD:

COMMENTS: DRILLED W/WATER. EXTENSIVE SLOUGHING PRODUCED BOREHOLE BELLING AND CAVERN BENEATH DRILL RIG. BACKFILLED W/ CEMENT-SAND SLURRY. GROUT NOT ADDED – GRADE TO BE LOWERED FOR UTILITY BOX

*CENTRALIZERS AS INDICATED. 5.0' OF CASING CUT OFF BEFORE 9-4-87

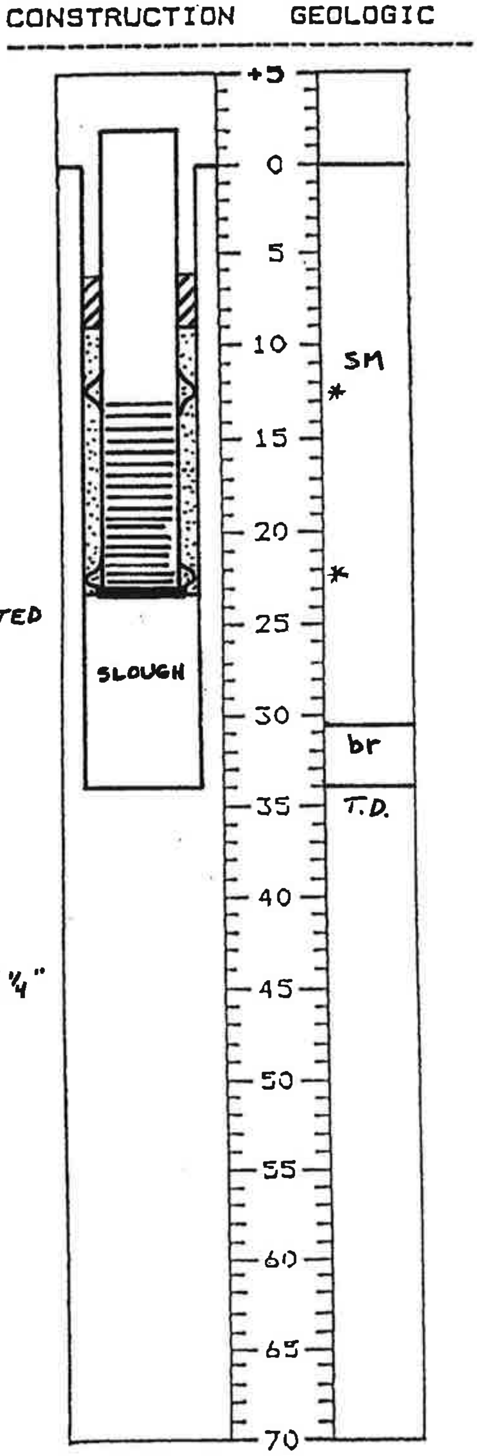
WELL NUMBER: E02A

ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-23-87	0920	
7-29-87		1113

WELL SKETCH
(DEPTH IN FEET)



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BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** E02A **Sheet** 1 **of** 2

Boring Location: BARRIER 1,		**Elevation and Datum:**	
Drilling Agency: DATUM EXPLORATION	**Driller:** R. PAYTON	**Date Started:** 6-30-87	**Date Finished:** 7-23-87
Drilling Equipment: EARTHDRILL 45		**Completion: Depth (feet)** 34.0	**Rock Depth: (feet)** 30.5
Method of Drilling: BUCKET AUGER		**Number of Samples:** — **Dist.:** —	**Undist.:** — **Core:** —
Borehole Size: 24-INCH		**Water Depth (ft):** **First:** 12	**Compl.:** **24 hrs.**
Type of Perforation Backfill: LONESTAR #2/12 SAND		**Logged By:** D. BAXLEY	**Checked by:** G. GUACCI, R.G. 3566
Type of Seal: BENTONITE TABLETS 1/4"			

Depth (feet)	Description	Graphic Log Lithology	Graphic Log OVA (ppm)	Samples Number	Samples Type	Samples Blow Count	Drilling Rate/Time	Remarks
	SILTY SAND (SM) - BR BLK, DK GR, VERY FINE GRAINED						922	START DRILLING W/24" BUCKET
5							0931	
	SOME COBBLES BETWEEN 6-10'							
10	BR, MEDIUM GRAINED						0934	
								HOLE SLOUGHING
15	DK BR							
							0941	STOPPED DRILLING
							1041	RESUMED DRILLING HOLE SLOUGHING, ADD WATER
20	PODS OF GR GN SILTY AND CLAYEY SAND						1045	STOPPED DRILLING
							1313	7-2-87 RESUMED DRILLING
25								
	SOME CLAY						1334	
30								

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BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: E02A Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	BEDROCK - GRANODIORITE OR DIORITE						1400 1415 1215	HARD DRILLING STOPPED, RESUMED 7-6-87, @ 32'. RIG DOWN
	TOTAL DEPTH DRILLED 34.0'						0920	RESUME DRILLING @ 32' 7-23-87, FINISH @ 34' HOLE SLOUGHING
35								
40								
45								
50								
55								
60								
65								
70								

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WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1

LOGGED BY: GARY GUACCI

DEPTH TO WATER (FEET)

DRILLING CO.: DATUM EXPLORATION

DRILLER: GARY GIPSON

RIG TYPE: EZ BORE 160

DRILLING METHOD: BUCKET AUGER

BOREHOLE DIAMETER (INCHES): 26" to 13' 24 to 38.4'

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 38.4

WELL COMPLETION DEPTH (FEET): 37.9

CASING TYPE: PVC CLASS 125

CASING DIAMETER (INCHES I.D.): 12

SCREEN TYPE: PVC CLASS 125, MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 19.2 TO 37.6

CASING INTERVAL (FEET): +1.4 TO 19.2

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL* (FEET): 12.0 TO 37.9

* LIKELY INCLUDES SLOUGH BELOW 20' AS WELL

BENTONITE SEAL (FORM): VOLCLAY TABLETS ½" & ¼"

BENTONITE INTERVAL (FEET): 9.0** TO 12.0

** PORTION OF SEAL AS SHALLOW AS 7.2'

GROUT TYPE: NONE

PERCENT BENTONITE IN GROUT: —

GROUT INTERVAL (FEET): — TO —

WELLHEAD:

COMMENTS: DRILLED W/ VARIFLO. SLOUGHING PRODUCED BOREHOLE BELLING BENEATH GROUND SURFACE. BACKFILLED LATER W/ SPOILS PILE MATERIAL. GROUT NOT ADDED DUE TO SLOUGHING PROBLEMS AND GRADE TO BE LOWERED FOR UTILITY BOX

***CENTRALIZERS AS INDICATED. 5.9' OF CASING CUT OFF BEFORE 9-4-87.

WELL NUMBER: E03A

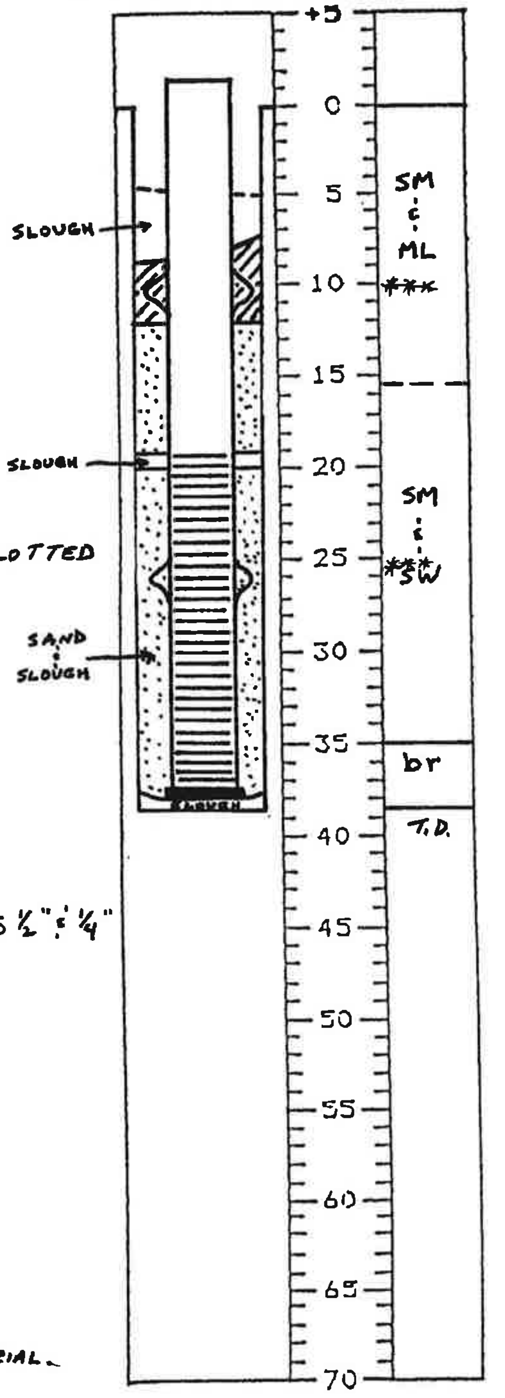
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
8-4-87	1213	1652

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



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BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** E03A **Sheet** 1 **of** 2

Boring Location: BARRIER 1,		**Elevation and Datum:**	
Drilling Agency: DATUM EXPLORATION	**Driller:** G. GIPSON	**Date Started:** 8-3-87	**Date Finished:** 8-4-87
Drilling Equipment: EZ BORE 160		**Completion: Depth (feet)** 38.4	**Rock Depth: (feet)** 35
Method of Drilling: BUCKET AUGER		**Number of Samples:** — **Dist.:** —	**Undist.:** — **Core:** —
Borehole Size: 24-INCH		**Water Depth (ft):** **First:** 4	**Compl.:** 24 hrs.
Type of Perforation Backfill: LONESTAR #2/12 SAND		**Logged By:** G. GUACCI R.G. 3566	**Checked by:** P. Guptill PDG R.G. 3490
Type of Seal: BENTONITE TABLETS ½" ¼"			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Drilling Rate/Time	Remarks
	SILTY SAND (SM) AND SANDY SILT (ML) - BR, DK GR, g 5, S 70-80, f 15-25, MPS 3½"						1055	START DRILLING w/24" BUCKET
5							1102 1219	STOPPED DRILLING BEGAN USING VARI FLO CAVING
	DK GR, INCREASE IN FINES (25-40%)							
10	DECREASE IN FINES						1239 1417	ADDED CASING RESUMED DRILLING TEMPORARY CASING (26") TO 13.0'
15	SILTY SAND (SM) AND GRAVELLY SAND (SW) - GN GR, g 5-10, S 70-80, f 15-20, MPS 7"						1609 0844	STOPPED DRILLING 8-4-87 RESUMED DRILLING
20								HOLE SLOUGHING
	g 10-20%, f 10							
25	g 5, f 15-20						0917	
	Sand coarser grained ROOT FRAGMENTS DK							
30							1001	

The Earth Technology Corporation

BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: E03A Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	SEE PREVIOUS PAGE						1001	CONTINUED SLOUGHING
	SANDY SILT LAYER 31-32'							
35	DIORITE - DK GR to GN GR, MW to HW, M, GNEISSIC						1121	
								SLOUGHING FROM ABOVE
	TOTAL DRILLED DEPTH 38.4'						1213	FINISHED DRILLING
40								
45								
50								
55								
60								
65								
70								

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER I,

LOGGED BY: GARY GUACCI

DEPTH TO WATER (FEET) 37 b.g.s. (8-25-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: GARY GIPSON

RIG TYPE: EZ BORE 160

DRILLING METHOD: BUCKET AUGER

BOREHOLE DIAMETER (INCHES): 24" to 31.7', 22" to 43.0', 18" to 44.9'

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 44.9

WELL COMPLETION DEPTH (FEET): 38.8

CASING TYPE: PVC CLASS 125

CASING DIAMETER (INCHES I.D.): 12

SCREEN TYPE: PVC CLASS 125 MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 19.7 TO 38.0

CASING INTERVAL (FEET): +1.2 TO 19.7

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 14.3 TO ≈40

BENTONITE SEAL (FORM): VOLCLAY TABLETS ½"

BENTONITE INTERVAL (FEET): 11.1* TO 14.3
* PORTION OF SEAL AS SHALLOW AS 10.4'

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL** (FEET): ≥2.3 TO 11.1
** PROBABLY INCLUDES SLOUGH AS WELL

WELLHEAD:

COMMENTS: DRILLED W/VARIFLO. SLOUGHING PRODUCED BOREHOLE BELLING BENEATH GROUND SURFACE. ***CENTRALIZERS AS INDICATED.

5.8' OF CASING CUT OFF BEFORE 9-4-87

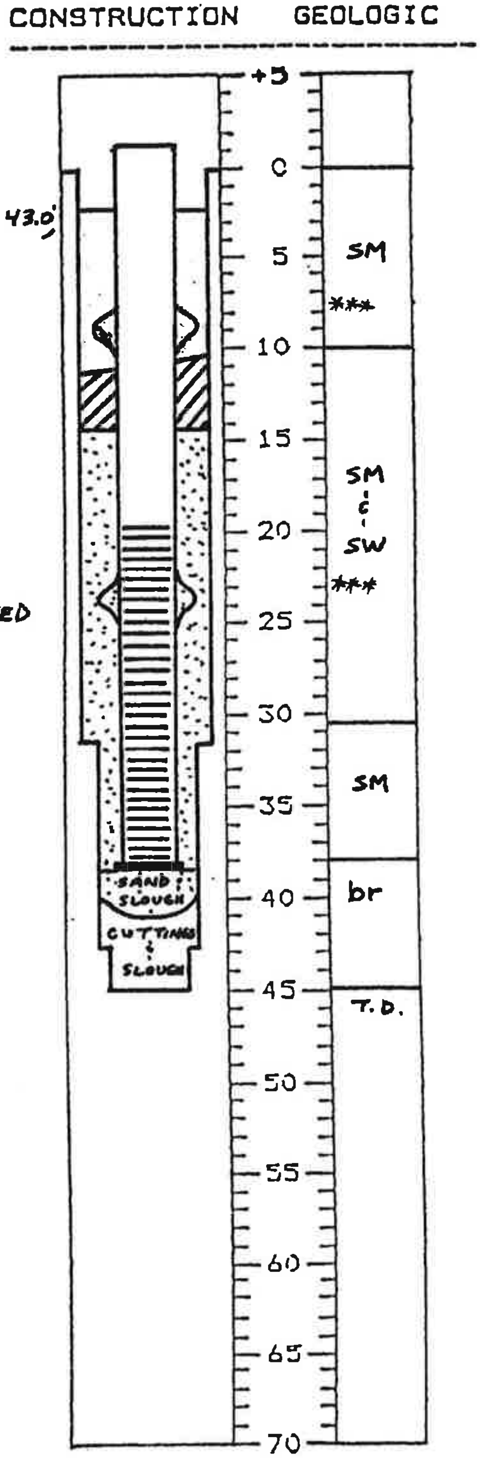
WELL NUMBER: E04A

ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
8-7-87	1137	
8-11-87		0834

WELL SKETCH
(DEPTH IN FEET)



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BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: E04A Sheet 1 of 2

Boring Location: BARRIER 1

Elevation and Datum:

Drilling Agency: DATUM EXPLORATION

Driller: G. GIPSON

Date Started: 8-5-87

Date Finished: 8-7-87

Drilling Equipment: EZ BORE 160

Completion Depth (feet): 44.9

Rock Depth: (feet) 38

Method of Drilling: BUCKET AUGER

Number of Samples: — Dist.: — Undist.: — Core: —

Borehole Size: 24-INCH TO 31FT, 18-INCH TO 44.9FT

Water Depth (ft): First: 3½ ± Compl.: 24 hrs.

Type of Perforation Backfill: LONESTAR #2/12 SAND

Logged By: G. GUACCI R.G. 3566

Checked by: P. Guptill ppg RG. 3490

Type of Seal: BENTONITE TABLETS ½"; VOLCLAY GROUT

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Drilling Rate/Time	Remarks
	SILTY SAND (SM) - LT BRN, RD BR AND GR, g 5-10, s 75-80, f 15						0929	START DRILLING, 24" BUCKET
5								
	BR, g 5, s 85, f 10, MPS 3½"							
	DK GR, DK BR						0945	ADDING CASING
10	SILTY SAND (SM) AND GRAVELLY SAND (SW) - DK GR, BRN GR, AND GR, COARSE GRAINED, g 10-15, s 80, f 5-10, MPS 1"						1005	SLOUGHING ADDED VARI FLO BEGIN DRILLING w/ VARI FLO
	4" COBBLE							
15								
	g 5, s 75-85, f 10-15						1055 1124	HOLE CONTINUES TO SLOUGH
20	COBBLES TO 3½"						1130	
25								
	g 15-25, s 65-80, f 5-10, MPS 3"						1206	HOLE SLOUGHING
	g 5, s 70, f 25						1237 1310	STOPPED DRILLING 8-6-87 RESUMED DRILLING AFTER DRIVING CASING
30	g 2, s 97, f 1							

The Earth Technology Corporation

BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: E04A Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	SEE PREVIOUS PAGE							
	SILTY SAND (SM) - DK GR, MEDIUM GRAINED, g 5, s 75, f 20, MPS 1"						1557 0802	STOPPED DRILLING 8-7-87 RESUMED DRILLING W/ 18" BUCKET. TEMPORARY CASING TO 31.7'
35								
	6" COBBLE						1013	
	DIORITE - DK GR to GRN GR, HW to MW, M, GNEISSIC							DRILLING SLOWER, HARDER
40								
45	TOTAL DEPTH DRILLED 44.9' HOLE REAMED (22") TO 43.0'						1137	FINISHED DRILLING
50								
55								
60								
65								
70								

The Earth Technology Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: GARY GUACCI

DEPTH TO WATER (FEET):

DRILLING CO.: DATUM EXPLORATION

DRILLER: GARY GIPSON

RIG TYPE: EZ BORE 160

DRILLING METHOD: BUCKET AUGER

BOREHOLE DIAMETER (INCHES): 26" to 11.1', 21" to 38.2', 18" to 39.1'

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 39.1

WELL COMPLETION DEPTH (FEET): 34.3

CASING TYPE: PVC CLASS 125

CASING DIAMETER (INCHES I.D.): 12

SCREEN TYPE: PVC CLASS 125, MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 18.8 TO 33.0

CASING INTERVAL (FEET): +2.2 TO 18.B

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 14.0 TO 38.2

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 10.8 TO 14.0

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL* (FEET): ≥ 6.0 TO 10.B

* PROBABLY ALSO INCLUDES SLOUGH

WELLHEAD:

COMMENTS: DRILLED W/WATER. UPPER 6-10 FT. OF MATERIAL MAY BE BACKFILL OF E05A(1) - WHICH WAS ABANDONED - ABOUT 5 FT SOUTHEAST OF E05A(2). **CENTRALIZERS AS INDICATED.

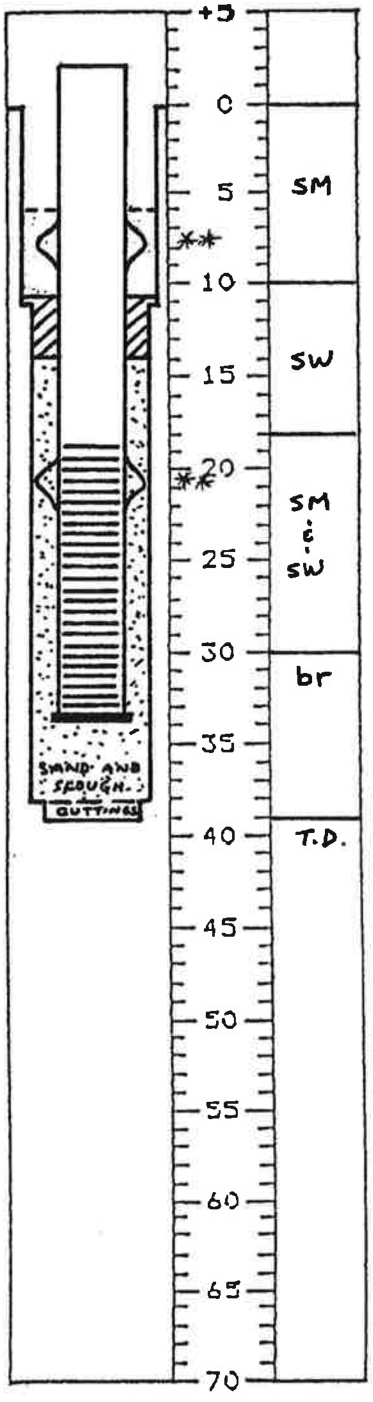
WELL NUMBER: E05A(2)

ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
9-9-87	0821	1702

WELL SKETCH
(DEPTH IN FEET)



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: E05A(2) Sheet 1 of 2

Boring Location: BARRIER 1,		Elevation and Datum:	
Drilling Agency: DATUM EXPLORATION	Driller: G. GIPSON	Date Started: 9-4-87	Date Finished: 9-8-87
Drilling Equipment: EZ BORE 160		Completion: Depth (feet) 39.1	Rock Depth: (feet) 30
Method of Drilling: BUCKET AUGER		Number of Samples: — Dist.: —	Undist.: — Core: —
Borehole Size: 24-INCH TO 13 FT., 18" TO 39.1 FT.		Water Depth (ft): First: 7½	Compl.: 24 hrs.
Type of Perforation Backfill: LONESTAR #2/12 SAND		Logged By: G. GUACCI R.G. 3566	Checked by: P. Guptill RG 3490
Type of Seal: BENTONITE TABLETS ¼", VOLCLAY GROUT			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Drilling Rate/Time	Remarks
	SILTY SAND (SM) - DK GR BR fine grained, g 5-10, s 75-85, f 10-15						0746	START DRILLING W/ 24" BUCKET
5								
	MPS 2"						0755 0935	SLOUGHING. BEGIN DRIVING CASING AND DRILLING.
10								TEMPORARY CASING (26") TO 11.1'
	SAND (SW) - GR BR, coarse grained, g 5, s 90-95, f 0-5, locally silty							SLOUGHING
							0953 1049	ADD MORE CASING (22")
15							1100 1359	ADD MORE CASING
	COBBLES TO 3"							
	SILTY SAND (SM) - GR, coarse grained, g 5, s 70-85, f 10-25, with layers of SAND (SW) and GRAVELLY SAND (SW)							
20								CONTINUED SLOUGHING
							1420 0836	STOPPED DRILLING 9-8-87 RESUMED DRILLING AND DRIVING CASING
25								
	COBBLES TO 4½"							
							1029	
30								

The Earth Technology Corporation

BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: E05A(2) Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	DIORITE - DK GR to DK GN GR, CW to HW, S, gneissic						1043	Add more casing
							1150	Stopped drilling
							1352	Resumed drilling
35								TEMPORARY CASING TO 30.6'
40	TOTAL DEPTH DRILLED 39.1'						1455	Finished drilling
	HOLE REAMED (21") TO 38.2'							
45								
50								
55								
60								
65								
70								

The Earth Technology Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER I,

LOGGED BY: DEAN BAXLEY

DEPTH TO WATER (FEET) Pumping

DRILLING CO.: DATUM EXPLORATION

DRILLER: RON PAYTON

RIG TYPE: EARTHDRILL 45

DRILLING METHOD: BUCKET AUGER

BOREHOLE DIAMETER (INCHES): 24

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 31.2

WELL COMPLETION DEPTH (FEET): 29.7

CASING TYPE: PVC CLASS 125

CASING DIAMETER (INCHES I.D.): 12

SCREEN TYPE: PVC CLASS 125 MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 14.6 TO 28.9

CASING INTERVAL (FEET): +1 TO 14.6

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 10.0 TO 31.2

BENTONITE SEAL (FORM): VOLCLAY TABLETS ½"

BENTONITE INTERVAL (FEET): 7 TO 10.0

GROUT TYPE: NONE

PERCENT BENTONITE IN GROUT: —

GROUT INTERVAL (FEET): — TO —

WELLHEAD:

COMMENTS: GROUT NOT ADDED - GRADE TO BE LOWERED FOR UTILITY BOX.
*CENTRALIZERS AS INDICATED. 4.9' OF CASING
CUT OFF 8-21-87

WELL NUMBER: E06A

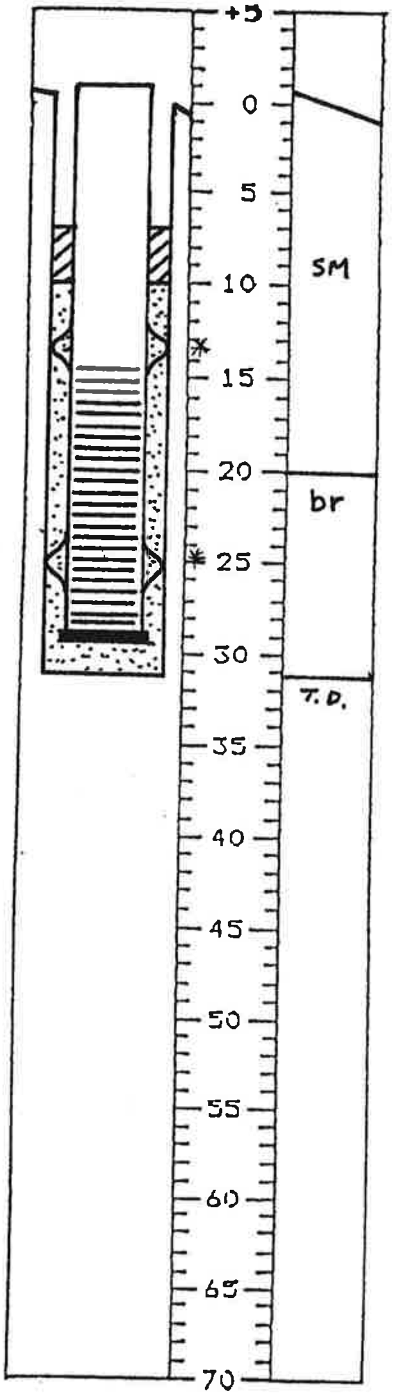
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-24-87	1335	1615

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: E06A Sheet 1 of 1

Boring Location: BARRIER 1,	Elevation and Datum:
Drilling Agency: DATUM EXPLORATION	Driller: R. PAYTON
Date Started: 7-24-87	Date Finished: 7-24-87
Drilling Equipment: EARTHDRILL 45	
Completion: Depth (feet) 31.2	Rock Depth: (feet) 20
Method of Drilling: BUCKET AUGER	
Number of Samples: —	Dist.: —
Undist.: —	Core: —
Borehole Size: 24-INCH	
Water Depth (ft): First: 18	Compl.: 24 hrs.
Type of Perforation Backfill: LONESTAR # 2/12 SAND	
Logged By: D. BAXLEY	Checked by: G. GUACCI, R.G. 3566
Type of Seal: BENTONITE TABLETS ½"	

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	SILTY SAND (SM) - BR, g5, s75 f20, MPS ½"						0715	START DRILLING w/24" BUCKET
5	MPS 2"						0850	EASY DRILLING
10							0858	
15	HIGHLY MICACEOUS						0945	
20	GRANODIORITE - LT BR, HW						0950	DRILLING HARDER
								VERY HARD DRILLING
25							1240	
30	TOTAL DRILLED DEPTH 31.2'						1335	FINISHED DRILLING

The Earth Technology Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 2,

LOGGED BY: GARY GUACCI

DEPTH TO WATER (FEET) Pumping

DRILLING CO.: DATUM EXPLORATION

DRILLER: GARY GIPSON

RIG TYPE: EZ BORE 160

DRILLING METHOD: BUCKET AUGER

BOREHOLE DIAMETER (INCHES): 26" to 22', 22" to 38.2', 18" to 38.9'

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 38.9

WELL COMPLETION DEPTH (FEET): 36.6

CASING TYPE: PVC CLASS 125

CASING DIAMETER (INCHES I.D.): 12

SCREEN TYPE: PVC CLASS 125, MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 20.6 TO 35.6

CASING INTERVAL (FEET): +1.6 TO 20.6

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 15 TO 37

BENTONITE SEAL (FORM): VOLCLAY TABLETS ¼" & ½"

BENTONITE INTERVAL* (FEET): ≈ 12 TO 15½
* MAY HAVE MINOR SLOUGH

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

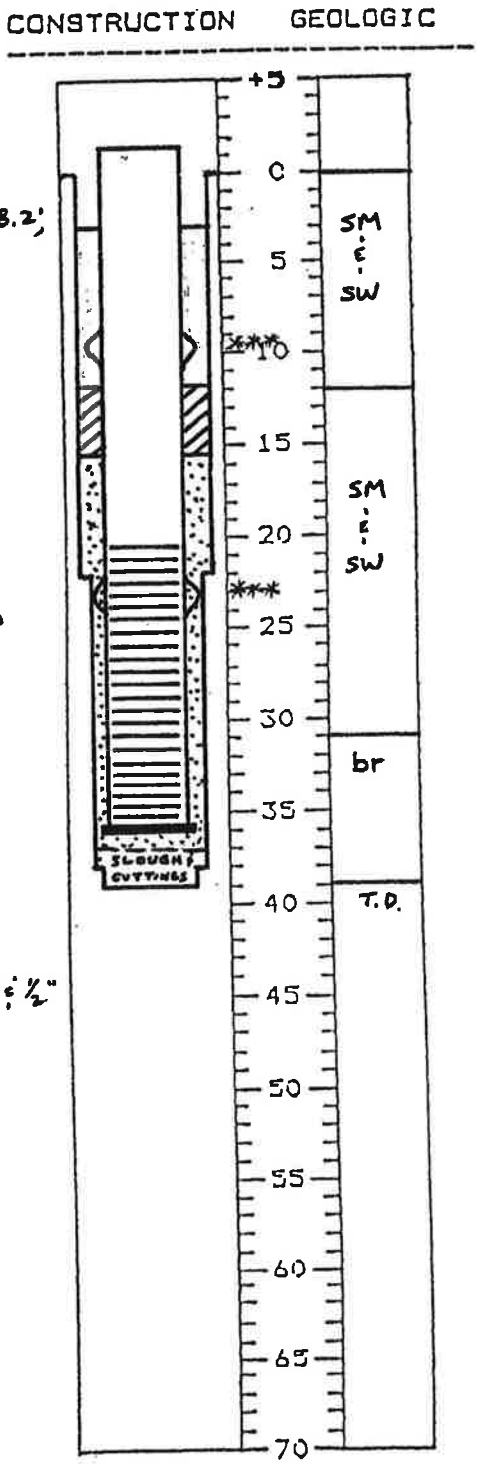
GROUT INTERVAL ** (FEET): 3.2 TO ≈ 12
** PROBABLY ALSO INCLUDES SLOUGH

WELLHEAD:

COMMENTS: SLOUGHING PRODUCED BOREHOLE BELLING BENEATH GROUND SURFACE
*** CENTRALIZERS AS INDICATED.

WELL NUMBER:	E07A	
ELEVATION:		
CONSTRUCTION PROGRESS		
DATE	START	FINISH
8-25-87	0946	1907

WELL SKETCH
(DEPTH IN FEET)



The Earth Technology Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: AKLILE GESSESSE

DEPTH TO WATER (FEET) 29.1 b.g.s. (9-24-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: JAMES KILBURN

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 30.0

WELL COMPLETION DEPTH (FEET): 30.0

CASING TYPE: STAINLESS STEEL, SCH 5, TYPE 316L

CASING DIAMETER (INCHES I.D.): 4

SCREEN TYPE: STAINLESS STEEL, TYPE 316L, WIRE-WOUND

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 19.7 TO 29.5

CASING INTERVAL (FEET): +0.5 TO 19.7

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 13.2 TO 30.0

BENTONITE SEAL (FORM): 0.5' BENSEAL, GRANULAR 2.6' VOLCLAY BENTONITE SLURRY

BENTONITE INTERVAL (FEET): 10.1 TO 13.2

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): ≥0.4 TO 10.1

WELLHEAD:

COMMENTS:

WELL NUMBER: MO1A

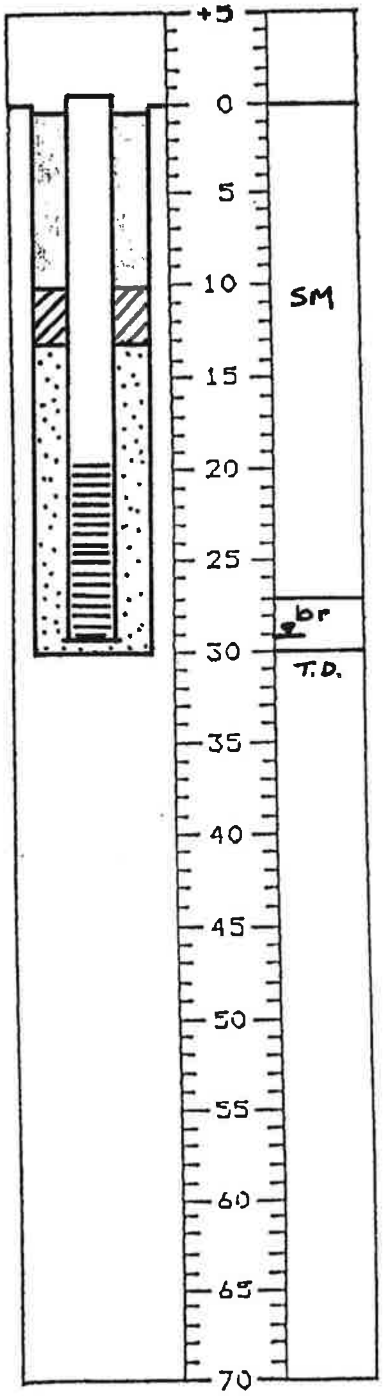
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-22-87	1250	1545

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: MOIA Sheet 1 of 1

Boring Location: BARRIER 1,
Elevation and Datum:
Drilling Agency: DATUM EXPLORATION
Driller: J. KILBURN
Date Started: 7-22-87
Date Finished: 7-22-87
Drilling Equipment: MOBILE DRILL B-61
Completion: Depth (feet): 30
Rock Depth: (feet) 27
Method of Drilling: HOLLOW STEM AUGER
Number of Samples: — Dist.: — Undist.: — Core: —
Borehole Size: 10-INCH
Water Depth (ft): First: 22 Compl.: 24 hrs.
Type of Perforation Backfill: LONESTAR #2/12 SAND
Type of Seal: GRANULAR BENTONITE, BENTONITE SLURRY AND VOLCLAY GROUT
Logged By: A. GESSESSE
Checked by: G. GUACCI, R.G. 3566

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
0							1125	START DRILLING
	SILTY SAND (SM) - DK GR, g 10 S 60 f 30, MPS ½"							
5							1230	SLOW DRILLING
10							1235	EASY DRILLING
	Some cobbles							
15	MPS 1"						1239	
20	LT GR						1241	
25								
	GRANODIORITE - LT BR						1245	HARD DRILLING
30	TOTAL DEPTH DRILLED 30'						1250	FINISHED DRILLING

Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: GARY GUACCI

DEPTH TO WATER (FEET) 28.5 b.g.s. (8-19-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: GORDON EDWARDS

RIG TYPE: SPEEDSTAR SS-200

DRILLING METHOD: ROTARY WASH, WATER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 77

WELL COMPLETION DEPTH (FEET): 69.5

CASING TYPE: STAINLESS STEEL, SCH 5, TYPE 316L

CASING DIAMETER (INCHES I.D.): 4

SCREEN TYPE: STAINLESS STEEL TYPE 316L WIRE-WOUND

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 49.5 TO 69.0

CASING INTERVAL (FEET): 0 TO 49.5

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 46.7 TO 71.2

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 42.5 TO 46.7

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 3.4 TO 42.5

WELLHEAD:

COMMENTS: *CENTRALIZERS AS INDICATED.

WELL NUMBER: M02B

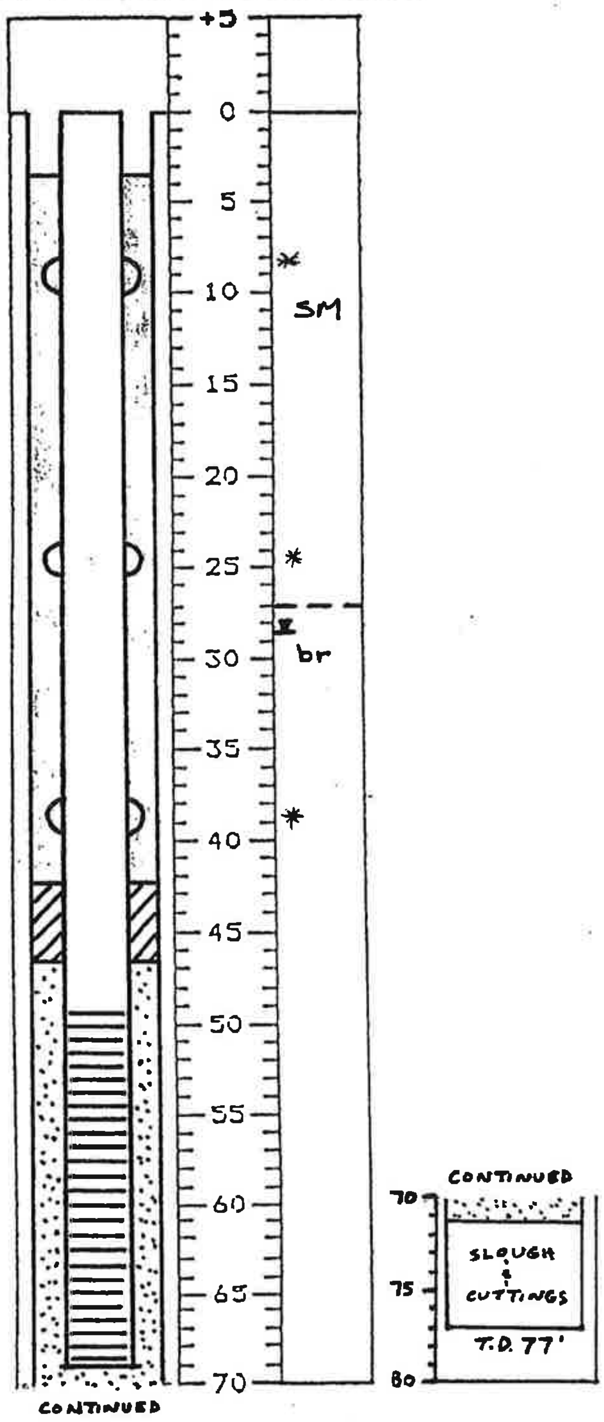
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-27-87	1111	1508

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** MD2B **Sheet** 1 **of** 3

Boring Location: BARRIER 1,

Elevation and Datum:

Drilling Agency: DATUM EXPLORATION **Driller:** G. EDWARDS

Date Started: 7-24-87 **Date Finished:** 7-27-87

Drilling Equipment: SPEEDSTAR SS-200

Completion Depth (feet) 77 **Rock Depth: (feet)** 27

Method of Drilling: ROTARY WASH

Number of Samples: — **Dist.:** — **Undist.:** — **Core:** —

Borehole Size: 10-INCH

Water Depth (ft): **First:** **Compl.:** **24 hrs.**

Type of Perforation Backfill: LONESTAR # 2/12 SAND

Type of Seal: BENTONITE TABLETS 1/4", VOLCLAY GROUT

Logged By: G. GUACCI R.G. 3566

Checked by: P. Guptill PG. R.G. 3490

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	SILTY SAND (SM) - BRN, gravelly, wood fragments						1509	START DRILLING W/ BUTTON TRICONE BIT
								LOUD CHATTER
5	Brick fragments						1510	
	BR GR to GR BR							INTERMITTENT CHATTER
	Gravel increases							CHATTER
10							1512	
15							1514	
	Cobbles 19-21'							LOUD CHATTER
20							1517	
							1518	STOPPED DRILLING
							0904	7-27-87 RESUMED DRILLING
25							0905	
	DIORITE - LT GR, DK GR and O BR, HW to MW							CHATTER, DRILLING SLOWED, HARDER, PULLDOWN APPLIED
30							0905	

The Earth Technology Corporation

BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: M02B Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	DIORITE, SEE PREVIOUS PAGE						0905	
35							0906	
40							0908 0922	Circulated, added drill rod
45							0923	
50							0926	
	SW							
55							0928	
	SW to UW							
60							0931 1103	LOST ABOUT 100-150 GALLONS FROM TANK. CIRCULATED, ADDED DRILL ROD
65							1104	
70							1106	

The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: M02B Sheet 3 of 3

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	DIORITE, SEE PREVIOUS PAGE						1106	
	GRANODIORITE - LT GR to DK GR, SW							CHATTER, HARDER DRILLING
75							1108	
	TOTAL DRILLED DEPTH 77'						1111	FINISHED DRILLING. LOST 75-100 GALS.
80								
85								
90								
95								
100								
105								
110								

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: DEAN BAXLEY

DEPTH TO WATER (FEET) DRY (9-15-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: JAMES KILBURN

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 21.0

WELL COMPLETION DEPTH (FEET): 20.9

CASING TYPE: STAINLESS STEEL, SCH 5, TYPE 316L

CASING DIAMETER (INCHES I.D.): 4

SCREEN TYPE: STAINLESS STEEL, TYPE 316L, WIRE-WOUND

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 15.6 TO 20.4

CASING INTERVAL (FEET): 0.4 TO 15.6

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 10.1 TO 21.0

BENTONITE SEAL (FORM): 0.5' VOLCLAY TABLETS 2.8' VOLCLAY BENTONITE SLURRY

BENTONITE INTERVAL (FEET): 6.8 TO 10.1

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 2 TO 6.8

WELLHEAD:

COMMENTS:

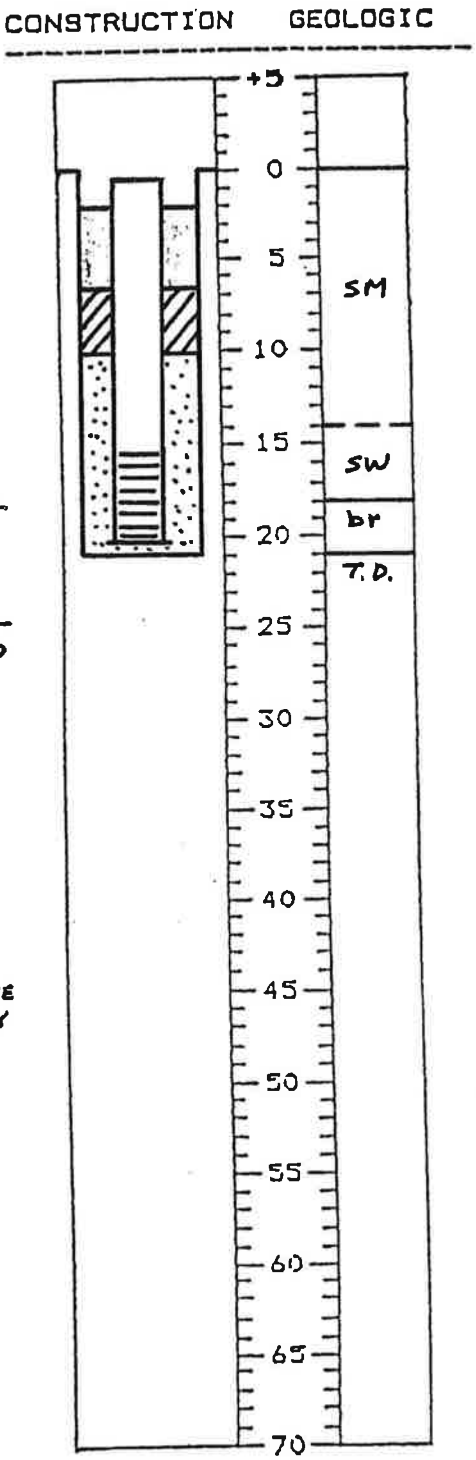
WELL NUMBER: M03A

ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-6-87	1235	
7-7-87		1501

WELL SKETCH
(DEPTH IN FEET)



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** M03A **Sheet** 1 **of** 1

Boring Location: BARRIER 1,

Elevation and Datum:

Drilling Agency: DATUM EXPLORATION **Driller:** J. KILBURN

Date Started: 7-6-87 **Date Finished:** 7-6-87

Drilling Equipment: MOBILE DRILL B-61

Completion: Depth (feet) 21 **Rock Depth: (feet)** 18

Method of Drilling: HOLLOW STEM AUGER

Number of Samples: — **Dist.:** — **Undist.:** — **Core:** —

Borehole Size: 10-INCH

Water Depth (ft): **First:** Dry **Compl.:** **24 hrs.**

Type of Perforation Backfill: LONESTAR #2/12 SAND

Type of Seal: BENTONITE TABLETS 1/4" BENTONITE SLURRY, VOLCLAY GROUT

Logged By: D. BAXLEY

Checked by: G. GUACCI, R.G. 3566

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Drilling Rate/Time	Remarks
	SILTY SAND (SM) - LT BR, g5, s60, f35, MPS 1/4"						1215	START DRILLING
	BR							RIG CHATTER
5							1220	CHATTER
	MPS 2"							
10							1223	
	- - - - - - - - - - - -							
15	GRAVELLY SAND (SW) - BR, g25, s60, f15, MPS 1½"						1228	
	LT BR							
	BEDROCK - NO RETURN							HARD DRILLING
20							1235	FINISHED DRILLING
	TOTAL DEPTH DRILLED 21'							
25								
30								

The Earth Technology Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: DEAN BAXLEY

DEPTH TO WATER (FEET) 28.9 b.g.s. (8-21-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: JAMES KILBURN

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 44.1

WELL COMPLETION DEPTH (FEET): 43.9

CASING TYPE: STAINLESS STEEL, SCH 5, TYPE 316L

CASING DIAMETER (INCHES I.D.): 4

SCREEN TYPE: STAINLESS STEEL, TYPE 316L, WIRE-WOUND

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 28.8 TO 43.4

CASING INTERVAL (FEET): +1 TO 28.8

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 21.5 TO 44.1

BENTONITE SEAL (FORM): 0.5' BENSEAL, GRANULAR 2.5' VOLCLAY BENTONITE SLURRY

BENTONITE INTERVAL (FEET): 18.5 TO 21.5

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 0 TO 18.5

WELLHEAD:

COMMENTS:

WELL NUMBER: MOSA

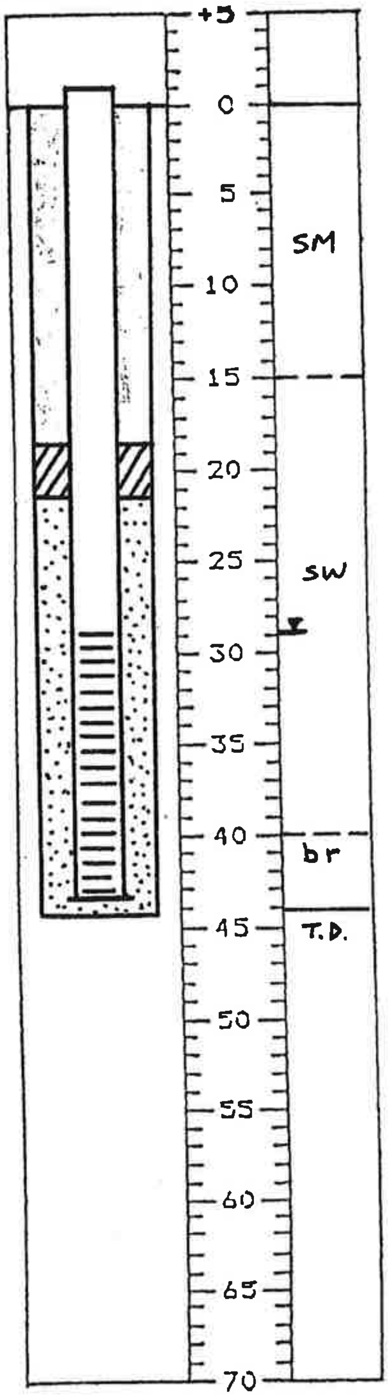
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-9-87	1140	1530

WELL SKETCH (DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** M05A **Sheet** 1 **of** 2

Boring Location: BARRIER 1,		**Elevation and Datum:**	
Drilling Agency: DATUM EXPLORATION	**Driller:** J. KILBURN	**Date Started:** 7-9-87	**Date Finished:** 7-9-87
Drilling Equipment: MOBILE DRILL B-61		**Completion: Depth (feet)** 44.1	**Rock Depth: (feet)** 40
Method of Drilling: HOLLOW STEM AUGER		**Number of Samples:** — **Dist.:** —	**Undist.:** — **Core:** —
Borehole Size: 10-INCH		**Water Depth (ft):** **First:** 31	**Compl.:** **24 hrs.**
Type of Perforation Backfill: LONESTAR #2/12 SAND		**Logged By:** D. BAXLEY	**Checked by:** G. GUACCI, R.G. 3566
Type of Seal: GRANULAR BENTONITE, BENTONITE SLURRY, VOLCLAY GROUT			

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
0	SILTY SAND (SM) - LT BR, g 5, s 80, f 15, MPS 1/4" GR						1042	START DRILLING
5							1045	
10							1050	
	DK GR							
15	SAND (SW) - DK GR, g 5, s 90, f 5, MPS 1/4"						1055	EASY DRILLING
20							1058	
	Cobbles							HARD DRILLING
25							1102	
30							1107	

The Earth Technology Corporation

BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: MOSA Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
							1107	
	Cobbles ≈32-35'							HARDER DRILLING
35							1115	
								EASIER DRILLING
40	BEDROCK - NO RETURN						1125	HARD DRILLING
							1140	FINISHED DRILLING
45	TOTAL DEPTH DRILLED 44.1'							
50								
55								
60								
65								
70								

Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER I,

LOGGED BY: GARY GUACCI

DEPTH TO WATER (FEET) 24.5 b.g.s. (8-21-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: GORDON EDWARDS

RIG TYPE: SPEEDSTAR SS-200

DRILLING METHOD: ROTARY WASH, WATER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 80.5

WELL COMPLETION DEPTH (FEET): 78.0

CASING TYPE: STAINLESS STEEL, SCH 5, TYPE 316L

CASING DIAMETER (INCHES I.D.): 4

SCREEN TYPE: STAINLESS STEEL TYPE 316L WIRE-WOUND

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 58.2 TO 77.5

CASING INTERVAL (FEET): +1.2 TO 58.2

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 52.7 TO 78.0

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 48.9 TO 52.7

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 1.4 TO 48.9

WELLHEAD:

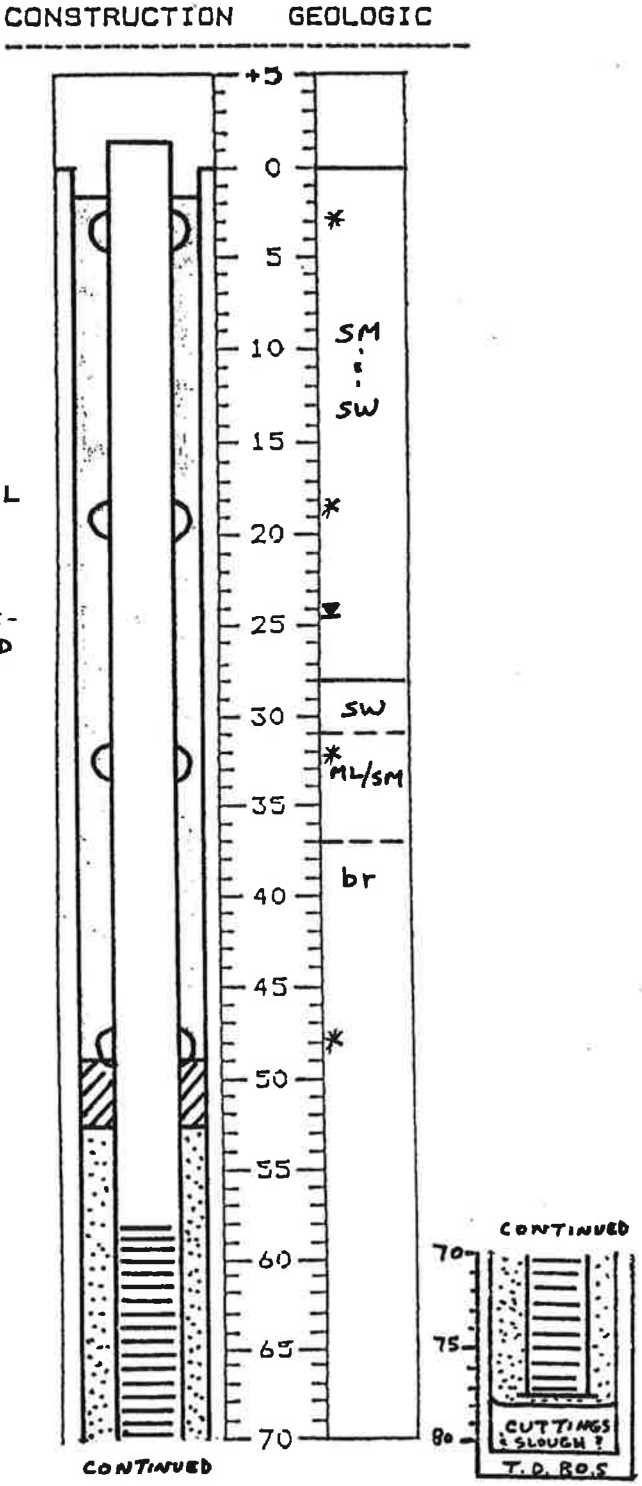
COMMENTS: *CENTRALIZERS AS INDICATED.

WELL NUMBER: M06B

ELEVATION:

CONSTRUCTION DATE	PROGRESS START	FINISH
7-20-87	0855	
7-21-87		0850

WELL SKETCH
(DEPTH IN FEET)



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: M06B Sheet 1 of 3

Boring Location: BARRIER 1,		Elevation and Datum:	
Drilling Agency: DATUM EXPLORATION	Driller: G. EDWARDS	Date Started: 7-15-87	Date Finished: 7-17-87
Drilling Equipment: SPEEDSTAR SS-200		Completion: Depth (feet) 80 ½	Rock Depth: (feet) 37
Method of Drilling: ROTARY WASH		Number of Samples: — Dist.: —	Undist.: — Core: —
Borehole Size: 10-INCH		Water Depth (ft): First:	Compl.: 24 hrs.
Type of Perforation Backfill: LONESTAR # 2/12 SAND		Logged By: G. GUACCI R.G. 3566	Checked by: P. Guptill RG. 3490
Type of Seal: BENTONITE TABLETS ¼", VOLCLAY GROUT			

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	SILTY SAND (SM) and SAND(SW) BR and GR, some gravel						1251	START DRILLING W/TRICONE BIT
5								
	GR BR to BR GR							
								DRILL CHATTER
10							1255	
	Gravel increases to 15%, MPS ¼"							
15							1256	
								DRILL CHATTER
	Gravel 5-10%							
20	DK GR						1258	ADDED DRILL ROD
25							1306	
	GRAVELLY SAND (SW) - DK GR							MUCH DRILL CHATTER HOLE CAVING
30							1308	

The Earth Technology Corporation

BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: M06B Sheet 2 of 3

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Drilling Rate/Time	Remarks
	SEE PREVIOUS PAGE						1308	
	SANDY SILT (ML) to SILTY SAND (SM) - DK GR, wood fragments							LESS CHATTER
35							1312	
	DIORITE - GR, MW to SW, ST							DRILLING SLOWER
40							1318 0750	STOPPED DRILLING, HOLE CAVING BACK TO 30 FT. ADD TEMPORARY CASING TO 37.6' ON 7/16/87. RESUME DRILLING 7/17/87 at 7:50AM
45	MW						0836	
	SW							
50							0852	
								CHANGED TO CARBIDE BUTTON BIT
55							1055	
60							1137 1206	ADD DRILL ROD
65							1218	
70							1305	SL. FASTER DRILLING AT 70'

The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: MO6B Sheet 3 of 3

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	DIORITE - SEE PREVIOUS PAGE						1305	
								DRILLING SLOWER
75							1327	
	FELSIC DIKE? 77½-78½'							
80							1357	FINISHED DRILLING. SOME WATER LOSS
	TOTAL DRILLED DEPTH 80½'							
85								
90								
95								
100								
105								
110								

The Earth Technology
Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: DEAN BAXLEY

DEPTH TO WATER (FEET) DRY (9-24-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: JAMES KILBURN

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 29.8

WELL COMPLETION DEPTH (FEET): 29.1

CASING TYPE: STAINLESS STEEL, SCH 5, TYPE 316L

CASING DIAMETER (INCHES I.D.): 4

SCREEN TYPE: STAINLESS STEEL, TYPE 316L, WIRE-WOUND

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 18.8 TO 28.6

CASING INTERVAL (FEET): +1.4 TO 8.8

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 13.2 TO 29.8

BENTONITE SEAL (FORM): 0.5' BENSEAL, GRANULAR 2.5' VOLCLAY BENTONITE SLURRY

BENTONITE INTERVAL (FEET): 10.2 TO 13.2

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): >2 TO 10.2

WELLHEAD:

COMMENTS:

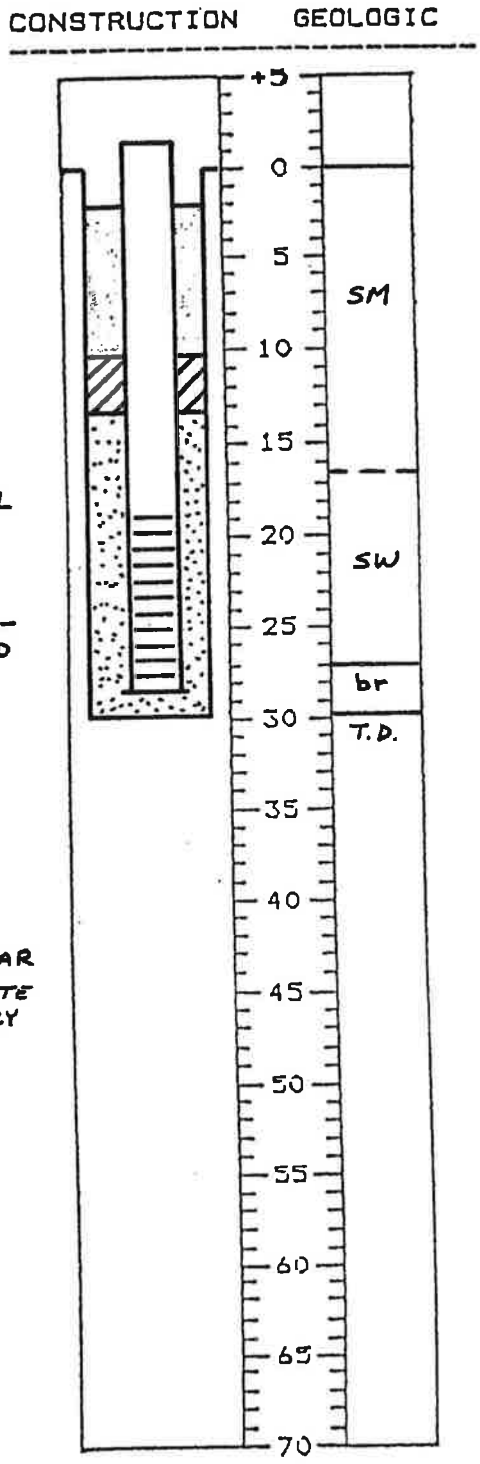
WELL NUMBER: M07A

ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-10-87	0950	≈ 1500

WELL SKETCH
(DEPTH IN FEET)



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: M07A Sheet 1 of 1

Boring Location: BARRIER 1,		Elevation and Datum:	
Drilling Agency: DATUM EXPLORATION	Driller: J. KILBURN	Date Started: 7-10-87	Date Finished: 7-10-87
Drilling Equipment: MOBILE DRILL B-61		Completion: Depth (feet) 29.8	Rock Depth: (feet) 27
Method of Drilling: HOLLOW STEM AUGER		Number of Samples: — Dist.: —	Undist.: — Core: —
Borehole Size: 10-INCH		Water Depth (ft): First: 18	Compl.: 24 hrs.
Type of Perforation Backfill: LONESTAR #2/12 SAND		Logged By: D. BAXLEY	Checked by:
Type of Seal: GRANULAR BENTONITE, BENTONITE SLURRY, VOLCLAY GROUT			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Drilling Rate/Time	Remarks
	SILTY SAND (SM) - LT BR g 5, s 80, f 15, MPS ½" DK GR at 2'						0910	START DRILLING
5							0915	
10	g 10						0919	
15	g 20, MPS 2"						0927	
	GRAVELLY SAND (SW) - DK GR, g 20, s 70, f 10, MPS 1"							
20							0935	
25							0942	
	BEDROCK - DIORITE?							RIG CHATTER, HARD DRILLING
30	TOTAL DEPTH DRILLED 29.8'						0950	FINISHED DRILLING

The Earth Technology Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: GARY GUACCI

DEPTH TO WATER (FEET) 29.7 b.g.s. (9-24-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: GORDON EDWARDS

RIG TYPE: SPEEDSTAR SS-200

DRILLING METHOD: ROTARY WASH, WATER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 72.5

WELL COMPLETION DEPTH (FEET): 65.3

CASING TYPE: STAINLESS STEEL, SCH 5, TYPE 316L

CASING DIAMETER (INCHES I.D.): 4

SCREEN TYPE: STAINLESS STEEL TYPE 316L WIRE-WOUND

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 45.3 TO 64.8

CASING INTERVAL (FEET): 0.8 TO 45.3

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 41.5 TO 65.6

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 37.8 TO 41.5

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): ≥ 9.3 TO 37.8

WELLHEAD:

COMMENTS: *CENTRALIZERS AS INDICATED.

WELL NUMBER: M08B

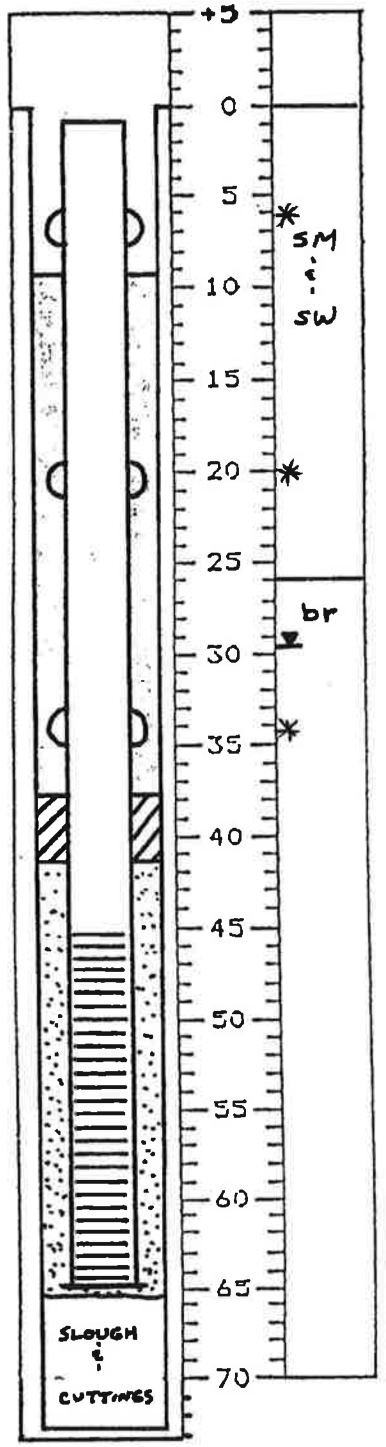
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-24-87	0725	1258

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



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BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** MO8B **Sheet** 1 **of** 3

Boring Location: BARRIER 1,	**Elevation and Datum:**
Drilling Agency: DATUM EXPLORATION **Driller:** G. EDWARDS	**Date Started:** 7-23-87 **Date Finished:** 7-23-87
Drilling Equipment: SPEEDSTAR SS-200	**Completion: Depth (feet)** **Rock Depth: (feet)** 26
Method of Drilling: ROTARY WASH	**Number of Samples:** — **Dist.:** — **Undist.:** — **Core:** —
Borehole Size: 10-INCH	**Water Depth (ft):** **First:** **Compl.:** **24 hrs.**
Type of Perforation Backfill: LONESTAR #2/12 SAND	**Logged By:** G. GUACCI R.G. 3566 **Checked by:** P. Guptill PDG R.G. 3490
Type of Seal: BENTONITE TABLETS 1/4" VOLCLAY GROUT	

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	SILTY SAND (SM) and GRAVELLY SAND (SW) - LT BR GR, probably some SAND(SW)						1027	START DRILLING W/ CARBIDE BIT DRILLING FAST AND EASY
5							1028	
	gravelly							LOUD CHATTER
10								
	More gravel (cobbles?)							VIOLENT CHATTER CHATTER CONTINUOUS
15							1029	
20							1030	ADDED DRILL PIPE
								SOME CHATTER
25							1037	
	DIORITE - LT GR, MW to SL							
30							1039	

The Earth Technology Corporation

BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: MOBB Sheet 2 of 3

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Drilling Rate/Time	Remarks
	DIORITE - SEE PREVIOUS PAGE						1039	EXTENSIVE CHATTER
35							1041	
	ST FRACTURE F FRACTURE							
40							1043 1337	ADDED DRILL PIPE. WATER LOSS ABOUT 150gals. STOPPED DRILLING TO HELP AT EDA2. RESUMED DRILLING.
45	ST, SW FRACTURE						1339	
50	F FRACTURE						1341	
55	Increase in Mafic minerals						1345	WATER LOSS 75gals.
60	Mafics abundant						1347 1415	ADDED DRILL PIPE
65							1417	
70							1419	

The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: MOBB Sheet 3 of 3

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	DIORITE - SEE PREVIOUS PAGE						1419	
	TOTAL DEPTH DRILLED 72½'						1421	FINISHED DRILLING
75								
80								
85								
90								
95								
100								
105								
110								

The Earth Technology
Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: JOHN SKALBECK

DEPTH TO WATER (FEET) DRY (9-15-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: JAMES KILBURN

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 19.5

WELL COMPLETION DEPTH (FEET): 19.5

CASING TYPE: STAINLESS STEEL, SCH 5, TYPE 316L

CASING DIAMETER (INCHES I.D.): 4

SCREEN TYPE: STAINLESS STEEL, TYPE 316L, WIRE-WOUND

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 14.2 TO 19.0

CASING INTERVAL (FEET): +1 TO 14.2

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 10.5 TO 19.5

BENTONITE SEAL (FORM): 0.5' BENSEAL, GRANULAR 2.5' VOLCLAY BENTONITE SLURRY

BENTONITE INTERVAL (FEET): 7.5 TO 10.5

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 0 TO 7.5

WELLHEAD:

COMMENTS:

WELL NUMBER: M09A

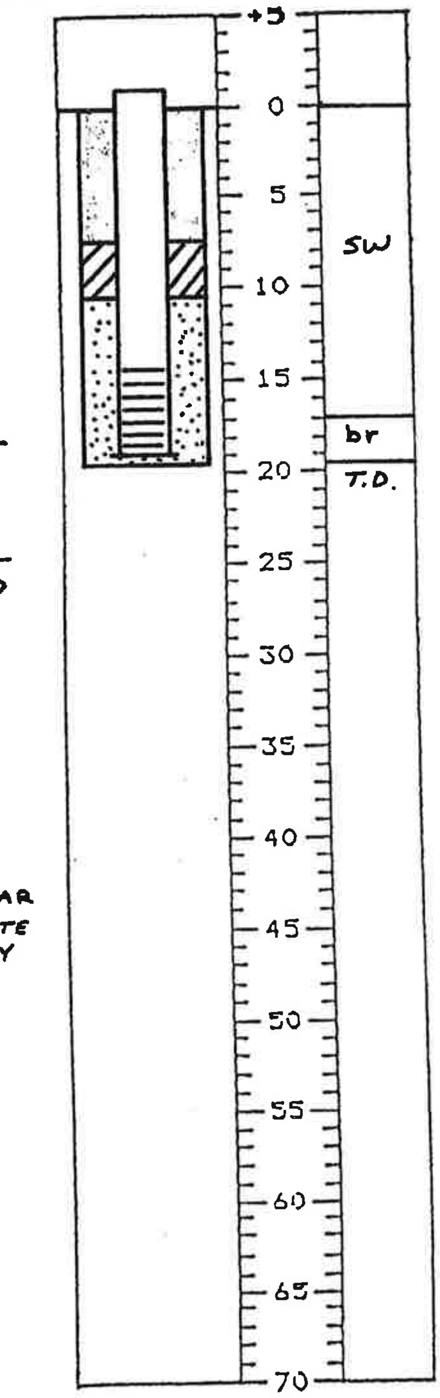
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-7-87	1126	1430

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: GARY GUACCI

DEPTH TO WATER (FEET) 29.1 b.g.s. (9-24-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: GORDON EDWARDS

RIG TYPE: SPEEDSTAR SS-200

DRILLING METHOD: ROTARY WASH, WATER*

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 58.0

WELL COMPLETION DEPTH (FEET): 54.5

CASING TYPE: STAINLESS STEEL, SCH 5, TYPE 316L

CASING DIAMETER (INCHES I.D.): 4

SCREEN TYPE: STAINLESS STEEL TYPE 316L WIRE-WOUND

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 34.7 TO 54.0

CASING INTERVAL (FEET): 0 TO 34.7

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 29.8 TO 55.6

BENTONITE SEAL (FORM): VOLCLAY TABLETS ½"

BENTONITE INTERVAL (FEET): 26.8 TO 29.8

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 2.0 TO 26.8

WELLHEAD:

COMMENTS: *DRILLED W/BENTONITE MUD TO 22' HOLE THEN FLUSHED W/CLEAN WATER. DRILLED REMAINING HOLE USING ONLY WATER

**CENTRALIZERS AS INDICATED.

WELL NUMBER: M10B

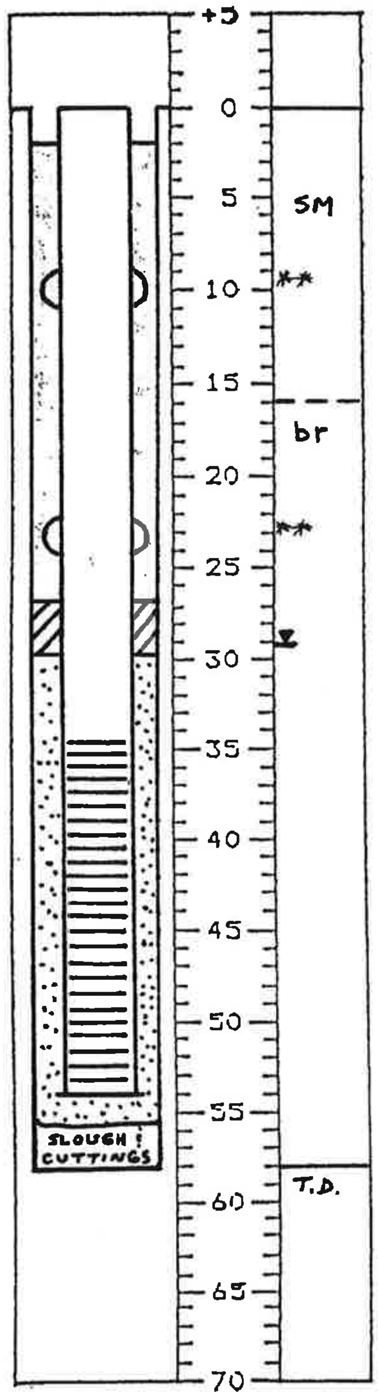
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-22-87	1117	
7-23-87		0813

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** M10B **Sheet** 1 **of** 2

Boring Location: BARRIER 1,		**Elevation and Datum:**	
Drilling Agency: DATUM EXPLORATION	**Driller:** G. EDWARDS	**Date Started:** 7-21-87	**Date Finished:** 7-22-87
Drilling Equipment: SPEEDSTAR SS-200		**Completion: Depth (feet)**	**Rock Depth: (feet)** 16
Method of Drilling: ROTARY WASH		**Number of Samples:** — **Dist.:** —	**Undist.:** — **Core:** —
Borehole Size: 10-INCH		**Water Depth (ft):** **First:**	**Compl.:** **24 hrs.**
Type of Perforation Backfill: LONESTAR #2/12 SAND		**Logged By:** G. GUACCI R.G. 3566	**Checked by:** P. Guptill PDG RG. 3490
Type of Seal: BENTONITE TABLETS ½" VOLCLAY GROUT			

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	SILTY SAND (SM) - LT BR, gravelly and clayey						1422	START DRILLING w/ BENTONITE MUD SMOOTH, EASY DRILLING w/ BUTTON TRICONE BIT
5	GR BR							
	BR							
10							1425	CHATTER
	clayey and silty sand - LT BR to LT GR BR, gravelly							
15							1427	
	- - - - - - - - - - - -	- - -						
	GRANODIORITE - LT Y BR to LT BR, HW to MW							FIRMER, SMOOTHER DRILLING
20								FLUSHED HOLE w/ CLEAN WATER,
							1432	STOPPED DRILLING
							1022	RESUMED DRILLING 7-22-87
25							1023	
	LT GR, SW, H							
30							1025	

The Earth Technology Corporation

BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: M10B Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	GRANODIORITE - SEE PREVIOUS PAGE						1025	
	SW to MW							
35							1029	
	DIORITE - GR, SW							
40							1033	ADDED DRILL ROD
45	UW						1049	
50	Some granodiorite						1054	CHATTER
	F ?FRACTURE							
55							1115	
	TOTAL DEPTH DRILLED 58.0'						1117	FINISHED DRILLING
60								
65								
70								

The Earth Technology Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: DEAN BAXLEY

DEPTH TO WATER (FEET) DRY (9-15-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: JAMES KILBURN

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 23.9

WELL COMPLETION DEPTH (FEET): 23.5

CASING TYPE: PVC SCH 40

CASING DIAMETER (INCHES I.D.): 3

SCREEN TYPE: PVC SCH 40, MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 18.0 TO 22.5

CASING INTERVAL (FEET): +2.0 TO 18.0

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 15.7 TO 23.9

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 12.6 TO 15.7

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 4.3 TO 12.6

WELLHEAD:

COMMENTS:

WELL NUMBER: P01A

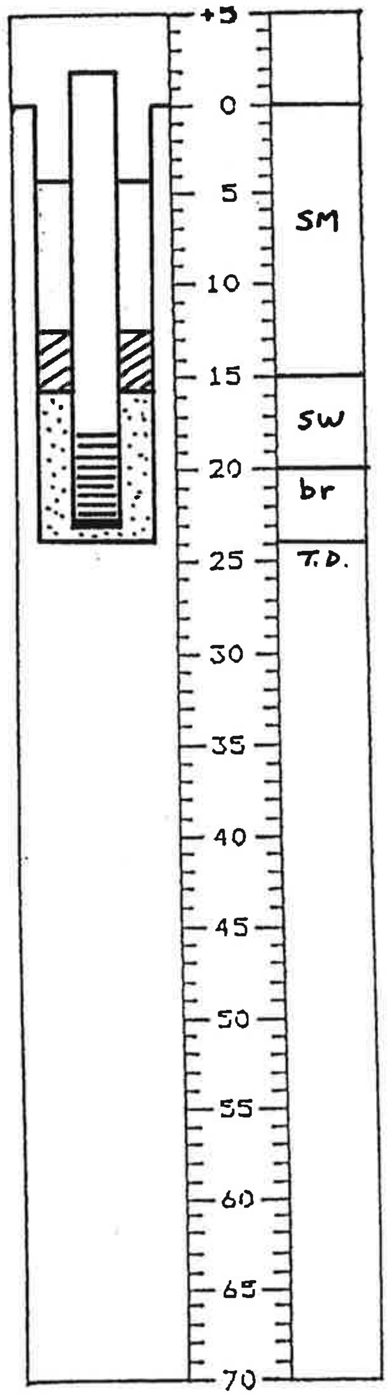
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
6-30-87	1315	
7-1-87		0850

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: P01A Sheet 1 of 1

Boring Location: BARRIER 1,		Elevation and Datum:	
Drilling Agency: DATUM EXPLORATION	Driller: J. KILBURN	Date Started: 6-30-87	Date Finished: 6-30-87
Drilling Equipment: MOBILE DRILL B-61		Completion: Depth (feet) 23.9	Rock Depth: (feet) 20
Method of Drilling: HOLLOW STEM AUGER		Number of Samples: — Dist.: —	Undist.: — Core: —
Borehole Size: 10-INCH		Water Depth (ft): First: DRY	Compl.: 24 hrs.
Type of Perforation Backfill: LONESTAR #2/12 SAND		Logged By: D. BAXLEY	Checked by: G. GUACCI, R.G. 3566
Type of Seal: BENTONITE TABLETS ¼", VOLCLAY GROUT			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	SILTY SAND (SM) - LT BR, g 5, s 70, f 25, MPS ¼"					1240		START DRILLING
						1243		
5								
10	DK BR					1247		
15	GRAVELLY SAND (SW) - BR, MPS 1½"					1250		
20	BEDROCK - NO RETURN					1300		HARD DRILLING
	TOTAL DEPTH DRILLED 23.9'					1315		FINISH DRILLING
25								
30								

The Earth Technology Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: JOHN SKALBECK

DEPTH TO WATER (FEET)

DRILLING CO.: DATUM EXPLORATION

DRILLER: JAMES KILBURN

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 40.0

WELL COMPLETION DEPTH (FEET): 40.0

CASING TYPE: PVC SCH 40

CASING DIAMETER (INCHES I.D.): 3

SCREEN TYPE: PVC SCH 40, MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 34.6 TO 39.1

CASING INTERVAL (FEET): +3 TO 34.6

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 28.8 TO 40.0

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 24.2 TO 28.8

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 2.0 TO 24.2

WELLHEAD:

COMMENTS: 6.9' OF CASING BROKEN OFF BEFORE 9-4-87, REPLACED WITH 10.0' SECTION

WELL NUMBER: P02A

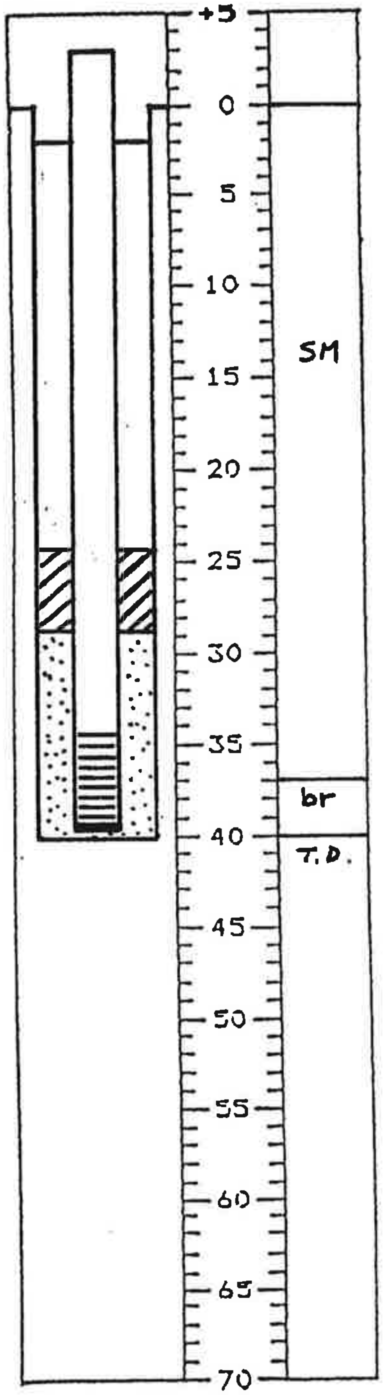
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-6-87	1002	1530

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** P02A **Sheet** 1 **of** 2

Boring Location: BARRIER 1,		**Elevation and Datum:**	
Drilling Agency: DATUM EXPLORATION	**Driller:** J. KILBURN	**Date Started:** 7-6-87	**Date Finished:** 7-6-87
Drilling Equipment: MOBILE DRILL B-61		**Completion: Depth (feet)** 40	**Rock Depth: (feet)** 37
Method of Drilling: HOLLOW STEM AUGER		**Number of Samples:** — **Dist.:** —	**Undist.:** — **Core:** —
Borehole Size: 10-INCH		**Water Depth (ft):** **First:** 12	**Compl.:** **24 hrs.**
Type of Perforation Backfill: LONESTAR #2/12 SAND		**Logged By:** J. SKALBECK	**Checked by:** G. GUACCI, R.G. 3566
Type of Seal: BENTONITE TABLETS 1/4", VOLCLAY GROUT			

Depth (feet)	Description	Graphic Log Lithology	OVA (ppm)	Samples Number	Type	Blow Count	Drilling Rate/Time	Remarks
	SILTY SAND (SM) - LT BR, some cobbles						0920	START DRILLING
	DK BRN, some cobbles							
5							0921	
	DK GR							
	LT BR							
	DK GR							
10							0926	
15							0931	
20	fine to medium grained						0938	
25							0944	
30							0949	

The Earth Technology Corporation

BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: P02A Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	GR						0949	
35								
							0955	
	BEDROCK – NO RETURN							HARD DRILLING, RIG CHATTER
40	TOTAL DEPTH DRILLED 40'						1002	FINISH DRILLING
45								
50								
55								
60								
65								
70								

The Earth Technology Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: DEAN BAXLEY

DEPTH TO WATER (FEET) 7.5 b.g.s. (9-24-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: JAMES KILBURN

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 39.1

WELL COMPLETION DEPTH (FEET): 38.3

CASING TYPE: PVC SCH 40

CASING DIAMETER (INCHES I.D.): 3

SCREEN TYPE: PVC SCH 40, MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 32.8 TO 37.3

CASING INTERVAL (FEET): +1 TO 32.8

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 29.9 TO 39.1

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 25.9 TO 29.9

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 3.0 TO 25.9

WELLHEAD:

COMMENTS: UNKNOWN AMOUNT OF CASING CUT OFF LATER

WELL NUMBER: P03A

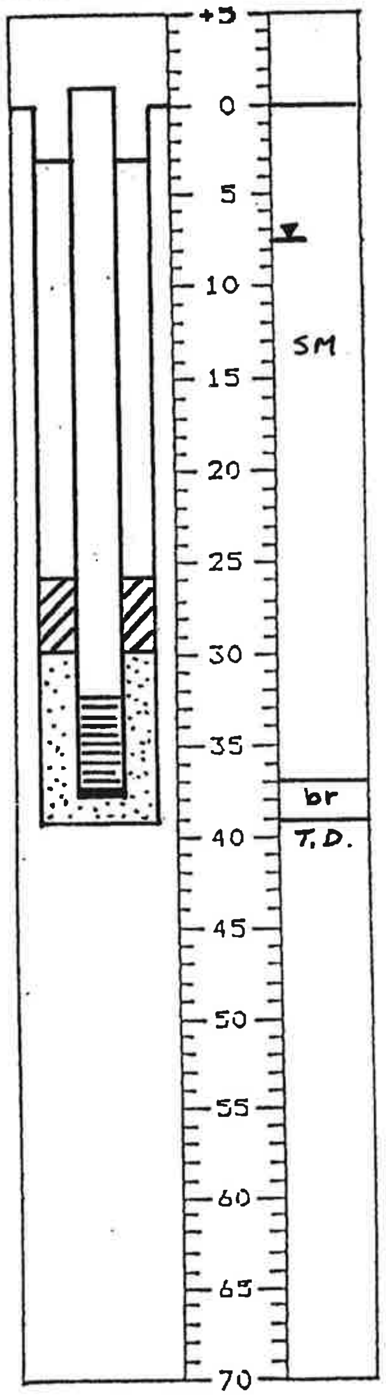
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-2-87	1348	✓

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** P03A **Sheet** 1 **of** 2

Boring Location: BARRIER 1,		**Elevation and Datum:**	
Drilling Agency: DATUM EXPLORATION	**Driller:** J. KILBURN	**Date Started:** 7-2-87	**Date Finished:** 7-2-87
Drilling Equipment: MOBILE DRILL B-61		**Completion: Depth (feet)** 39.1	**Rock Depth: (feet)** 37
Method of Drilling: HOLLOW STEM AUGER		**Number of Samples:** — **Dist.:** —	**Undist.:** — **Core:** —
Borehole Size: 10-INCH		**Water Depth (ft):** **First:** 14	**Compl.:** 24 hrs.
Type of Perforation Backfill: LONESTAR #2/12 SAND		**Logged By:** D. BAXLEY	**Checked by:** G. GUACCI, R.G. 3564
Type of Seal: BENTONITE TABLETS ¼", VOLCLAY GROUT			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Drilling Rate/Time	Remarks
	SILTY SAND (SM) - LT BR, g 10, s 75, f 15, MPS ½"						1300	START DRILLING
	DK GR							
5							1310	
10	Decreasing coarse grained sand						1320	
15							1324	
20	Coarse grained sand increasing						1328	
25							1331	
								RIG CHATTER
30							1335	

The Earth Technology
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BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: P03A Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	SEE PREVIOUS PAGE						1335	
								HARDER DRILLING
35							1340	CHATTER, HARDER DRILLING
	DIORITE							HARD DRILLING
							1348	FINISHED DRILLING
40	TOTAL DEPTH DRILLED 39.1'							
45								
50								
55								
60								
65								
70								

The Earth Technology
Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: JOHN SKALBECK

DEPTH TO WATER (FEET) 6.1 b.g.s. (9-24-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: JAMES KILBURN

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 29

WELL COMPLETION DEPTH (FEET): 28.9

CASING TYPE: PVC SCH 40

CASING DIAMETER (INCHES I.D.): 3

SCREEN TYPE: PVC SCH 40, MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 23.4 TO 27.9

CASING INTERVAL (FEET): +1 TO 23.4

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 20 TO 29

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 16 TO 20

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 2 TO 16

WELLHEAD:

COMMENTS:

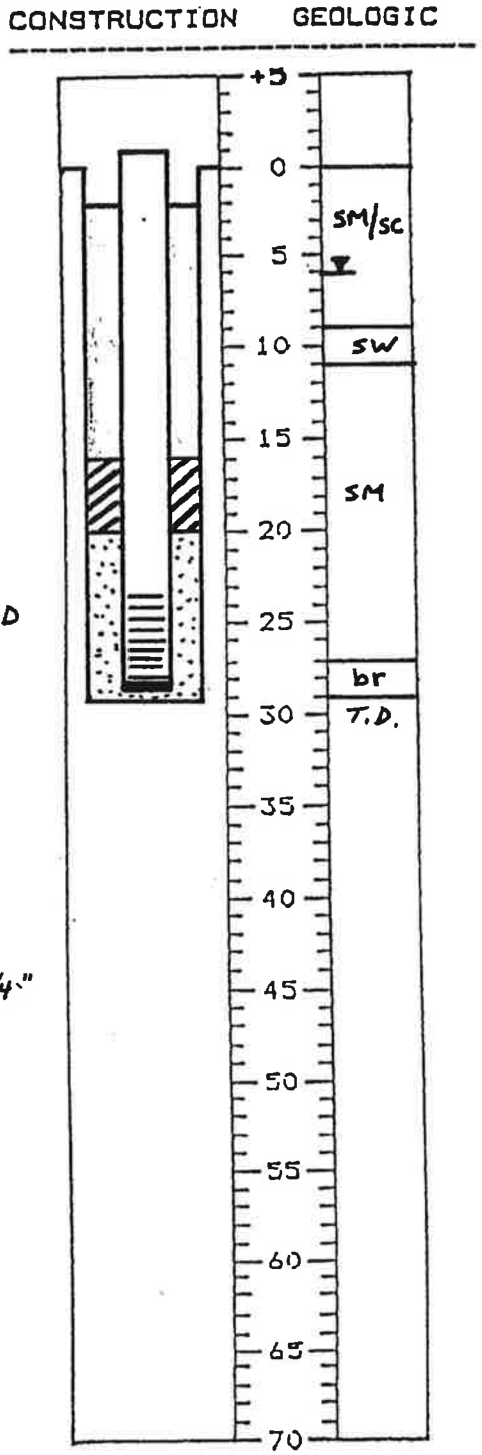
WELL NUMBER: P04A

ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-2-87	1045	≈1500

WELL SKETCH
(DEPTH IN FEET)



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** PO4A **Sheet** 1 **of** 1

Boring Location: BARRIER 1,		**Elevation and Datum:**	
Drilling Agency: DATUM EXPLORATION	**Driller:** J. KILBURN	**Date Started:** 7-2-87	**Date Finished:** 7-2-87
Drilling Equipment: MOBILE DRILL B-61		**Completion: Depth (feet)** 29	**Rock Depth: (feet)** 27
Method of Drilling: HOLLOW STEM AUGER		**Number of Samples:** — **Dist.:** —	**Undist.:** — **Core:** —
Borehole Size: 10-INCH		**Water Depth (ft):** **First:** 13	**Compl.:** **24 hrs.**
Type of Perforation Backfill: LONESTAR #2/12 SAND		**Logged By:** J. SKALBECK	**Checked by:** G. GUACCI, R.G. 3566
Type of Seal: BENTONITE TABLETS 1/4", VOLCLAY GROUT			

Depth (feet)	Description	Graphic Log Lithology	Graphic Log OVA (ppm)	Samples Number	Samples Type	Samples Blow Count	Samples Drilling Rate/Time	Remarks
	SILTY SAND (SM) - BR and BLK, very fine to fine grained sand, some clay						1013	START DRILLING
5							1015	
	GRAVELLY SAND(SW) - BLK							
10							1020	
	SILTY SAND (SM) - BLK, some cobbles							
15							1030	
20	fine to medium grained						1034	
25							1038	
	BEDROCK - NO RETURN							HARD DRILLING
30	TOTAL DEPTH DRILLED 29'						1045	REFUSAL

The Earth Technology Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: Scholl Canyon Subsurface Barrier

PROJECT NUMBER: 87-886-0003

WELL LOCATION: Barrier 1,

LOGGED BY: Dean Baxley

DEPTH TO WATER (FEET) 2.2 b.g.s. (8-19-87)

DRILLING CO.: Datum Exploration

DRILLER: James Kilburn

RIG TYPE: Mobile Drill B-61

DRILLING METHOD: Hollow Stem Auger

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: Grab

TOTAL DEPTH DRILLED (FEET): 40.3

WELL COMPLETION DEPTH (FEET): 40.0

CASING TYPE: PVC SCH 40

CASING DIAMETER (INCHES I.D.): 3

SCREEN TYPE: PVC SCH 40, Machine Slotted

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 34.5 TO 39.0

CASING INTERVAL (FEET): +5 TO 34.5

FILTER PACK: Lonestar #2/12 Sand

FILTER INTERVAL (FEET): 30.9 TO 40.3

BENTONITE SEAL (FORM): Volclay Tablets ¼"

BENTONITE INTERVAL (FEET): 26.8 TO 30.9

GROUT TYPE: Volclay Grout

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 2 TO 26.8

WELLHEAD:

COMMENTS:

WELL NUMBER: P05A

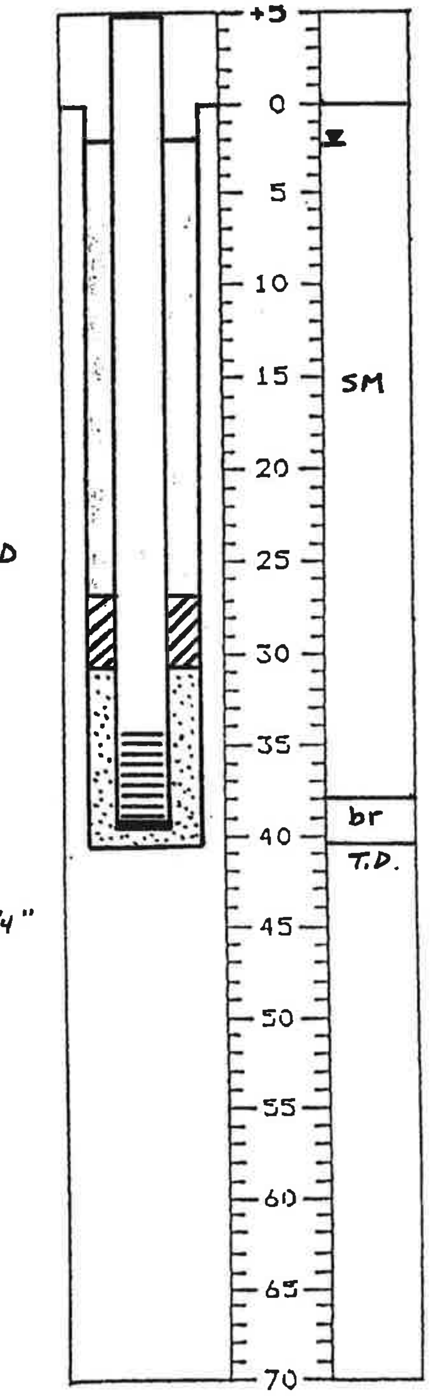
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-9-87	0730	1650

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



The Earth Technology
Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER I,

LOGGED BY: DEAN BAXLEY

DEPTH TO WATER (FEET) 25.0 b.t.o.c. (8-19-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: JAMES KILBURN

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 31

WELL COMPLETION DEPTH (FEET): 30.5

CASING TYPE: PVC SCH 40

CASING DIAMETER (INCHES I.D.): 3

SCREEN TYPE: PVC SCH 40, MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 25.0 TO 29.5

CASING INTERVAL (FEET): +1 TO 25.0

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 21.9 TO 30.8

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 18.3 TO 21.9

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 0 TO 18.3

WELLHEAD:

COMMENTS:

WELL NUMBER: P10A

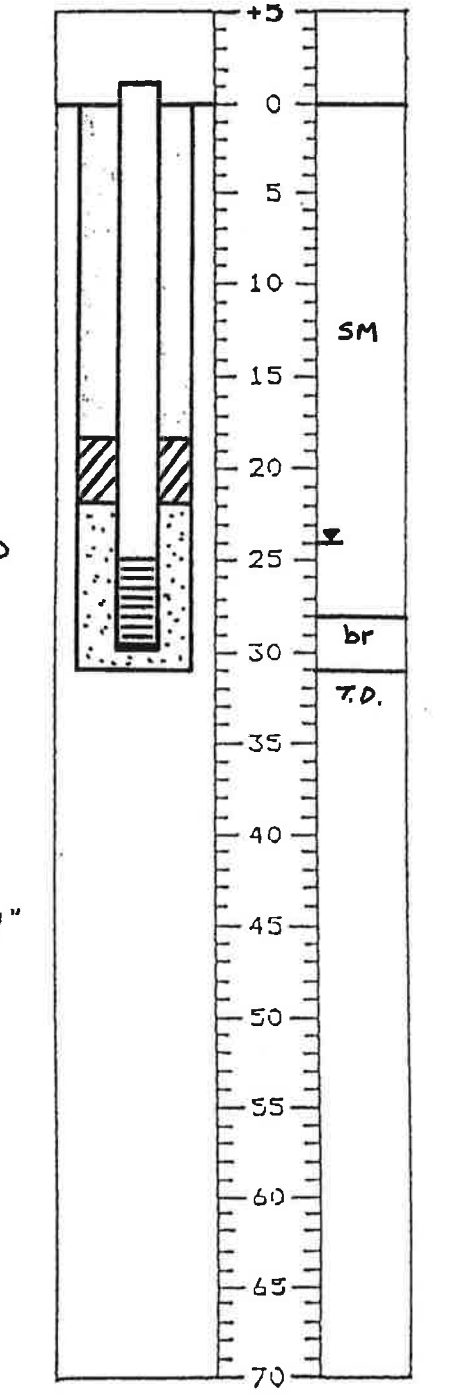
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-8-87	0925	1410

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: P10A Sheet 1 of 1

Boring Location: BARRIER 1,		Elevation and Datum:	
Drilling Agency: DATUM EXPLORATION	Driller: J. KILBURN	Date Started: 7-8-87	Date Finished: 7-8-87
Drilling Equipment: MOBILE DRILL B-61		Completion Depth (feet) 31	Rock Depth: (feet) 28
Method of Drilling: HOLLOW STEM AUGER		Number of Samples: — Dist.: —	Undist.: — Core: —
Borehole Size: 10-INCH		Water Depth (ft): First:	Compl.: 24 hrs.
Type of Perforation Backfill: LONESTAR #2/12 SAND		Logged By: D. BAXLEY	Checked by: G. GUACCI, R.G. 3566
Type of Seal: BENTONITE TABLETS ¼", VOLCLAY GROUT			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Drilling Rate/Time	Remarks
	SILTY SAND (SM) - DK GR g 5, s 75, f 20, MPS ½"						0830	START DRILLING
5							0835	SOMEWHAT HARD DRILLING
	DK BR							
10							0838	
	MPS 2"							HARD DRILLING
15							0845	
20	slightly coarser grained						0909	
								HARD DRILLING
25							0914	
	Cobbles							
	DIORITE							
							0925	FINISHED DRILLING

TOTAL DEPTH DRILLED 31'

The Earth Technology
Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: DEAN BAXLEY

DEPTH TO WATER (FEET) 29.0 b.g.s. (8-19-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: JAMES KILBURN

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 39.9

WELL COMPLETION DEPTH (FEET): 39.7

CASING TYPE: PVC SCH 40

CASING DIAMETER (INCHES I.D.): 3

SCREEN TYPE: PVC SCH 40, MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 34.2 TO 38.7

CASING INTERVAL (FEET): 0 TO 34.2

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 30.4 TO 39.9

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 27 TO 30.4

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 2.1 TO 27

WELLHEAD:

COMMENTS:

WELL NUMBER: P11A

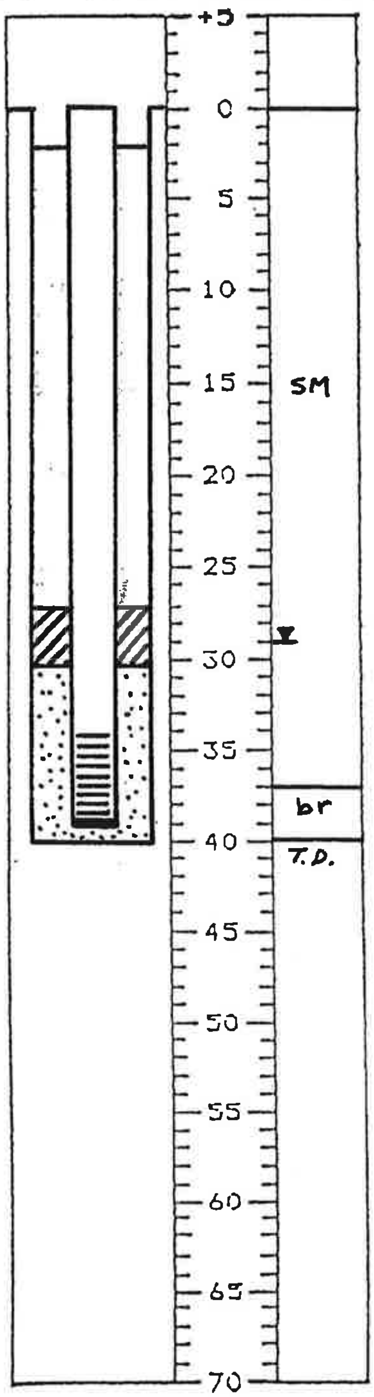
ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-1-87	1000	1405

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** P11A **Sheet** 1 **of** 2

Boring Location: BARRIER 1,		**Elevation and Datum:**	
Drilling Agency: DATUM EXPLORATION	**Driller:** J. KILBURN	**Date Started:** 7-1-87	**Date Finished:** 7-1-87
Drilling Equipment: MOBILE DRILL B-61		**Completion: Depth (feet)** 39.9	**Rock Depth: (feet)** 37
Method of Drilling: HOLLOW STEM AUGER		**Number of Samples:** — **Dist.:** —	**Undist.:** — **Core:** —
Borehole Size: 10-INCH		**Water Depth (ft):** **First:** 28	**Compl.:** **24 hrs.**
Type of Perforation Backfill: LONESTAR #2/12 SAND		**Logged By:** D. BAXLEY	**Checked by:** G. GUACCI, R.G. 3566
Type of Seal: BENTONITE TABLETS 1/4", VOLCLAY GROUT			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Drilling Rate/Time	Remarks
	SILTY SAND (SM) - LT BR, g 5, s 60, f 35, MPS 3/8", some clay DK GR at 2'						0913	START DRILLING
5							0920	
	MPS 2"							
10							0925	
								EASY DRILLING
15	DK GR, Gravelly, g 10, s 70, f 20, MPS 1/2"						0930	
20	MPS 3"						0935	
								HARDER DRILLING
25							0945	
30							0950	

The Earth Technology Corporation

BORING LOG

Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: P11A Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	SEE PREVIOUS PAGE					0950		ODOR
35						0953		
	BEDROCK — NO RETURN							HARD DRILLING, GROUND SHAKING DRILLER SAYS BEDROCK
40	TOTAL DEPTH DRILLED 39.9'					1000		FINISHED DRILLING
45								
50								
55								
60								
65								
70								

The Earth Technology Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON SUBSURFACE BARRIER

PROJECT NUMBER: 87-886-0003

WELL LOCATION: BARRIER 1,

LOGGED BY: JOHN SKALBECK

DEPTH TO WATER (FEET) 30.0 b.t.o.c. (8-19-87)

DRILLING CO.: DATUM EXPLORATION

DRILLER: JAMES KILBURN

RIG TYPE: MOBILE DRILL B-61

DRILLING METHOD: HOLLOW STEM AUGER

BOREHOLE DIAMETER (INCHES): 10

SAMPLING METHOD: GRAB

TOTAL DEPTH DRILLED (FEET): 40.0

WELL COMPLETION DEPTH (FEET): 39.5

CASING TYPE: PVC SCH 40

CASING DIAMETER (INCHES I.D.): 3

SCREEN TYPE: PVC SCH 40, MACHINE SLOTTED

SLOT SIZE (INCHES): 0.02

SCREENED INTERVAL (FEET): 34.0 TO 38.5

CASING INTERVAL (FEET): +1 TO 34.0

FILTER PACK: LONESTAR #2/12 SAND

FILTER INTERVAL (FEET): 30.0 TO 40.0

BENTONITE SEAL (FORM): VOLCLAY TABLETS 1/4"

BENTONITE INTERVAL (FEET): 26.8 TO 30.0

GROUT TYPE: VOLCLAY GROUT

PERCENT BENTONITE IN GROUT: 94

GROUT INTERVAL (FEET): 2.0 TO 26.8

WELLHEAD:

COMMENTS:

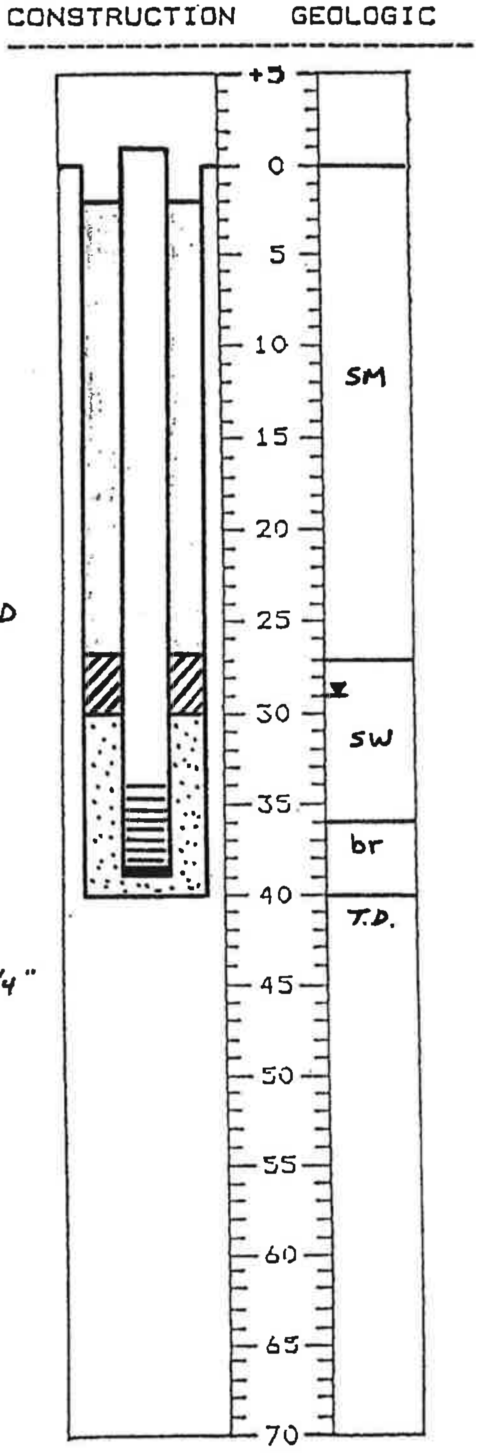
WELL NUMBER: P12A

ELEVATION:

CONSTRUCTION PROGRESS

DATE	START	FINISH
7-1-87	1533	
7-2-87		0935

WELL SKETCH
(DEPTH IN FEET)



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 **Field Log of Boring Number:** P12A **Sheet** 1 **of** 2

Boring Location: BARRIER 1,

Elevation and Datum:

Drilling Agency: DATUM EXPLORATION **Driller:** J. KILBURN

Date Started: 7-1-87 **Date Finished:** 7-1-87

Drilling Equipment: MOBILE DRILL B-61

Completion: Depth (feet) 40 **Rock Depth: (feet)** 36

Method of Drilling: HOLLOW STEM AUGER

Number of Samples: — **Dist.:** — **Undist.:** — **Core:** —

Borehole Size: 10-INCH

Water Depth (ft): **First:** **Compl.:** **24 hrs.**

Type of Perforation Backfill: LONESTAR #2/12 SAND

Type of Seal: BENTONITE TABLETS ¼", VOLCLAY GROUT

Logged By: J. SKALBECK

Checked by: G. GUACCI, R.G. 3566

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	SILTY SAND (SM) - DK BRN to BLK, very fine grained						1446	START DRILLING
5							1449	
	BLK silty and clayey sand (SM/SC) at 7-9'							
	DK BR, medium to coarse grained, some cobbles							
10							1454	
15							1459	
20	MPS 2"						1503	
25							1508	METHANE ODOR
	GRAVELLY SAND (SW) - MPS 2", some silt							
30							1516	STRONG ODORS

The Earth Technology Corporation

BORING LOG

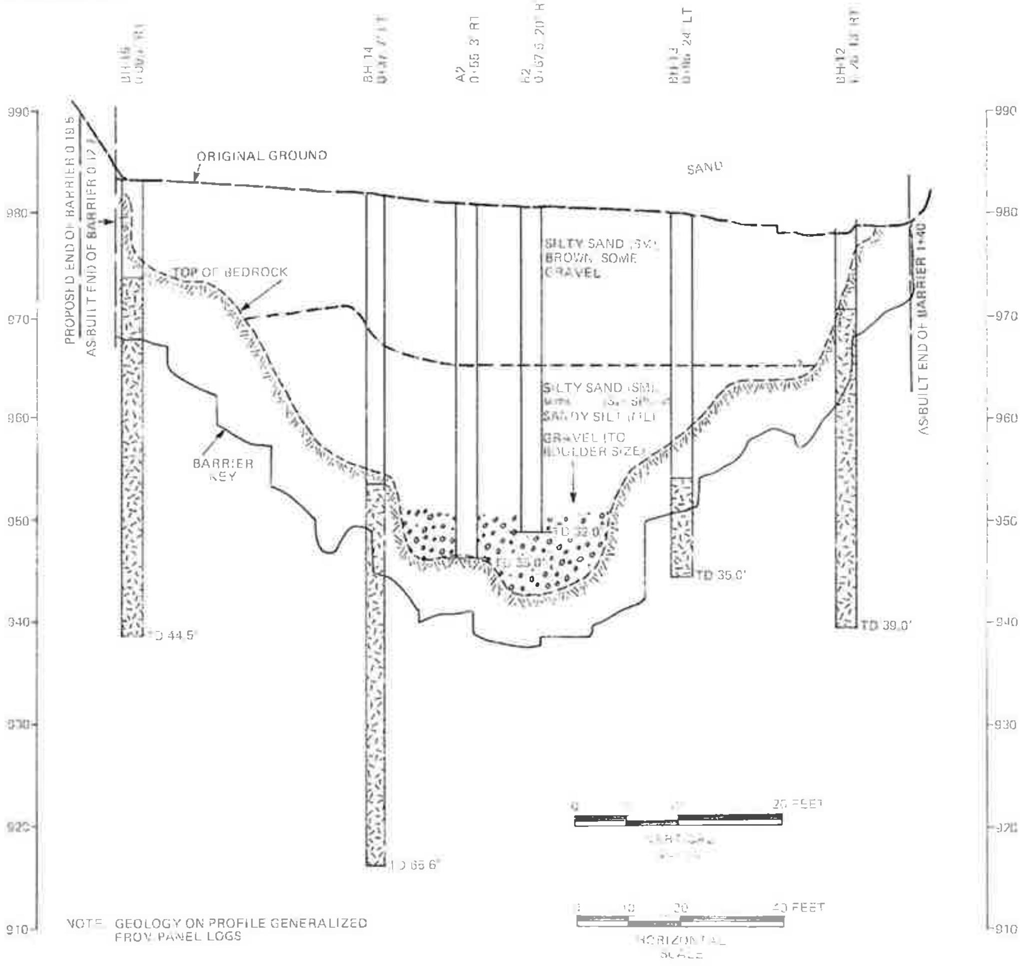
Project name: SCHOLL CANYON SUBSURFACE BARRIER

Project Number: 87-886-0002 Field Log of Boring Number: P12A Sheet 2 of 2

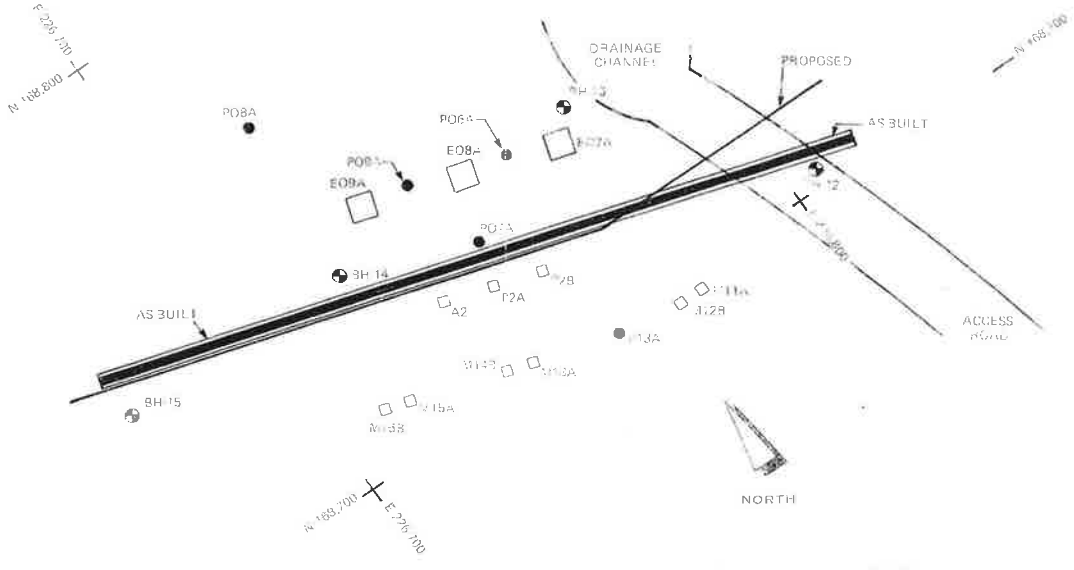
Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	SEE PREVIOUS PAGE						1516	
35							1523	ODORS
	BEDROCK - NO RETURN							HARD DRILLING
40	TOTAL DEPTH DRILLED 40'						1533	FINISHED DRILLING
45								
50								
55								
60								
65								
70								

	13	0	10	20	30	40	50	60	70	80	90	100	110	120	130
COMPLETION DATE	6/23	6/24	6/24	6/25	6/25	6/29	6/25	7/1	6/30	7/2	7/1	7/7	7/6	7/8	6/29
*PANEL NUMBER	1	2B	2A	3B	3A	5	4	8	7	10	9	12	11	13	6

*OVERLAP NOT SHOWN



NOTE: GEOLOGY ON PROFILE GENERALIZED FROM PANEL LOGS



REFERENCE: PROFILE AND PLAN MODIFIED FROM L.A. COUNTY SANITATION DISTRICT DRAWING 7TD 4-4, SHEET NO. 4, DATED JANUARY 1987.

The Earth Technology Corporation

SCHOLL CANYON

PROFILE AND PLAN
BARRIER NO. 2

HARDING LAWSON ASSOCIATES
1994

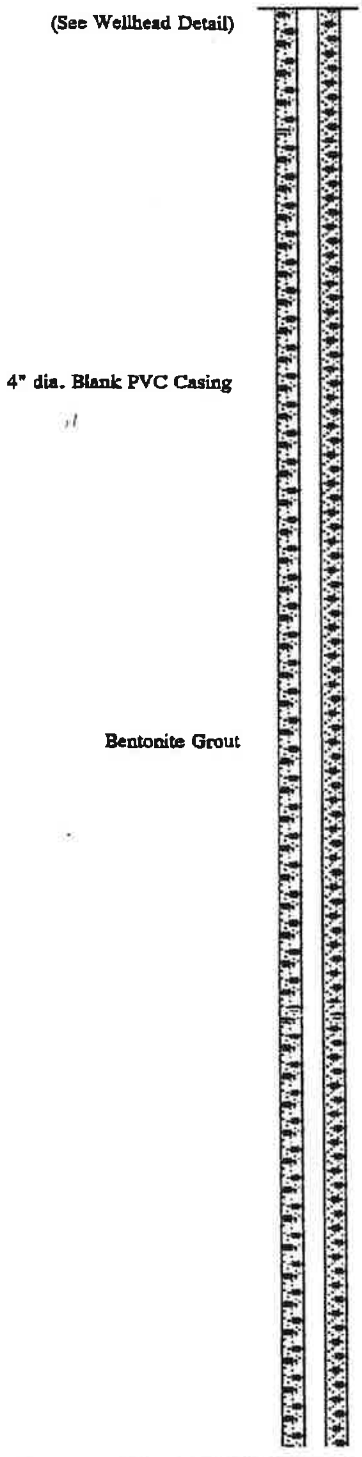
27533.5\W-4.TEMF

Top of Casing 971.56 ft.**

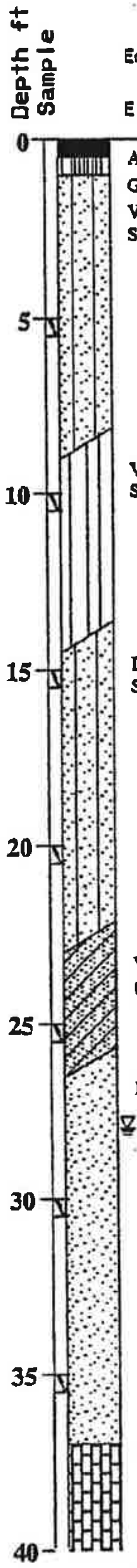
Equipment AIR ROTARY/CASING

Elevation 971.86 ft. Date 3/16/94

(See Wellhead Detail)



Time:Bit Depth	Time:Casing Depth	Drill Chatter	FID	Depth ft
				0
14:14	14:15		0	5
	14:16 14:30			
14:16 14:30	14:31		0	10
14:31	14:32		0	15
14:32	14:34 14:46		0	20
14:34 14:46	14:49			
			0	25
14:52 15:09	14:52 15:09	Yes		
15:10	15:10	Yes	0	30
15:14	15:14	Yes	0	35
15:15 15:27	15:15 15:32			
				40



ASPHALTIC CONCRETE

GRAVEL AGGREGATE BASE

VERY DARK GRAYISH BROWN (2.5YR 3/2) SILTY SAND (SM)
loose, moist, medium- to coarse-grained, with (30%) silt, trace (3-5%) cobbles (4" dia.) tonalite composition

VERY DARK GRAYISH BROWN (2.5YR 3/2) SANDY SILT (ML)
soft, moist, with silt (30%) fine-grained sand, micaceous

DARK GRAYISH BROWN (2.5YR 4/2) SILTY SAND (SM)
loose, moist, fine- to medium-grained, poorly graded sand, with (30%) silt

gravel layer zone

color change to very dark grayish brown (10YR 3/2)

VERY DARK GRAY (2.5Y 3/1) CLAYEY SAND (SC)
soft, moist, poorly graded fine- to medium-grained sand, 30% clay

DARK GRAY (2.5Y 4/1) GRAVELLY SAND (SP)
loose, moist, poorly graded medium-grained sand, trace (5-10%) gravel tonalite composition
groundwater encountered during drilling, becomes wet

gravel zone

gravel zone

DARK GRAY (2.5Y 4/1) DIORITE
moderately fractured, cuttings <0.5" in size, most grains moderately hard, some grains very hard moderately strong, deep weathering

Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring PO1B

(sheet 1 of 3)

County Sanitation District No. 2
Scholl Canyon Landfill

PLATE
C4

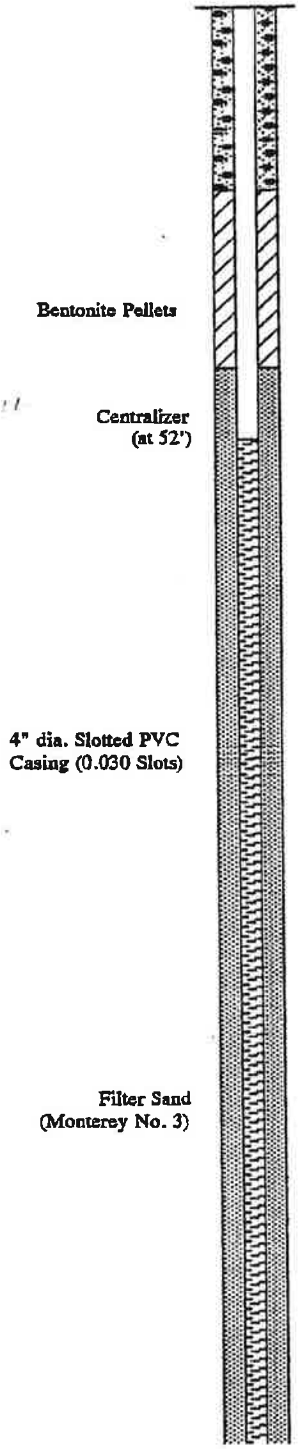
DRAWN	PROJECT NUMBER-TASK	APPROVED	DATE	REVISED DATE
JCM	27533.5	MR	10/94	

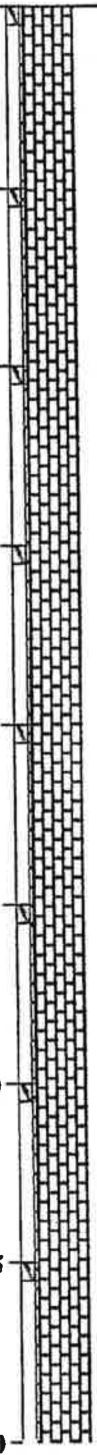
27533.5\W-4.TEMF

Top of Casing 971.56 ft.**

Equipment AIR ROTARY/CASING

Elevation 971.86 ft. Date 3/16/94





Time:Bit Depth	Time:Casing Depth	Drill Chatter	FID	Depth ft	Sample	
	15:36 15:49		0	40		Discontinued drive casing due to refusal
15:54 15:58	15:58	Yes				
16:02 16:34		Yes	0	45		cuttings 0.5" to 0.1" in size, friable, moderate weathering
16:35		Yes	0	50		cuttings 0.8" to 0.5" in size, most grains strong, little weathering, Fe-oxide staining present on several surfaces
		Yes				
16:44 7:37		Yes	0	55		cuttings 0.7" to 0.2" in size, moderately hard, moderate weathering, Fe-oxide staining on minerals, rock is more mafic, hornblend and Fe bearing minerals more pronounced
7:45			0	60		
						cuttings <0.2" in size, hard, strong, little weathering, occasional feldspar crystals longer than 0.4", rock is less mafic, hornblends exhibit Fe-oxide deposits and are extremely brittle
8:11			0	65		boring producing much water
		Yes				
		Yes				cuttings 1.0" to 0.5" in size, moderately hard, moderately strong, moderate weathering, mostly felsic and silica minerals, heavy Fe-oxide staining
		Yes				
		Yes				
8:27			0	70		
		Yes				cuttings <0.2" in size, hard, moderately strong, heavy Fe-oxide staining
		Yes				
		Yes				boring producing much water
		Yes				
8:32 8:34		Yes	0	75		cuttings <0.2" in size, some larger (0.5") feldspar crystals, strong Fe-oxide staining
		Yes				
		Yes				
		Yes				
		Yes				discrete interval water sample collection from open borehole 14:00 3/16/94
				80		

HLA

Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring PO1B

(sheet 2 of 3)

County Sanitation District No. 2
Scholl Canyon Landfill

PLATE
C5

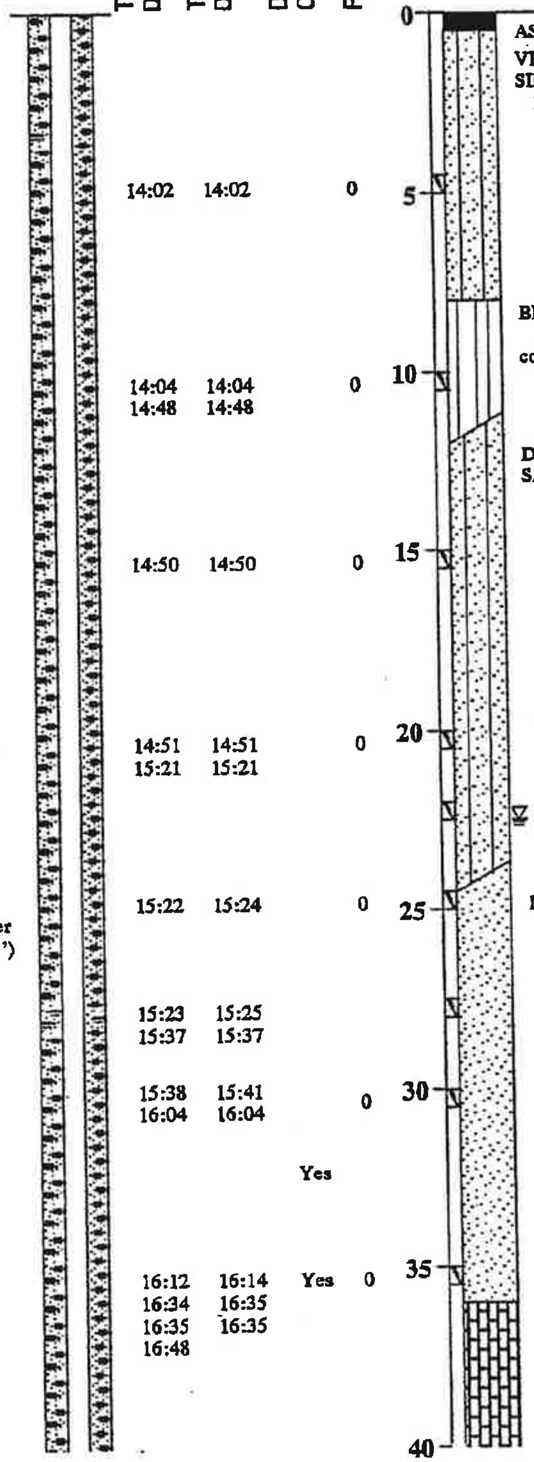
DRAWN	PROJECT NUMBER–TASK	APPROVED	DATE	REVISED DATE
JCM	27533.5	MPR	10/94	

27533.5\W-4 TEMF

Top of Casing **971.89 ft.****

Equipment **AIR ROTARY/CASING**

Elevation **972.60 ft.** Date **3/18/94**



Time:Bit Depth	Time:Casing Depth	Drill Chatter	FID	Depth ft
14:02	14:02		0	5
14:04 14:48	14:04 14:48		0	10
14:50	14:50		0	15
14:51 15:21	14:51 15:21		0	20
15:22	15:24		0	25
15:23 15:37	15:25 15:37			
15:38 16:04	15:41 16:04		0	30
		Yes		
16:12 16:34 16:35 16:48	16:14 16:35 16:35	Yes	0	35
				40

ASPHALTIC CONCRETE

VERY DARK GRAYISH BROWN (2.5YR 3/2) SILTY SAND (SM)
loose, moist, medium- to coarse-grained, poorly graded sand, with (30%) micaceous silts

BLACK (2.5YR 2/1) SANDY SILT (ML)
firm, moist, silt with (30%) medium- to coarse-grained sand, micaceous silt

DARK GRAYISH BROWN (2.5YR 4/2) SILTY SAND (SM)
loose, moist, medium- to coarse-grained, poorly graded angular to sub-angular sand, with (30%) silt, sand grains are from decomposing tonalite float rocks

▽ color change to dark gray (2.5YR 4/2)

DARK GRAY (2.5YR 4/2) SAND (SP)
firm, wet, medium-grained poorly graded angular to subangular sand

gravel zone

gravel zone

loose, Fe-oxide staining present

DARK GRAY (2.5Y 4/1) DIORITE
cuttings 0.2" to 0.8" in size, moderately fractured, moderately hard, weak, moderate weathering, trace amounts of Fe-oxide staining, discontinue drive casing at 36.0 feet at bedrock contact

Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring PO2B

(sheet 1 of 3)

County Sanitation District No. 2

Scholl Canyon Landfill

PLATE
C7

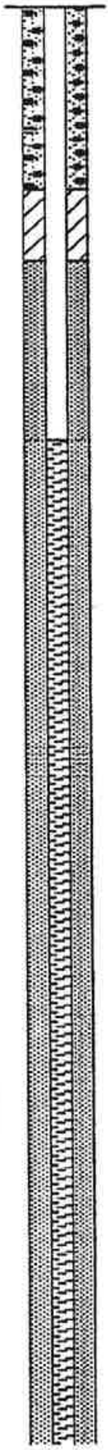
DRAWN	PROJECT NUMBER-TASK	APPROVED	DATE	REVISED DATE
JCM	27533.5	MR	10/94	

Top of Casing 971.89 ft.**

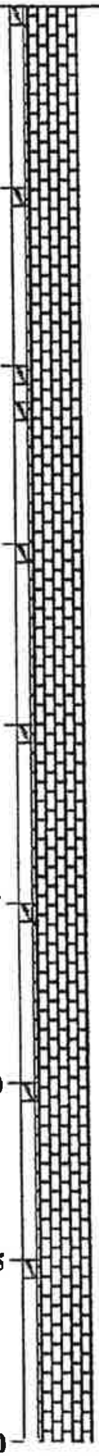
Equipment AIR ROTARY/CASING

Elevation 972.60 ft. Date 3/18/94

27533.5\W-4.TEMF



Time:Bit Depth	Time:Casing Depth	Drill Chatter	FID	Depth ft	Sample	
16:55		Yes	0	40		
16:58			0	45		cuttings 0.1" to 0.4" in size, moderately hard, trace (2%) Fe-oxide staining
17:01			0	50		cuttings <0.1" in size, hard, little weathering
17:05 7:11			0			cuttings are brittle, moderate weathering, increase in Fe-oxide staining
7:12		Yes	0	55		cuttings 0.1" to 0.3" in size, rock is more mafic, fracture plane is filled, material heavily oxidized and extremely brittle
						discrete interval groundwater sample collected from open borehole 9:00 3/18/94
7:14 9:32			0	60		
		Yes				cuttings 0.2" to 0.5" in size, moderately hard, moderately strong, little weathering, decreasing amounts of Fe-oxide staining
9:40			0	65		cuttings 0.3" to 0.6" in size, rock is more feldsic, hard, strong
9:48		Yes	0	70		moderately hard, weak, moderate weathering, Fe-oxide staining increasing, feldspars are deeply weathered
		Yes				
						increase water production
9:58		Yes	0	75		cuttings 0.1" to 0.2" in size, Fe-oxide staining and fresh grains mixed together probable slough
						discrete interval groundwater sample collected from open borehole 11:00 3/18/94
				80		



Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring PO2B

(sheet 2 of 3)

County Sanitation District No. 2
Scholl Canyon Landfill

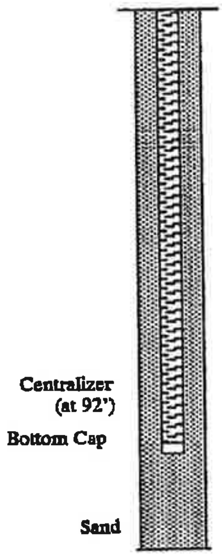
PLATE
C8

DRAWN	PROJECT NUMBER–TASK	APPROVED	DATE	REVISED DATE
JCM	27533.5	MR	10/94	

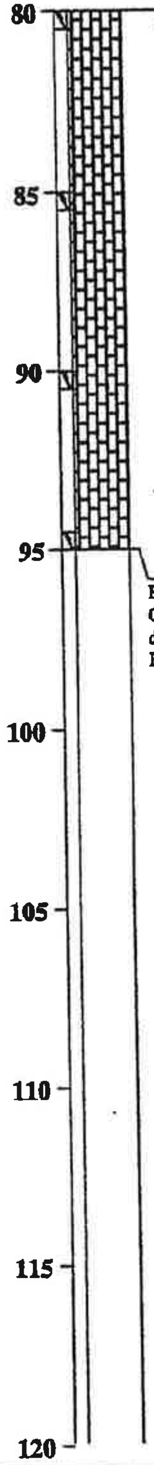
Top of Casing 971.89 ft.**

Equipment AIR ROTARY/CASING

Elevation 972.60 ft. Date 3/18/94



Time:Bit Depth	Time:Casing Depth	Drill Chatter	FID	Depth ft	Sample	Description
10:04 11:09			0	80		cuttings 0.2" in size, hard, strong, fresh, little to no Fe-oxide staining
		Yes				
12:02			0	85		cuttings 0.2" in size
		Yes				
12:23			0	90		cuttings 0.2" in size
12:31		Yes	0	95		cuttings 0.2" in size, moderately hard, moderately strong, little weathering, increase in Fe-oxide staining



Boring terminated at 95.0 feet on 3/18/94.
Groundwater encountered at 22.5 feet during drilling.
Boring converted to Well PO2B on 3/18/94.

Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring PO2B

(sheet 3 of 3)

County Sanitation District No. 2
Scholl Canyon Landfill

PLATE C9

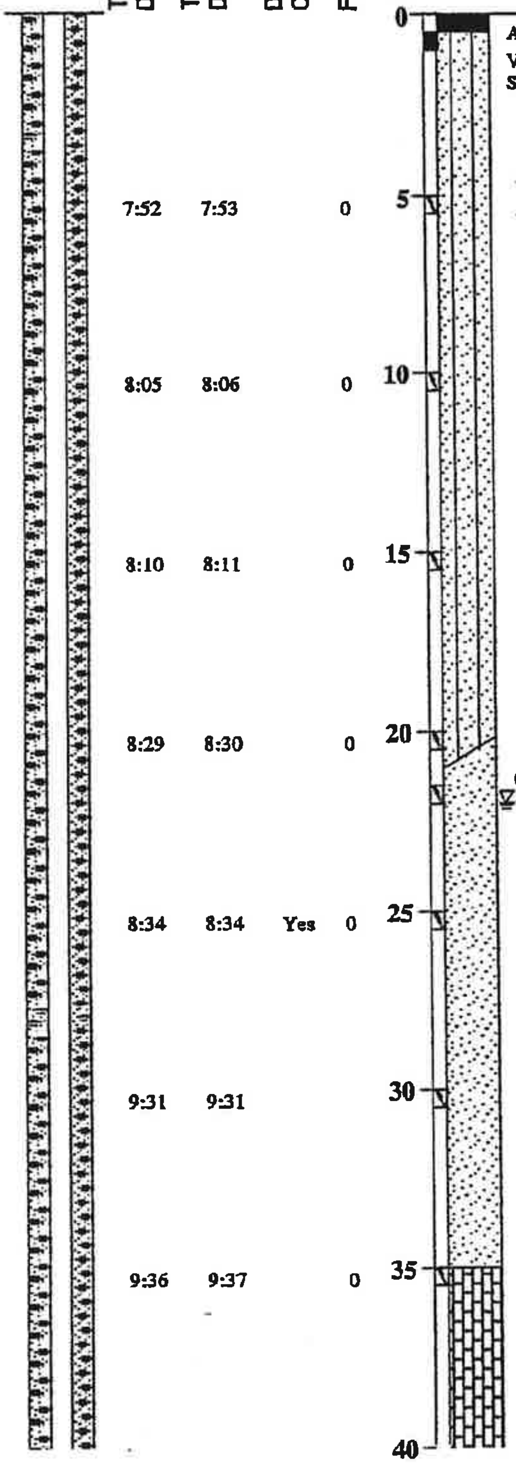
DRAWN	PROJECT NUMBER-TASK	APPROVED	DATE	REVISED DATE
JCM	27533.5	MR	10/94	

27533.5 W-4.TEMP

Top of Casing 971.14 ft.**

Equipment AIR ROTARY/CASING

Elevation 971.67 ft. Date 3/20/94



Depth ft	Sample	Time:Bit Depth	Time:Casing Depth	Drill Chatter	FID	
0						ASPHALTIC CONCRETE VERY DARK GRAYISH BROWN (2.5Y 3/2) SILTY SAND (SM) loose, moist, poorly graded, fine- to medium-grained sand, with (35%) silt
5		7:52	7:53		0	
10		8:05	8:06		0	color change to dark grayish brown (2.5Y 4/2)
15		8:10	8:11		0	subrounded to subangular sand
20		8:29	8:30		0	OLIVE GRAY (2.5Y 4/2) SAND (SP) loose, wet, medium-grained poorly graded sand, little (15%) silt
25		8:34	8:34	Yes	0	color change to dark gray (2.5Y 4/1), subangular to angular particles gravel zone
30		9:31	9:31			gravel zone
35		9:36	9:37		0	DARK GRAY (2.5Y 4/1) DIORITE cuttings, 0.3" to <0.1" in size, little fracturing, moderately hard, weak, deep weathering, Fe-oxide staining present
40						

HLA Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring PO3B

(sheet 1 of 3)

County Sanitation District No. 2
Scholl Canyon Landfill

PLATE
C10

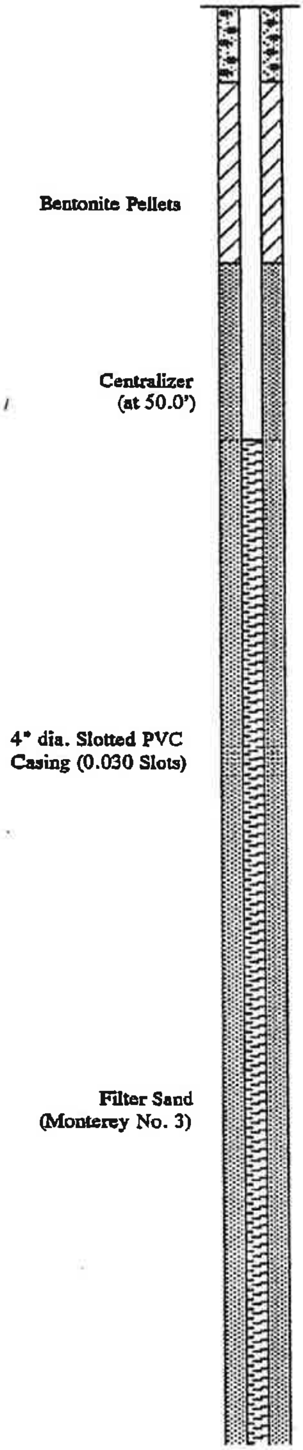
DRAWN JCM
PROJECT NUMBER—TASK 27533.5
APPROVED MR
DATE 10/94
REVISED DATE

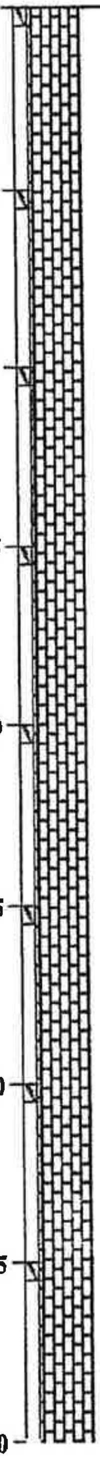
27533.5\W-4.TEMF

Top of Casing 971.14 ft.**

Equipment AIR ROTARY/CASING

Elevation 971.67 ft. Date 3/20/94





Time:Bit Depth	Time:Casing Depth	Drill Chatter	FID	Depth ft	
9:43			0	40	cuttings 0.2" to <0.1" in size, fragment faces heavily coated with Fe-oxide staining
9:51			0	45	cuttings 0.5" to 0.2" in size, moderate weathering, decreasing Fe- Oxide staining
9:53		Yes	0	50	cuttings 1.0" to 0.2" in size, moderately strong, extremely rough drilling
10:04			0	55	water injected at 55.0 feet below ground surface to drive out cuttings, little water production cuttings 0.5" to 0.2" in size, Fe-Oxide staining present
					boring making water at 59.0 feet below ground surface
10:10			0	60	
		Yes			
		Yes			
10:16		Yes	0	65	increase in water production cuttings 0.2" to 0.1" in size, moderately hard, moderately strong, deep weathering, Fe-Oxide present in water being produced
		Yes			
		Yes			
10:36			0	70	cuttings 0.2" to 0.1" in size, hard, Fe-Oxide present in water being produced
10:40		Yes	0	75	cuttings 0.2" to 0.1" in size
				80	

Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring PO3B

(sheet 2 of 3)

County Sanitation District No. 2
Scholl Canyon Landfill

PLATE C11

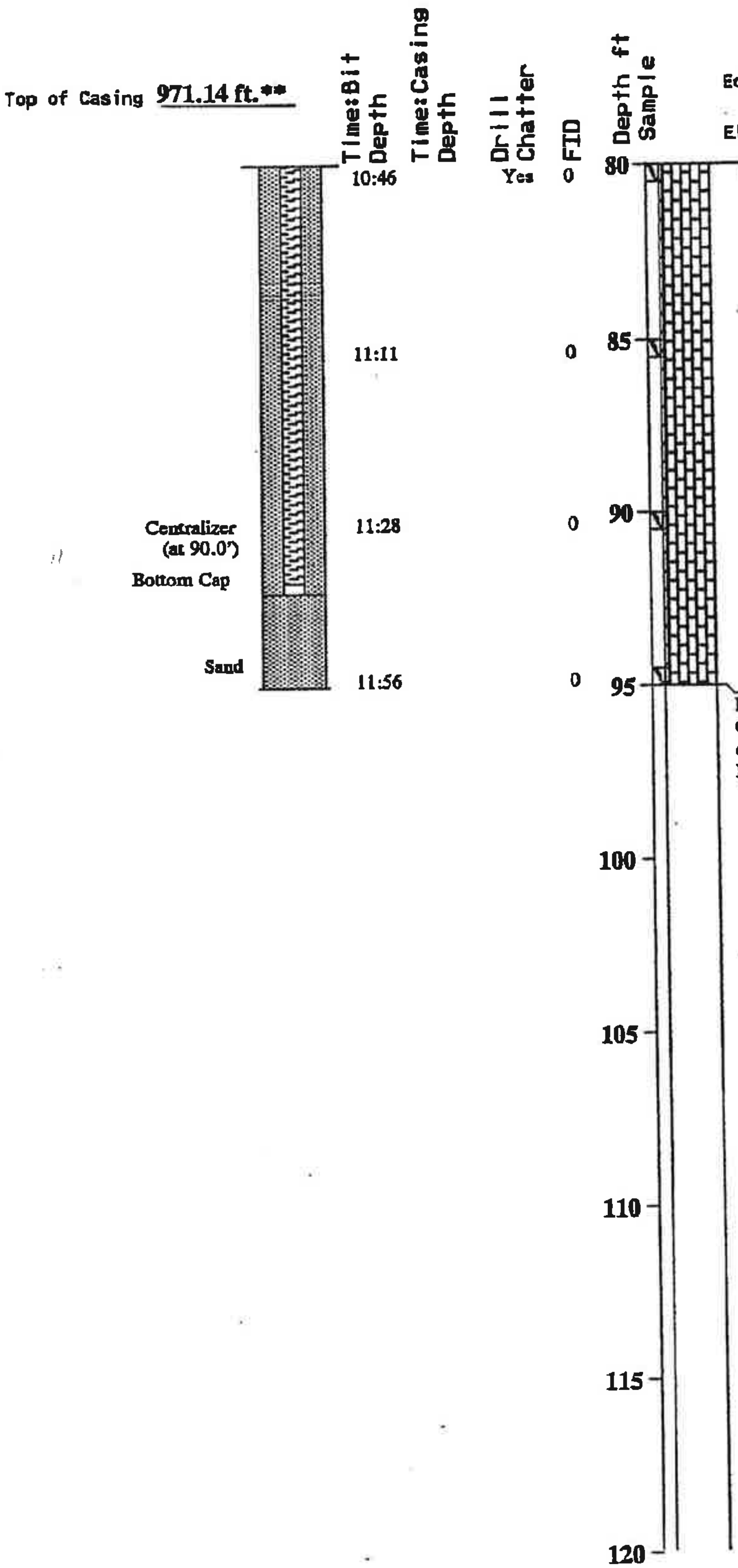
DRAWN	PROJECT NUMBER-TASK	APPROVED	DATE	REVISED DATE
JCM	27533.5	MR	10/94	

27533.5\W-4.TEMF

Top of Casing **971.14 ft.****

Equipment **AIR ROTARY/CASING**

Elevation **971.67 ft.** Date **3/20/94**



cuttings 0.5" to 0.2" in size, moderately weathered, decrease in Fe-Oxide staining

cuttings 0.3" to 0.2" in size, hard, moderately strong, some pieces have extensive Fe-Oxide staining

cuttings 0.2" to 0.1" in size, strong, little weathering

Boring terminated at 95.0 feet on 3/20/94.
Groundwater encountered at 22.0 feet during drilling.
Boring converted to Well PO3B on 3/20/94.

HLA Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring PO3B

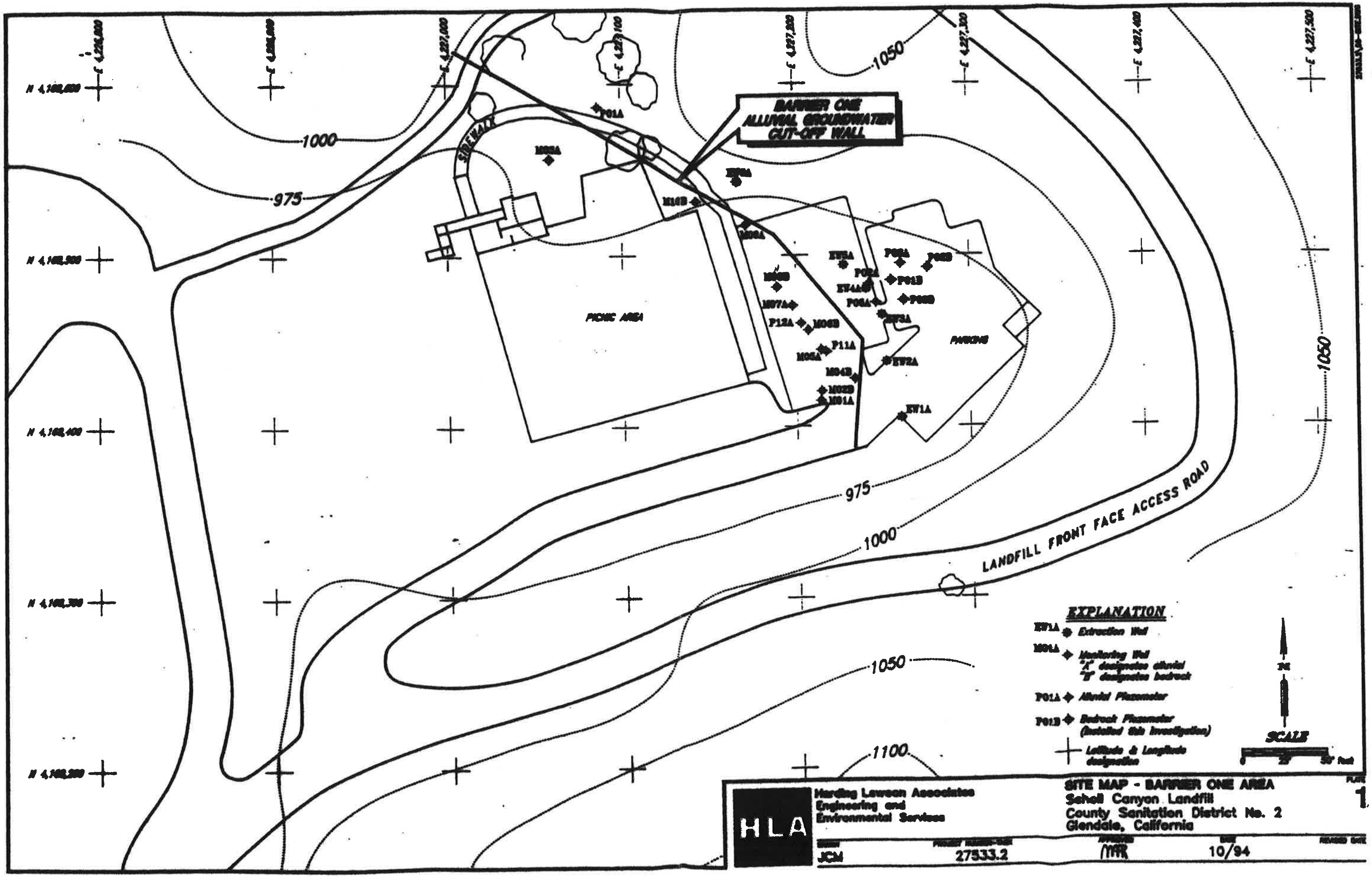
(sheet 3 of 3)

County Sanitation District No. 2

Scholl Canyon Landfill

PLATE
C12

DRAWN	PROJECT NUMBER–TASK	APPROVED	DATE	REVISED DATE
JCM	27533.5	MAR	10/94	



HLA

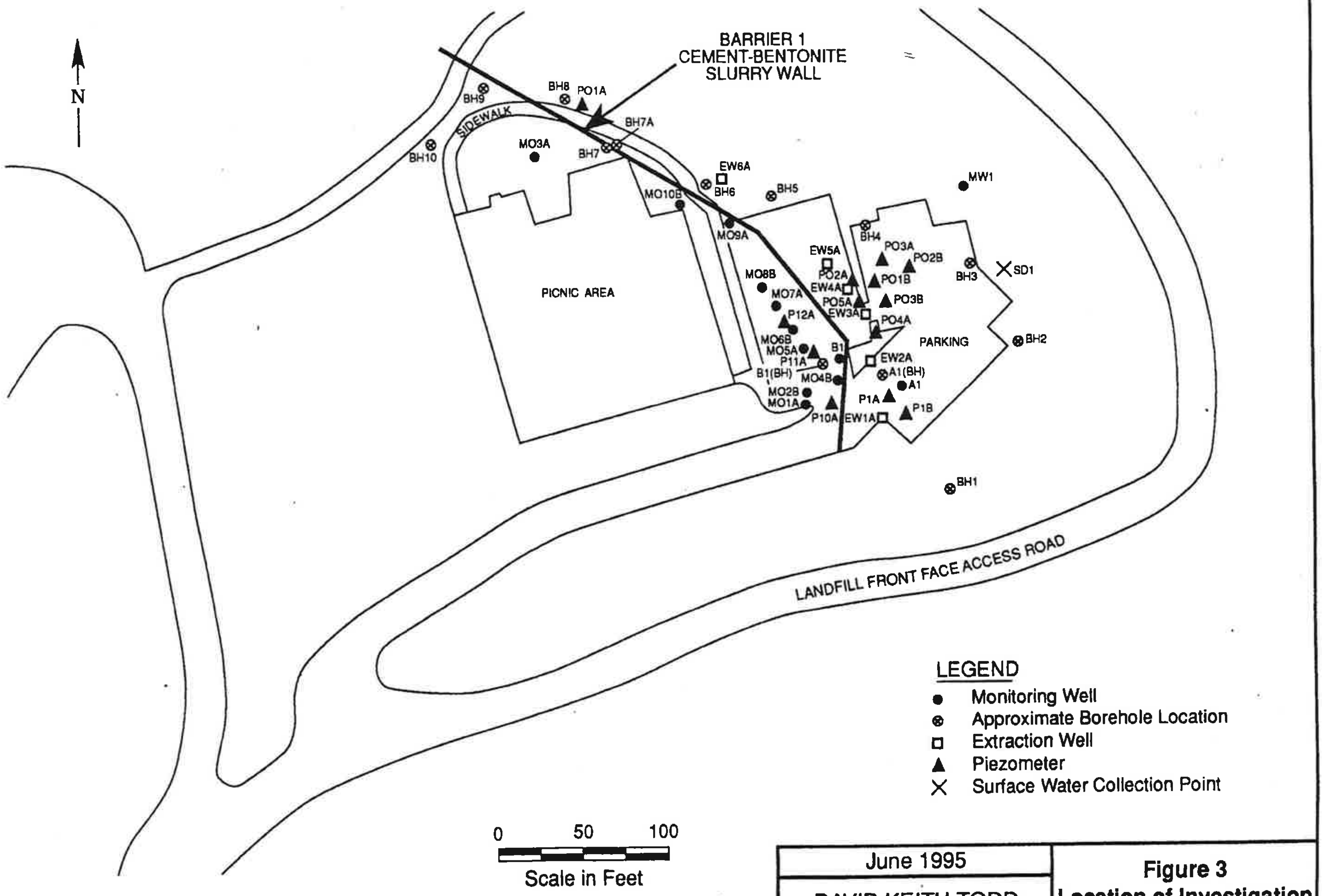
Harding Lawson Associates
Engineering and
Environmental Services

SITE MAP - BARRIER ONE AREA
Scholl Canyon Landfill
County Sanitation District No. 2
Glendale, California

PLATE
1

DRAWN	PROJECT NUMBER-TASK	APPROVED	DATE	REVISED DATE
JCM	27533.2	MFR	10/94	

DAVID KEITH TODD CONSULTING ENGINEERS, INC.
1995



From: Harding Lawson Associates, 1994.

June 1995

DAVID KEITH TODD
Consulting Engineers, Inc.
Berkeley, California

Figure 3
Location of Investigation and Monitoring Points at Barrier I

Corporation

WELL CONSTRUCTION LOG

PROJECT NAME: SCHOLL CANYON LANDFILL

PROJECT NUMBER: 87-613-0001

WELL LOCATION: SCHOLL CANYON PARK, AREA 1

LOGGED BY: D.H. RANDELL

DEPTH TO WATER (FEET FTOC): 23.94 12/18/86

DRILLING CO.: DATUM EXPLORATION, INC.

DRILLER: DINO

RIG TYPE: MOBILE DRILL B-80

DRILLING METHOD: ROTARY WASH (WATER)

BOREHOLE DIAMETER (INCHES): 10 (9 7/8" BIT)

SAMPLING METHOD: GRAB/SPLITSPOON

SAMPLING INTERVAL (FEET): 10'/BEDROCK

TOTAL DEPTH DRILLED (FEET): 65

CASING TYPE: STAINLESS STEEL, ASTM A312/SA-312TP-316L, HEAT 9467

CASING DIAMETER (INCHES I.D.): 4

SCREEN TYPE: STAINLESS STEEL AS ABOVE, WIRE WOUND

SLOT SIZE (INCHES): 0.02"

SCREENED INTERVAL (FEET): 55.5 TO 45

CASING INTERVAL (FEET): 45 TO 0.25

FILTER PACK: LONESTAR #2/12 MONTEREY TYPE SAND

FILTER INTERVAL (FEET): 58 TO 41.5

BENTONITE SEAL (FORM): VOLCLAY BENTONITE TABLETS 1/4"

BENTONITE INTERVAL (FEET): 41.5 TO 35

GROUT TYPE: PORTLAND I-II LOW ALKALI CEMENT

PERCENT BENTONITE IN GROUT: 5

GROUT INTERVAL (FEET): 35 TO 2

WELLHEAD: FLUSH-MOUNTED, SCREW-LOCK CHRISTY BOX 3" ABOVE GRADE, 2 INNER LOCKING CAP

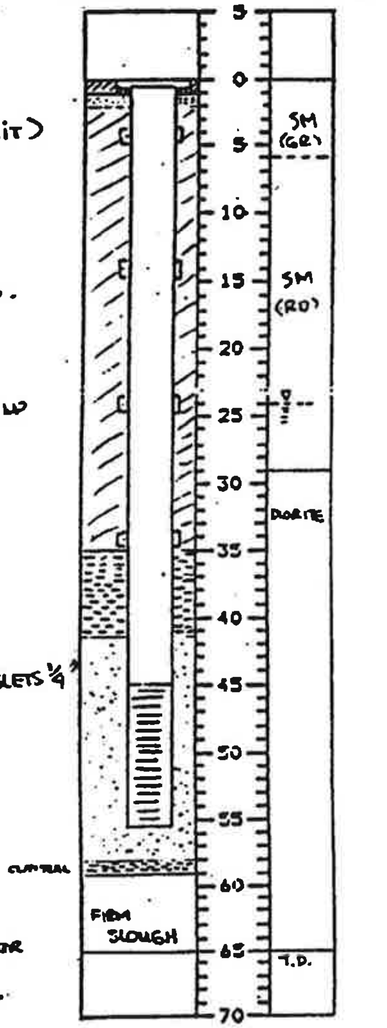
COMMENTS: CHRISTY BOX PLACED ON 1-FOOT BED OF LONESTAR #2/12 SAND, WITH 2 3-INCH STEEL DRAIN PIPES EMBEDDED IN CONCRETE, WELDED BOTTOM PLATE. SCREEN "EXTEND HAD 2" BLANK AT BOTTOM AND 4" BLANK AT TOP. (TOTAL 10.5'). CENTRALIZERS EVERY 10', STARTING AT 35' (BRAINARD-KILMAN RK T-4C)

DRILLING PROGRESS

DATE	START	FINISH
12/18/86	12:00p	4:57p

WELL SKETCH
(DEPTH IN FEET)

CONSTRUCTION GEOLOGIC



The Earth Technology Corporation

BORING LOG

Project Name: SCHOLL CANYON LANDFILL, PUMPING TESTS

Project Number: 87-613-0001 **Field Log of Boring Number:** B1 (2) M04B **Sheet** 1 **of** 2

Boring Location: SCHOLL CANYON PARK, AREA 1		**Elevation and Datum:**	
Drilling Agency: DATUM EXPLORATION	**Driller:** DINO	**Date Started:** 12/8/86	**Date Finished:** 12/9/86
Drilling Equipment: MOBILE DRILL B-80		**Completion Depth (feet)** 65	**Rock Depth: (feet)** 29
Method of Drilling: ROTARY WASH (WATER)		**Number of Samples:** 2 **Dist.:** 2	**Undist.:** — **Core:** —
Borehole Size: 10"		**Water Depth (ft):** **First:** ~25	**Compl.:** — **24 hrs.** —
Type of Perforation Backfill: LONESTAR #2/12 FILTER PACK .02 STAINLESS STEEL 316L WIRE-WOUND		**Logged By:** D.H. RANDELL	**Checked by:**
Type of Seal: VOLCLAY BENTONITE TABLETS 1/4"			

Depth (feet)	Description	Graphic Log		Samples			Drilling Rate/Time	Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count		
	4" ASPHALTIC CONCRETE						12:03	START DRILL
	SILTY SAND, GEN'LY W. GRADED, ANG TO SUBANG, DK GR, NO ODOR, DRY TO SL. MOIST, LOOSE TO V. LOOSE, HOMOGENEOUS, NO HCL, NO CEMENT, SM.	SM						
5								
	SILTY SAND, GEN'LY W. GRADED, MPS 2", 95, S50, FIS, ANG, LT BR, SL. MOIST, SL EARTHY ODOR, MED DENSE, HOMOGENEOUS, NO HCL, NO CEMENT, SM.							
10	SAME AS ABOVE	SM	—	1		5 19	12:22	1ST 8" = SOIL 2ND 10" = SLOUGH
15								
20	WASH CUTTINGS OBSERVED AS MED. SAND (+20), ANG TO SUBANG, SOME IRON-STAINING, LT BR AND WHITE, SOME BLACK GRAINS.	—	—	—	G	—	12:38	MF. PIRCH ON SITE 12:50
							12:55	22' DRILL CHATTER
25							12:58	25' LOST DRILLING WATER TO 13.5' BELOW GRADE. PROB. HIT GROUNDWATER
								27' ADDING WATER TO MUD TANK. WATER METER READINGS WILL FOLLOW.
								28'; 199.15 ft^3 → HARD DRILLING
30	DIORITE, LTBR + DBR, HIGHLY WEATHERED, CLAYEY, MASSIVE, SOME IRON-STAINING.	DIORITE	—	2		33 >91	1:16	PHOTOGRAPHS 1 AND 2

The Earth Technology Corporation

BORING LOG

Project name: SCHOLL CANYON LANDFILL PUMPING TESTS

Project Number: 87-613-0001 Field Log of Boring Number: B4 (-2) M04 B Sheet 2 of 2

Depth (feet)	Description	Graphic Log		Samples				Remarks
		Lithology	OVA (ppm)	Number	Type	Blow Count	Drilling Rate/Time	
	29' SAMPLE CONTINUED TO 30.5'							
35								
							1:39 1:55	39' HARD DRILLING ADDED HEAVIER DRILLCOLLAR
40								
							2:09	43' CONSTANT DRILL CHATTER
45	WASH CUTTINGS OBSERVED AS, MED. SAND (+20), ANG TO SUBANG, SAME AS AT 20'.	—	—	—	G	—	2:09	
							2:22	WATER METER 212.58 ft^3 GOOD CUTTINGS RETURN. MED SAND W/SILT
50							2:43 2:46	50' WATER METER 215.79 ft^3 PHOTO 3 GEN'L RIG SHOT
							3:02	53' STEADY, HARD DRILLING WATER METER 218.15 ft^3
55							3:15	55' STEADY, HARD DRILLING CONSTANT CHATTER
							3:46	58' WATER METER 221.65 ft^3
60							4:19	60' WATER METER 223.13 ft^3
							4:40	62 WATER METER 227.58 ft^3
							4:57	64' WATER METER 231.42 ft^3
65	TOTAL DEPTH 65'							FINAL WATER METER 233.45 ft^3, 5:10 FROM 60' TO 65' REPEATEDLY CIRCULATED TO REMOVE CUTTING. SUSPENDED CUTTING FALL INTO B'HOLE
70								

EARTH TECH, INC.

1996

EARTH TECH

WELL NUMBER : PO4B

CONSTRUCTION PROGRESS

DATE	START	FINISH
9/26/95	11:30 a.m.	
9/27/95		5:00 p.m.

WELL CONSTRUCTION LOG

PROJECT NAME : Scholl Canyon

PROJECT NUMBER : 85-8358

WELL LOCATION/ELEVATION (FROM TOP OF CASING):

LOGGED BY : Pat Smith

DEPTH TO FIRST ENCOUNTERED WATER (FEET FROM GROUND SURFACE): 22

DEPTH TO STATIC WATER (FEET FROM GROUND SURFACE AND DATE) MEASURED): 22.52 10/1/95

DRILLING CO. : H-F Drilling, Inc.

DRILLER : Vern

RIG TYPE : Mobile B-61

DRILLING METHOD : Air and Mud Rotary, Hollow-Stem Auger to 15.0'

BOREHOLE DIAMETER (INCHES) : 6.25

SAMPLING METHOD : HQ Core, Drive Samples to 15.0'

SAMPLING INTERVAL (FEET) : Variable

TOTAL DEPTH DRILLED (FEET) : 275.0

CASING TYPE : Schedule 80 PVC

CASING DIAMETER (INCHES I.D.) : 2

SCREEN TYPE : Schedule 80 PVC

SLOT SIZE (INCHES) : 0.01

SCREENED INTERVAL (FEET FROM GROUND SURFACE) : 245.5 TO 260.5

CASING INTERVAL (FEET FROM GROUND SURFACE) : 0.5 TO 245.5

FILTER PACK : #2/12 Monterey Sand

FILTER INTERVAL (FEET FROM GROUND SURFACE) : 240.0 TO 269.0

TRANSITION SEAL (FORM) : #0/30 Sand and $^1/_2$" Pel Plug TR30 Coated Pellets

TRANSITION SEAL INTERVAL (FEET FROM GROUND SURFACE) :

232.0 to 235.0 Bentonite Pellets and 235.0 to 240.0 #0/30 Sand

BACKFILL (FORM): Volclay Grout

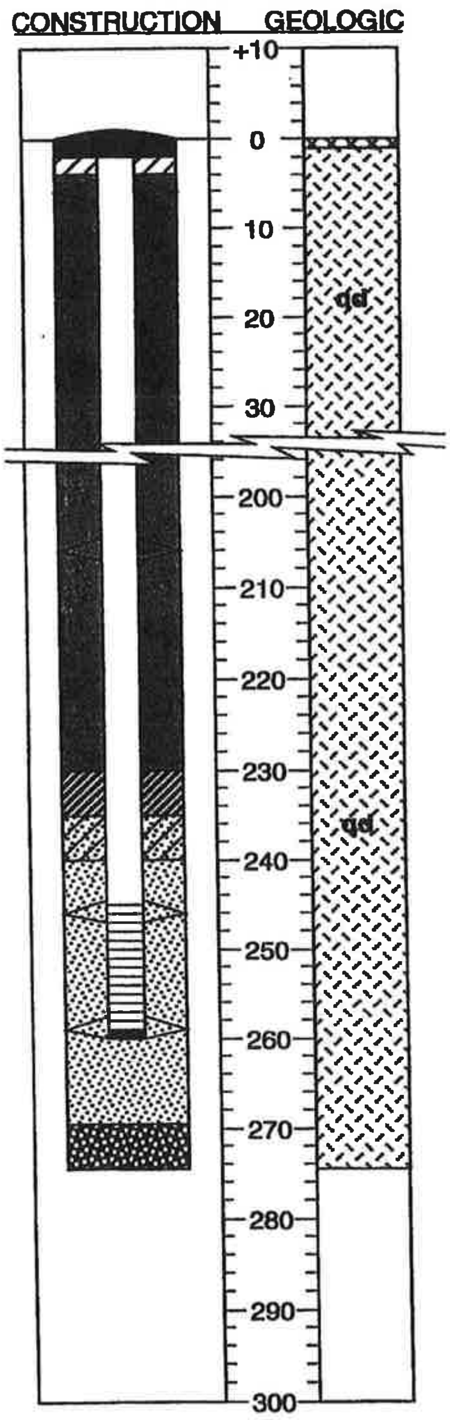
BACKFILL INTERVAL (FEET FROM GROUND SURFACE) : 1.0 TO 232.0

WELLHEAD : Traffic Box

COMMENTS : <> = Centralizers; See Construction Diagram.

Slough from 269.0' to 275.0'.

WELL SKETCH
(DEPTH IN FEET)



EARTH TECH

WELL NUMBER : PO5B

CONSTRUCTION PROGRESS

DATE	START	FINISH
9/29/95	6:00 a.m.	
9/29/95		5:30 p.m.

WELL CONSTRUCTION LOG

PROJECT NAME : Scholl Canyon

PROJECT NUMBER : 85-8358

WELL LOCATION/ELEVATION (FROM TOP OF CASING):

LOGGED BY : Pat Smith

DEPTH TO FIRST ENCOUNTERED WATER (FEET FROM GROUND SURFACE): 21

DEPTH TO STATIC WATER (FEET FROM TOP OF CASING AND DATE MEASURED): 15.60 10/2/95

DRILLING CO. : H-F Drilling, Inc.

DRILLER : Vern

RIG TYPE : CME 85

DRILLING METHOD : Mud Rotary, Hollow-Stem Auger to 8 Feet

BOREHOLE DIAMETER (INCHES) : 6.25

SAMPLING METHOD : HQ Core

SAMPLING INTERVAL (FEET) : Variable

TOTAL DEPTH DRILLED (FEET) : 275.0

CASING TYPE : Schedule 80 PVC

CASING DIAMETER (INCHES I.D.) : 2

SCREEN TYPE : Schedule 80 PVC

SLOT SIZE (INCHES) : 0.01

SCREENED INTERVAL (FEET FROM GROUND SURFACE) : 205.0 TO 215.0

CASING INTERVAL (FEET FROM GROUND SURFACE) : 0.3 TO 205.0

FILTER PACK : #2/12 Monterey Sand

FILTER INTERVAL (FEET FROM GROUND SURFACE) : 195.0 TO 222.0

TRANSITION SEAL (FORM) : $^1/_2$" Pel Plug TR30 Coated Pellets

TRANSITION SEAL INTERVAL (FEET FROM GROUND SURFACE) : 186.0 TO 195.0

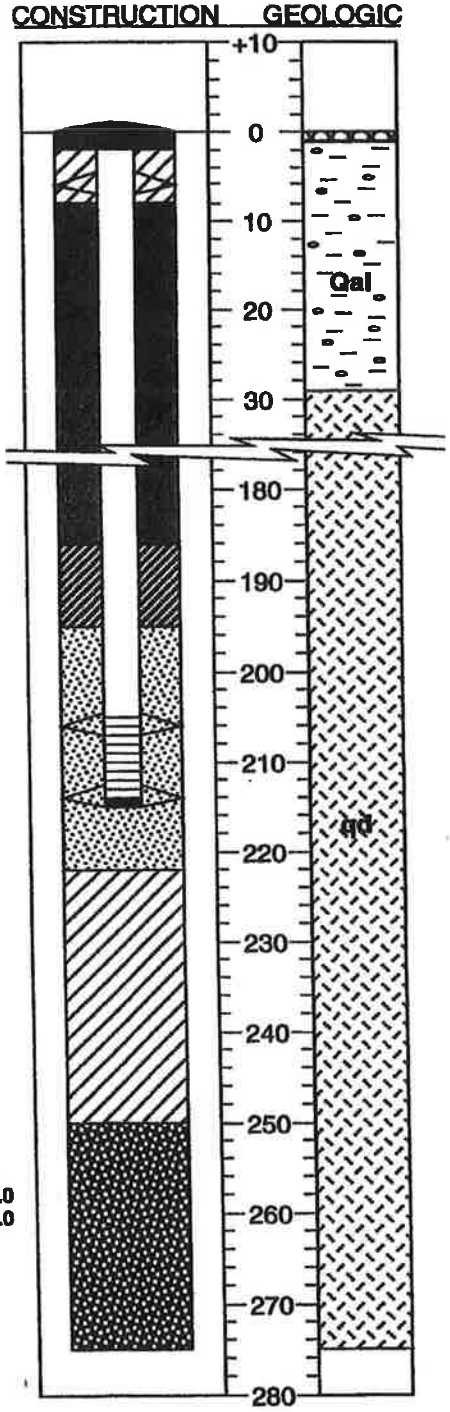
UPPER/LOWER BACKFILL (FORM): Enviro Plug & Volclay Grout/Enviro Plug Med. Chips

UPPER/LOWER BACKFILL INTERVAL (FEET FROM GROUND SURFACE): 1.0 TO 186.0 / 222.0 TO 250.0

WELLHEAD : Traffic Box

COMMENTS : <> = Centralizers; See Construction Diagram. Sloughed material from 250.0' to 275.0'.

WELL SKETCH
(DEPTH IN FEET)



EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon	Project No: 95-8358-20
Northing: Easting:	Surface Elevation:	Boring No: P04B
Hole Angle (-90=vertical): -90.0	Bearing: ——	Depth: 275.0 Depth water Table (BGS): 22.00
Started: 8/21/95	Finished: 8/31/95	Core Barrel Diameter: 2.5" No of Core Boxes: 5
Drilling Agency: H-F Drilling Drilling Equipment: Mobile B-61	Drilling Method: HSA/Rotary Core/Rotary Tri-cone Drilling Fluid: Misted Water (0-102'), Water & Bentonite (102-275')	
Logged By: Pat Smith	Checked By: Grant Miller	Page No 1 of 12

The data presented in this log is a simplification of actual conditions encountered and applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change with the passage of time.

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/Blow count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
	D1	9:16		100	140 lbs /18"				Asphalt and base.		Hollow-stem Auger 0-15 feet.
	D2	9:17 9:20		75					QUARTZ DIORITE (qd); Very pale orange and dusky yellowish brown (10YR 8/2 and 2/2); medium to very coarse (.25-2mm) phaneritic; decomposed to intensely weathered; very soft; quartz/plagioclase and orthoclase feldspar/hornblende/biotite; dry.	W9/ W7	
	D3	9:21 9:28		100	120						
5	D4	9:29 9:40		50	210						
	D5	9:41 10:32		10	160						
	D6	10:33 10:40		50	130						
	D7	10:41 10:47		75	140						
10	D8	10:48 10:56		100	170						
	D9	10:57 11:03		100	200				@12': Two fractures, very closely spaced, slightly open, rough, very thin clay filling.		
	D10	11:04 11:12		50	250						
	D11	11:13 11:18		75	100						
	D12	11:19 11:26		100	250						
15	R13	11:27 12:30		60	0				@15': Moist; moderately soft.		Air Rotary coring with diamond surface set bit 15-96 feet.
	R14	12:31 12:36		5	0				@17.5': Fracture, slightly open, rough, very thin clay filling.		
20							Fracture dips 50°. Fracture dips 20°.				

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	**Project:** Scholl Canyon		**Project No:** 95-8358-20	
Northing:	**Easting:**	**Surface Elevation:**	**Boring No:** P04B	
Logged By: Pat Smith	**Checked By:** Grant Miller		**Page No** 2 of 12	

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
	R15	12:36 12:41		50	0				QUARTZ DIORITE; very pale orange and dusky yellowish brown (10YR 8/2 and 2/2); medium to very coarse (.25-2mm) phaneritic; decomposed to intensely weathered; very soft; quartz/plagioclase and orthoclase feldspar/ hornblende/ biotite; dry.	W9/ W7	
	R16	12:42 12:47		0	0				@22': First groundwater; becomes soft.		Free groundwater encountered at 22 feet.
25											
	R17	12:49 12:55		100	0				@ 26': Moderately weathered; moderately hard.	W5	
							Fracture dips 15°. Fracture dips 30°. Fracture dips 5°.		@28': Fractures, very close, slightly open, rough, very thin clay filling.		FID 0/0.
	R18	12:58 13:04		0	0						
30											
	R19	13:06 13:11		0	0						
	R20	13:12 13:17		0	0						
35											
	R21	13:19 13:25		0	0						
	R22	13:56		0	0						
40											
	R23	14:00 14:08		75	0						
											Sample pulverized; FID 0/0.
	R24	14:12 14:15		0	0						
	R25	14:25 14:29		90	0						Sample pulverized.
45											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon	Project No: 95-8358-20
Northing: Easting:	Surface Elevation:	Boring No: P04B
Logged By: Pat Smith	Checked By: Grant Miller	Page No 3 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
	R26	14:33 14:38		0	0				**QUARTZ DIORITE**; See above.	W5	
	R27	14:41 14:48		0	0						
	R28	14:52 14:57		50	0				**GOUGE**: SANDY SILTY CLAY (CL); medium dark gray (N4); 70% low plastic clay, 20% angular to subangular quartz/feldspar sand, 10% angular to subrounded quartz diorite rock fragments to 1/2"; firm to stiff; wet.	W1	Sample pulverized.
	R29	15:01 15:06		0	0						
50	R30	15:16 15:25		0	0						
	R31	15:29 16:05		0	0						
	R32	16:07 16:16		0	0						
	R33	16:47		0	0						
55											
	R34	16:51 8:08		0	0						Drilling stopped at 56 feet on 8/21/95 and resumed on 8/22/95.
	R35	8:10 8:38		0	0						
60	R36	8:51 8:50		0	0						
65											
	R37	9:21 9:47		100	0						Rotary coring with no air circulation.
	R38	9:50 10:01 10:06		80	0						
	R39	10:08		20	0						
70	R40	10:12		20	0						

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	**Project:** Scholl Canyon	**Project No:** 95-8358-20
Northing: **Easting:**	**Surface Elevation:**	**Boring No:** P04B
Logged By: Pat Smith	**Checked By:** Grant Miller	**Page No** 4 **of** 12

Depth in feet	Sample Type and Number	Begin and End Times	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Description	Weathering	Tests and Remarks
	R41	10:22 10:29 10:32	0	0			GOUGE: SANDY SILTY CLAY (CL); medium dark gray (N4); 70% low plastic clay, 20% angular to subangular quartz/feldspar sand, 10% angular to subrounded quartz diorite rock fragments to 1/2"; firm to stiff; wet.	W1	Drilling becomes hard, resumed air circulation.
	R42	10:57 11:00	0	0					Drilling becomes fast (soft).
	R43	11:13 11:18	0	0			@74.5': Sample composed of medium gray (N5); 70% angular to subangular, well graded, quartz/feldspar sand, 15% low plastic silt and clay, and 15% angular to subrounded quartz diorite rock fragments to 1/2"; dessiminated calcium carbonate; very dense; wet.		
75	R44	11:21 11:27	100	0					FID 0/0
	R45	11:32 11:43	0	0					
	R46	11:46 11:54	0	0					
	R47	12:00 12:04	80	0					Driller uses 3-piece shoe.
80	R48	12:10 12:17	5	0					
	R49	12:20 12:27	50	0					
	R50	12:32 12:45	85	0		Fault/Shear dips 50°. Horizontal fault/shear.			Drilling becomes slow (hard); discontinue use of 3-piece shoe, used misted water; FID 0/0.
	R51	12:51 13:01	0	0					
85									
	R52	13:20 13:28	0	0					
	R53	13:32 14:15	0	0					
	R54	14:25 8:32	10	0					Drilling stopped at 88 feet on 8/22/95 and resumed on 8/23/95.
90	R55	8:37 9:43	0	0		Fractures dip 40° & 60°.	@89': Fractures are very close, tight to slightly open, rough, clean to very thin calcite/serpentine/chlorite (?) infilling and coating.		Driller reports cavity forming.
	R56	9:50 9:52	0	0					
95									

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts
Project: Scholl Canyon
Project No: 95-8358-20
Northing:
Easting:
Surface Elevation:
Boring No: P04B
Logged By: Pat Smith
Checked By: Grant Miller
Page No 5 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
		9:58 11:38							GOUGE: Cuttings indicate WELL GRADED SAND with SILT and GRAVEL; medium gray (N5); 70% angular to subangular quartz/feldspar sand; 15% angular to subrounded quartz diorite rock fragments to 1/2"; 15% low plastic silt and clay; dessiminated calcium carbonate; very dense; wet; micaceous.	W1	Borehole sands up to 69 feet when air shuts off. Air Rotary drilling with tri-cone bit 96-102 feet.
100											
	R57	12:00 12:06		0	0						Air Rotary coring with new diamond surface set bit 102-166 feet. Drilling stopped at 103 feet on 8/23/95 and resumed on 8/24/95 using mud rotary.
	R58	12:15 9:53		25	0						
									QUARTZ DIORITE; medium gray (N5); medium to very coarse (.25-2mm) phaneritic; fresh; alternating very soft to very hard; quartz/plagioclase and orthoclase feldspar/hornblende/biotite; dry.		
105	R59	10:38 11:50		0	0						
110	R60	12:13 12:51		0	0						Cuttings grab core barrel causing release of samples.
115	R61	13:19 14:10		0	0						
	R62	14:20 15:13		0	0						
	R63	15:29 11:15		0	0						Drilling stopped at 118 feet on 8/24/95 and resumed on 8/25/95.
	R64	11:50		5	0						
120											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts
Project: Scholl Canyon
Project No: 95-8358-20
Northing:
Easting:
Surface Elevation:
Boring No: P04B
Logged By: Pat Smith
Checked By: Grant Miller
Page No 6 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
		12:41							QUARTZ DIORITE (qd) ; medium gray (N5); medium to very coarse (.25-2mm) phaneritic; fresh; alternating hard to very hard; quartz/plagioclase and orthoclase feldspar/hornblende/biotite; dry.	W1	
	R65	13:21		0	0						
125											
	R66	15:16 10:05		0	0						Drilling stopped at 127 feet on 8/25/95 and resumed on 8/28/95.
	R67	10:15 10:35		85	0						Very fast drilling from 129-131 feet (gouge?).
130							Multiple fractures dip 70°, 70°, 80°, 40°, 40°, 40° and 40°.		@130': Fractures are extremely close, tight to slightly open, slightly rough to rough, clean to very thin calcite/ serpentine/chlorite infilling and coating.		
	R68	10:54 11:00		20	0						
135											
	R69	11:16 11:20		3	0		Multiple fractures dip 90°, 50°, 70° and 60°.				
140											
	R70	11:35 11:42		40	0		Multiple fractures dip 10°, 60°, 25° and 60°.		GOUGE: SANDY SILTY CLAY (CL); medium dark gray (N4); 70% low plastic clay, 20% angular to subangular quartz/feldspar sand, 10% angular to subrounded quartz diorite rock fragments to 1/2"; becomes to soft; wet.		
145											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon	Project No: 95-8358-20
Northing: Easting:	Surface Elevation:	Boring No: P04B
Logged By: Pat Smith	Checked By: Grant Miller	Page No 7 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
	R71	11:59 12:16		40	0				GOUGE: SANDY SILTY CLAY (CL); medium dark gray (N4); 70% low plastic clay, 20% angular to subangular quartz/feldspar sand, 10% angular to subrounded quartz diorite rock fragments to 1/2"; firm to stiff; wet.	W1	
	R72	12:31 15:01		30	0		Multiple fractures dip 35°, 35°, 50° and 60°.		QUARTZ DIORITE (qd); medium gray (N5); medium to very coarse (.25-2mm) phaneritic; fresh; soft; quartz/plagioclase and orthoclase feldspar/hornblende/biotite; dry; fractures are extremely close, tight to slightly open, slightly rough to rough, clean to very thin calcite/serpentine/chlorite (?) infilling and coating.		
150											
									@152': Fractures are tight and clean.		Drilling stopped at 153 feet on 8/28/95 and resumed on 8/29/95.
	R73	15:30 8:48		0	0		Multiple fractures dip 90°, 60°, 40°, 30° and 40°, Foliation dips 55° to 60°.				
155									@155': Becomes foliated.		
	R74	8:58 9:00		5	0						
160											
	R75	9:16 10:58		20	0		Foliation dips 55°.				
165							Foliation dips 55°.		@165': Fractures are extremely close, tight to slightly open, slightly rough to rough, clean to very thin calcite/serpentine/chlorite (?) infilling and coating.		
		11:27 14:36									Mud Rotary drilling with tri-cone bit 166-190 feet.
170											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts
Project: Scholl Canyon
Project No: 95-8358-20
Northing:
Easting:
Surface Elevation:
Boring No: P04B
Logged By: Pat Smith
Checked By: Grant Miller
Page No 8 **of** 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
									QUARTZ DIORITE (qd); Cuttings indicate medium gray (N5); medium to coarse (.25-2mm) phaneritic; fresh; alternating very soft to very hard; quartz/ plagioclase and orthoclase feldspar/ hornblende/biotite; dry.	W1	
		14:42									
175		14:55 15:18									
180		15:32									
185		15:48 16:07									
190	R76	16:18 17:01		4	0						Mud Rotary coring with diamond surface set bit 190-195 feet.
195							Foliation dips 55°.				

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon	Project No: 95-8358-20
Northing:	Easting:	
Surface Elevation:		Boring No: P04B
Logged By: Pat Smith	Checked By: Grant Miller	Page No 9 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
		17:26							**QUARTZ DIORITE (qd)**; Cuttings indicate medium gray (N5); medium to coarse (.25-2mm) phaneritic; fresh; alternating very soft to very hard; quartz/ plagioclase and orthoclase feldspar/ hornblende/biotite; dry.	W1	Drilling stopped at 195 feet on 8/29/95 and resumed on 8/30/95 using mud rotary tri-cone drilling 195-220 feet. Borehole collapsed to approx. 100 feet.
200		8:09									
205		8:18 8:27									
210		8:35									
215		8:47 9:12									
220											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon	Project No: 95-8358-20
Northing: Easting:	Surface Elevation:	Boring No: P04B
Logged By: Pat Smith	Checked By: Grant Miller	Page No 10 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
	R77	9:20							QUARTZ DIORITE (qd); Cuttings indicate medium gray (N5); medium to coarse (.25-2mm) phaneritic; fresh; alternating very soft to very hard; quartz/ plagioclase and orthoclase feldspar/ hornblende/biotite; dry.	W1	Mud Rotary coring with diamond surface set bit 220-225 feet.
225		10:19 11:00					Multiple fractures dip 90°, 60°, 90°, 25°, 50° and 70°.		@224.5': Massive; feldspar content increases.		Mud Rotary drilling with tri-cone bit 225-250 feet.
230		11:10									
235		11:20 11:28									
240		11:40									
245											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts
Project: Scholl Canyon
Project No: 95-8358-20
Northing:
Easting:
Surface Elevation:
Boring No: P04B
Logged By: Pat Smith
Checked By: Grant Miller
Page No 11 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
		11:50							QUARTZ DIORITE (qd); Cuttings indicate medium gray (N5); medium to coarse (.25-2mm) phaneritic; fresh; alternating very soft to very hard; quartz/ plagioclase and orthoclase feldspar/ hornblende/biotite; dry.	W1	
250	R78	12:20 13:09		15	0						Mud Rotary coring with diamond surface set bit 250-257 feet.
							Multiple fractures dip 70°, 50°, 40° and 60°.		@252.5 & 253.5': Fractures are extremely close, tight to slightly open, slightly rough to rough, clean to very thin calcite/serpentine/chlorite (?) infilling and coating.		
	R79	13:55 14:17		40	0		Multiple fractures dip 50°, 70° and 25°.				
	R80	15:27 10:40		5	0						Drilling stopped at 254 feet on 8/30/95 and resumed on 8/31/95.
255											
		11:14 12:44					Multiple fractures dip 50°, 50°, 70°, 20°, 60° and 50°.		@256.7': Fractures are extremely close, tight to slightly open, slightly rough to rough, clean to very thin calcite/serpentine/chlorite (?) infilling and coating.		Mud Rotary drilling with tri-cone bit 257-275 feet.
260		13:21 13:45									
265		14:02 14:12									
270											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon	Project No: 95-8358-20
Northing: Easting:	Surface Elevation:	Boring No: P04B
Logged By: Pat Smith	Checked By: Grant Miller	Page No 12 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
		14:29 //							QUARTZ DIORITE (qd); Cuttings indicate medium gray (N5); medium to coarse (.25-2mm) phaneritic; fresh; alternating very soft to very hard; quartz/ plagioclase and orthoclase feldspar/ hornblende/biotite; dry.	W1	
275		16:27							Borehole terminated at 275 feet. First groundwater observed at approx. 22 feet.		Drilling ended on 8/31/95.
280											
285											
290											
295											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon	Project No: 95-8358-20
Northing: Easting:	Surface Elevation:	Boring No: P05B
Hole Angle (-90=vertical): -90.0	Bearing: ------	Depth: 275.0
		Depth water Table (BGS): 21.00
Started: 9/18/95	Finished: 9/22/95	Core Barrel Diameter: 2.5"
		No of Core Boxes: 2
Drilling Agency: H-F Drilling Drilling Equipment: CME 75	Drilling Method: HSA/Rotary Core/Rotary Tri-cone Drilling Fluid: Water & Bentonite (8-275')	
Logged By: Pat Smith	Checked By: Grant Miller	Page No 1 of 12

The data presented in this log is a simplification of actual conditions encountered and applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change with the passage of time.

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/Blow count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
		8:52			140 lbs /18"				Asphalt and base.		Begin drilling with HSA to 8 feet. Set conductor casing to 8 feet.
									ALLUVIUM (Qal) SANDY SILT (ML); dark yellowish brown (10YR 4/2); 70% low plastic silt, 30% fine to coarse, subangular sand; firm; moist.		
5		8:53 8:56									
	R1	8:58 11:49		0							Mud Rotary coring 8-49 feet using 4.5-inch surface set diamond bit.
10											
	R2	11:56 12:21		10					@11': Color changes to moderate brown (5YR 4/4); grades to 55% silt, 40% sand, trace angular to subangular, gravel-sized quartz diorite rock fragments.		
	R3	12:26 12:34		10							
	R4	12:38 13:02		0							
15											
	R5	13:05 13:17		0							
	R6	13:19 13:21		60							
	R7	13:26 14:17		100							
20											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon		Project No: 95-8358-20
Northing:	Easting:	Surface Elevation:	Boring No: **P05B**
Logged By: Pat Smith	Checked By: Grant Miller		Page No 2 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
	R8	14:22 14:36		100					ALLUVIUM (Qal) SANDY SILT (ML); moderate brown (5YR 4/4); grades to 55% silt, 40% sand, trace angular to subangular, gravel-sized quartz diorite rock fragments; firm; moist.		FID=0/0. Free groundwater indicated by driller at 21 feet.
	R9	14:43 14:50 " 14:54		0							
	R10			75					SILTY SAND (SM); moderately brown (5YR 44); 60% fine to coarse, angular to subangular sand, 30% low plastic silt, 10% fine to coarse, angular, gravel-sized quartz diorite rock fragments; dense; wet,; micaceous.		Drilling stopped at 23 feet on 9/18/95 and resumed on 9/19/95.
25											
	R11	9:49 9:58		1	0						
									QUARTZ DIORITE (qd); medium gray (N5) to very pale orange (10YR 8/2); medium to coarse grained (.25-2mm), phaneritic; moderately weathered to fresh; hard to very hard; plagioclase and orthoclase feldspar /quartz/hornblende/biotite; dry; occurring with intervals of very soft clay; fractures, very close, tight to slightly open, rough, thin iron-oxide staining.	W5-W1	Drilling becomes hard.
30											
	R12	10:42 11:27		5	0		Vertical fractures.				
35											
40											FID=0/0.
	R13	12:08 13:50		0	0						
45											

E A R T H T E C H

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts
Project: Scholl Canyon
Project No: 95-8358-20
Northing:
Easting:
Surface Elevation:
Boring No: P05B
Logged By: Pat Smith
Checked By: Grant Miller
Page No 3 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
									<u>QUARTZ DIORITE (qd)</u>; medium gray (N5) to very pale orange (10YR 8/2); medium to coarse grained (.25-2mm), phaneritic; moderately weathered to fresh; hard to very hard; plagioclase and orthoclase feldspar /quartz/ hornblende/biotite; dry; occuring with intervals of very soft clay having calcium carbonate dessiminated throughout; fractures, very close, tight to slightly open, rough, thin iron-oxide staining.	W5-W1	
											Drilling becomes hard.
		14:37 9:08									Drilling stopped at 49 feet on 9/19/95 and resumed on 9/20/95 with 6.5-inch tricone, no sampling.
50									@49': Cuttings and drill rate indicate that quartz diorite grades to fresh; very hard.		From 49-54 feet drilling is slow.
											From 54-59 feet drilling is fast.
55											
		9:35									
	R14	10:20		10	0						
60											
											From 62-63 feet coring is slow.
		11:09 12:04					Fractures dip 70° and vertical.				
65											
											From 68-72 feet drilling is slow.
70											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts | Project: Scholl Canyon | Project No: 95-8358-20

Northing: Easting: | Surface Elevation: | Boring No: **P05B**

Logged By: Pat Smith | Checked By: Grant Miller | Page No 4 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
									QUARTZ DIORITE (qd); Cuttings indicate medium gray (N5); medium to coarse grained (.25-2mm), phaneritic; fresh; hard; plagioclase and orthoclase feldspar /quartz/hornblende/biotite; dry; occuring with intervals of very soft clay.	W1	
		12:19 12:26									
75											
80											
		12:50 13:01									
85											
90											
		13:21 13:31									
95											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon		Project No: 95-8358-20
Northing:	Easting:	Surface Elevation:	Boring No: P05B
Logged By: Pat Smith	Checked By: Grant Miller		Page No 5 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
									QUARTZ DIORITE (qd); Cuttings indicate medium gray (N5); medium to coarse grained (.25-2mm), phaneritic; fresh; hard; plagioclase and orthoclase feldspar /quartz/hornblende/biotite; dry; occuring with intervals of very soft clay.	W1	
									@99': Cuttings indicate more clay.		From 99-102 feet faster drilling.
100											
		13:53 14:10									
105											
110											
		14:25 14:37									
115											
120											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon	Project No: 95-8358-20
Northing: Easting:	Surface Elevation:	Boring No: P05B
Logged By: Pat Smith	Checked By: Grant Miller	Page No 6 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
									<u>QUARTZ DIORITE (qd)</u>; Cuttings indicate medium gray (N5); medium to coarse grained (.25-2mm), phaneritic; fresh; hard; plagioclase and orthoclase feldspar /quartz/hornblende/biotite; dry; occuring with numerous intervals of very soft clay.	W1	
		14:53 15:08									
									@122': Cuttings indicate less clay.		
125											
									@127': Cuttings indicate more clay.		
130											
		15:22 15:44									
135									@135': Cuttings indicate less clay.		
											Drill rod chatter at 137.5 feet.
140											
		16:00 16:07									
145											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon	Project No: 95-8358-20
Northing: Easting:	Surface Elevation:	Boring No: P05B
Logged By: Pat Smith	Checked By: Grant Miller	Page No 7 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
									<u>QUARTZ DIORITE (qd)</u>; Cuttings indicate medium gray (N5); medium to coarse grained (.25-2mm), phaneritic; fresh; hard; plagioclase and orthoclase feldspar /quartz/hornblende/biotite; dry; occuring with numerous intervals of very soft clay.	W1	
		"									
150									@150': Cuttings indicate less clay.		
		16:23 16:33									
155											
160											
		16:49 16:55									
165											
170											

E A R T H T E C H

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts
Project: Scholl Canyon
Project No: 95-8358-20
Northing:
Easting:
Surface Elevation:
Boring No: P05B
Logged By: Pat Smith
Checked By: Grant Miller
Page No 8 **of** 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
		17:13 7:55							<u>QUARTZ DIORITE (qd)</u>; Cuttings indicate medium gray (N5); medium to coarse grained (.25-2mm), phaneritic; fresh; hard; plagioclase and orthoclase feldspar /quartz/hornblende/biotite; dry; occuring with numerous intervals of very soft clay.	W1	Drilling stopped at 172 feet on 9/20/95 and resumed on 9/21/95.
									@172': Cuttings indicate slightly more clay.		
175											
180											
		8:10 8:21									
185											
									@189': Cuttings indicate more clay with slight red coloration.		Drilling becomes slower.
190											
		8:38 8:46									
195											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts
Project: Scholl Canyon
Project No: 95-8358-20
Northing:
Easting:
Surface Elevation:
Boring No: P05B
Logged By: Pat Smith
Checked By: Grant Miller
Page No 9 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
									QUARTZ DIORITE (qd); Cuttings indicate medium gray (N5) with iron-oxide staining; medium to coarse grained (.25-2mm), phaneritic; fresh; hard; plagioclase and orthoclase feldspar /quartz/hornblende/biotite; dry; occuring with numerous intervals of very soft clay.	W1	
		''									
200											
		9:07 9:16									
205											
210											
		9:33 9:35									
											From 213-250 feet drilling becomes slower with drill rod chatter.
215											
		9:57 10:32									
220											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon		Project No: 95-8358-20
Northing:	Easting:	Surface Elevation:	Boring No: P05B
Logged By: Pat Smith	Checked By: Grant Miller		Page No 10 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
									QUARTZ DIORITE (qd); Cuttings indicate medium gray (N5); medium to coarse grained (.25-2mm), phaneritic; fresh; hard; plagioclase and orthoclase feldspar /quartz/hornblende/biotite; dry; occuring with numerous intervals of very soft clay.	W1	
		10:54 10:57									
225											
230											
		11:18 11:28									
235											
		11:48 11:55									
240											
245											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon		Project No: 95-8358-20
Northing:	Easting:	Surface Elevation:	Boring No: P05B
Logged By: Pat Smith		Checked By: Grant Miller	Page No 11 of 12

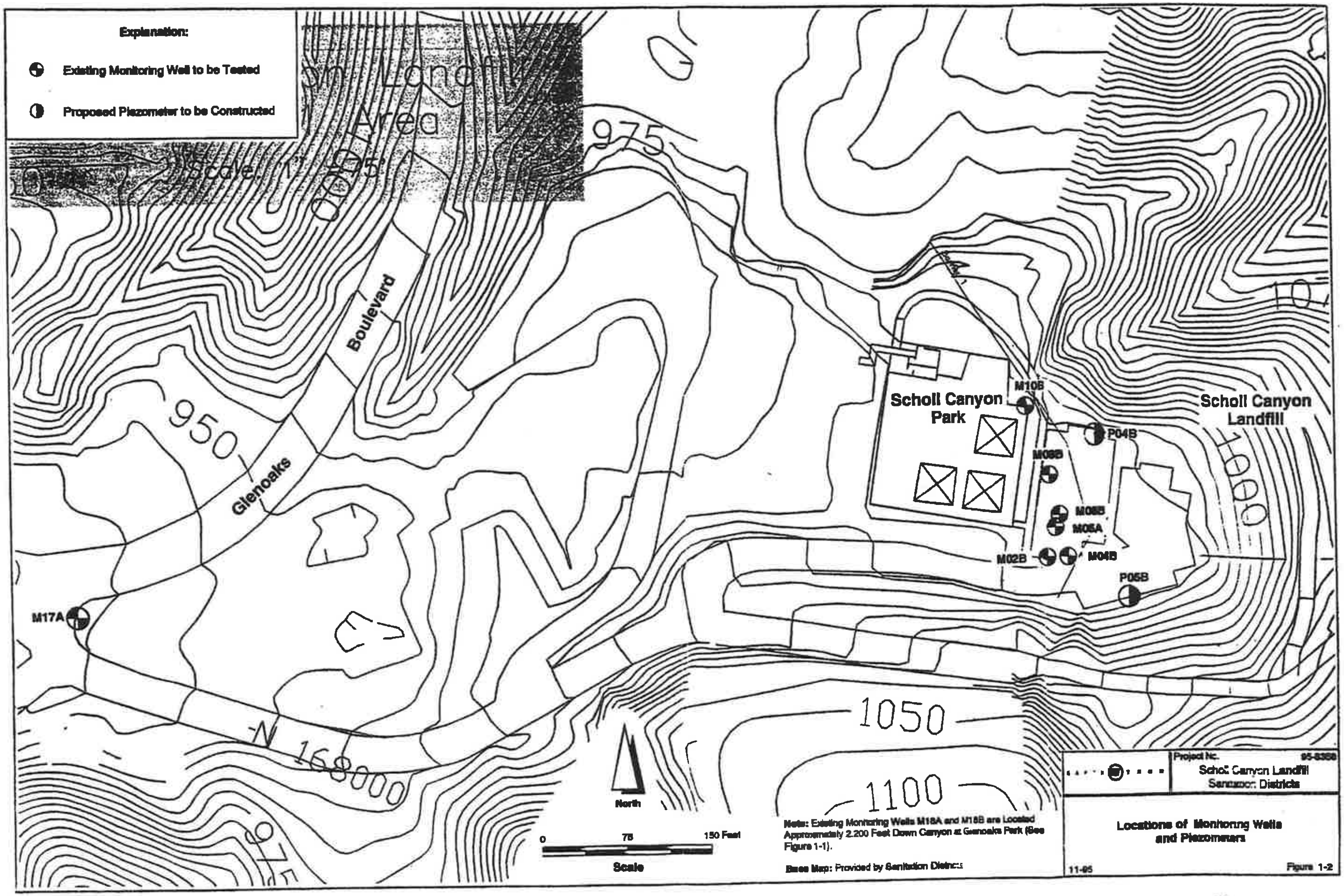
Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
		12:18 12:23							QUARTZ DIORITE (qd): Cuttings indicate medium gray (N5); medium to coarse grained (.25-2mm), phaneritic; fresh; hard; plagioclase and orthoclase feldspar /quartz/hornblende/biotite; dry; occuring with numerous intervals of very soft clay.	W1	
250	R15	12:34 14:36		5	0				@250': Color change to grayish green (10G 4/2), metamorphic alteration, calcium carbonate dessiminated throughout.		Mud Rotary coring with diamond surface set bit 250-266.5 feet. Drill rod chatter from 250-275 feet.
											FID=0/0.
255											
	R16	15:16 16:05		1	0		Fracture dips 70°.		@257': Fracture, very close, slightly open, rough, thin clay filling.		
260											
265											
		16:54 9:49					Fracture dips 60°.		@266': Fracture, very close, tight, moderately rough, clean.		Drilling stopped at 266.5 feet on 9/21/95 and resumed on 9/22/95. Mud Rotary drilling with tri-cone bit 266.5- 275 feet.
270											

EARTH TECH

ROCK CORE LOG

Client: Los Angeles County Sanitation Districts	Project: Scholl Canyon		Project No: 95-8358-20
Northing:	Easting:	Surface Elevation:	Boring No: P05B
Logged By: Pat Smith	Checked By: Grant Miller		Page No 12 of 12

Depth in feet	Sample Type and Number	Begin and End Times	Core Loss Log	% Core/Sample Recovered	RQD/ Blow Count	Structure Log	Structural Description	Lithic Symbol	Lithic Description	Weathering	Tests and Remarks
		// 9:50							<u>QUARTZ DIORITE (qd)</u>; Cuttings indicate grayish green (10G 4/2); medium to coarse grained (.25-2mm), phaneritic; fresh; hard; plagioclase and orthoclase feldspar /quartz/hornblende/biotite; dry; occuring with numerous intervals of very soft clay.	W1	
275									Borehole terminated at 275 feet. Free groundwater indicated at approx. 21 feet.		Drilling ended on 9/22/95.
280											
285											
290											
295											



Note: Existing Monitoring Wells M18A and M18B are Located Approximately 2,200 Feet Down Canyon at Glenoaks Park (See Figure 1-1).

Base Map: Provided by Sanitation Districts

Project No. 95-8358

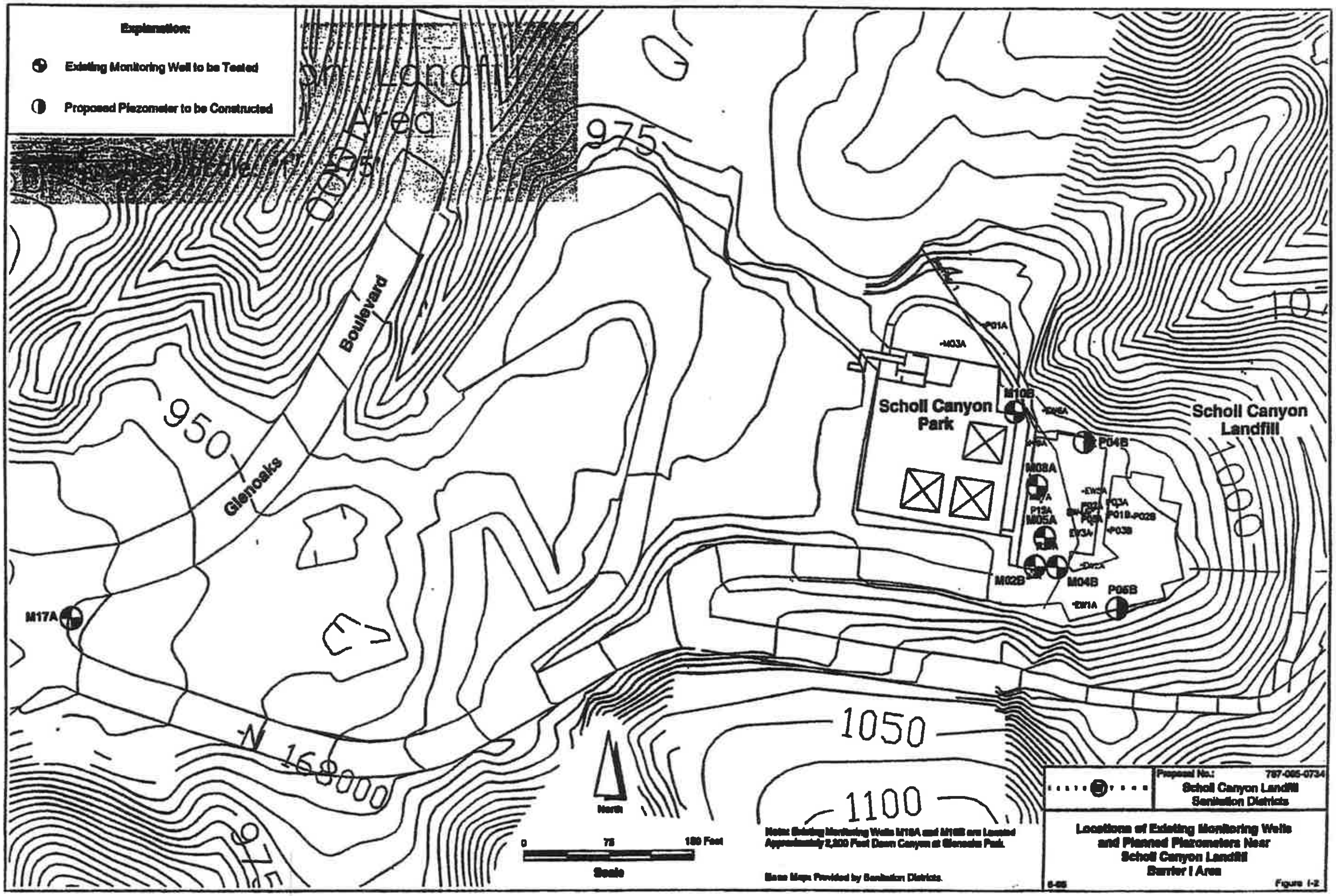
Scholl Canyon Landfill
Sanitation Districts

Locations of Monitoring Wells and Piezometers

11-95

Figure 1-2

New piezometers to be constructed: P04B
P05B



Note: Existing Monitoring Wells M18A and M18B are Located Approximately 2,200 Feet Down Canyon at Glenoaks Park.

Base Maps Provided by Sanitation Districts.

Locations of Existing Monitoring Wells and Planned Piezometers Near Scholl Canyon Landfill Barrier I Area

Figure I-2

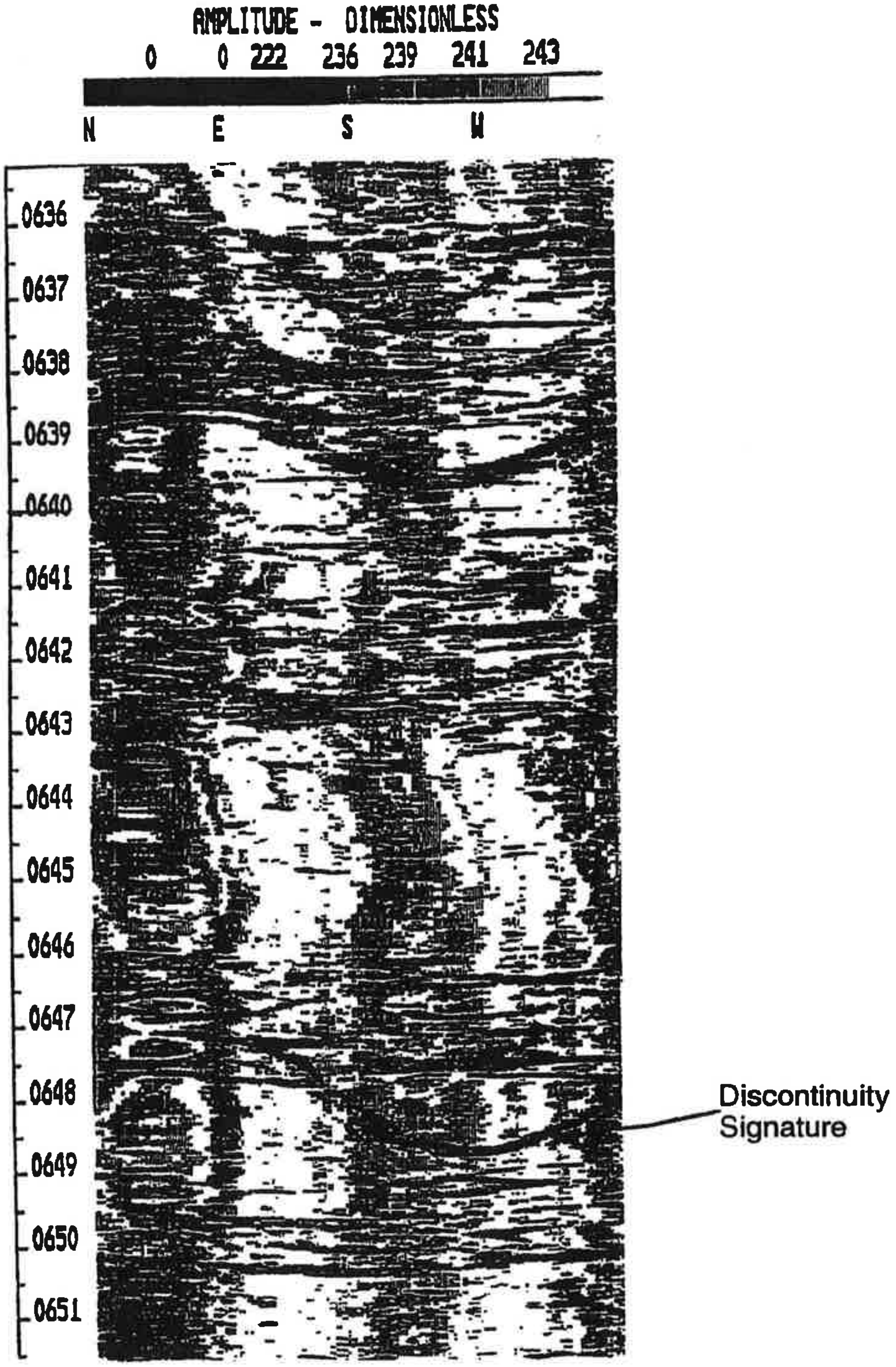
This appendix describes the instrumentation and procedures used to collect the wireline geophysical data. Acoustic borehole televiewer (BHTV), electric, and gamma logs were completed for each piezometer borehole. An acoustic caliper log was also prepared for the Piezometer P05B borehole.

The wireline survey consisted of lowering two separate tools (borehole televiewer tool and combination electric-gamma tool) to the bottom of the borehole and recording data as the tools are raised at a rate of 2 to 6 feet per minute for the BHTV tool and at a rate of 12 to 14 feet per minute for the combination tool. Data are digitally recorded at a rate of one point per 0.002 foot for the BHTV tool and one point per 0.025 foot for the combination tool. All data was digitally recorded by a Robertson Geologging, Ltd. Model PC-2 logging system. The wireline surveys were conducted by NORCAL Geophysical Consultants, Inc.

An acoustic caliper log, derived from the travel time data within the BHTV log, was produced for piezometer P05B by the Stanford University Geophysical Group under the direction of Dr. Coleen Barton.

The BHTV generates a paper and digital record of all discontinuities (joints, shears, foliation for example) as they intersect the borehole wall. The BHTV is an ultrasonic imaging tool that consists of a transducer ultrasonic energy source and receiver coupled with a magnetometer that provides continuous orientation of the log as it is recorded. Pulses of ultrasonic energy are directed at the wall of the borehole. The reflected energy is sensed and processed into a record that distinguishes hard borehole wall rock from less dense, less reflective zones (discontinuities). A typical record is shown in Figure E-1, which illustrates planar defects in the rock (discontinuities) as sinusoidal images on a flat paper log. North, south, east, and west reference points are marked on the log for direct read out of dip directions. The dip direction is from the high point of the sinusoidal curve to the low point. The dip angle is calculated from the shallowest to the deepest intercept of each discontinuity on the borehole wall. The two-dimension BHTV logs recorded for Piezometers P04B and P05B are attached to this appendix as Figures E-2 and E-3, respectively. Analyses of the BHTV data can be used to statistically determine the most persistent discontinuity sets by plotting the data on a Schmidt equal area net.

Graphs showing electrical resistivity, spontaneous potential, and natural gamma are also included in this appendix (Figures E-4 and E-5). The electric log measures electrical properties (resistivity and spontaneous potential) between the boring fluid and the formation. The log consists of three data profiles plotted on three graphs with depth on the vertical axes. On the right graph, spontaneous potential (SP) is plotted on the horizontal axis. This log measures the difference in the electric potential between the drilling fluid and the formation. The log shows changes related to changing clay content and/or groundwater quality. Open fractures may produce positive or negative peaks in this log by allowing formation waters to interact with borehole fluids. Filled discontinuities generally produce smaller amplitude peaks because the material filling the discontinuity minimizes chemical reactions with formation waters. The left graph shows electrical resistivity measurements on the horizontal axis. The 16-inch measurements respond mostly to boring fluid and mudcake resistivities. The 64-inch measurements respond to formation changes with a penetration of about 2 feet. The natural gamma log measures the amount of natural radioactivity present in the formation versus depth. It also reflects the clay content of formations, because radioactive elements tend to concentrate in clays. The natural gamma trace is shown on the right graph by a bold line.



EARTH TECH

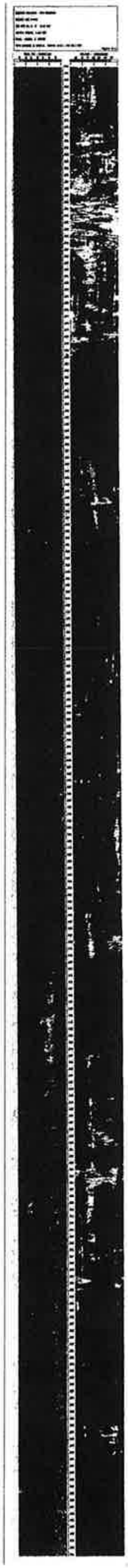
Project No.: 95-8358

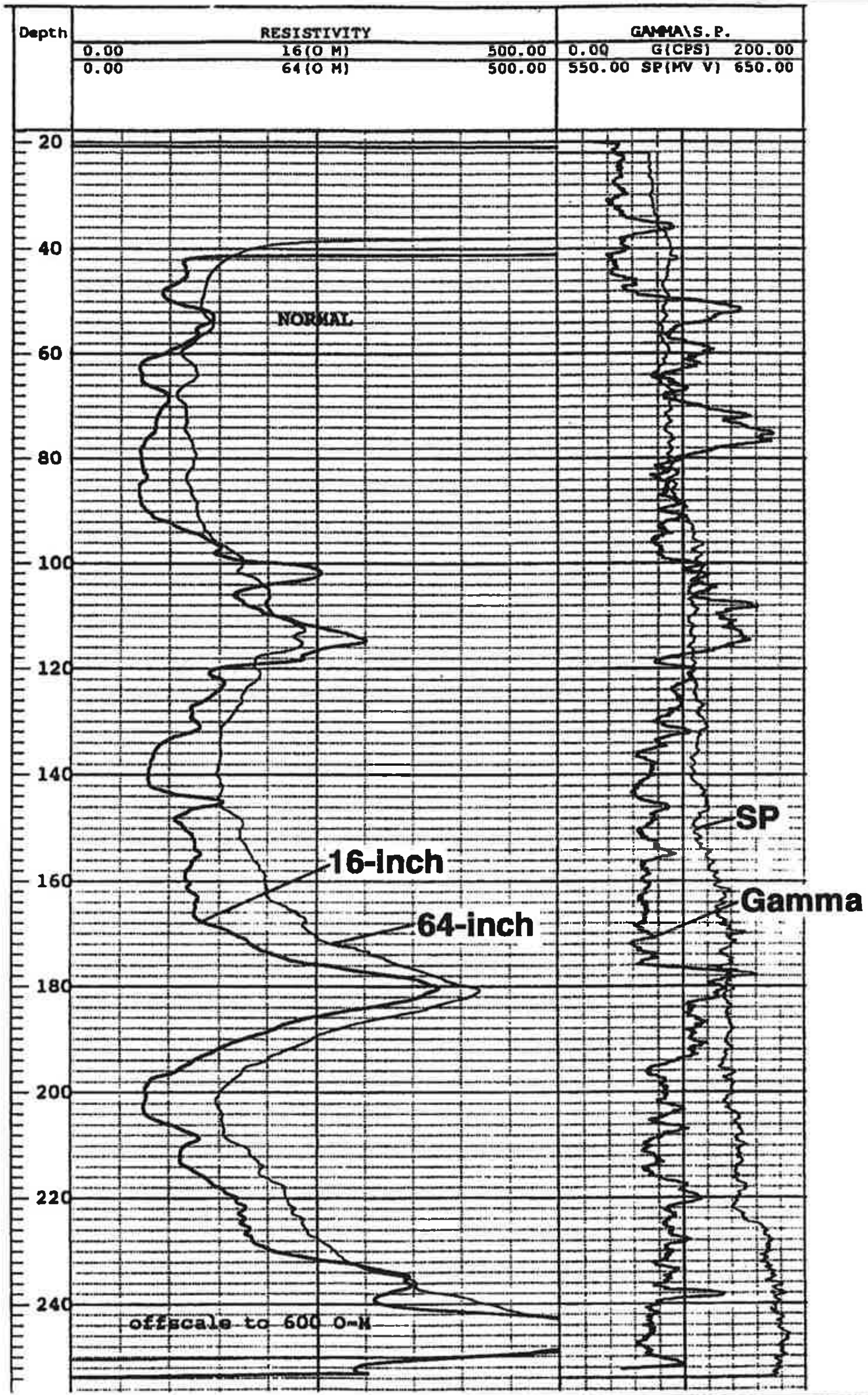
Scholl Canyon Landfill
Sanitation Districts

Typical Acoustic Televiewer Record

11-95

Figure E-1





EARTH TECH

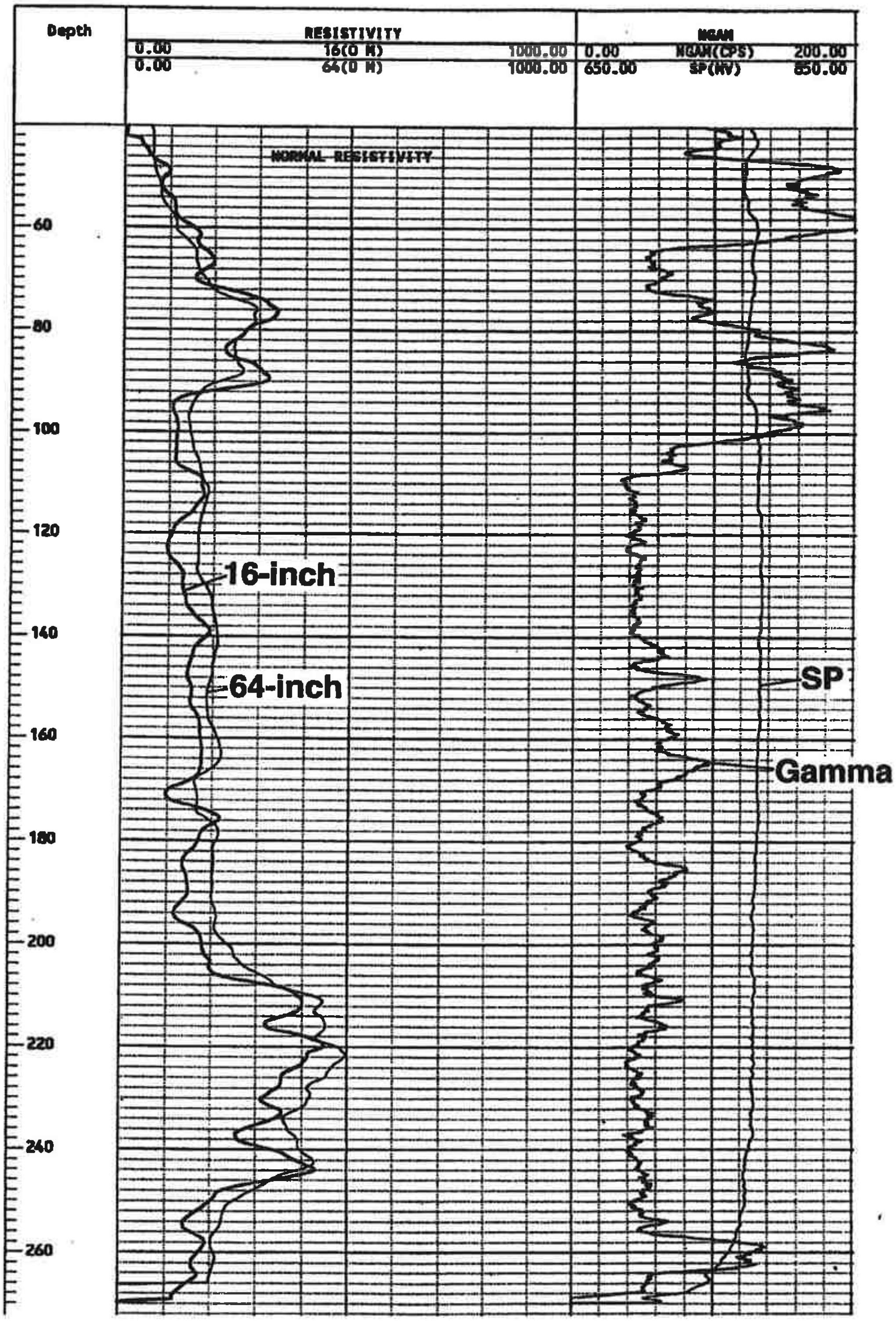
Project No.: 95-8358

Scholl Canyon Landfill
Sanitation Districts

Electric and Gamma Logs P04B

11-95

Figure E-4



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Project No.: 95-8358

Scholl Canyon Landfill
Sanitation Districts

Electric and Gamma Logs P05B

11-95

Figure E-5

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Table 5. Survey Data for Previously Constructed Monitoring Wells and Piezometers

Monitoring Well/ Piezometer No.	Location (feet)		Elevation (feet msl)	
	Northing	Easting	Ground Surface	TOC
		Monitoring Wells		
M01A	168,415.46	227,213.74	968.68	968.39
M02B	168,420.37	227,214.10	968.75	968.16
M03A	168,537.13	227,061.86	976.55	976.14
M04B	168,426.77	227,235.86	969.47	969.08
M05A	168,446.27	227,217.36	969.66	968.92
M06B	168,458.45	227,209.26	969.95	969.27
M07A	168,471.54	227,200.91	970.46	970.17
M08B	168,483.48	227,193.11	971.07	970.76
M09A	168,520.96	227,175.48	973.14	972.66
M10B	168,535.64	227,148.89	973.97	973.31
		Piezometers		
P01A	168,591.72	227,092.04	976.82	976.63
P01B	168,483.62	227,260.65	971.93	971.63
P02A	168,482.27	227,246.23	971.96	971.39
P02B	168,495.96	227,276.11	972.66	971.98
P03A	168,492.80	227,263.69	972.43	971.97
P03B	168,475.83	227,269.14	971.74	971.20
P04B	168,528.41	227,210.79	973.40	973.03
P05A	168,471.01	227,249.58	971.48	971.07
P05B	168,418.21	227,292.84	971.19	970.82
P11A	168,442.16	227,223.44	969.62	969.08
P12A	168,461.56	227,208.03	970.04	969.39

Notes: TOC - Top of Casing

msl - Mean seal level

Survey control provided by the following monuments:

1) "PK" on AC Road - N168,451.62/E226,849.13 @ 955.80 feet msl
3) RW433 - N168,296.68/E227,106.21 @ 994.74 feet msl
2) RW434 - N168,284.39/E227,075.39 @ 992.33 feet msl
4) Chiseled "X" - N168,447.05/E227,187.63 @ 970.39 feet msl

Table 3. Extraction Well Construction Details

Extraction Well No.	Completion Date	Location (feet)		Elevation (feet msl)			Depths Below Existing Asphalt Surface (feet)							
		Northing	Easting	Top of Casing	Ground Surface	Approximate Bedrock Surface	Total Depth Reamed	Total Depth of Well	Length of End Cap	Screened Interval	Blank Casing Interval	Filter Pack Interval	Bentonite Chip Intervals	Surface Seal/ Grout Interval
EW1B	10/1/98	168,406.36	227,275.89	968.09	970.56	942	101.50	101.50	0.85	22.16 – 100.65	2.47 – 22.16	19.00 – 101.50	16.00 – 19.00 4.50 – 8.00	8.0 – 16.0
EW2B	9/29/98	168,458.11	227,248.66	968.78	970.91	937	101.12	101.12	0.87	26.91 – 100.25	2.13 – 26.91	21.40 – 101.12	18.40 – 21.40 4.50 – 13.20	13.20 – 18.40
EW3B	9/25/98	168,480.81	227,234.42	969.60	971.75	936	102.00	98.25	0.87	23.97 – 97.38	2.15 – 23.97	19.20 – 98.25	16.20 – 19.20 4.50 – 7.50	7.50 – 16.20
EW4B	9/22/98	168,504.35	227,218.85	969.86	972.59	954	102.00	101.32	0.87	21.94 – 100.45	2.73 – 21.94	18.90 – 101.70	15.40 – 18.90	4.50 – 15.40
EW5B	9/18/98	168,528.46	227,204.19	970.74	973.29	973	102.00	101.23	0.87	21.75 – 100.36	2.55 – 21.75	18.60 – 102.00	15.50 – 18.60 4.50 – 10.50	10.50 – 15.50

Notes: msl = mean sea level

Survey control provided by the following monuments:

"PK" on AC road – N168,451.62/E226,849.13 @ 955.80 feet msl

RW433 – N168,296.68/E227,106.21 @ 994.74 feet msl

RW434 - N168,284.39/E227,075.39 @ 992.33 feet msl

Chiseled "X" – N168,447.05/E227,187.63 @ 970.39 feet msl

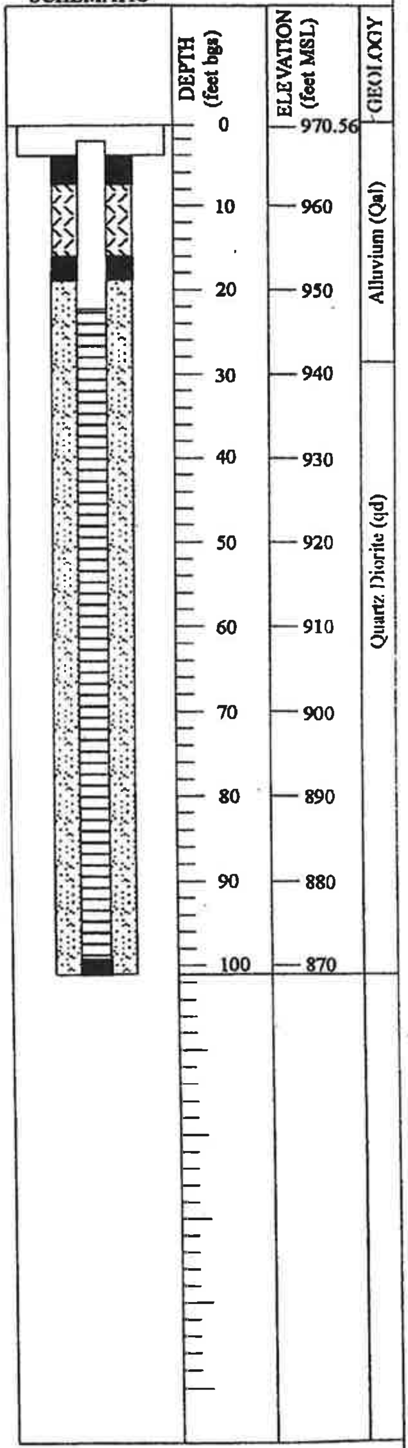
WELL CONSTRUCTION LOG

WELL NUMBER EW1B

DATE STARTED	DATE COMPLETED
9/29/98	10/1/98

Project Name: Scholl Canyon Landfill
Project Number: 98-109
Well Location/Elevation (Top of Casing):
N168406.36 E227275.89 elv. 968.09' msl
Logged By and Registration No.: Paul Dunster, R.G. 6761
Depth to First-Encountered Water
(Feet from Ground Surface and Date Measured): 16.5 on 8/14/98
Depth to Static Water
(Feet from Top of Casing and Date Measured): 12.80 on 10/14/98
Drilling Company and Address: Beylik Drilling, 555 S. Harbor Blvd., La Habra
Driller: Don Stratton
Rig Type: Failing F10 (Coring); 1RTH100 (Well Construction)
Drilling Method: HSA to 30'; HQ Core to 72'; Stratex (Well Construction)
Sampling Method: Modified California, HQ Core
Sampling Interval (feet): Continuous
Borehole Diameter (inches): 13.25
Total Depth Drilled/Reamed (feet): 72/101.5
Casing/Screen Type: Sch. 80 PVC, Flush Threaded
Casing/Screen Diameter (inches I.D) 7.63
End Cap Type: Sch. 40 PVC slip cap riveted to Sch. 80 PVC coupling
Sump Interval (Feet from Ground Surface): NA to NA
Screened Interval (Feet from Ground Surface): 100.65 to 22.16
Slot Size (inches): 0.020
Casing Interval (Feet from Ground Surface): 22.16 to 2.47
Centralizer Type: Not used
Centralizer Placement (Feet from Ground Surface): NA to NA
Lower Seal (Form) Not used
Lower Seal Interval (Feet from Ground Surface): NA to NA
Lower Seal Volume: NA
Filter Pack Type: Lonestar #2/12 Lapis Lustre
Filter Pack Interval (Feet from Ground Surface): 101.50 to 19.00
Filter Pack Volume: 38 cu. ft.
Predevelopment Method: Swab and Pump
Upper Seal (Form): Medium bentonite chips
Upper Seal Interval (Feet from Ground Surface): 19.00 to 16.00
Upper Seal Volume: 3 sacks (50 lbs. each)
Grout Seal (Form): Enviroplug grout and 1.5 sacks of medium bentonite chips
Grout Seal Interval (Feet from Ground Surface) 16.00 to 4.50
Grout Seal Volume: 50 gallons
Wellhead Completion: 6'8" x 3'8" concrete vault with hinged cover
Comments: Centralizers not used since well casing was installed within ID of temporary conductor casing.

CONSTRUCTION SCHEMATIC



Advanced Earth Sciences, Inc.
Geotechnical and Environmental Consultants

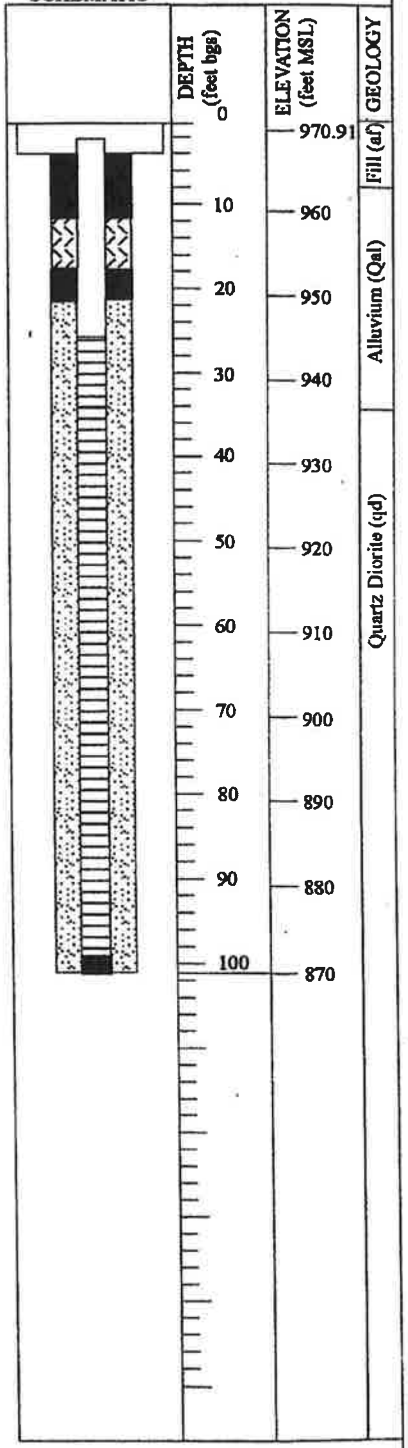
WELL CONSTRUCTION LOG

WELL NUMBER EW2B

DATE STARTED	DATE COMPLETED
9/28/98	9/29/98

Project Name: Scholl Canyon Landfill
Project Number: 98-109
Well Location/Elevation (Top of Casing):
N168458.11 E227248.66 elv. 968.78' msl
Logged By and Registration No.: Paul Dunster, R.G. 6761
Depth to First-Encountered Water
(Feet from Ground Surface and Date Measured): 16.5 on 8/14/98
Depth to Static Water
(Feet from Top of Casing and Date Measured): 12.69 on 10/14/98
Drilling Company and Address: Beylik Drilling, 555 S. Harbor Blvd., La Habra
Driller: Don Stratton
Rig Type: Failing F10 (Coring); 1RTH100 (Well Construction)
Drilling Method: HSA to 35.5'; HQ Core to 95'; Stratex (Well Construction)
Sampling Method: Modified California, HQ Core
Sampling Interval (feet): Continuous
Borehole Diameter (inches): 13.25
Total Depth Drilled/Reamed (feet): 95/101.12
Casing/Screen Type: Sch. 80 PVC, Flush Threaded
Casing/Screen Diameter (inches I.D) 7.63
End Cap Type: Sch. 40 PVC slip cap riveted to Sch. 80 PVC coupling
Sump Interval (Feet from Ground Surface): NA to NA
Screened Interval (Feet from Ground Surface): 100.25 to 26.91
Slot Size (inches): 0.020
Casing Interval (Feet from Ground Surface): 26.91 to 2.13
Centralizer Type: Not used
Centralizer Placement (Feet from Ground Surface): NA to NA
Lower Seal (Form) Not used
Lower Seal Interval (Feet from Ground Surface): NA to NA
Lower Seal Volume: NA
Filter Pack Type: Lonestar #2/12 Lapis Lustre
Filter Pack Interval (Feet from Ground Surface): 101.12 to 21.40
Filter Pack Volume: 40 cu. ft.
Predevelopment Method: Swab and Pump
Upper Seal (Form): Medium bentonite chips
Upper Seal Interval (Feet from Ground Surface): 21.4 to 18.4
Upper Seal Volume: 4 sacks (50 lbs. each)
Grout Seal (Form): Enviroplug grout (3 bags in 70 gallons) and 9 sacks of medium bentonite chips
Grout Seal Interval (Feet from Ground Surface) 18.40 to 4.50
Grout Seal Volume: 70 gallons
Wellhead Completion: 6'8" x 3'8" concrete vault with hinged cover
Comments: Centralizers not used since well casing was installed within ID of temporary conductor casing.

CONSTRUCTION SCHEMATIC



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WELL CONSTRUCTION LOG

WELL NUMBER EW3B

DATE STARTED	DATE COMPLETED
9/23/98	9/25/98

Project Name: Scholl Canyon Landfill

Project Number: 98-109

Well Location/Elevation (Top of Casing):
N168480.81 E227234.42 elv. 969.60' msl

Logged By and Registration No.: Grant Miller, CEG 1397

Depth to First-Encountered Water
(Feet from Ground Surface and Date Measured): 18.0 on 8/13/98

Depth to Static Water
(Feet from Top of Casing and Date Measured): 13.41 on 10/14/98

Drilling Company and Address: Beylik Drilling, 555 S. Harbor Blvd., La Habra

Driller: Don Stratton

Rig Type: Failing F10 (Coring); 1RTH100 (Well Construction)

Drilling Method: HSA to 36'; HQ Core to 100'; Stratex (Well Construction)

Sampling Method: Modified California, HQ Core

Sampling Interval (feet): Continuous

Borehole Diameter (inches): 13.25

Total Depth Drilled/Reamed (feet): 100/102

Casing/Screen Type: Sch. 80 PVC, Flush Threaded

Casing/Screen Diameter (inches I.D) 7.63

End Cap Type: Sch. 40 PVC slip cap riveted to Sch. 80 PVC coupling

Sump Interval (Feet from Ground Surface): NA to NA

Screened Interval (Feet from Ground Surface): 97.38 to 23.97

Slot Size (inches): 0.020

Casing Interval (Feet from Ground Surface): 23.97 to 2.15

Centralizer Type: Not used

Centralizer Placement (Feet from Ground Surface): NA to NA

Lower Seal (Form) Not used

Lower Seal Interval (Feet from Ground Surface): NA to NA

Lower Seal Volume: NA

Filter Pack Type: Lonestar #2/12 Lapis Lustre

Filter Pack Interval (Feet from Ground Surface): 98.25 to 19.20

Filter Pack Volume: 38 cu. ft.

Predevelopment Method: Swab and Pump

Upper Seal (Form): Medium bentonite chips

Upper Seal Interval (Feet from Ground Surface): 19.20 to 16.20

Upper Seal Volume: 5 sacks (50 lbs. each)

Grout Seal (Form): Enviroplug grout (2 bags in 50 gallons) and 2 sacks of medium bentonite chips

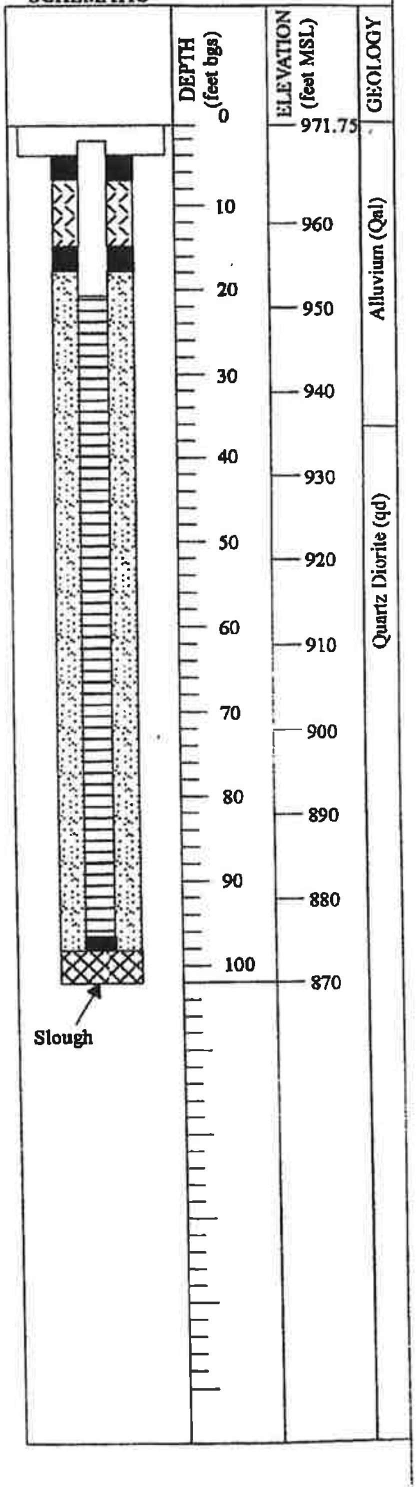
Grout Seal Interval (Feet from Ground Surface) 16.20 to 4.50

Grout Seal Volume: 50 gallons

Wellhead Completion: 6'8" x 3'8" concrete vault with hinged cover

Comments: Centralizers not used since well casing was installed within ID of temporary conductor casing.
Slough material consists of medium to coarse sand based on material present on Stratex drill bit.

CONSTRUCTION SCHEMATIC



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WELL CONSTRUCTION LOG

WELL NUMBER EW4B

DATE STARTED	DATE COMPLETED
9/18/98	9/22/98

Project Name: Scholl Canyon Landfill

Project Number: 98-109

Well Location/Elevation (Top of Casing):
N168504.35 E227218.85 elv. 969.86' msl

Logged By and Registration No.: Paul Dunster, RG 6761

Depth to First-Encountered Water
(Feet from Ground Surface and Date Measured): 18.00 on 8/13/98

Depth to Static Water
(Feet from Top of Casing and Date Measured): 20.99 on 10/14/98

Drilling Company and Address: Beylik Drilling, 555 S. Harbor Blvd., La Habra

Driller: Don Stratton

Rig Type: Failing F10 (Coring); 1RTH100 (Well Construction)

Drilling Method: HSA to 25'; HQ Core to 99'; Stratex (Well Construction)

Sampling Method: Modified California, HQ Core

Sampling Interval (feet): Continuous

Borehole Diameter (inches): 13.25

Total Depth Drilled/Reamed (feet): 99/102

Casing/Screen Type: Sch. 80 PVC, Flush Threaded

Casing/Screen Diameter (inches I.D.) 7.63

End Cap Type: Sch. 40 PVC slip cap riveted to Sch. 80 PVC coupling

Sump Interval (Feet from Ground Surface): NA to NA

Screened Interval (Feet from Ground Surface): 100.45 to 21.94

Slot Size (inches): 0.020

Casing Interval (Feet from Ground Surface): 21.94 to 2.73

Centralizer Type: Not used

Centralizer Placement (Feet from Ground Surface): NA to NA

Lower Seal (Form) Not used

Lower Seal Interval (Feet from Ground Surface): NA to NA

Lower Seal Volume: NA

Filter Pack Type: Lonestar #2/12 Lapis Lustre

Filter Pack Interval (Feet from Ground Surface): 101.70 to 18.90

Filter Pack Volume: 38.5 cu. ft.

Predevelopment Method: Swab and Pump

Upper Seal (Form): Medium bentonite chips

Upper Seal Interval (Feet from Ground Surface): 18.90 to 15.40

Upper Seal Volume: 2 sacks (50 lbs. each)

Grout Seal (Form): Enviroplug grout (2 bags in 50 gallons)

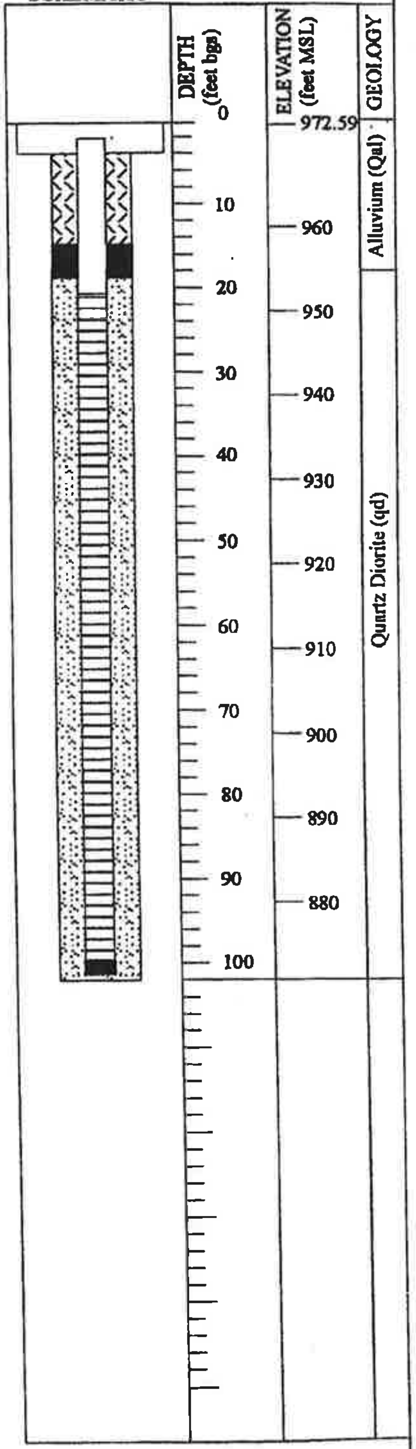
Grout Seal Interval (Feet from Ground Surface) 15.40 to 4.50

Grout Seal Volume: 50 gallons

Wellhead Completion: 6'8" x 3'8" concrete vault with hinged cover

Comments: Centralizers not used since well casing was installed within ID of temporary conductor casing.

CONSTRUCTION SCHEMATIC



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Project: Scholl Canyon Landfill **Boring:** EW1B **Pg.** 1 **of** 5

Driller: Beylik, Randy Whitcomb
Drilling Method: HSA; Mud Rotary Core
Location: N: 168406.36
Sampler: Modified California, HQ Core
E: 227275.89
Borehole Diameter: HSA - 8", HQ - 3.9"
Date Started: 8/14/98
Ground Elevation (Feet MSL): 970.56
Depth to First Groundwater (Feet): 16.50
Date Completed: 9/11/98
Top of Casing Elevation (Feet MSL): 968.09
Depth to Static Groundwater (Feet): 12.80
Logged by: GM
Drill Rig Type: Failing F-10
Weather Conditions: Clear and hot
Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
										ALLUVIUM (Qal): **SILTY SAND (SM)**; dark brown (10YR 3/3), 5-10% fine to medium gravel, 70% fine- to medium-grained sand, 25-30% silt, low plastic fines, medium dense, dry to moist, no odor, non-stratified	Hand auger to 5' Drilling with hollow-stem augers Sampling with 140 lbs downhole hammer Core box 1: 0' - 15.0' Core box 2: 15.0' - 24.5' Core box 3: 24.5' - 57.0' Core box 4: 57.0' - 72.0'
	5	1052	D1	⧗	100	8 4 3	--	11 -- 11		As above, angular gravel to 1", 20% coarse sand, dry to moist, no odor	
		1055	D2	⧗	67	4 5 7	--	--		As above, angular gravel to 1", 20% coarse sand, dry to moist, no odor	
			D3	⧗	100	12 14 15 18	--	--		As above, angular gravel to 1/2", 10% coarse sand, dry to moist, no odor	
										5% clay - moist	
	10	1103	D4	⧗	100	12 12 12	--	11 -- 11		As above, angular gravel to 3/4", 5-10% coarse sand, moist, no odor	
		1106	D5	⧗	94	8 8 12	--	--		As above, 15-20% silt, <5% angular gravel to 1/4", dry to moist, no odor	
		1109	D6	⧗	83	10 11 12 16	--	--		As above, 20-25% silt, <5% angular gravel to 1/4", 10% coarse sand, dry to moist, no odor	
	15										

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

WLOG4 98109 11/12/98

Project: Scholl Canyon Landfill **Boring:** EW1B **Pg.** 2 **of** 5

Driller: Beylik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168406.36 **Sampler:** Modified California, HQ Core

E: 227275.89 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/14/98

Ground Elevation (Feet MSL): 970.56 **Depth to First Groundwater (Feet):** 16.50 **Date Completed:** 9/11/98

Top of Casing Elevation (Feet MSL): 968.09 **Depth to Static Groundwater (Feet):** 12.80 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
	15	1116	D7		100	10 15 15	–	11 — 10		**SILTY SAND (SM)**; brown, 15% angular gravel to 1/2", 70% fine- to medium-grained sand, 15% silt, trace clay, non to low plastic fines, medium dense to dense, moist, no odor, non-stratified	
	//	1120	D8		67	11 16 20	–	–		As above, wet	First water at 16.5
		1129	D9		100	21 29 68 102	–	–		As above, 30-40% silt, very dense	Moist below 18.5'
	20	1135	D10		100	29 31 46	–	13 — 11		Gravelly zone, 40% angular gravel, clay content increasing As above, 5-10% clay, dense to very dense	
		1143	D11		100	34 50 71	–	–		As above, wet, 0% clay Cobbly interval, fragments >2.5", 5-10% clay, moist	Wet
			D12		100	40 80 191	–	–		**SILTY SAND WITH GRAVEL (SM)**; olive-brown, 20% gravel to 2", 50% fine- to medium-grained sand, 30% silt and clay fines, low plasticity, very dense, moist, no odor, non-stratified, gravel fragments consist of highly weathered reddish quartz diorite	Moist Wet
	25	1210	D13		100	71 142	–	41 — 11			Moist
		1216	D14		100	49 60 109	–	–			
		1226	D15		100	50 111 205	–	–		**GRAVELLY SAND (SM)**; olive-brown, 40% gravel, 40% sand, 20% silt and clay, low plasticity, very dense, moist, no odor, non-stratified, gravel fragments consist of highly weathered quartz diorite	
		1238	D16		100	217	–	–			
	30									See next page	HSA Refusal End 8/14/98 Begin 9/4/98

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW1B **Pg.** 3 **of** 5

Driller: Beylik, Randy Whitcomb

Drilling Method: HSA; Mud Rotary Core

Location: N: 168406.36

Sampler: Modified California, HQ Core

E: 227275.89

Borehole Diameter: HSA - 8", HQ - 3.9"

Date Started: 8/14/98

Ground Elevation (Feet MSL): 970.56

Depth to First Groundwater (Feet): 16.50

Date Completed: 9/11/98

Top of Casing Elevation (Feet MSL): 968.09

Depth to Static Groundwater (Feet): 12.80

Logged by: GM

Drill Rig Type: Failing F-10

Weather Conditions: Clear and hot

Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
	//	1236 (1.3) 1239	C1	■	0	–	0	–	☒	Soft interval (easy drilling) No recovery Harder material	Coring with diamond impregnated bit and water
	35	1259 (0.8) 1302	C2	■	0	–	0	–	☒	No recovery	
		1316 (1.3) 1318	C3	■	0	–	0	–	☒	No recovery, cuttings imply highly weathered QUARTZ DIORITE, moderate yellowish-brown, medium-grained	Bit blocked off; unable to sustain circulation
	40	1452 (1.3) 1454	C4	■	0	–	0	–	☒	No recovery, cuttings imply highly- to moderately-weathered rock, moderate yellowish-brown to moderate olive-brown, medium-grained	
		1508 (2.5) 1509	C5	■	0	–	0	–	☒	No recovery, cuttings imply moderately weathered rock, moderate olive-brown to light olive-gray, medium-grained	
	45	1516 (0.7)	C6	□	20	–	0	–	▨	See next page	

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW1B **Pg.** 4 **of** 5

Driller:	Beylik, Randy Whitcomb	**Drilling Method:**	HSA; Mud Rotary Core		
Location: N:	168406.36	**Sampler:**	Modified California, HQ Core		
E:	227275.89	**Borehole Diameter:**	HSA - 8", HQ - 3.9"	**Date Started:**	8/14/98
Ground Elevation (Feet MSL):	970.56	**Depth to First Groundwater (Feet):**	16.50	**Date Completed:**	9/11/98
Top of Casing Elevation (Feet MSL):	968.09	**Depth to Static Groundwater (Feet):**	12.80	**Logged by:**	GM
Drill Rig Type:	Failing F-10	**Weather Conditions:**	Clear and hot	**Reviewed by:**	GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1523								Becomes harder at 47'; QUARTZ DIORITE, 25% plagioclase, 15% quartz, 60% dark-colored mafic minerals (hornblende), fine- to medium-grained, gneissic, speckled very light gray and dark gray with greenish-gray, unweathered, hard to very hard with very soft clay gouge intervals, fragments imply very intensely fractured, very closely spaced, tight to open, patchy reddish iron-oxide staining to calcite, chlorite and clay gouge filling, smooth and polished to rough surfaces	Bit has broken edges and rock fragments lodged in opening End 9/4/98 Begin 9/8/98 Using bentonite drilling fluid
		1108	C7		10	–	0	–			
	50										
										As above, no clay gouge material apparent, gneissic foliation dips 60 degrees, quartz veining, pyrite crystals on some fracture surfaces	
		(0.4)									Recovered fragments up to 2.5" in size
		1122									
		1136	C8		28	–	0	–		As above, moderately to slightly weathered, hard to very hard, light olive-gray with pinkish-gray crystals (orthoclase), gneissic foliation dips 55 degrees, very intensely fractured, very closely spaced, tight to moderately open, clean to moderately thin calcite coating/filling	Recovered fragments up to 2" in size
	55										
		(0.5)									
		1142									
		1152	C9		33	–	0	–		As above, moderately to slightly weathered	Recovered fragments up to 2" in size
		(0.8)									
	60	1156									

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW1B **Pg.** 5 **of** 5

Driller: Beylik, Randy Whitcomb
Drilling Method: HSA; Mud Rotary Core
Location: N: 168406.36
Sampler: Modified California, HQ Core
E: 227275.89
Borehole Diameter: HSA - 8", HQ - 3.9"
Date Started: 8/14/98
Ground Elevation (Feet MSL): 970.56
Depth to First Groundwater (Feet): 16.50
Date Completed: 9/11/98
Top of Casing Elevation (Feet MSL): 968.09
Depth to Static Groundwater (Feet): 12.80
Logged by: GM
Drill Rig Type: Failing F-10
Weather Conditions: Clear and hot
Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1205 (0.3) 1220	C10		0	–	0	–		No recovery	Inner barrel sanded in Pulled rods Bit worn approximately 25%
	65	1533 (0.8) 1536	C11		60	–	0	–		**QUARTZ DIORITE BRECCIA;** 40% plagioclase, 10% orthoclase, 10% quartz, 40% dark minerals (hornblende, biotite), fine- to medium-grained, vaguely gneissic, light olive-gray to dusky yellow, moderately weathered, moderately soft to hard, very intensely fractured, very closely spaced, tight to slightly open with clean to very thin iron-oxide coatings and clay linings, smooth to slightly rough surfaces, some polished	
		1551 (0.6) 1555	C12		47	–	0	–		**QUARTZ DIORITE;** 40% plagioclase, 10% orthoclase, 20% quartz, 30% dark minerals, gneissic foliation, very intensely fractured, very closely spaced, clean to very thin iron-oxide and clay coatings, smooth, polished and slightly rough surfaces	
	70	1641 (0.1) 1701	C13		0	–	0	–			Bit badly worn End 9/8/98 Begin 9/9/98
		0859 0940	C14		0	–	0	–			Bit entirely worn away End 9/9/68 Begin 9/11/98 Coring with new
			C15		50	–	0				
										Boring terminated at 72 feet	diamond impregnated bit and water Bit 25% worn after completing C15
	75										

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
Gm	11/13/98				

WLOG4 98108 11/9/98

Project: Scholl Canyon Landfill **Boring:** EW2B **Pg.** 1 of 7

Driller: Beylik, Randy Whitcomb

Drilling Method: HSA; Mud Rotary Core

Location: N: 168458.11

Sampler: Modified California, HQ Core

E: 227248.66

Borehole Diameter: HSA - 8", HQ - 3.9"

Date Started: 8/14/98

Ground Elevation (Feet MSL): 970.91

Depth to First Groundwater (Feet): 16.50

Date Completed: 9/13/98

Top of Casing Elevation (Feet MSL): 968.78

Depth to Static Groundwater (Feet): 12.69

Logged by: GM

Drill Rig Type: Failing F-10

Weather Conditions: Clear and hot

Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
										ARTIFICIAL FILL (af): **SILTY SAND (SM), SAND (SP), AND SANDY CLAY (CL)** (interbedded); very dark grayish-brown, 5% angular gravel to 1" 30-100%, fine- to medium-grained sand, 0-65% silt and clay, low plasticity, medium dense, moist to wet, no odor	Hand auger to 5' Drilling with hollow-stem augers Sampling with 140 lbs downhole hammer Core box 1: 0 - 16.5' Core box 2: 16.5' - 27.5' Core box 3: 27.5' - 42.5' Core box 4: 42.5' - 61.5' Core box 5: 61.5' - 70.0' Core box 6: 70.0' - 92.0' Core box 7: 92.0' - 95.0'
	5	0756	D1		78	3 2 1	–	23 --- 11			
		0802	D2		61	1	–	–		**SANDY SILT (ML) TO SILTY SAND (SM);** Very dark grayish-brown, 5% angular gravel, 30-40% fine-grained sand, 55-65% silt, low to non-plastic fines, medium-dense, stiff, moist, no odor	
		0809	D3		79	5 5 6 8	–	–		**ALLUVIUM (Qal):** **SILTY SAND (SM);** dark grayish-brown Gravelly bed, gravel up to 2"	
	10	0812	D4		94	5 6 9	–	13 --- 11			
		0813	D5		100	6 8 10	–	–			
		0818	D6		100	9 9 10 10	–	–		FRIABLE SAND (SP) interval, fine- to medium-grained sand, trace gravel	
	15										

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW2B **Pg.** 2 of 7

Driller: Beylik, Randy Whitcomb
Drilling Method: HSA; Mud Rotary Core
Location: N: 168458.11
Sampler: Modified California, HQ Core
E: 227248.66
Borehole Diameter: HSA - 8", HQ - 3.9"
Date Started: 8/14/98
Ground Elevation (Feet MSL): 970.91
Depth to First Groundwater (Feet): 16.50
Date Completed: 9/13/98
Top of Casing Elevation (Feet MSL): 968.78
Depth to Static Groundwater (Feet): 12.69
Logged by: GM
Drill Rig Type: Failing F-10
Weather Conditions: Clear and hot
Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		–	D7	⋈	100	10 12 12	–	330 — 14		SILTY SAND (SM) GRAVELLY SAND (SP) Inverval, friable	First water at 16.5'
		0824	D8	⋈	100	7 9 14	–	–		SILTY SAND (SM); dark grayish-brown, 5% angular gravel to 1", 65% fine- to medium-grained sand, 35% silt, non to low plastic fines, medium dense, wet, no odor, non-stratified	
		0830	D9	⋈	75	7 7 10 13	–	–		SAND (SP) TO SAND WITH SILT (SP/SM); 5% angular gravel to 1.5", 85% fine- to medium-grained sand, 10% silt, non plastic fines, medium dense, wet, no odor, non-stratified	
	20	0834	D10	⋈	78	7 7 10	–	320 — 11		As above, wet	
		0836	D11	⋈	75	6 8 9	–	–		As above, wet Unoxidized, dark greenish-gray, as above, wet	
		0845	D12	⋈	100	9 12 14 19	–	–		As above, wet, trace to no gravel SILTY SAND (SM) interval	
	25	0851	D13	⋈	100	17 20 28	–	170 — 11		As above with thin (1-3") interbeds of fine-grained sand and silty sand, trace to no gravel	
		0857	D14	⋈	100	16 18 28	–	–		As above, wet, trace to no gravel Gravel content increasing	
		0909	D15	⋈	100	20 27 119 247	–	–		As above with rock fragments to 2.5"	Broke sample Too coarse to sample
	30										

WLOG4 98109 11/9/98

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW2B **Pg.** 3 **of** 7

Driller: Bevlik, Randy Whitcomb
Drilling Method: HSA; Mud Rotary Core
Location: N: 168458.11
Sampler: Modified California, HQ Core
E: 227248.66
Borehole Diameter: HSA - 8", HQ - 3.9"
Date Started: 8/14/98
Ground Elevation (Feet MSL): 970.91
Depth to First Groundwater (Feet): 16.50
Date Completed: 9/13/98
Top of Casing Elevation (Feet MSL): 968.78
Depth to Static Groundwater (Feet): 12.69
Logged by: GM
Drill Rig Type: Failing F-10
Weather Conditions: Clear and hot
Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
										GRAVELLY/COBBLY SAND (SP)	Advancing borehole to 33'; too coarse to sample
		0945	D16		100	28 80 189	–	–			
	35	1001	D17		50	82 180	–	–		**FELSIC DIKE:** 80% orthoclase, 20% quartz, coarse-grained, pale yellowish-brown, slightly weathered, very hard to extremely hard, very intensely fractured, very closely spaced, tight to slightly open, clean, smooth to slightly rough surfaces, in contact with biotite-rich quartz diorite	End 8/14/98 Begin 9/2/98
		0935 (0.6) 0941	C1		24	–	0	–		**QUARTZ DIORITE:** 40% plagioclase, 20% quartz, 40% dark minerals (biotite and hornblende), medium-grained, vaguely gneissic, speckled very light gray and grayish-black, slightly weathered, hard to very hard, very intensely to intensely fractured, very closely to closely spaced, tight to moderately open, clean to moderately thin iron oxide coating and calcite fillings, rough to slightly rough surfaces	Coring with side discharge diamond impregnated bit and water Circulation loss to formation during run
	40	0952 (0.4) 1000	C2		50	–	11	–		C2 - Same as above	Circulation loss to formation during run
	45	1038 (0.4)	C3		50	–	0	–		Same as above, very intensely fractured, patchy iron oxide and calcite coatings on some fracture surfaces, patchy chlorite mineralization	Mixing bentonite mud

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW2B **Pg.** 4 **of** 7

Driller: Beylik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168458.11 **Sampler:** Modified California, HQ Core

E: 227248.66 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/14/98

Ground Elevation (Feet MSL): 970.91 **Depth to First Groundwater (Feet):** 16.50 **Date Completed:** 9/13/98

Top of Casing Elevation (Feet MSL): 968.78 **Depth to Static Groundwater (Feet):** 12.69 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1050								See previous page	Circulation loss to formation during run
	50	1153 (0.2) 1223	C4		20	–	0	–		As above, vaguely gneissic, foliation dips approximately 55 degrees, unweathered, extremely hard, very intensely to intensely fractured, very closely to closely spaced, tight, clean with patchy chlorite, calcite and trace pyrite on some fracture surfaces	Adding 5 bags of bentonite Circulation loss to formation during run Efforts to regain circulation results in numerous interruptions in core run
	55	1335 (0.7) 1342	C5		20	--	0	–		As above, vaguely gneissic, foliation dips approximately 60 degrees, unweathered, extremely hard	Adding 5 bags of bentonite Maintained circulation during run
	60	1355 (0.21) 1407	C6		100	–	22	–		As above, vaguely gneissic, foliation dips 65 to 75 degrees, unweathered, extremely hard, moderately to slightly fractured, moderately closely to widely spaced, tight to slightly open, clean with spotty reddish iron oxide coatings to very thin calcite fillings, slightly to moderately rough surfaces, main fracture set dips approximately 80 to 85 degrees	Circulation loss to formation during run, much less than above

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW2B **Pg.** 5 **of** 7

Driller: Bevilk, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168458.11 **Sampler:** Modified California, HQ Core

E: 227248.66 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/14/98

Ground Elevation (Feet MSL): 970.91 **Depth to First Groundwater (Feet):** 16.50 **Date Completed:** 9/13/98

Top of Casing Elevation (Feet MSL): 968.78 **Depth to Static Groundwater (Feet):** 12.69 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1423 (0.07) 1501	C7		100	–	27	–		As above, gneissic foliation dips approximately 55 degrees, unweathered, extremely hard, intensely to moderately fractured with very intensely fractured intervals, tight to slightly open, clean to very thin calcite/chlorite fillings	Some circulation loss to formation
	65	1515 (0.2) 1538	C8		100	–	14	–		As above, gneissic foliation dips approximately 60 degrees, unweathered, extremely hard, intensely to moderately fractured, closely to moderately closely spaced, tight to slightly open, clean to patchy reddish iron oxide, calcite and chlorite coatings/fillings, slightly rough to smooth surfaces, some slickensided surfaces	Some circulation loss to formation
	70	1556 (0.12)	C9		100	–	30	–		As above, gneissic foliation dips 60 to 65 degrees, unweathered, extremely hard, intensely to moderately fractured with very intensely fractured intervals, closely to moderately closely spaced, tight to slightly open, clean with reddish iron oxide, and chlorite and calcite coatings/fillings, slightly rough to rough, some slickensided surfaces, some breaks along foliation planes	Some circulation loss to formation
	75	1651 1635 (0.2)	C10		32	–	0	–		As above, gneissic, very intensely to intensely fractured, some yellowish iron oxide coatings, felsic dike	Some circulation loss to formation Variably hard and softer intervals

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

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Project: Scholl Canyon Landfill **Boring:** EW2B **Pg.** 6 of 7

Driller: Beylik, Randy Whitcomb
Drilling Method: HSA; Mud Rotary Core
Location: N: 168458.11
Sampler: Modified California, HQ Core
E: 227248.66
Borehole Diameter: HSA - 8", HQ - 3.9"
Date Started: 8/14/98
Ground Elevation (Feet MSL): 970.91
Depth to First Groundwater (Feet): 16.50
Date Completed: 9/13/98
Top of Casing Elevation (Feet MSL): 968.78
Depth to Static Groundwater (Feet): 12.69
Logged by: GM
Drill Rig Type: Failing F-10
Weather Conditions: Clear and hot
Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1714								See previous page	End 9/2/98 Begin 9/3/98 Some circulation loss to formation
	''	0816 (0.8) 0819	C11		0	–	0	–		No recovery, implies very intensely fractured conditions	
	80	0827 (0.4) 0834	C12		0	–	0	–		No recovery, implies very intensely fractured conditions	Some circulation loss to formation
		0849 (0.1) 0908	C13		40	–	0	–		As above, unweathered, extremely hard, very intensely to intensely fractured, very closely to closely spaced, tight to moderately open, clean with patchy reddish iron-oxide staining, and chlorite and quartz filling, slightly rough surfaces	Some circulation loss to formation Recovered fragments up to 3" long
	85	0925 (0.15) 0945	C14		43	–	0	–		As above, fragment size and recovery implies very intensely fractured	Some circulation loss to formation Recovered fragments up to 2" long
		1445 (0.1) 1512	C15		67	–	0	–		As above with felsic dike interval, very intensely fractured (recovered fine gravel to fragments up to 3"), open fractures with green mineral infilling	Pulling rods to check bit wear; 25% wear; core fragments wedged in bit Some circulation loss to formation
	90	1524	C16		13	–	0	–			

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

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Project: Scholl Canyon Landfill **Boring:** EW2B **Pg.** 7 of 7

Driller: Beylik, Randy Whitcomb
Drilling Method: HSA; Mud Rotary Core
Location: N: 168458.11
Sampler: Modified California, HQ Core
E: 227248.66
Borehole Diameter: HSA - 8", HQ - 3.9"
Date Started: 8/14/98
Ground Elevation (Feet MSL): 970.91
Depth to First Groundwater (Feet): 16.50
Date Completed: 9/13/98
Top of Casing Elevation (Feet MSL): 968.78
Depth to Static Groundwater (Feet): 12.69
Logged by: GM
Drill Rig Type: Failing F-10
Weather Conditions: Clear and hot
Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 In.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		(0.15) 1544								As above, fragments to 3" long and recovery percentage imply very intense fracturing, slightly rough fracture surfaces with patchy reddish iron-oxide coating and spotty yellowish staining	Some circulation loss to formation Difficulty maintaining circulation
	// 95	1610 (0.05) 1710	C17		33	–	0	–		As above, vertical fracture set, lined with chlorite	Difficulty maintaining circulation; numerous stops during run to regain circulation
	100 105									Boring terminated at 95'	Pulled rods; 100% bit wear

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW3B **Pg.** 1 **of** 7

Driller: Beylik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168480.81 **Sampler:** Modified California, HQ Core

E: 227234.42 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/13/98

Ground Elevation (Feet MSL): 971.75 **Depth to First Groundwater (Feet):** 18.00 **Date Completed:** 8/18/98

Top of Casing Elevation (Feet MSL): 969.60 **Depth to Static Groundwater (Feet):** 13.41 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 In.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
										ALLUVIUM (Qal): **SILTY SAND (SM)**; very dark grayish-brown, <5% angular gravel to 3/4", 65% fine- to medium-grained sand, 30% silt, low plasticity, medium dense, moist, no odor, massive, micaceous	Hand auger to 5' Drilling with hollow-stem augers Sampling with 140 lbs downhole hammer Core box 1: 0 - 15.0' Core box 2: 15.0' - 26.0' Core box 3: 26.0' - 36.0' Core box 4: 36.0' - 56.0' Core box 5: 56.0' - 64.0' Core box 6: 64.0' - 72.5' Core box 7: 72.5' - 97.0' Core box 8: 97.0' - 100.0'
	5	1345	D1		78	4 4 6	–	22.0 — 3.5			
		1350	D2		78	3 3 6	–	--		**SAND WITH SILT (SP/SM)**; brown to very dark grayish-brown, <5% gravel to 1/4", 85% fine- to medium-grained sand, <5% coarse sand, 5-10% silt, trace clay, low plastic fines, medium dense, moist, no odor, thinly to moderately bedded, micaceous	
		1354	D3		100	6 6 8 12	–	–		**SILTY SAND (SM)**; very dark grayish-brown, <5% gravel, 65% fine- to medium-grained sand, 25% fines, <5% clay, medium dense, moist, no odor, massive, micaceous	
	10	–	D4		100	5 5 7	–	8.4 — 3.4		**SAND WITH SILT (SP/SM)**; brown, 5% gravel to 1.5", 85% fine- to medium-grained sand, 10% fines, low plastic fines, medium dense, moist with very moist intervals, no odor, moderately bedded, micaceous	
		1404	D5		100	8 12 16	–	–			
		1411	D6		83	8 12 15 15	–	–		As above with angular gravel to 1.5"	
	15										

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
Gm	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW3B **Pg.** 2 **of** 7

Driller: Beylik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168480.81 **Sampler:** Modified California, HQ Core

E: 227234.42 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/13/98

Ground Elevation (Feet MSL): 971.76 **Depth to First Groundwater (Feet):** 18.00 **Date Completed:** 8/18/98

Top of Casing Elevation (Feet MSL): 969.60 **Depth to Static Groundwater (Feet):** 13.41 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1418	D7		89	7 13 11	–	180 — 3.3		As above Siltier clayey interval, very moist	
		1422	D8		100	7 8 10	–	–		**SAND WITH SILT (SP/SM) TO SILTY SAND (SM);** vaguely bedded, olive-brown, <5% angular gravel to 1/2", 60-80% fine- to medium-grained sand, 15-35% silt, low to non-plastic, medium dense, moist to wet	First water at 18'
		1426	D9		100	7 9 11 12	–	–		As above, lithic fragments to 2.5", wet, charcoal fragments	
	20	1437	D10		100	9 11 20	–	115 — 3.2		As above with dark brown and dark greenish-gray intervals, wet, gravel layer at 21'	Oxidized Unoxidized
		1445	D11		67	18 21 42	–	220 — 3.0		As above with dark greenish-gray intervals, 5% gravel, 70% medium sand, 10% coarse sand, 15% fines	
		1450	D12		100	8 15 12 8	–	–		As above, mostly medium- to coarse-grained sand with intervals of SILTY SAND (SM), greenish black, 80% fine sand, 20% fines, low plasticity, medium dense, wet, slight odor, moderately bedded	
	25	1458	D13		100	12 27 41	–	94 — 3.0			
		1506	D14		100	21 67 72	–	–		**SAND (SP);** very dark gray to greenish black, <5% gravel, 90% fine- and medium-grained sand, 5% fines, non-plastic, dense to very dense, wet, vaguely bedded	
		1515	D15		100	18 26 31 37	–	–		As above, wet **SILTY SAND (SM);** greenish black, <5% gravel, 65-70% fine- to medium-grained sand, 30-35% fines	
	30										

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

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Project: Scholl Canyon Landfill **Boring:** EW3B **Pg.** 3 **of** 7

Driller: Beylik, Randy Whitcomb
Drilling Method: HSA; Mud Rotary Core
Location: N: 168480.81
Sampler: Modified California, HQ Core
E: 227234.42
Borehole Diameter: HSA - 8", HQ - 3.9"
Date Started: 8/13/98
Ground Elevation (Feet MSL): 971.75
Depth to First Groundwater (Feet): 18.00
Date Completed: 8/18/98
Top of Casing Elevation (Feet MSL): 969.60
Depth to Static Groundwater (Feet): 13.41
Logged by: GM
Drill Rig Type: Failing F-10
Weather Conditions: Clear and hot
Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1525	D16		100	26 31 41	–	220 — 2.9		**SAND (SP) with intervals of SILTY SAND (SM);** greenish black, <5% gravel, 85-90% fine- to medium-grained sand, 5-10% fines, non-plastic, dense, wet, no odor, moderately bedded	
		1531	D17		100	20 27 44	–	–		As above with intervals of fine-grained sand	
		1546	D18		100	12 37 65 141	–	–		As above with intervals of fine-grained sand and silty sand, gravel to 2.5"	
	35	–	D19		100	68 221	–	200 — 2.8		As above, Quartz Diorite in sampler shoe	
		1107 (0.5) 1112	C1		0	–	0	–		No recovery, fine- to medium-grained cuttings, medium-grained most common	HSA refusal at 36' End 8/13/98 Begin 8/17/98 Convert to HQ coring Circulating water only Using new diamond impregnated bit
	40	1123 (0.5) 1128	C2		0	–	0	–		No recovery, fine- to medium-grained cuttings, finer grained than above	
		1141 (0.4) 1149	C3		0	–	0	–		No recovery, as above	
	45	1158	C4		0	–	0	–		No recovery, as above	

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
Gm	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW3B **Pg.** 4 **of** 7

Driller: Bevlik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168480.81 **Sampler:** Modified California, HQ Core

E: 227234.42 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/13/98

Ground Elevation (Feet MSL): 971.75 **Depth to First Groundwater (Feet):** 18.00 **Date Completed:** 8/18/98

Top of Casing Elevation (Feet MSL): 969.60 **Depth to Static Groundwater (Feet):** 13.41 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		(0.1) 1223									
		1423 (1.3) 1425	C5		0	–	0	–		No recovery, medium- to coarse-grained	Applying down force, drilling at high RPMs
	50	1434 (0.6) 1438	C6		80	–	0	–		**QUARTZ DIORITE:** 10-15% quartz, 35-40% plagioclase, 50% hornblende, trace biotite, gneissic foliation dipping 65 to 70 degrees, speckled very light gray and grayish-black, slightly weathered, very hard to extremely hard, intensely to moderately fractured, closely to moderately closely spaced, tight to slightly open, clean to very thin calcite and patchy red mineral coating, smooth (some slickensided) to slightly rough surfaces	
		1448 (0.3) 1457	C7		100	–	0	–		C7: As above, very intensely to intensely fractured, patchy reddish mineralization on surfaces	
	55	1516 (0.5) 1527	C8		90	–	42	–		C8: As above, intensely to moderately fractured, closely to moderately closely spaced, tight to slightly open, clean to very thin coatings (reddish mineralization and calcite), gneissic foliation dips 45 degrees	
	60	1539	C9		100	–	0	–			

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW3B **Pg.** 5 **of** 7

Driller: Bevlik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core
Location: N: 168480.81 **Sampler:** Modified California, HQ Core
E: 227234.42 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/13/98
Ground Elevation (Feet MSL): 971.75 **Depth to First Groundwater (Feet):** 18.00 **Date Completed:** 8/18/98
Top of Casing Elevation (Feet MSL): 969.60 **Depth to Static Groundwater (Feet):** 13.41 **Logged by:** GM
Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		(0.2) 1552								As above, very intensely (lower part) to intensely fractured, very closely to closely spaced, tight to moderately open, clean to moderately thin filling (calcite) and iron-oxide coating (reddish material not apparent on surfaces), smooth to moderately rough surfaces, vague gneissic foliation dips approximately 40 degrees	
	//	1637 (0.3) 1647	C10		100	–	14	–		C10: As above, very intensely to intensely fractured, very closely to closely spaced, tight to moderately open, clean to moderately thin calcite and iron-oxide filling/coating, slightly rough surfaces, some slickensided	Pulled rods to check bit, OK
	65	1659 (0.3) 1711	C11		100	–	0	–		C11: As above with infrequent quartz/feldspar dikes, very intensely to moderately fractured, very closely to moderately closely spaced, tight to moderately open, clean to moderately thin iron-oxide and calcite filled, slightly rough surfaces, some slickensided	
	70	1731 (0.2) 1751	C12		100	–	29	–		C12: As above, intensely to moderately fractured, closely to moderately closely spaced with intervals that are very closely spaced, tight to slightly open, clean to very thin chlorite (?) and iron oxide (reddish) coatings, moderately rough surfaces	End 8/14/98
	75	1138 (0.4) 1145	C13		100	–	18	–		C13: As above with quartz/feldspar dike dipping 45 degrees, gneissic, very intensely to moderately fractured, foliation dips 55-60 degrees	Begin 8/15/98 Difficulting tripping rods past 50' Pull rods to free sand-locked inner barrel Borehole taking water; drilling with bentonite mud

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

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Project: Scholl Canyon Landfill **Boring:** EW3B **Pg.** 6 **of** 7

Driller: Bevlik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168480.81 **Sampler:** Modified California, HQ Core

E: 227234.42 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/13/98

Ground Elevation (Feet MSL): 971.75 **Depth to First Groundwater (Feet):** 18.00 **Date Completed:** 8/18/98

Top of Casing Elevation (Feet MSL): 969.60 **Depth to Static Groundwater (Feet):** 13.41 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1201	C14		35	–	0	–		As above, with quartz/feldspar dike, very intensely to intensely fractured, very closely spaced, tight to slightly open, clean with reddish staining on some surfaces, moderately rough surfaces	
	11	(0.4)									Lost circulation, pulled up rods to regain
	80	1214									
		1234	C15		0	–	0	–		No recovery	Driller indicated softer interval than above rock
		(0.4)									
	85	1246									
		1254	C16		8	–	0	–		As above, inferred to be very intensely fractured, gneissic, foliation dips 55 degrees	
		(0.6)									
	90	1302									

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/96				

Project: Scholl Canyon Landfill **Boring:** EW3B **Pg.** 7 **of** 7

Driller: Bevlik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168480.81 **Sampler:** Modified California, HQ Core

E: 227234.42 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/13/98

Ground Elevation (Feet MSL): 971.75 **Depth to First Groundwater (Feet):** 18.00 **Date Completed:** 8/18/98

Top of Casing Elevation (Feet MSL): 969.60 **Depth to Static Groundwater (Feet):** 13.41 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 In.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1315 (0.5) 1326	C17		58	–	0	–		As above, very intensely to intensely fractured, very closely to closely spaced, tight to slightly open, clean to very thin iron-oxide coating/filling, slightly rough surfaces, some slickensided surfaces, infrequent crushed intervals (very soft, friable)	
	95	1339 1350	C18		100	–	17	–		As above, very intensely to moderately fractured, very closely to moderately closely spaced, tight to moderately open, clean to moderately thin calcite fillings and reddish iron-oxide coatings, gneissic foliation dips approximately 50 degrees	
	100									Boring terminated at 100 feet	
	105										

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW4B **Pg.** 1 **of** 7

Driller: Beylik, Randy Whitcomb
Drilling Method: HSA; Mud Rotary Core
Location: N: 168504.35
Sampler: Modified California, HQ Core
E: 227218.85
Borehole Diameter: HSA - 8", HQ - 3.9"
Date Started: 8/13/98
Ground Elevation (Feet MSL): 972.59
Depth to First Groundwater (Feet): 18.00
Date Completed: 9/1/98
Top of Casing Elevation (Feet MSL): 969.86
Depth to Static Groundwater (Feet): 20.99
Logged by: GM
Drill Rig Type: Failing F-10
Weather Conditions: Clear and hot
Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
										ALLUVIUM (Qal): **SILTY SAND (SM);** dark yellowish-brown, 5% gravel, 60% fine- to medium-grained sand, 33% silt, low plasticity, medium dense, moist, no odor, very friable	Hand auger to 5' Drilling with hollow-stem augers Sampling with 140 lbs downhole hammer Core box 1: 0 - 16.5' Core box 2: 16.5' - 34.0' Core box 3: 34.0' - 69.0' Core box 4: 69.0' - 81.5' Core box 5: 81.5' - 99.0'
	5		D1		100	4 5 11	–	14.0 — 3.8		**SILTY SAND TO SAND WITH SILT (SP/SM);** dark grayish-brown, 5% angular gravel, 80% medium sand, 15% silt, low plasticity, medium dense, moist, no odor	
		1127	D2		100	5 6 9	--	--		As above with clayey intervals, very moist	
		1136	D3		100	12 13 10 11	–	–		As above Clayey interval (5-10%), very moist	
	10	1139	D4		100	7 8 9	–	21.0 — 3.5		Trace subrounded weathered rock fragments to 1.5", trace to 5% clay-bearing interval	
		1159	D5		100	8 8 11	–	--		As above, mostly medium-grained sand, 5-10% coarse-grained sand, trace angular gravel	
		1209	D6		75	6 9 11 21	--	–		As above Coarse sand and fine gravel layer	
	15										

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

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Project: Scholl Canyon Landfill **Boring:** EW4B **Pg.** 2 **of** 7

Driller: Bevlik, Randy Whitcomb

Drilling Method: HSA; Mud Rotary Core

Location: N: 168504.35

Sampler: Modified California, HQ Core

E: 227218.85

Borehole Diameter: HSA - 8", HQ - 3.9"

Date Started: 8/13/98

Ground Elevation (Feet MSL): 972.59

Depth to First Groundwater (Feet): 18.00

Date Completed: 9/1/98

Top of Casing Elevation (Feet MSL): 969.86

Depth to Static Groundwater (Feet): 20.99

Logged by: GM

Drill Rig Type: Failing F-10

Weather Conditions: Clear and hot

Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1214	D7		61	7 10 12	–	87.0 — 3.5		As above, trace medium angular gravel	
		1217	D8		100	20 21 27	–	–		**SAND WITH GRAVEL (SP);** dark grayish-brown, 15-20% angular gravel, 65% medium- to coarse-grained sand, 10-15% silt, low plasticity, mostly medium sand, medium dense, moist, no odor; silt layer at 18', very moist, abundant, weathered quartz diorite clasts	
		1223	D9		100	27 39 44 52	–	–		Sharp contact **QUARTZ DIORITE;** feldspar, quartz, hornblende, medium-grained, massive, yellowish-gray to dusky yellow, highly to completely weathered, very soft, very intensely fractured, very closely spaced, tight to slightly open, very thin clay filling, iron-oxide staining, very moist, no odor	Groundwater first encountered at 18'
	20	1228	D10		100	22 49 61	–	7.5 — 3.4			
		1237	D11		72	48 56 85	–	–		As abve, pale yellowish-green, extremely closely sheared, altered to clay, completely to highly weathered, shearing inclined approximately 60 degrees	
		–	D12		92	89 174	–	–		D-11: greenish-gray, no fractures apparent, highly weathered, very soft, very thin clay-lined shear inclined at 80 degrees	
		1305	D13		100	77 137	–	–		D-12: as above, vaguely gneissic, 80-degree inclination D-13: as above	
	25	0943	C1		0	–	0	–			End 8/13/98 Begin 8/19/98 Continue with HQ core and diamond impregnated bit
		(2.5)								Cuttings indicate material similar to above, penetration rate implies very friable/very soft	Circulating water only
	30	0945									

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW4B **Pg.** 3 **of** 7
Driller: Bevlik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core
Location: N: 168504.35 **Sampler:** Modified California, HQ Core
E: 227218.85 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/13/98
Ground Elevation (Feet MSL): 972.59 **Depth to First Groundwater (Feet):** 18.00 **Date Completed:** 9/1/98
Top of Casing Elevation (Feet MSL): 969.86 **Depth to Static Groundwater (Feet):** 20.99 **Logged by:** GM
Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
	/	0954 (1.0) 0958	C2		38	–	0	22 — 13		**CLAY GOUGE;** fine- to medium-grained, foliated, dusky yellow (5Y 6/4) to moderate olive-brown (5Y 4/4), completely to highly weathered, very soft, near vertical foliation/shearing, no obvious fractures	Lost circulation during C2
	35	1038 (1.7) 1041	C3		0	–	0	–		Assumed to be same as above to approximately 37 feet when circulation was regained	Lost circulation Regained circulation at approx. 37 feet
	40	1050 (1.7) 1053	C4		3	–	0	–		**QUARTZ DIORITE;** 10-15% quartz, 35-40% plagioclase, 50% dark minerals (hornblende, biotite), fine- to medium-grained, pale olive (10Y 6/2), moderately weathered, soft to very soft, very intensely to intensely fractured, very close to closely spaced, tight to moderately open, very thin to moderately thin clay/calcite fillings, slightly rough surfaces	
	45	1102	C5		0	–	0	–			Intermittently lost circulation during C5

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW4B **Pg.** 4 **of** 7

Driller: Beylik, Randy Whitcomb
Drilling Method: HSA; Mud Rotary Core
Location: N: 168504.35
Sampler: Modified California, HQ Core
E: 227218.85
Borehole Diameter: HSA - 8", HQ - 3.9"
Date Started: 8/13/98
Ground Elevation (Feet MSL): 972.59
Depth to First Groundwater (Feet): 18.00
Date Completed: 9/1/98
Top of Casing Elevation (Feet MSL): 969.86
Depth to Static Groundwater (Feet): 20.99
Logged by: GM
Drill Rig Type: Failing F-10
Weather Conditions: Clear and hot
Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		(1.3) 1106		■					☒		End 8/18/98 Begin 8/31/98
	50	1025 (1.25) 1027	C6	■	0	–	0	–	☒	No recovery, cuttings imply no change in composition, fine- to medium-grained	Borehole open to 26' Drilling with bentonite mud
		1034 (0.8) 1037	C7	■	0	–	0	–	☒	No recovery, cuttings imply no change in composition	
	55	1049 (0.5) 1054	C8	■	0	–	0	–	☒	No recovery, cuttings imply no change in composition	
		1109 (0.6) 1113	C9	□	53	–	0	–	▨	**CLAY GOUGE WITH QUARTZ DIORITE FRAGMENTS;** 50% clay, 25% plagioclase, 10% quartz, 15% dark-colored mafic minerals, fine- to medium-grained, sheared, medium gray, greenish-gray and light brownish-gray, slightly weathered/altered, soft to very soft, very intensely sheared, very closely spaced, tight to moderately open, clean to thin clay filling, vertically oriented smooth and polished surfaces	Intermittently lost circulation during C9
	60	1124 (0.4)	C10	■	0	–	0	–	☒	See next page	Intermittently lost circulation during C10

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW4B **Pg.** 5 **of** 7

Driller: Beylik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168504.35 **Sampler:** Modified California, HQ Core

E: 227218.85 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/13/98

Ground Elevation (Feet MSL): 972.59 **Depth to First Groundwater (Feet):** 18.00 **Date Completed:** 9/1/98

Top of Casing Elevation (Feet MSL): 969.86 **Depth to Static Groundwater (Feet):** 20.99 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1131								No recovery, cuttings imply mostly quartz diorite, loss of circulation suggests the presence of clay gouge zones	
	/	1146 (0.4) 1150	C11		0	–	0	–		No recovery, cuttings imply mostly fine- to medium-grained quartz diorite	Moderate RPMs Maintained circulation during C12
	65	1201 (0.4) 1207	C12		77	–	27	–		**QUARTZ DIORITE:** 50% plagioclase, 10% quartz, 60% dark minerals, medium- to coarse-grained, gneissic, very light gray and dark gray, slightly weathered, moderately hard to hard, intensely to moderately fractured, closely to moderately closely space, tight to moderately open, clean to moderately thin reddish iron-oxide coating/filling, slightly rough to smooth surfaces	Moderate RPMs Maintained circulation
		1222 (0.5) 1227	C13		100	–	27	–		Same as above, some fractures, parallel foliation, dips approximately 75 degrees, some fractures lined with calcite	Moderate RPMs
	70	1248 (0.4) 1255 1300 (0.7) 1303	C14		40	–	7	–		Same as above, vaguely gneissic	Moderate RPMs
	75	1321 (0.1)	C15		100	–	0	–		Same as above, fragments imply intense fracturing, reddish mineral coating on fracture surfaces, very hard to extremely hard	Fragments up to 3"

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW4B **Pg.** 6 **of** 7

Driller: Beylik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168504.35 **Sampler:** Modified California, HQ Core

E: 227218.85 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/13/98

Ground Elevation (Feet MSL): 972.59 **Depth to First Groundwater (Feet):** 18.00 **Date Completed:** 9/1/98

Top of Casing Elevation (Feet MSL): 969.86 **Depth to Static Groundwater (Feet):** 20.99 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1338								See previous page	Moderate RPMs for slow penetration
		1523 (0.3) 1532	C16		90	–	35	–		As above, gneissic, foliation dips 55 degrees, very hard to extremely hard, moderately fractured with intervals very intensely fractured, moderately closely spaced, tight to moderately open, clean to moderately thin calcite and iron oxide coating/fillings, smooth to slightly rough fracture surfaces	Pulling rods to check bit; bit OK, rock wedged in opening and loose in core barrel
	80	1549 (0.1) 1619	C17		53	–	0	–		Gneissic, foliation dips 65 degrees, breaks along some foliation planes, intensely to very intensely fractured	Inner barrel wedged in rods; rods sheared off at 32'
		1307 (0.5) 1312	C18		7	–	0	– –		Same as above, very intensely fractured, abundant patchy chlorite (soft, green) on fracture surfaces	End 8/31/98 Begin 9/1/98 Recovered fragments up to 2"
	85	1336 (0.6) 1344	C19		65	–	0	–		Same as above with abundant chlorite, very intensely to intensely fractured and sheared, slightly weathered, slightly to moderately altered, moderately soft to soft, very closely to closely spaced shears and fractures, tight to open, clean to stained (reddish iron-oxide) to moderately thin clay filling, smooth to slightly rough surfaces, some slickensided, very steep to near vertical dips	
	90	1359	C20		62	–	0	–		See next page	

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW4B **Pg.** 7 **of** 7

Driller: Beylik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168504.35 **Sampler:** Modified California, HQ Core

E: 227218.85 **Borehole Diameter:** HSA - 8", HQ - 3.9" **Date Started:** 8/13/98

Ground Elevation (Feet MSL): 972.59 **Depth to First Groundwater (Feet):** 18.00 **Date Completed:** 9/1/98

Top of Casing Elevation (Feet MSL): 969.86 **Depth to Static Groundwater (Feet):** 20.99 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Clear and hot **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
										Very intensely fractured quartz diorite, as above Felsic dike at transition	
	/	(0.7) 1406								Very intensely sheared, abundant clay gouge with suspended quartz diorite fragments, greenish gray, light brownish gray and light greenish gray plastic clay, 65 degree dips	
	95	1424 (0.6) 1432	C21		0	–	0	–		No recovery, intermittent loss of circulation implies presence of clay gouge to 99'	Losing circulation; bit blocking off with clay
	100 105									Boring terminated at 99 feet	

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
Gm	10/13/98				

Project: Scholl Canyon Landfill **Boring:** EW5B **Pg.** 1 **of** 7

Driller: Beylik, Randy Whitcomb
Drilling Method: HSA; Mud Rotary Core
Location: N: 168528.46
Sampler: Modified California, HQ Core
E: 227204.18
Borehole Diameter: HSA - 11'; HQ - 3.9"
Date Started: 8/10/98
Ground Elevation (Feet MSL): 973.29
Depth to First Groundwater (Feet): 21.00
Date Completed: 8/12/98
Top of Casing Elevation (Feet MSL): 970.74
Depth to Static Groundwater (Feet): 16.17
Logged by: GM
Drill Rig Type: Failing F-10
Weather Conditions: Cloudy/clear
Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
										2" Asphalt **QUARTZ DIORITE;** coarse-grained, foliated, white to moderate olive-brown to yellowish gray, moderately weathered, moderately soft, no apparent fractures, dry, no odor	Hand auger to 5' Drilling with hollow-stem augers Sampling with 140 lbs downhole hammer Core box 1: 0 - 14.0' Core box 2: 14.0' - 24.0' Core box 3: 24.0' - 48.5' Core box 4: 48.5' - 100.0'
	5	0912	D1	⧗	100	11 37 60	–	4.7 — 4.7			
		0929	D2	⧗	100	37 55 90	–	–		Very intensely fractured, very closely spaced, slightly open, very thin clay and calcium carbonate filling, iron-oxide staining	
		0938	D3	⧗	100	40 105	–	–		Biotite-rich interval, olive gray, similar fracture characteristics, as above	
		0948	D4	⧗	100	27 60	–	–		Weakly sheared interval, medium- to coarse-grained, feldspar-rich with weathered mica	
	10	0953	D5	⧗	100	25 31	–	4.8 — 4.8		Coarse-grained, randomly sheared	
		0957	D6	⧗	100	12 16	–	–		Shears inclined at approximately 45 degrees, clayey, very soft to soft, dry to moist	Moisture content increasing
		1004	D7	⧗	100	10 21	–	–		No obvious shearing or fracturing, very soft, fine- to medium-grained	
		1007	D8	⧗	100	22 50	–	–		Foliated zone, inclined at about 45 degrees, very soft, medium- to coarse-grained, no obvious fractures or shearing	
		1015	D9	⧗	100	37 45	–	–		Weakly foliated, some shearing, no obvious fractures, very soft, highly- to moderately-weathered	
	15										

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW5B **Pg.** 2 **of** 7

Driller: Beylik, Randy Whitcomb
Drilling Method: HSA; Mud Rotary Core
Location: N: 168528.46
Sampler: Modified California, HQ Core
E: 227204.18
Borehole Diameter: HSA - 11'; HQ - 3.9"
Date Started: 8/10/98
Ground Elevation (Feet MSL): 973.29
Depth to First Groundwater (Feet): 21.00
Date Completed: 8/12/98
Top of Casing Elevation (Feet MSL): 970.74
Depth to Static Groundwater (Feet): 16.17
Logged by: GM
Drill Rig Type: Failing F-10
Weather Conditions: Cloudy/clear
Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1036	D10		67	37 73	–	5.1 — 5.1		Medium- to coarse-grained, no obvious fractures or shearing, very soft, moderately weathered	
		1043	D11		100	38 44	–	–		Biotite-rich, very close fractures, tight, clean, iron-oxide stained	
		1047	D12		100	39 70	–	–		Random shearing, no obvious fractures, medium- to coarse-grained, very soft	
		1102	D13		67	55 110	–	–		Near vertical shearing, very thin, medium- to coarse-grained, very soft	
		1111	D14		100	67 130	–	–		Random shearing, iron-oxide staining, soft	
	20	1118	D15		100	39 120	–	5.3 — 5.3		With thin biotite-rich intervals, iron-oxide stained surfaces, no obvious fractures or staining	
		1133	D16		67	37 86	–	–		Very intensely fractured, abundant iron-oxide stained surfaces, slightly open, very thin clay filling	First water at 21'
		1142	D17		100	66 83	–	–		No obvious fracturing or shearing, less iron-oxide staining, very soft to soft	
		1153	D18		25	126 200	–	–		No iron-oxide staining, random clean discontinuous planar surfaces	
		1211	D19		100	111 192	–	–		Light gray with black mica, slightly weathered, very intensely fractured, very close, tight, clean, some weak staining, soft with extremely hard fragments	
	25	1224	D20		67	88 151	–	7.4 — 6.7		As above	
		1241	D21		33	212 286	–	–		As above, vaguly foliated	Water at 25.9' Converting to HQ coring with surface set diamond bit
		1250	D22		67	130 192	–	–		Mafic-rich interval	
	30	1609 (0.5) 1613	C1		4	–	–	–		Mafic-rich fragment, moderately open fracture with thin chlorite filling, others clean, slightly rough surfaces	Core barrel 7.5' long Single fragment recovered

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

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Project: Scholl Canyon Landfill **Boring:** EW5B **Pg.** 3 **of** 7

Driller: Bevlik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168528.46 **Sampler:** Modified California, HQ Core

E: 227204.18 **Borehole Diameter:** HSA - 11"; HQ - 3.9" **Date Started:** 8/10/98

Ground Elevation (Feet MSL): 973.29 **Depth to First Groundwater (Feet):** 21.00 **Date Completed:** 8/12/98

Top of Casing Elevation (Feet MSL): 970.74 **Depth to Static Groundwater (Feet):** 16.17 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Cloudy/clear **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1709 (0.3) 1715	C2		33	–	0	–		Gneissic, medium- to coarse-grained, some dark yellowish-orange discoloration, fracture surfaces slightly rough, clean, biotite-rich zones, schistose, inferred to be very intensely fractured based on fragment sizes	Extremely hard rock fragments
		1734 (0.4) 1739	C3		25	–	0	–		Vaguely gneissic, very intensely fractured, very close, tight clean to coated fractures, slightly rough surfaces	Fragments up to 2.5"
	35	1750 (0.4) 1755	C4		8	–	0	–		Very intensely fractured, very close, tight, clean to coated surfaces, smooth to slightly rough	Fragments up to 1.5"
		1809 (0.7) 1812	C5		8	–	0	–		Very intensely fractured, very close, tight, clean to stained surfaces, iron-oxide stained surfaces, rough, moderately open calcite-filled fracture	Fragments up to 2.25"
		1824 (1.0) 1825	C6		0	–	0	–		No recovery	
	40	0820 (0.8) 0822	C7		0	–	0	–		No recovery	End 8/10/98 Begin 8/11/98
		0912 (0.2) 0920	C8		0	–	0	–		No recovery	Slow rotation, stops circulation for last 6"
		1004 (0.3) 1007	C9		16	–	0	–		Slightly weathered, hard to very hard, very intensely fractured, very close, tight to slightly open, clean smooth to slightly rough surface, light iron-oxide staining on surfaces	
	45	1027 (0.5) 1029 1036 (0.4)	C10		50	–	0	–		Vaguely gneissic, slightly weathered, very hard to extremely hard, very intensely fractured, very close, tight to slightly open, clean, slightly rough, iron oxide staining, very thin spotty clay coatings	Added rod, continued C10 Fragments to 3"

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

Project: Scholl Canyon Landfill **Boring:** EW5B **Pg.** 4 **of** 7

Driller: Bevlik, Randy Whitcomb
Drilling Method: HSA; Mud Rotary Core
Location: N: 168528.46
Sampler: Modified California, HQ Core
E: 227204.18
Borehole Diameter: HSA - 11'; HQ - 3.9"
Date Started: 8/10/98
Ground Elevation (Feet MSL): 973.29
Depth to First Groundwater (Feet): 21.00
Date Completed: 8/12/98
Top of Casing Elevation (Feet MSL): 970.74
Depth to Static Groundwater (Feet): 16.17
Logged by: GM
Drill Rig Type: Failing F-10
Weather Conditions: Cloudy/clear
Reviewed by: GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1041								Slickensided surfaces, quartz veining, spotty red mineralized surfaces	
		1108 (0.2) 1119	C11		40	–	0	–		Slightly weathered, very hard to extremely hard, very intensely fractured, very close, tight, clean iron-oxide staining, smooth to slightly rough Very soft, completely weathered, very intensely sheared zone, altered to clay, 60-degree inclination, numerous slickensided and smooth polished surfaces	Rock fragments to 1.5" Bit blocked off and lost circulation Inner barrel jammed in core barrel, pulling rods
	50	1219 (1.2) 1222	C12		0	–	0	–		No recovery, inferred to be very intensely fractured, clay gouge likely not present (maintained circulation through run)	Roated at high RPM
		1230 (0.5) 1234	C13		0	–	0	–		No recovery, as above	Rotating at moderate RPM
	55	1303 (0.4) 1311	C14		3	–	0	–		Diorite, medium dark gray, fine- to medium-grained, gneissic, slightly weathered to unweathered, extremely hard, quartz layering, very intensely fractured, very close spacing, tight, clean with red spotty mineralization, very thin chlorite patches and pyrite streaks, moderately rough surfaces	Moderate rotation Rock fragments to 1.5"
	60	1416 (0.3) 1428	C15		8	–	0	–		Gneiss, medium dark gray with light gray banding, slightly weathered to unweathered, extremely hard, very intensely fractured, very close spacing, tight, clean with pyrite and chlorite mineralization, slightly rough surfaces	Moderate rotation Rock fragments to 1"

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Geotechnical and Environmental Consultants

Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

WLOG4 98109 11/9/98

Project: Scholl Canyon Landfill **Boring:** EW5B **Pg.** 5 **of** 7

Driller: Beylik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168528.46 **Sampler:** Modified California, HQ Core

E: 227204.18 **Borehole Diameter:** HSA - 11"; HQ - 3.9" **Date Started:** 8/10/98

Ground Elevation (Feet MSL): 973.29 **Depth to First Groundwater (Feet):** 21.00 **Date Completed:** 8/12/98

Top of Casing Elevation (Feet MSL): 970.74 **Depth to Static Groundwater (Feet):** 16.17 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Cloudy/clear **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		1522 (0.2) 1539	C16		13	–	13	–		**QUARTZ DIORITE;** medium-grained, massive, very light gray, medium- gray and greenish gray, slightly weathered, very hard, very intensely to intensely fractured, very close spacing, tight to slightly open, clean to very thin patchy clay filling, iron-oxide staining, slightly to moderately rough surfaces, rock appears to erode along fractures	Moderate rotation
	65	1634 (0.2) 1646 (0.3) 1655	C17		5	–	0	–		**QUARTZ DIORITE;** medium-grained, gneissic, very light gray, medium-gray and greenish-gray, slightly to moderately weathered, moderately hard, very intensely fractured, very close spacing, tight to moderately open, clean to moderately thin calcite filling, spotty iron-oxide coating, slightly rough to rough surfaces, some smooth slickensided surfaces	Using solid inner barrel with modified core catcher Moderate rotation Fragments to 2.5"
	70	1713 (0.2) 1741	C18		0	–	0	–		No recovery, infers very intense fracturing (?)	Moderate to low rotation Circulation good throughout run
	75	1755	C19		0	–	0	–			Moderate to fast rotation

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Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

WLOG4 98109 11/9/98

Project: Scholl Canyon Landfill **Boring:** EW5B **Pg.** 6 **of** 7

Driller: Bevlik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168528.46 **Sampler:** Modified California, HQ Core

E: 227204.18 **Borehole Diameter:** HSA - 11'; HQ - 3.9" **Date Started:** 8/10/98

Ground Elevation (Feet MSL): 973.29 **Depth to First Groundwater (Feet):** 21.00 **Date Completed:** 8/12/98

Top of Casing Elevation (Feet MSL): 970.74 **Depth to Static Groundwater (Feet):** 16.17 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Cloudy/clear **Reviewed by:** GM

Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		(0.4) 1809								No recovery. Rock fragments to 1" size in mud tank suggest this interval consists of very intensely fractured gneissic quartz diorite	Abundant sand cuttings accumulating in mud tank
		1829 1847	C20		0	–	0	–		Extremely hard, very slow penetration	C20: Moderate rotation, occasional rod chatter at higher RPM
	80	1114 (0.04) 1156	C21		0	–	0	–		No recovery	Slow penetration; new bit for C21, low RPMs circulating water only
		1207 (0.1) 1230	C22		0	–	0	–		No recovery, cuttings indicate quartz diorite	C22: high RPMs
		1309 (0.1) 1317	C23		0	–	0	–		No recovery, cuttings indicate quartz diorite	C23: medium RPMs
	85	1354 (0.4) 1407	C24		0	–	0	–		No recovery, cuttings indicate quartz diorite	C24: medium to high RPMs
	90	1421	C25		0	–	0	–			C25: medium to high RPMs

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Geotechnical and Environmental Consultants

Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				

WLOG4 98108 11/9/98

Project: Scholl Canyon Landfill **Boring:** EW5B **Pg.** 7 of 7

Driller: Beylik, Randy Whitcomb **Drilling Method:** HSA; Mud Rotary Core

Location: N: 168528.46 **Sampler:** Modified California, HQ Core

E: 227204.18 **Borehole Diameter:** HSA - 11'; HQ - 3.9" **Date Started:** 8/10/98

Ground Elevation (Feet MSL): 973.29 **Depth to First Groundwater (Feet):** 21.00 **Date Completed:** 8/12/98

Top of Casing Elevation (Feet MSL): 970.74 **Depth to Static Groundwater (Feet):** 16.17 **Logged by:** GM

Drill Rig Type: Failing F-10 **Weather Conditions:** Cloudy/clear **Reviewed by:** GM

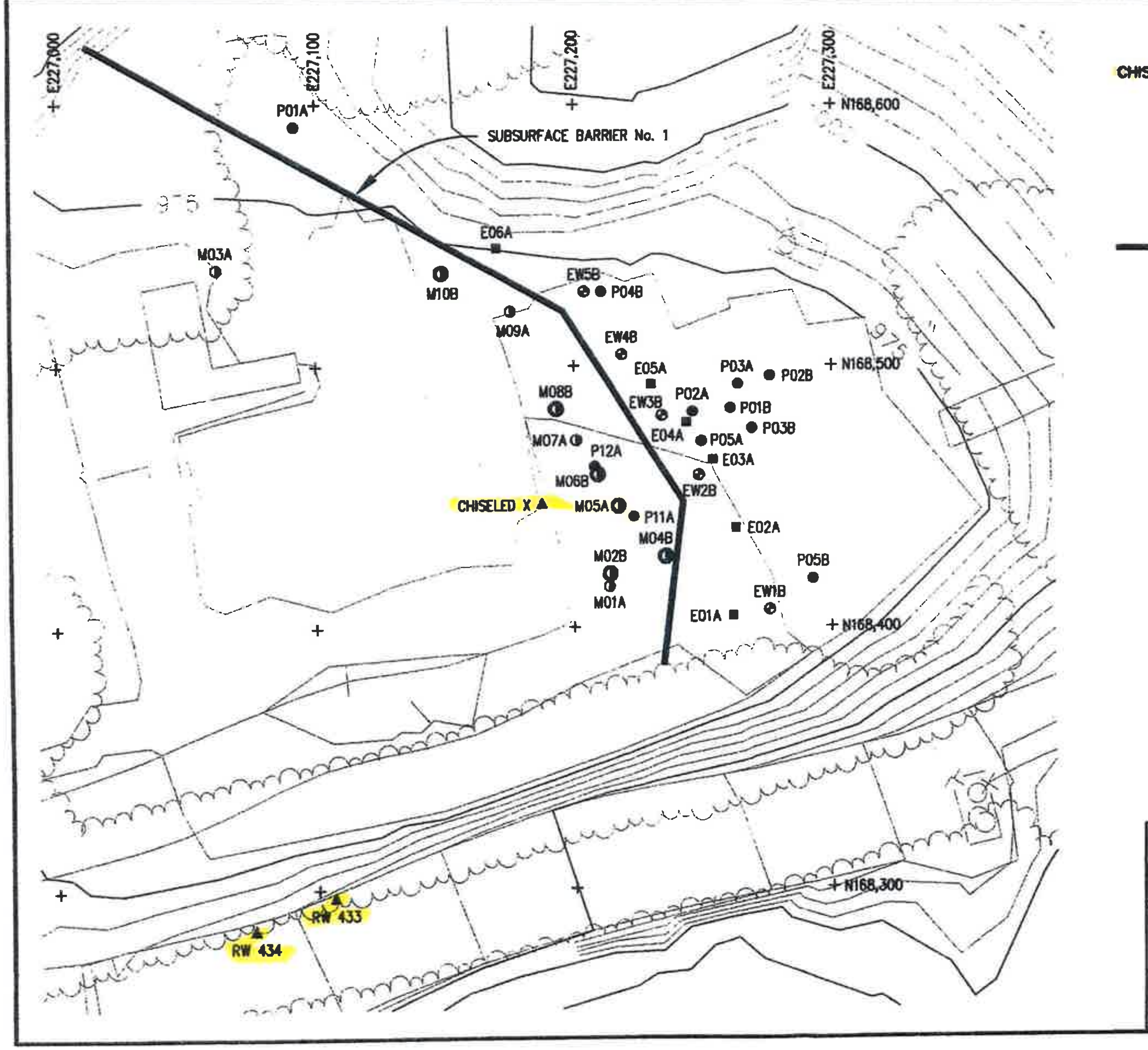
Elevation (feet, MSL)	Depth (feet)	Drilling Time (rate, ft/min)	Sample No.	Sample Type	Recovery (%)	Blows/6 in.	RQD (%)	FID (ppm)	Graphic Log	Material Description	Remarks
		(0.1)		■						No recovery, cuttings indicate quartz diorite, medium grained	
		1458	C26	■	0	–	0	–			C26: moderate RPMs Observing metal shavings in cuttings - bit wear (?)
	95			■							
		(0.1)		■						No recovery, cuttings appear to be relatively finer-grained with higher percentage of mafic minerals and biotite	Penetration much slower - bit wear (?)
		1548		■							
			C27	■	0	–	0	–		No recovery	Final 6" drilled at low RPMs, C27: very low RPMs
	100	1613		■							
										Boring terminated at 100 feet. Used two surface-set diamond core bits, both worn 100%.	
	105										

WLOG4 98109 11/9/98

Advanced Earth Sciences, Inc.
Geotechnical and Environmental Consultants

Corehole Log

Approved	Date	Revised	Date	Project No.	FIG.
GM	11/13/98				



EXPLANATION

CHISELED X	▲	BENCHMARK
EW5B	⊘	EXTRACTION WELL, installed during this project
E06A	■	EXTRACTION WELL, installed previously
M10B	◐	MONITORING WELL, installed previously, with dedicated sampling pump
M03A	◑	MONITORING WELL, installed previously
P11A	●	PIEZOMETER, installed previously
▬		SUBSURFACE BARRIER ALIGNMENT

NORTH
SCALE

0 20 40 60 80 feet

Advanced Earth Sciences, Inc.
Geotechnical and Environmental Consultants

Project No. 98-109

Scholl Canyon Landfill
Sanitation Districts

Well and Piezometer Locations
at Scholl Canyon Park

1-99

Figure 3

VAN BEVEREN & BUTELO, INC.

2006

BORING 1

Drilled Date(s): June 20, 2005

Equipment Used: Truck-mounted Bucket Auger (24-inch-diameter)

Depth to Water: Not encountered

Driving Weight and Drop: Driving weight below / 6-inch-drop

SURFACE ELEVATION: 1640.0 feet (See Figure 1 for benchmark)

ELEVATION (feet)	DEPTH (feet)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	DRIVING WEIGHT FOR 12-IN. DROP (lbs)	BLOW COUNT (blows/foot)	SAMPLE LOCATION	
							FILL SM - SILTY SAND - medium to coarse, gravel (up to 3"), asphalt concrete fragments, brown **BEDROCK** GRANITE - greenish-brown
1635	5			3,723	18 for 1"	☒	Joint: N35E, 80N [No Sample Recovery]
1630	10	13.6	124	3,723	13 for 6"	⧓	gray to greenish-brown Foliation: 62E, 45N
							Joint face N-S, vertical
1625	15	3.7	121	3,723	15 for 6"	⧓	greenish-brown
1620	20	3.3	115	3,723	20 for 6"	⧓	weathered Joints: N80E, 76E N5W, 52W
1615	25			3,723	14 for 3"	☒	[No Sample Recovery] Joint: N15W, 58N
1610	30						
1605	35						Joints: N37E, 80N N80W, 44N Joint: N30E, 60S
1600	40						

(Continued on next page)

LOG OF BORING

Job No: 05-045 By: EY Date: 7-21-2005 Checked: Printed: 8-11-05 [LOG OF BORING DRIVE WT; 05-045.GPJ]

The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

VAN BEVEREN & BUTELO, INC.

FIGURE A-1.1a

BORING 1

(Continued)

Drilled Date(s): June 20, 2005

Equipment Used: Truck-mounted Bucket Auger (24-inch-diameter)

Depth to Water: Not encountered

Driving Weight and Drop: Driving weight below / 6-inch-drop

SURFACE ELEVATION: 1640.0 feet (See Figure 1 for benchmark)

ELEVATION (feet)	DEPTH (feet)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	DRIVING WEIGHT FOR 12-IN. DROP (lbs)	BLOW COUNT (blows/foot)	SAMPLE LOCATION	
						▨	GRANITE - *cont.* greenish-brown iron stain: N40W, 78N
1595	45					▨	Joint: N40W, 50N
1590	50						**END OF BORING AT 50 FEET.** Notes 1) Fill to 8 inches. 2) Groundwater not encountered. 3) Boring backfilled will cuttings and tamped.
1585	55						
1580	60						
1575	65						
1570	70						
1565	75						
1560	80						

Job No: 05-045 By: EY Date: 7-21-2005 Checked: Printed: 8-11-05 [LOG OF BORING DRIVE WT; 05-045.GPJ]

The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

VB&B VAN BEVEREN & BUTELO, INC.

FIGURE A-1.1b

BORING 2

Drilled Date(s): June 21, 2005
Equipment Used: Truck-mounted Bucket Auger (24-inch-diameter)

Depth to Water: Seepage at 30 feet
Driving Weight and Drop: Driving weight below / 12-inch-drop

SURFACE ELEVATION: 1530.0 feet (See Figure 1 for benchmark)

ELEVATION (feet)	DEPTH (feet)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	DRIVING WEIGHT FOR 12-IN. DROP (lbs)	BLOW COUNT (blows/foot)	SAMPLE LOCATION	
							ALLUVIUM SM - SILTY SAND - brown **BEDROCK** GRANITE - weathered, orange brown massive, hard
1525	5	0.8	136	3,723	11 for 6"	⧓	iron-oxide staining, mottled white and gray Joints: NS, 62E 44E, 45N
1520	10	4.7	125	3,723	11	⧓	massive Joint face: N26W, 80SW
1515	15	1.3		3,723		⧓	Joint: NS, 52E
1510	20	2.7	119	3,723	10 for 9"	⧓	orange brown to tan
1505	25	9.5	133	3,723	17	⧓	Joint: N70E, 78N dark orange brown
1500	30	16.2	113	2,397	20	⧓	slight seepage iron-oxide staining, grayish-brown Shear NS, vertical
1495	35	3.3	138	2,397	22	⧓	iron-oxide staining, grayish-brown Joint faces: N15E, 82S N70W, 72N
1490	40						

(Continued on next page)

LOG OF BORING

Job No: 05-045 By: EY Date: 7-21-2005 Checked: Printed: 8-11-05 [LOG OF BORING DRIVE WT; 05-045.GPJ]

The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

VAN BEVEREN & BUTELO, INC.

FIGURE A-1.2a

BORING 2

(Continued)

Drilled Date(s): June 21, 2005

Equipment Used: Truck-mounted Bucket Auger (24-inch-diameter)

Depth to Water: Seepage at 30 feet

Driving Weight and Drop: Driving weight below / 12-inch-drop

SURFACE ELEVATION: 1530.0 feet (See Figure 1 for benchmark)

ELEVATION (feet)	DEPTH (feet)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	DRIVING WEIGHT FOR 12-IN. DROP (lbs)	BLOW COUNT (blows/foot)	SAMPLE LOCATION		
		1.1	125	2,397	18	⧓	▨	Iron-oxide staining, dark gray Joints: N35E, 80E N10W, 45SW
1485	45	10.2	123	2,397	13	⧓	▨	dark grayish-brown
1480	50							**END OF BORING AT 50 FEET.**
1475	55							
1470	60							
1465	65							
1460	70							
1455	75							
1450	80							

Notes

1) Fill not encountered.

2) Slight groundwater seepage encountered at a depth of 30 feet.

3) Boring backfilled with cuttings and tamped.

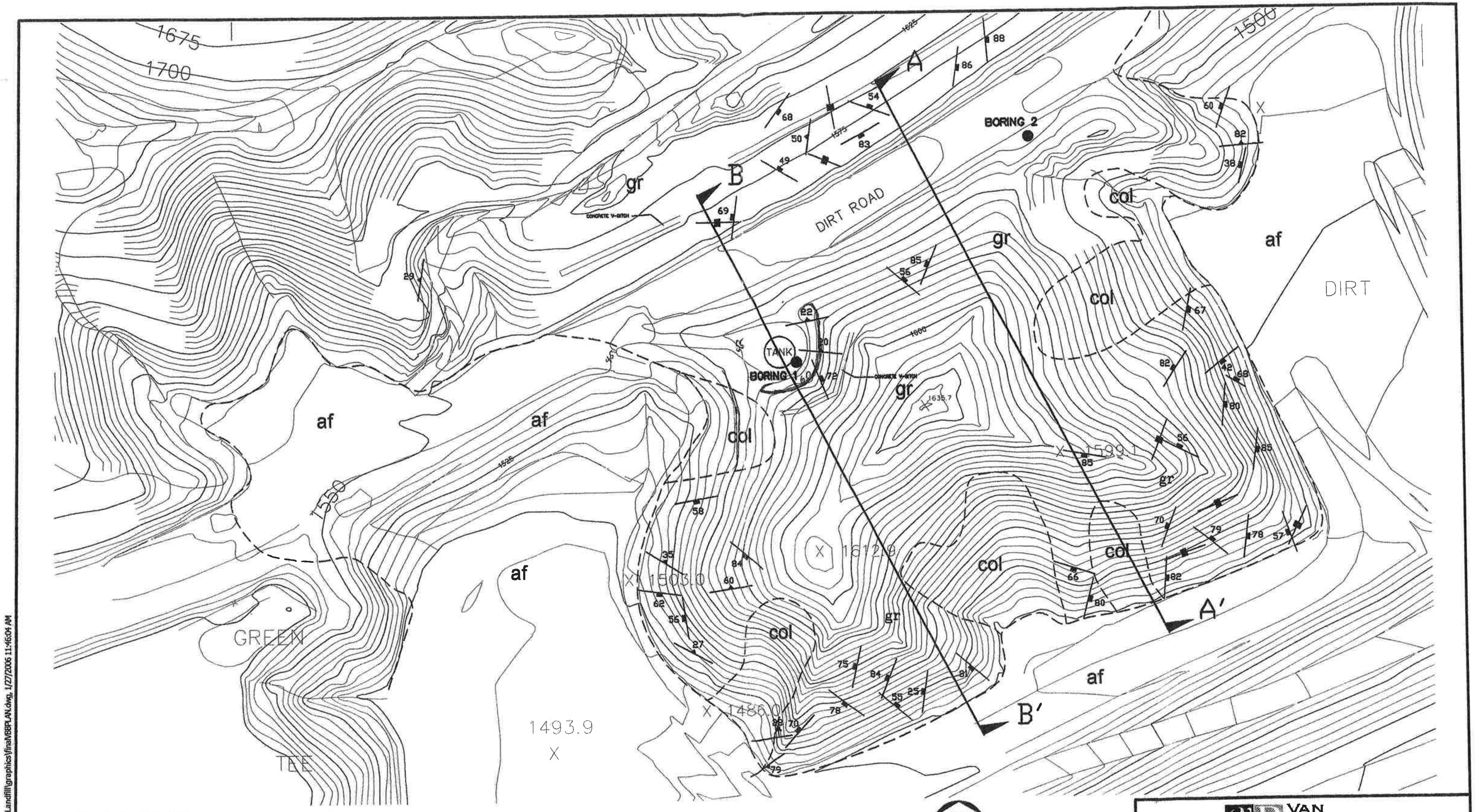
Job No: 05-045 By: EY Date: 7-21-2005 Checked: ______ Printed: 8-11-05 [LOG OF BORING DRIVE WT; 05-045.GPJ]

The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

VAN BEVEREN & BUTELO, INC.

FIGURE A-1.2b



EXPLANATION

BORING 2 ● APPROXIMATE LOCATION OF EXPLORATORY BORING

B B' GEOLOGIC CROSS SECTION

GEOLOGIC CONTACT

af	ARTIFICIAL FILL
col	COLLUVIUM
gr	GRANITIC BEDROCK

STRIKE & DIP OF:
- FOLIATION
- JOINTING
- VERTICAL JOINTING
- SHEAR

NORTH

GRAPHIC SCALE 1" = 100'

0 100 200 300 Feet

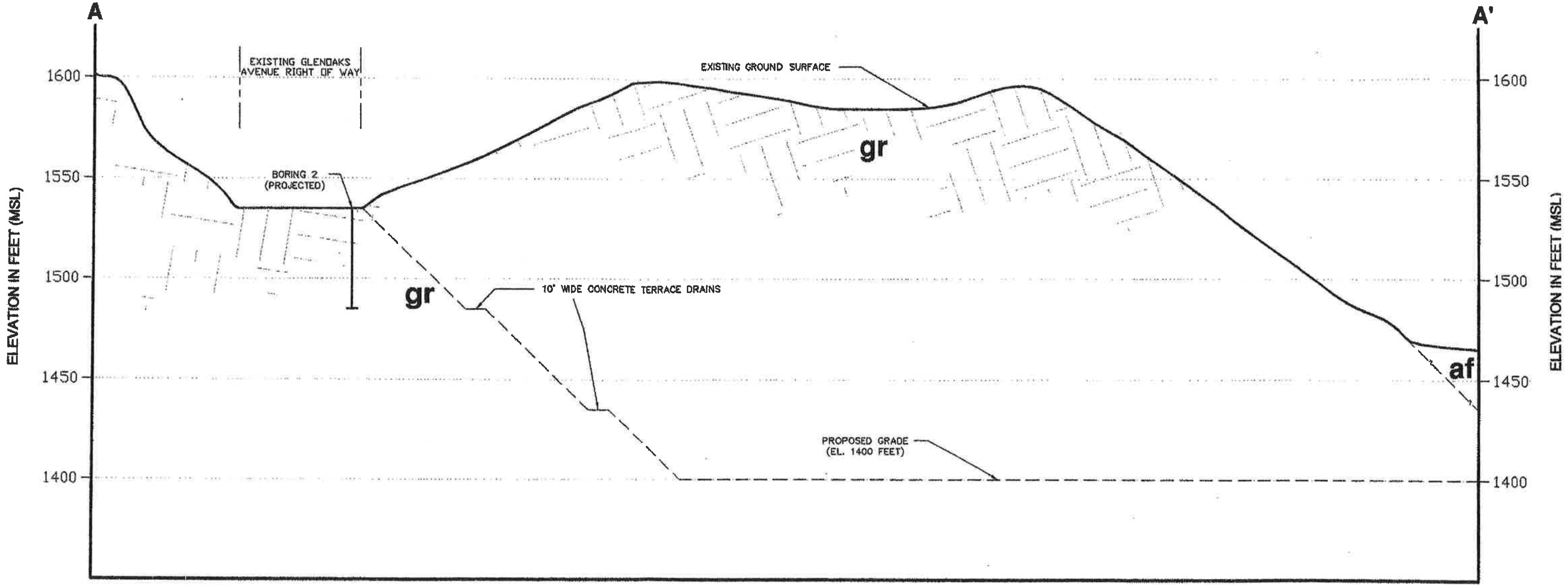
VAN BEVEREN & BUTELO, INC.
706 W. Broadway, Suite 201, Glendale, CA 91204
VOICE (818) 543-4560 FAX (818) 543-4565

GEOTECHNICAL MAP

SCHOLL CANYON ROAD
– FIGURE 1 –

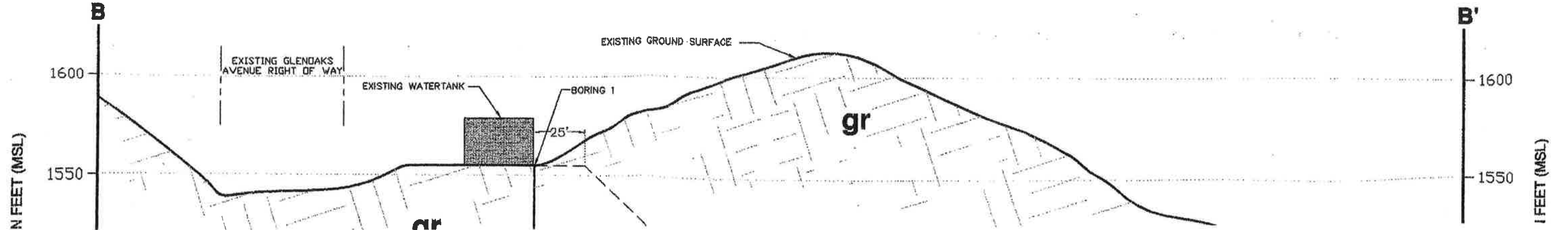
JOB NO. 05-045
DRAWN BY: EY
CHECKED BY: JJB
TO ACCOMPANY REPORT DATED: 1/27/06

G:\2005 Projects\05-045 L...O Scholl Cyn Landfill\graphics\final\VBPLAN.dwg, 1/27/2006 11:46:04 AM



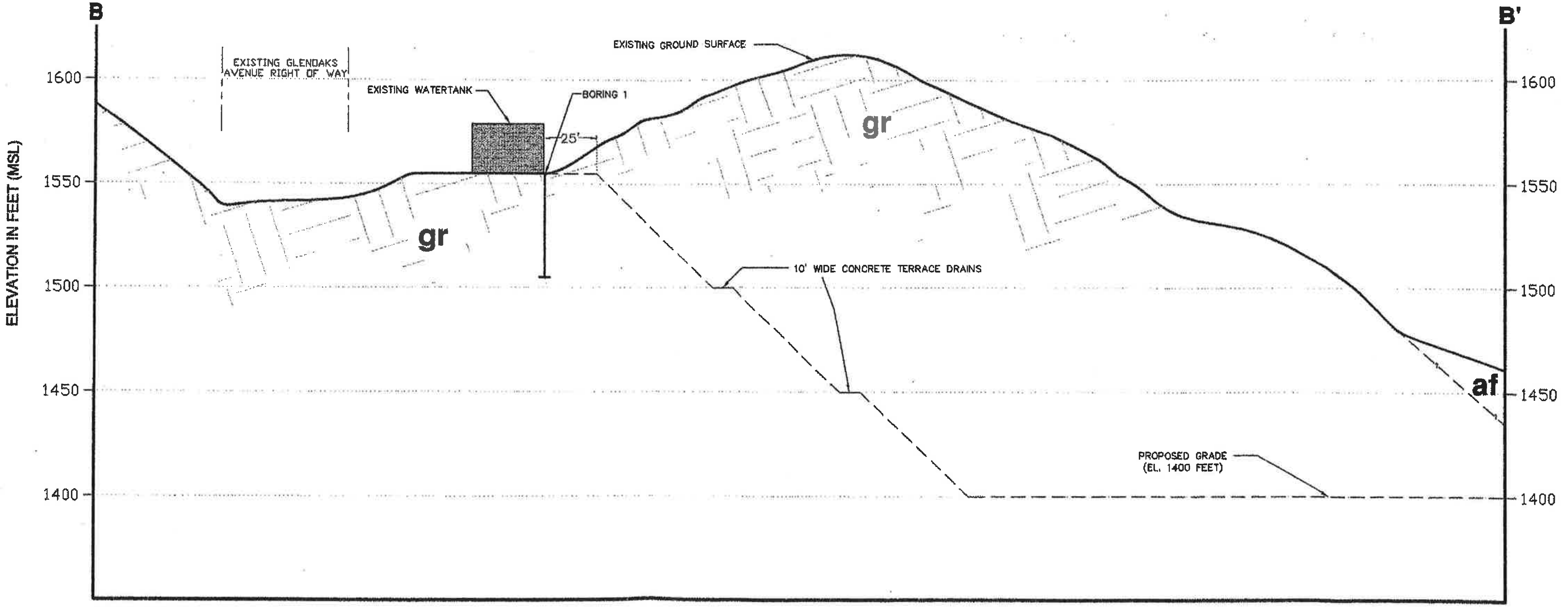
CROSS SECTION A-A'

SCALE 1" = 60'



CROSS SECTION A-A'

SCALE 1" = 50'

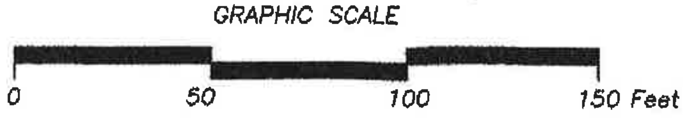


CROSS SECTION B-B'

SCALE 1" = 50'

SEE FIGURE 1 FOR EXPLANATION OF SYMBOLS

ED ON THE GEOLOGIC AND SOIL CONDITIONS ENCOUNTERED IN OUR EXPLORATIONS AT THE
AND DATES. THE CONDITIONS BETWEEN SUCH LOCATIONS HAVE BEEN INTERPOLATED AND COULD VARY
TED. THIS SECTION IS INTENDED FOR DESCRIPTIVE PURPOSES ONLY.



GE

VAN
BEVEREN
& BUTELO,
INC.

REPORT OF GEOTECHNICAL INVESTIGATION PROPOSED CONCRETE VAULT ENERGY DISSIPATOR

SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Prepared for:

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY

Whittier, California

February 25, 2000

Van Beveren & Butelo Project 00-001

BORING CVD-1

Drilled Date: January 25, 2000

Equipment Used: 8" Hollow Stem Auger (CME-75)

Depth to Water: Not encountered

Driving Weight & Drop: 140lb - 18 inches

ELEVATION (feet)	DEPTH (feet)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	N VALUE (SPT)	BLOW COUNT (blows/foot)	SAMPLE LOCATION
		6.9	104		44	
970	5			20		
		37.9	75		12	
965	10			19		
		5.8	100		71	
960	15			28		
		9.9	113		90 for 9"	
955	20			75		
950						
	25	9.3	101		50 for 4"	
945						
	30				50 for 4"	○
940						
	35					
935	40					

SURFACE ELEVATION 974.2 feet

3" Asphalt

FILL - SILTY SAND (SM) - about 20% gravel, brownish grey

NATURAL SURFACE

SILTY SAND (SM) - about 20% gravel, greyish brown

CLAYEY SILT (ML) - some Sand, few gravel, greyish green

SILTY SAND (SM) - fine to coarse, few gravel

Layer of Clay

Well graded, about 20% gravel

Fine, about 30% gravel (to 1" in size), greenish brown

QUARTZ DIORITE - weathered, fractured, grey to greenish grey

Sample not recovered

END OF BORING AT 30½'.

NOTE: Water not encountered.

Datum: Elevations refer to site datum. Elevations provided by County Sanitation Districts of Los Angeles County.

LOG OF BORING

The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

Job No: 00-001 By: JB Date: 2-2-2000 Checked: VB

VAN BEVEREN & BUTELO, INC.

FIGURE A - 1.1

BORING CVD-2

Drilled Date: January 25, 2000
Equipment Used: 8" Hollow Stem Auger (CME-75)

Depth to Water: See Note Below
Driving Weight & Drop: 140lb - 30 inches

ELEVATION (feet)	DEPTH (feet)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	N VALUE (SPT)	BLOW COUNT (blows/foot)	SAMPLE LOCATION	
							SURFACE ELEVATION 976.0 feet
975							FILL - SILTY SAND (SM) - with gravel, light brown
							Asphalt layer About 20% gravel, brownish grey
		4.3	107		50 for 6"	⧗	▼NATURAL SURFACE SILTY SAND (SM) - fine, about 20% gravel, yellowish to greyish brown
	5						
970		2.3	101		75	⧗	SAND (SW) - well graded, about 20% gravel, grey to yellowish grey to greyish brown
		2.3	105		80	⧗	Hydrocarbon odor observed in samples in laboratory between 8' and 21'
	10						SILTY SAND (SM) - fine to medium, about 20% gravel, brownish grey
965		6.5	103		59	⧗	
	15	3.0	111		18	⧗	Dark greyish brown
960		10.0	103		29	⧗	Dark grey
	20						
955		6.9	99		50 for 6"	⧗	
	25						
950		6.2	115		50 for 6"	⧗	QUARTZ DIORITE - weathered, fractured, grey to greenish grey
	30						
945		5.1	108		100 for 6"	⧗	Less weathered
	35						
940							END OF BORING AT 35½'. NOTE: Water measured inside auger at 28', 10 minutes after completion of drilling.
	40						

Job No: 00-001 By: JB Date: 2-2-2000 Checked: VB

The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

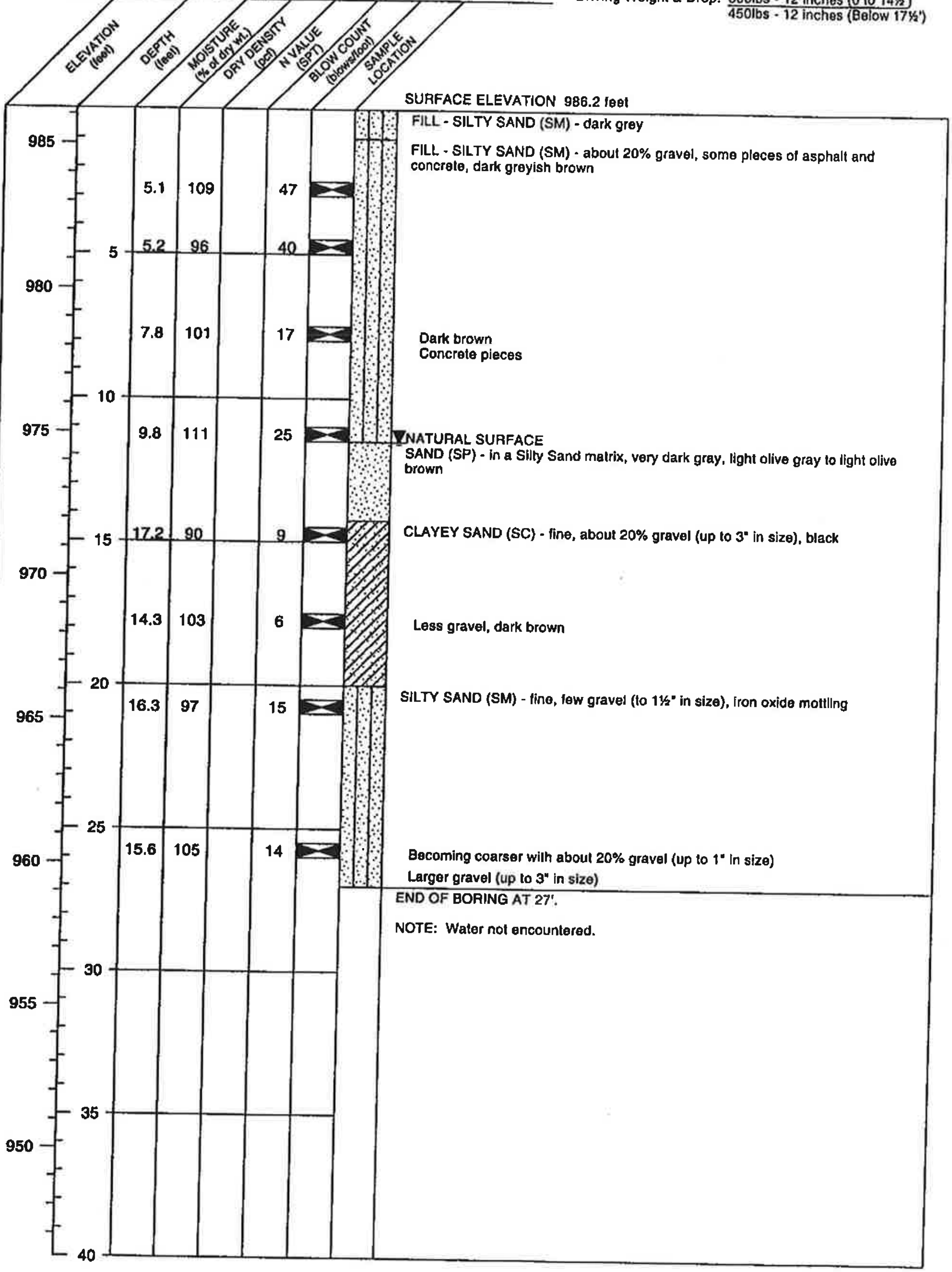
VAN BEVEREN & BUTELO, INC.

FIGURE A - 1.2

BORING CVD-3

Drilled Date: January 28, 2000
Equipment Used: 8" Hollow Stem Auger

Depth to Water: Not encountered
Driving Weight & Drop: 600lbs - 12 inches (0 to 14½')
450lbs - 12 inches (Below 17½')



ELEVATION (feet)	DEPTH (feet)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	N VALUE (SPT)	BLOW COUNT (blows/foot)
		5.1	109		47
		5.2	96		40
		7.8	101		17
		9.8	111		25
		17.2	90		9
		14.3	103		6
		16.3	97		15
		15.6	105		14

SURFACE ELEVATION 986.2 feet

FILL - SILTY SAND (SM) - dark grey

FILL - SILTY SAND (SM) - about 20% gravel, some pieces of asphalt and concrete, dark greyish brown

Dark brown
Concrete pieces

NATURAL SURFACE
SAND (SP) - in a Silty Sand matrix, very dark gray, light olive gray to light olive brown

CLAYEY SAND (SC) - fine, about 20% gravel (up to 3" in size), black

Less gravel, dark brown

SILTY SAND (SM) - fine, few gravel (to 1½" in size), iron oxide mottling

Becoming coarser with about 20% gravel (up to 1" in size)
Larger gravel (up to 3" in size)

END OF BORING AT 27'.

NOTE: Water not encountered.

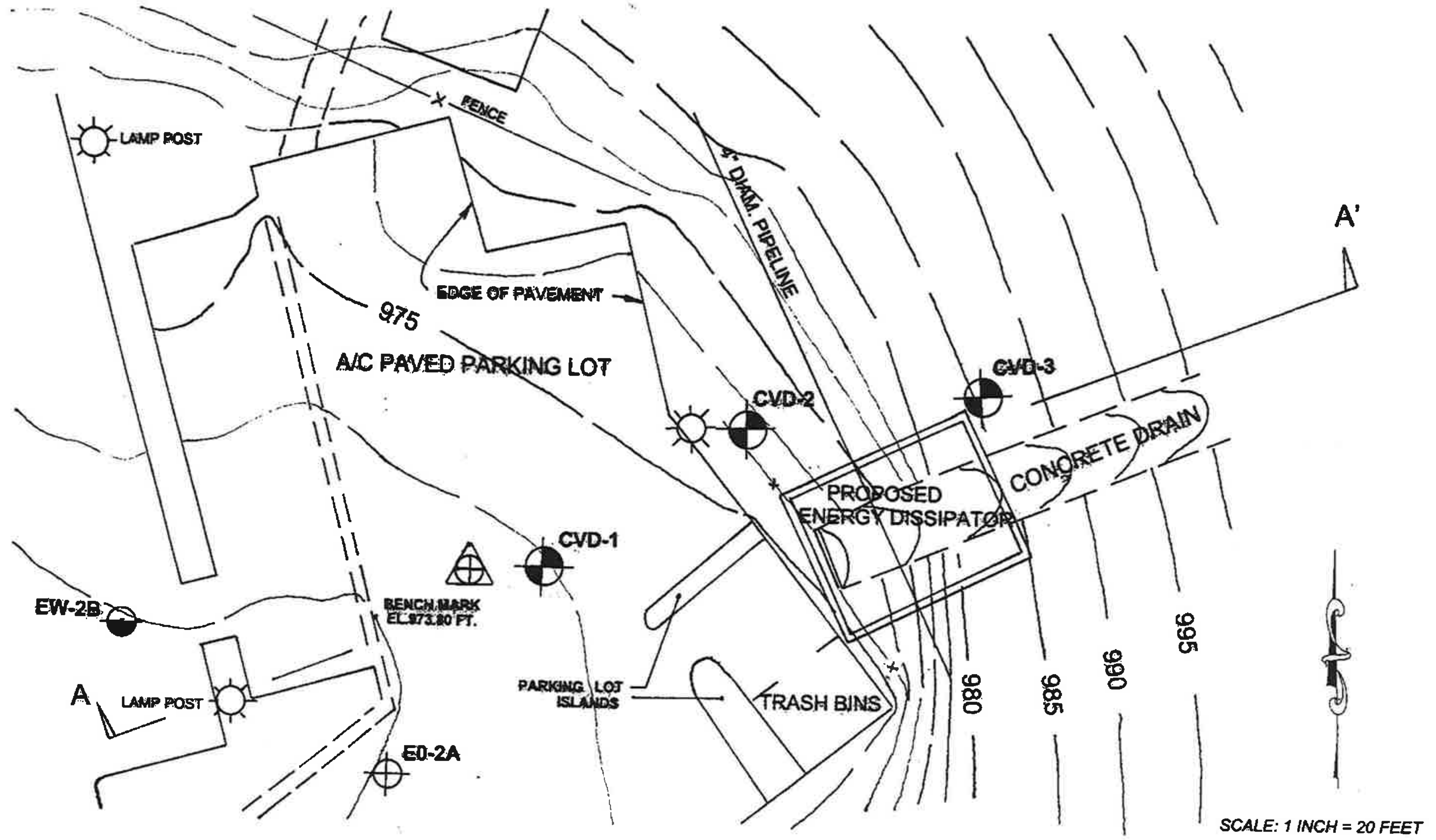
Job No: 00-001 By: JB Date: 2-2-2000 Checked: VB

The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

VAN BEVEREN & BUTELO, INC.

FIGURE A - 1.3



SCALE: 1 INCH = 20 FEET

EXPLANATION

CVD-3 APPROXIMATE LOCATION OF VB&B EXPLORATORY BORING

REPORTED LOCATION OF PREVIOUS BORINGS:

EW-2B BY ADVANCED EARTH SCIENCES

E0-2A BY THE EARTH TECHNOLOGY CORP.

A A' SUBSURFACE SECTION

LAMP POST

Drawing Reference: County Sanitation Districts of Los Angeles County aerial topographic survey, undated.

VAN BEVEREN & BUTELO, INC.
706 W. Broadway, Suite 201, Glendale, CA 91206 818-543-4560

PLOT PLAN
FIGURE 1

Job No:	00-001	To Accompany Report Dated: 2/25/00
Date:	2/17/00	
By:	JJB	
Checked:		

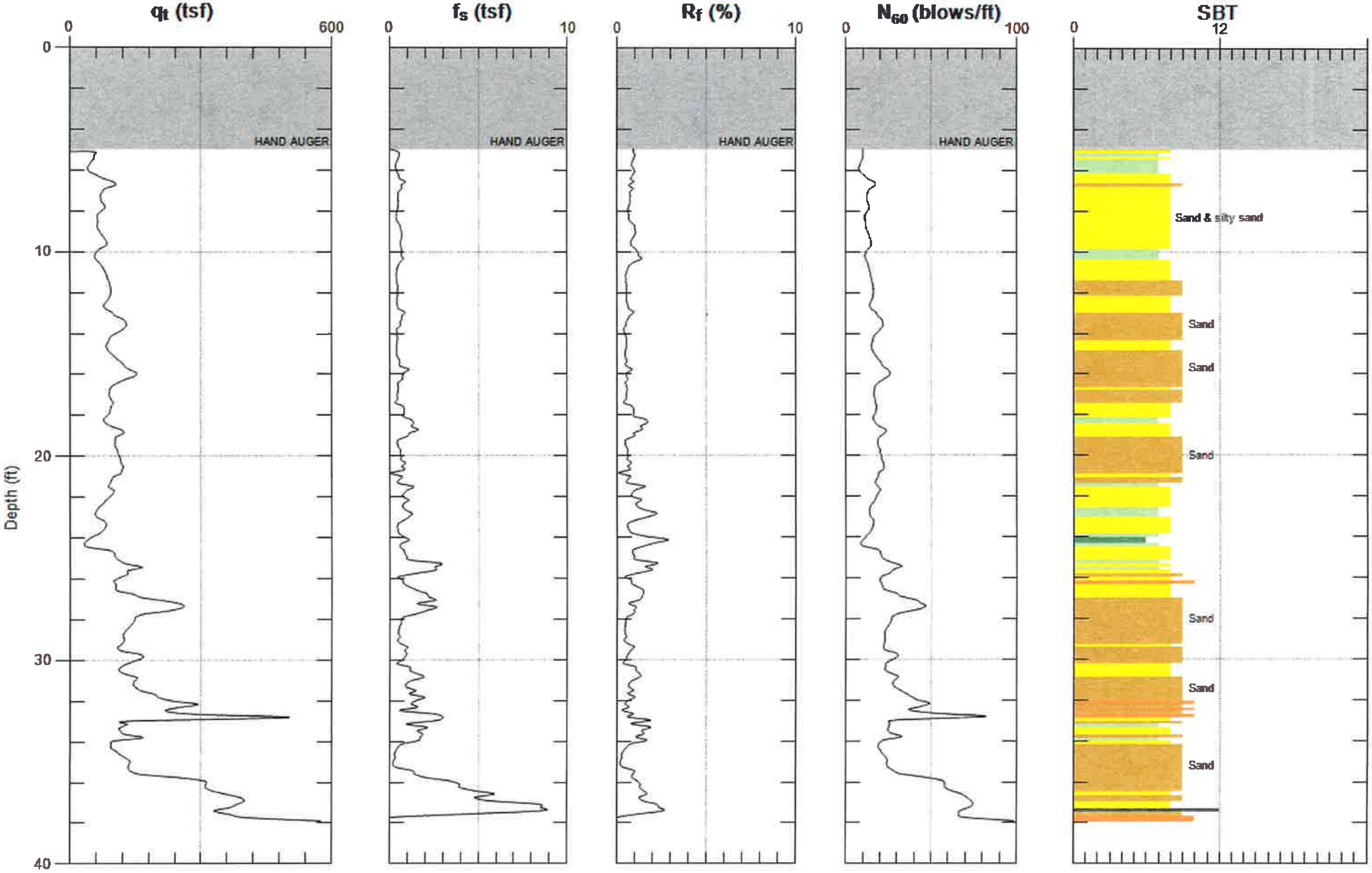
APPENDIX B

CPT FIELD INVESTIGATION BY GLA

GREGG GEOLOGIC

Site: SCHOLL CYN PARK
Sounding: CPT-01

Engineer: CARRI STEELE
Date: 11/26/2007 08:54

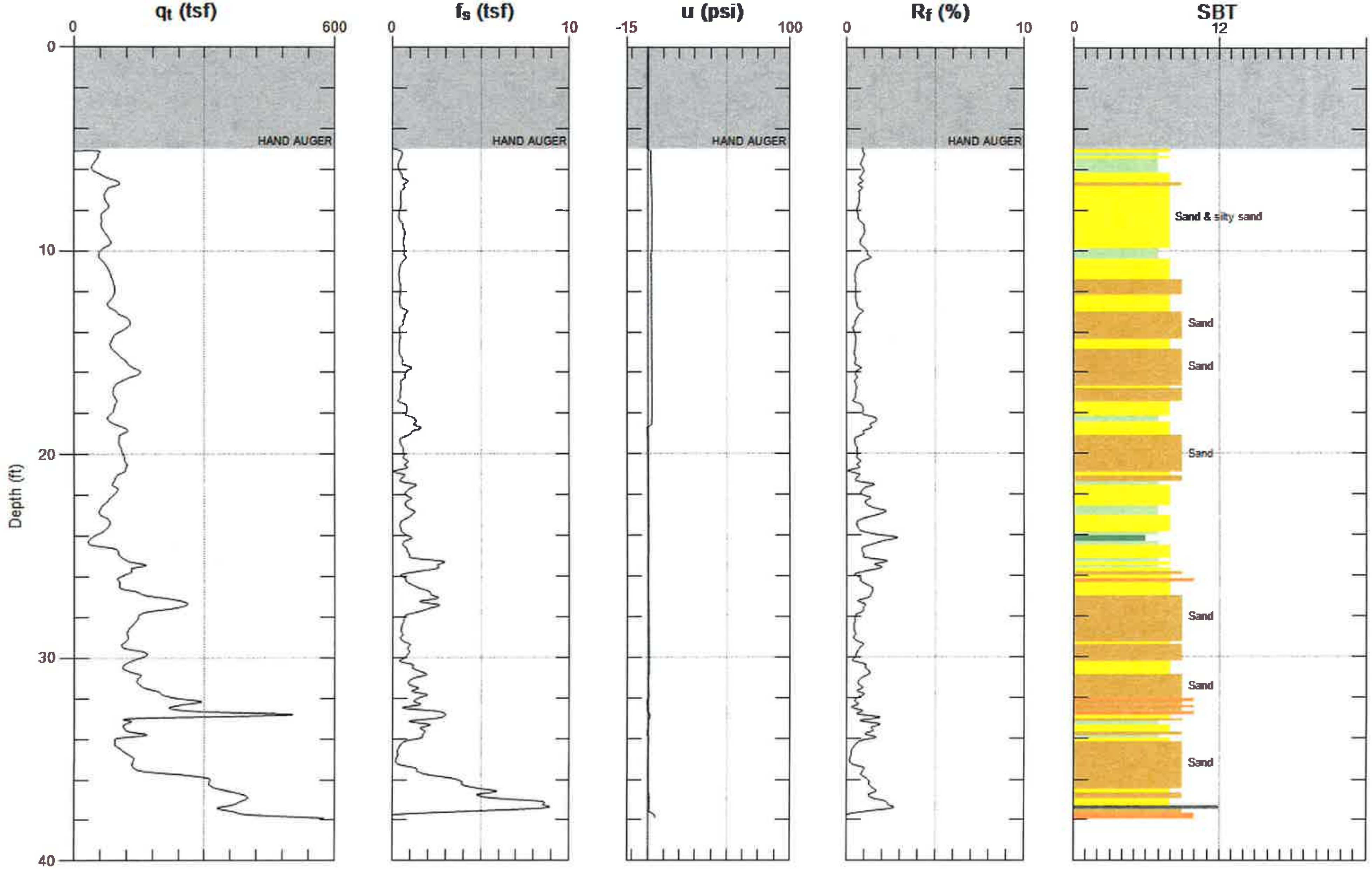


Max. Depth: 37.894 (ft)
Avg. Interval: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

Site: SCHOLL CYN PARK
Sounding: CPT-01

Engineer: CARRI STEELE
Date: 11/26/2007 08:54



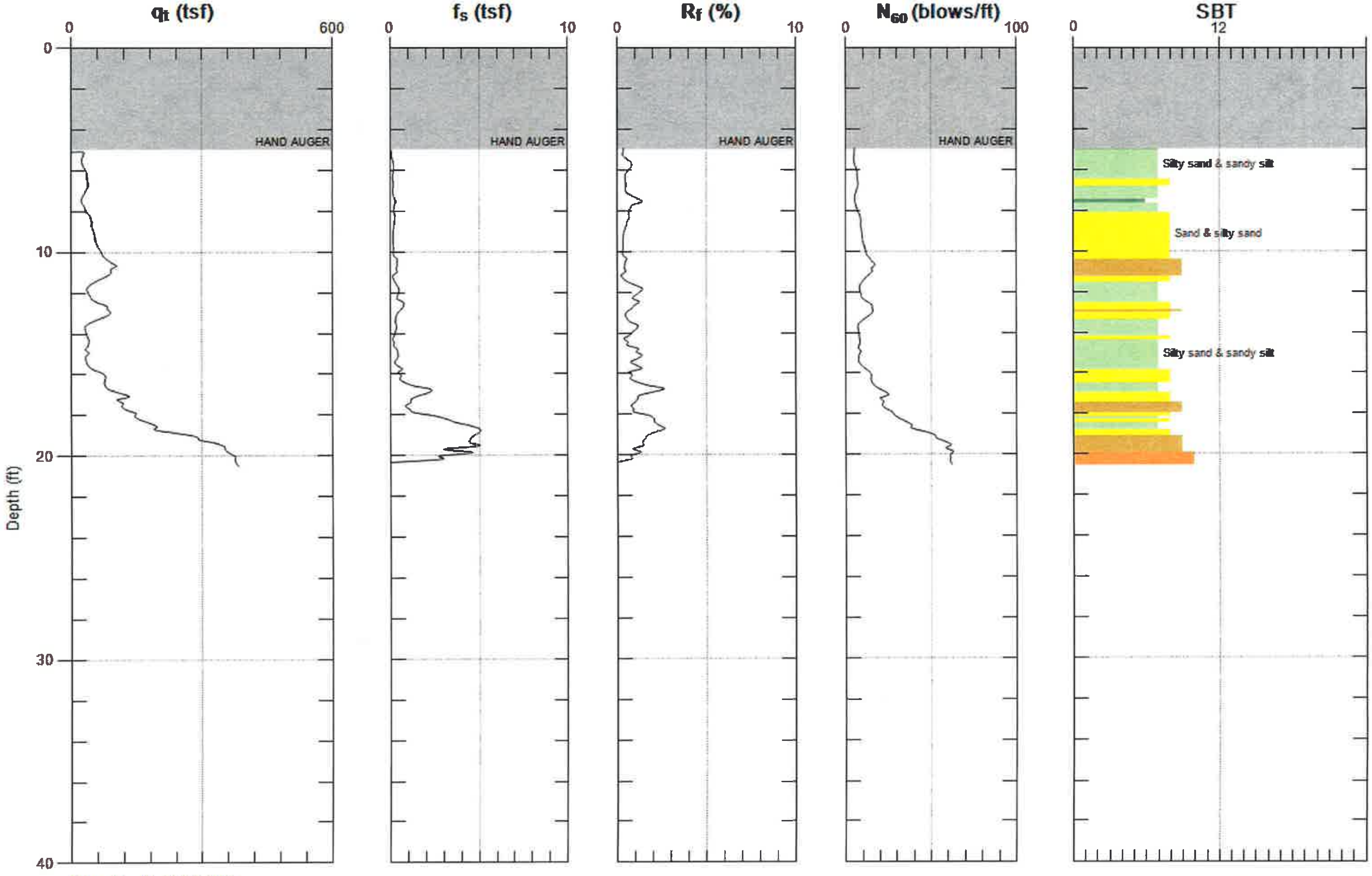
Max. Depth: 37.894 (ft)
Avg. Interval: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG **GEOLOGIC**

Site: SCHOLL CYN PARK
Sounding: CPT-02

Engineer: CARRI STEELE
Date: 11/26/2007 09:38



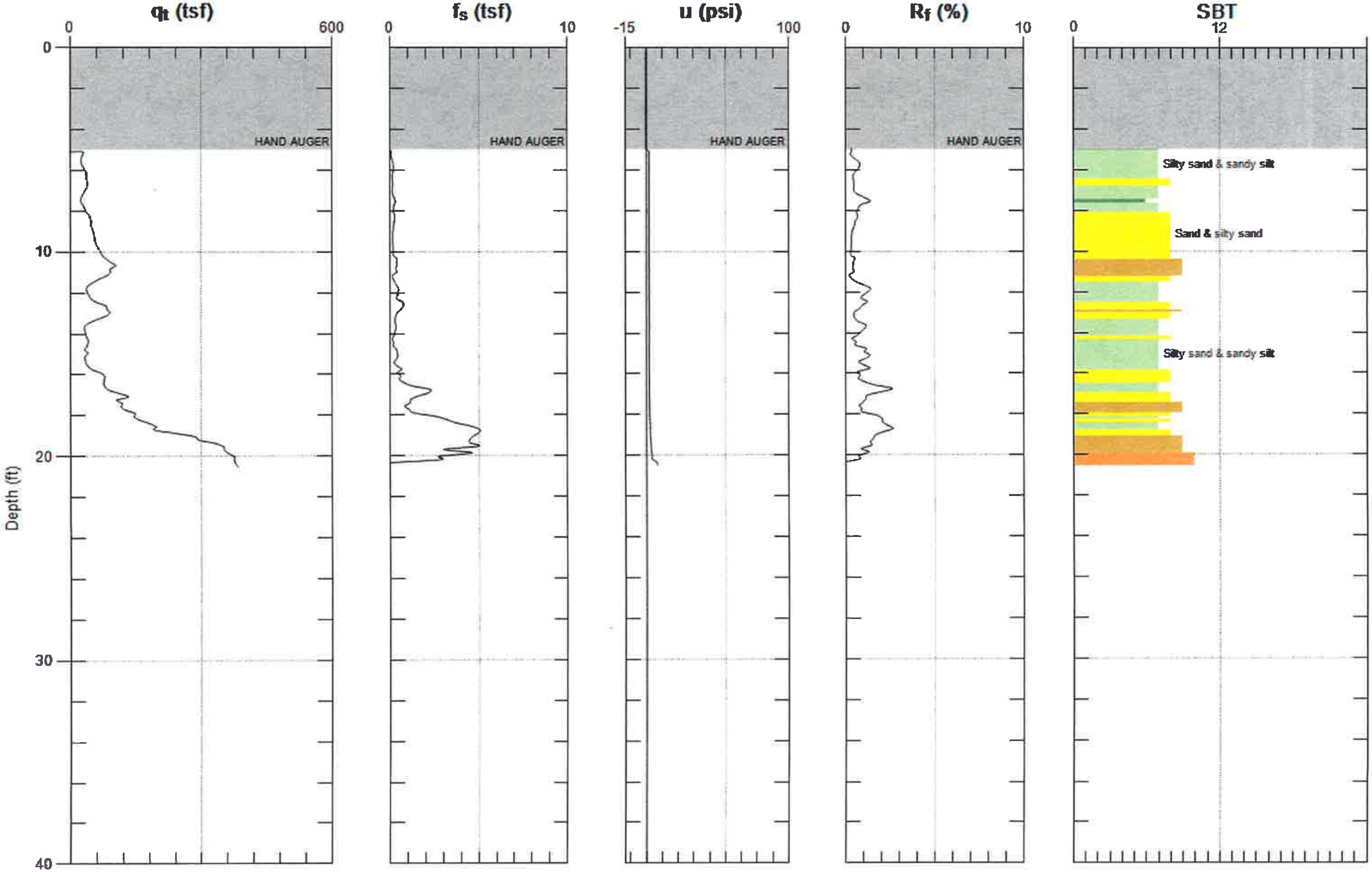
Max. Depth: 20.505 (ft)
Avg. Interval: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG GEOLOGIC

Site: SCHOLL CYN PARK
Sounding: CPT-02

Engineer: CARRI STEELE
Date: 11/26/2007 09:38



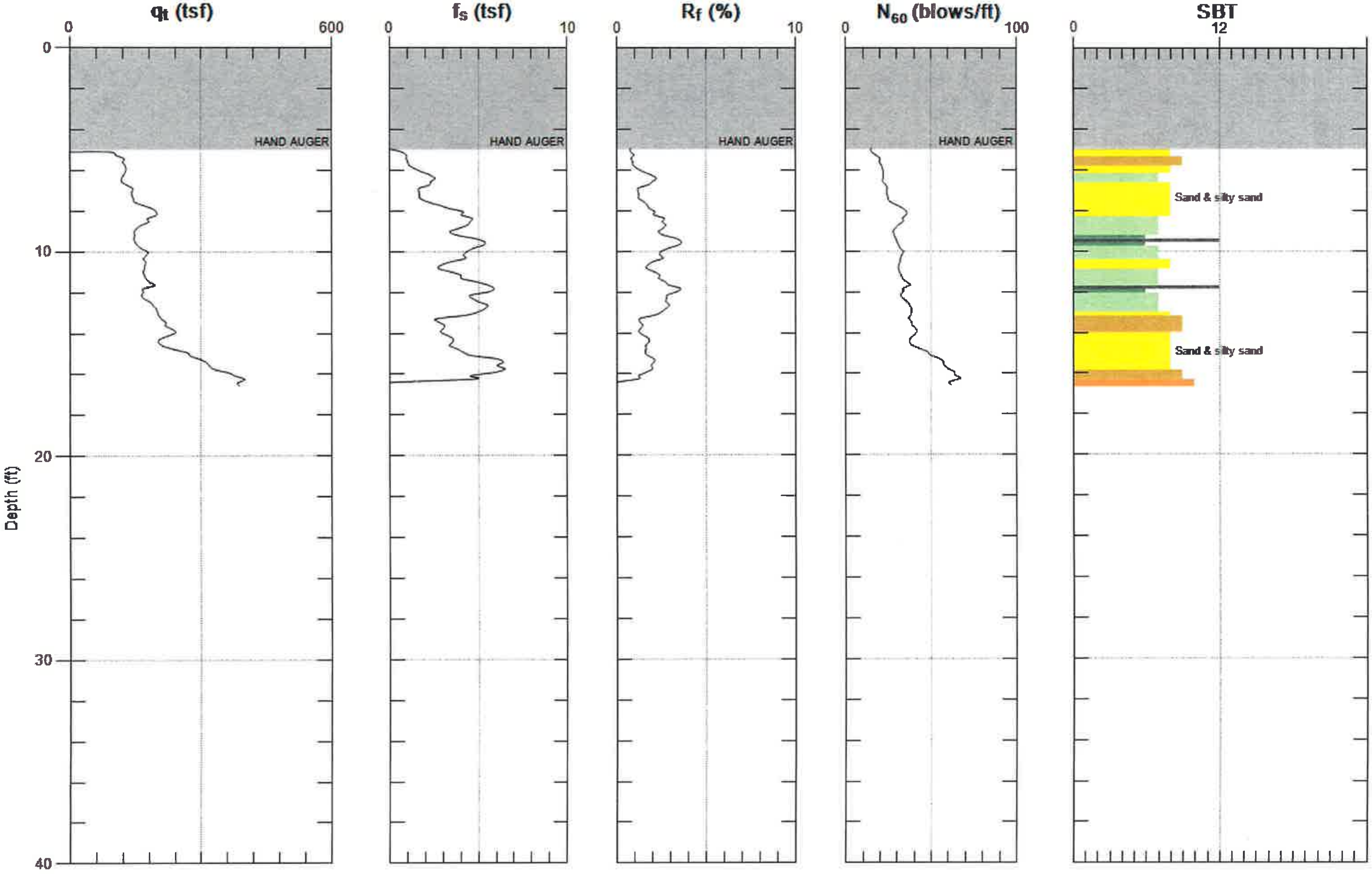
Max. Depth: 20.505 (ft)
Avg. Interval: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG GEOLOGIC

Site: SCHOLL CYN PARK
Sounding: CPT-03A

Engineer: CARRI STEELE
Date: 11/26/2007 10:30



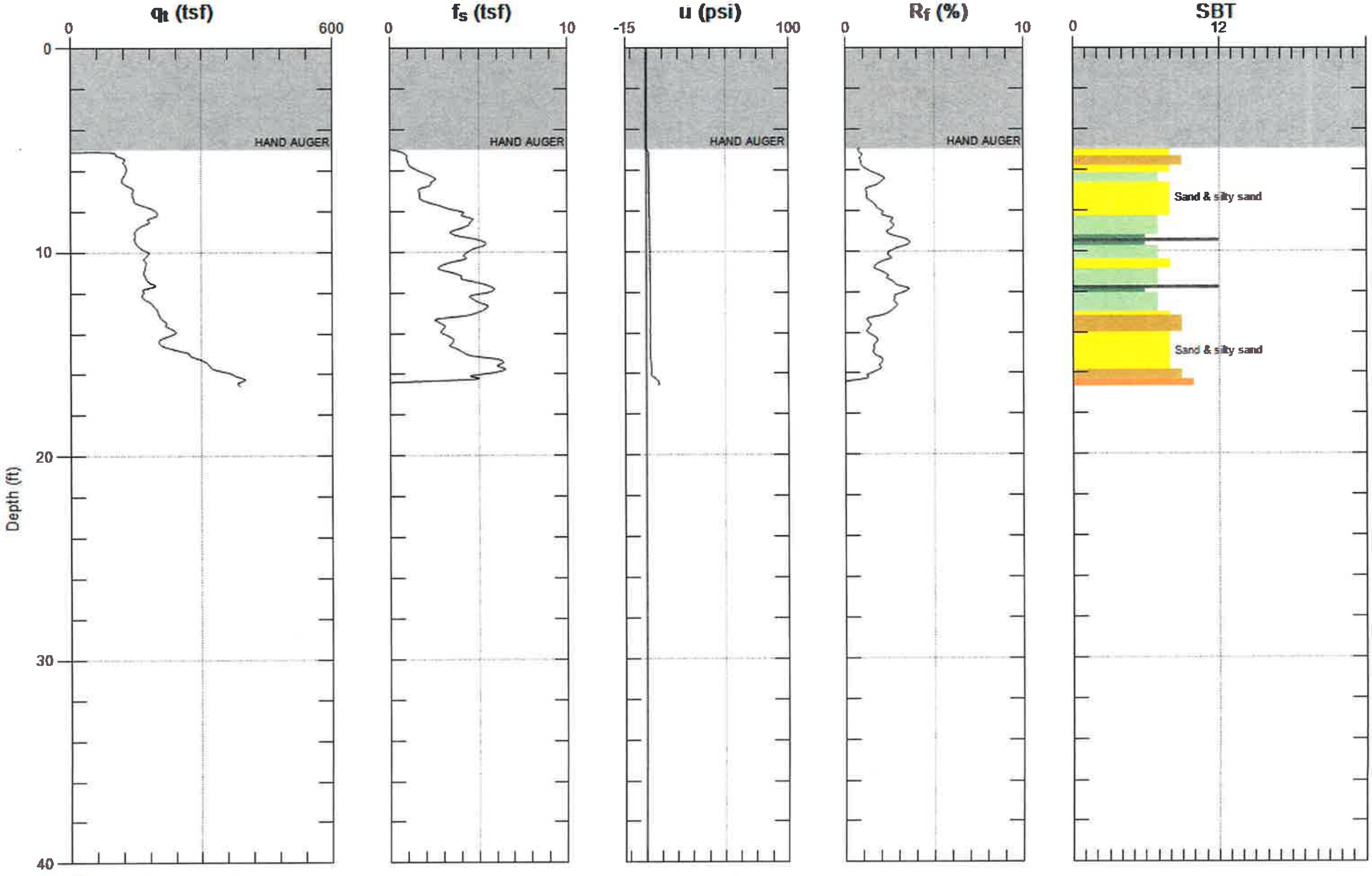
Max. Depth: 16.568 (ft)
Avg. Interval: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG GEOLOGIC

Site: SCHOLL CYN PARK
Sounding: CPT-03A

Engineer: CARRI STEELE
Date: 11/26/2007 10:30



Max. Depth: 16.568 (ft)
Avg. Interval: 0.164 (ft)

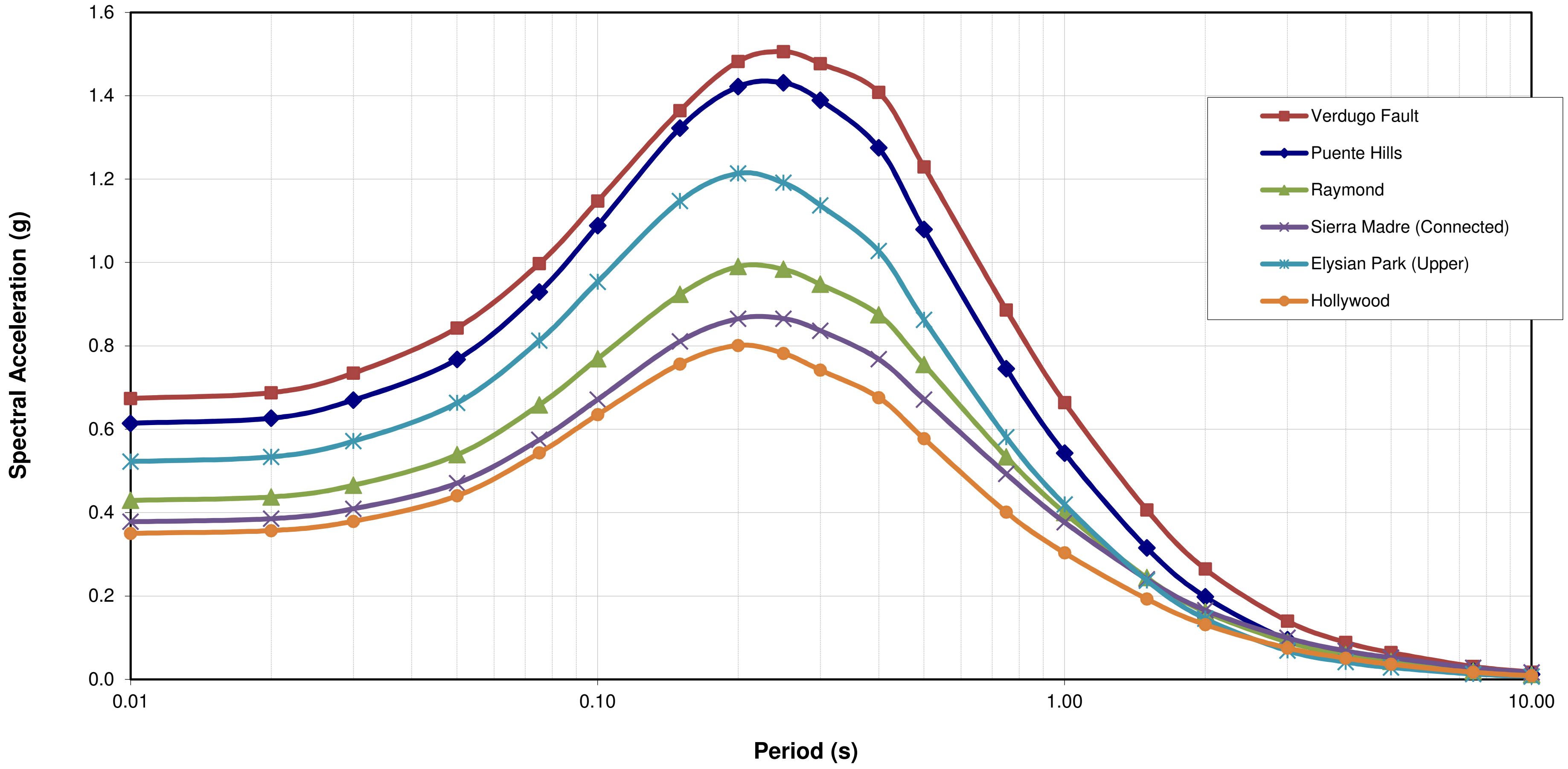
SBT: Soil Behavior Type (Robertson 1990)

APPENDIX C

DETERMINISTIC SEISMIC HAZARD ASSESSMENT

APPENDIX C-1

NGA GROUND MOTION CALCULATIONS



Average[1] Site-Specific Deterministic Horizontal Bedrock[2] Acceleration Response Spectra for MCE Event on Selected Faults

	Verdugo	Puente Hills	Elysian Pk Up	Raymond	Sierra Madre	Hollywood
Avg. PGA =	0.67 g	0.61 g	0.52 g	0.43 g	0.38 g	0.35 g
Avg. Sa(t=0.2s) =	1.48 g	1.42 g	1.21 g	0.99 g	0.87 g	0.80 g
Avg. Sa(t=1.0s) =	0.66 g	0.54 g	0.42 g	0.40 g	0.38 g	0.30 g
MCE Mag., Mw =	6.9	7.1	6.7	6.8	7.2	6.7

[1] *Geometric Mean of four Next Generation Attenuation Relations, EERI, 2008; Idriss (2008) excluded.*

[2] *Vs-30 ≈ 500 m/s based on site-specific geophysical surveys.*

FIGURE C-1

ACCELERATION RESPONSE SPECTRA FOR SELECTED FAULTS

GEOTECHNICAL REPORT
PROPOSED EXPANSION
SCHOLL CANYON LANDFILL
GLENDALE, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: **RMW**	DATE: **January 2012**	JOB NO.: **2007-0138**

CALCULATION OF WEIGHTED AVERAGE 2008 NGA MODELS:

by Linda Al Atik, PEER - Sep, 2009 - l_atik@berkeley.edu

This Excel file calculates the weighted average of the natural logarithm of the spectral values from the NGA models

NGA Model:	AS08	BA08	CB08	CY08	I08
Weight:	0.25	0.25	0.25	0.25	

N	1

AS08: Abrahamson & Silva 2008 NGA Model
BA08: Boore & Atkinson 2008 NGA Model
CB08: Campbell & Bozorgnia 2008 NGA Model
CY08: Chiou & Youngs 2008 NGA Model
I08: Idriss 2008 NGA Model

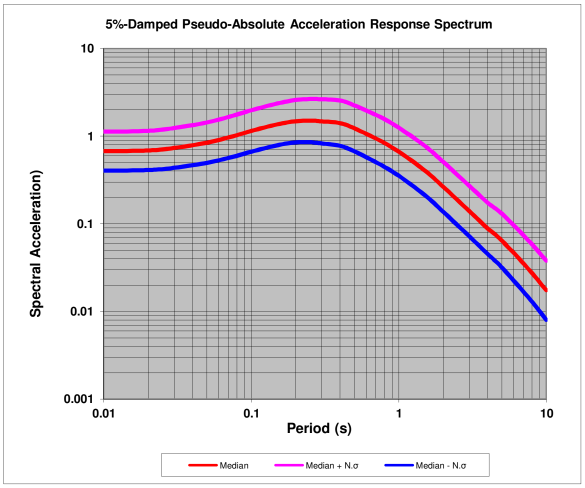
Site: Scholl Canyon Landfill
Fault: Verdugo Fault

Explanatory Variables

M	6.90
R_{RUP} (km)	0.60
R_{JB} (km)	0.00
R_X (km)	0.74
U	0
F_{RV}	1
F_{NM}	0
F_{HW}	1
Z_{TOR} (km)	0.00
δ	55
V_{S30} (m/sec)	500
$F_{Measured}$	1
$Z_{1.0}$ (m)	DEFAULT
$Z_{2.5}$ (km)	DEFAULT
***W* (km)**	18
F_{AS}	0
HW Taper	1

Geometric Mean Horizontal Component

GMP	*T* (s)	SA Median	SA Median + N.σ	SA Median - N.σ	SD Median
PSA (g)	0.010	6.736E-01	1.126E+00	4.031E-01	1.672E-03
SD (cm)	0.020	6.877E-01	1.150E+00	4.114E-01	6.828E-03
	0.030	7.345E-01	1.239E+00	4.355E-01	1.641E-02
	0.050	8.431E-01	1.434E+00	4.958E-01	5.232E-02
	0.075	9.973E-01	1.712E+00	5.810E-01	1.393E-01
	0.10	1.147E+00	1.977E+00	6.658E-01	2.848E-01
	0.15	1.364E+00	2.360E+00	7.882E-01	7.618E-01
	0.20	1.482E+00	2.587E+00	8.493E-01	1.472E+00
	0.25	1.506E+00	2.653E+00	8.544E-01	2.336E+00
	0.30	1.477E+00	2.640E+00	8.265E-01	3.300E+00
	0.40	1.408E+00	2.553E+00	7.766E-01	5.593E+00
	0.50	1.229E+00	2.249E+00	6.718E-01	7.628E+00
	0.75	8.863E-01	1.654E+00	4.750E-01	1.238E+01
	1.0	6.639E-01	1.249E+00	3.530E-01	1.648E+01
	1.5	4.065E-01	7.757E-01	2.130E-01	2.270E+01
	2.0	2.647E-01	5.101E-01	1.374E-01	2.628E+01
	3.0	1.399E-01	2.718E-01	7.206E-02	3.127E+01
	4.0	8.892E-02	1.742E-01	4.539E-02	3.532E+01
	5.0	6.429E-02	1.303E-01	3.171E-02	3.990E+01
	7.5	3.104E-02	6.554E-02	1.470E-02	4.335E+01
	10.0	1.747E-02	3.802E-02	8.023E-03	4.336E+01
PGA (g)	0	6.708E-01	1.121E+00	4.015E-01	
PGV (c/s)	-1	7.005E+01	1.201E+02	4.086E+01	



DEFINITION OF PARAMETERS:

N = Number of standard deviations to be considered in the calculations
PSA = Pseudo-absolute acceleration response spectrum (g; 5% damping)
PGA = Peak ground acceleration (g)
PGV = Peak ground velocity (cm/s)
SD = Relative displacement response spectrum (cm; 5% damping)
M = Moment magnitude
R_{RUP} = Closest distance to coseismic rupture (km), used in AS08, CB08 and CY08. See Figures a, b and c for illustation
R_{JB} = Closest distance to surface projection of coseismic rupture (km). See Figures a, b and c for illustation
R_X = Horizontal distance from top of rupture measured perpendicular to fault strike (km), used in AS08 and CY08. See Figures a, b and c for illustation
U = Unspecified-mechanism factor: 1 for unspecified; 0 otherwise, used in BA08
F_{RV} = Reverse-faulting factor: 0 for strike slip, normal, normal-oblique; 1 for reverse, reverse-oblique and thrust
F_N = Normal-faulting factor: 0 for strike slip, reverse, reverse-oblique, thrust and normal-oblique; 1 for normal
F_{HW} = Hanging-wall factor: 1 for site on down-dip side of top of rupture; 0 otherwise, used in AS08 and CY08
Z_{TOR} = Depth to top of coseismic rupture (km), used in AS08, CB08 and CY08
δ = Average dip of rupture plane (degrees), used in AS08, CB08 and CY08
V_{S30} = Average shear-wave velocity in top 30m of site profile
$F_{Measured}$ = Vs30 Factor: 1 if VS30 is measured, 0 if Vs30 is inferred, used in AS08 and CY08
$Z_{1.0}$ = Depth to 1.0 km/sec velocity horizon (m), used in AS08 and CY08. Enter "DEFAULT" in order to use the default values or enter your site specific number
$Z_{2.5}$ = Depth of 2.5 km/s shear-wave velocity horizon (km), used in CB08. Enter "DEFAULT" in order to use the default value or enter your site specific number
W = Fault rupture width (km), used in AS08
F_{AS} = Aftershock factor: 0 for mainshock; 1 for aftershock, used in AS08 and CY08
HW Taper = To choose the hanging wall taper to be used in AS08. Enter 0 to use the hanging wall taper as published in Abrahamson and Silva (2008), or enter 1 to use the revised hanging wall taper suggested by Norm Abrahamson

CALCULATION OF WEIGHTED AVERAGE 2008 NGA MODELS:

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NGA Model:	AS08	BA08	CB08	CY08	I08
Weight:	0.25	0.25	0.25	0.25	0

N	1

Project: *Scholl Canyon LF*
Fault: *Puente Hills*

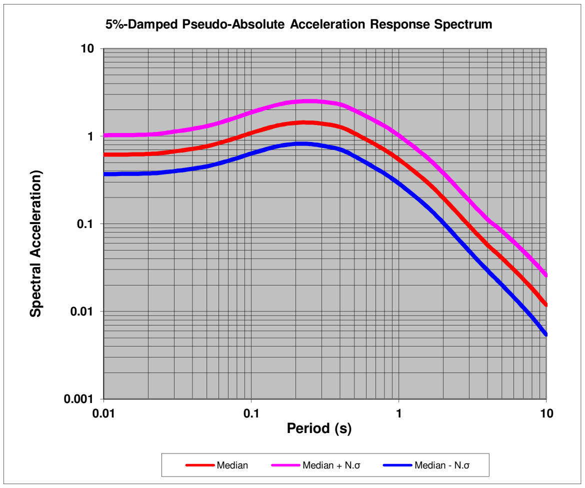
AS08: Abrahamson & Silva 2008 NGA Model
BA08: Boore & Atkinson 2008 NGA Model
CB08: Campbell & Bozorgnia 2008 NGA Model
CY08: Chiou & Youngs 2008 NGA Model
I08: Idriss 2008 NGA Model

Explanatory Variables

M	7.10
R_{RUP} (km)	10.64
R_{JB} (km)	0.00
R_X (km)	14.45
U	0
F_{RV}	1
F_{NM}	0
F_{HW}	1
Z_{TOR} (km)	5.00
δ	25
V_{S30} (m/sec)	500
$F_{Measured}$	1
$Z_{1.0}$ (m)	DEFAULT
$Z_{2.5}$ (km)	DEFAULT
W (km)	19
F_{AS}	0
HW Taper	0

Geometric Mean Horizontal Component

GMP	*T* (s)	SA Median	SA Median + N.σ	SA Median - N.σ	SD Median
PSA (g)	0.010	6.144E-01	1.024E+00	3.688E-01	1.525E-03
SD (cm)	0.020	6.264E-01	1.044E+00	3.758E-01	6.220E-03
	0.030	6.700E-01	1.127E+00	3.985E-01	1.497E-02
	0.050	7.677E-01	1.301E+00	4.529E-01	4.764E-02
	0.075	9.293E-01	1.590E+00	5.431E-01	1.298E-01
	0.10	1.089E+00	1.870E+00	6.336E-01	2.702E-01
	0.15	1.322E+00	2.282E+00	7.662E-01	7.385E-01
	0.20	1.422E+00	2.474E+00	8.169E-01	1.412E+00
	0.25	1.431E+00	2.515E+00	8.142E-01	2.220E+00
	0.30	1.389E+00	2.476E+00	7.794E-01	3.104E+00
	0.40	1.275E+00	2.305E+00	7.051E-01	5.064E+00
	0.50	1.079E+00	1.970E+00	5.914E-01	6.699E+00
	0.75	7.454E-01	1.388E+00	4.002E-01	1.041E+01
	1.0	5.425E-01	1.019E+00	2.888E-01	1.347E+01
	1.5	3.155E-01	6.014E-01	1.655E-01	1.762E+01
	2.0	1.981E-01	3.815E-01	1.029E-01	1.967E+01
	3.0	9.504E-02	1.845E-01	4.896E-02	2.123E+01
	4.0	5.730E-02	1.122E-01	2.926E-02	2.276E+01
	5.0	4.074E-02	8.258E-02	2.010E-02	2.528E+01
	7.5	2.057E-02	4.342E-02	9.743E-03	2.872E+01
	10.0	1.187E-02	2.583E-02	5.453E-03	2.946E+01
PGA (g)	0	6.119E-01	1.019E+00	3.674E-01	
PGV (c/s)	-1	5.409E+01	9.244E+01	3.166E+01	



DEFINITION OF PARAMETERS:

N = Number of standard deviations to be considered in the calculations
PSA = Pseudo-absolute acceleration response spectrum (g; 5% damping)
PGA = Peak ground acceleration (g)
PGV = Peak ground velocity (cm/s)
SD = Relative displacement response spectrum (cm; 5% damping)
M = Moment magnitude
R_{RUP} = Closest distance to coseismic rupture (km), used in AS08, CB08 and CY08. See Figures a, b and c for illustation
R_{JB} = Closest distance to surface projection of coseismic rupture (km). See Figures a, b and c for illustation
R_X = Horizontal distance from top of rupture measured perpendicular to fault strike (km), used in AS08 and CY08. See Figures a, b and c for illustation
U = Unspecified-mechanism factor: 1 for unspecified; 0 otherwise, used in BA08
F_{RV} = Reverse-faulting factor: 0 for strike slip, normal, normal-oblique; 1 for reverse, reverse-oblique and thrust
F_{NM} = Normal-faulting factor: 0 for strike slip, reverse, reverse-oblique, thrust and normal-oblique; 1 for normal
F_{HW} = Hanging-wall factor: 1 for site on down-dip side of top of rupture; 0 otherwise, used in AS08 and CY08
Z_{TOR} = Depth to top of coseismic rupture (km), used in AS08, CB08 and CY08
δ = Average dip of rupture plane (degrees), used in AS08, CB08 and CY08
V_{S30} = Average shear-wave velocity in top 30m of site profile
$F_{Measured}$ = Vs30 Factor: 1 if VS30 is measured, 0 if Vs30 is inferred, used in AS08 and CY08
$Z_{1.0}$ = Depth to 1.0 km/sec velocity horizon (m), used in AS08 and CY08. Enter "DEFAULT" in order to use the default values or enter your site specific number
$Z_{2.5}$ = Depth of 2.5 km/s shear-wave velocity horizon (km), used in CB08. Enter "DEFAULT" in order to use the default value or enter your site specific number
W = Fault rupture width (km), used in AS08
F_{AS} = Aftershock factor: 0 for mainshock; 1 for aftershock, used in AS08 and CY08
HW Taper = To choose the hanging wall taper to be used in AS08. Enter 0 to use the hanging wall taper as published in Abrahamson and Silva (2008), or enter 1 to use the revised hanging wall taper suggested by Norm Abrahamson

CALCULATION OF WEIGHTED AVERAGE 2008 NGA MODELS: ***by Linda Al Atik, PEER - Sep, 2009 - l_atik@berkeley.edu***

This Excel file calculates the weighted average of the natural logarithm of the spectral values from the NGA models

NGA Model:	AS08	BA08	CB08	CY08	I08
Weight:	0.25	0.25	0.25	0.25	0

N	1

Project: ***Scholl Canyon LF***
Fault: ***Elysian Park (Upper)***

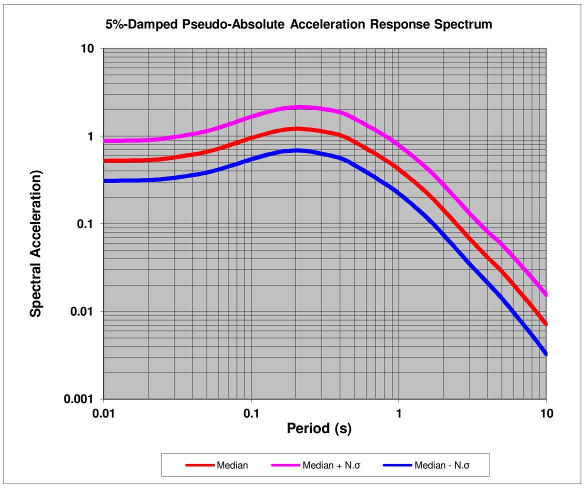
AS08: Abrahamson & Silva 2008 NGA Model
BA08: Boore & Atkinson 2008 NGA Model
CB08: Campbell & Bozorgnia 2008 NGA Model
CY08: Chiou & Youngs 2008 NGA Model
I08: Idriss 2008 NGA Model

Explanatory Variables

M	6.70
R_{RUP} (km)	9.51
R_{JB} (km)	0.00
R_X (km)	9.90
U	0
F_{RV}	1
F_{NM}	0
F_{HW}	1
Z_{TOR} (km)	3.00
δ	50
V_{S30} (m/sec)	500
$F_{Measured}$	1
$Z_{1.0}$ (m)	DEFAULT
$Z_{2.5}$ (km)	DEFAULT
***W* (km)**	16
F_{AS}	0
HW Taper	1

Geometric Mean Horizontal Component

GMP	*T* (s)	SA Median	SA Median + N.σ	SA Median - N.σ	SD Median
PSA (g)	0.010	5.224E-01	8.831E-01	3.090E-01	1.297E-03
SD (cm)	0.020	5.337E-01	9.027E-01	3.156E-01	5.300E-03
	0.030	5.714E-01	9.760E-01	3.345E-01	1.277E-02
	0.050	6.631E-01	1.143E+00	3.846E-01	4.115E-02
	0.075	8.123E-01	1.415E+00	4.665E-01	1.134E-01
	0.10	9.535E-01	1.667E+00	5.455E-01	2.367E-01
	0.15	1.147E+00	2.014E+00	6.536E-01	6.408E-01
	0.20	1.214E+00	2.145E+00	6.864E-01	1.205E+00
	0.25	1.191E+00	2.123E+00	6.683E-01	1.848E+00
	0.30	1.137E+00	2.052E+00	6.300E-01	2.540E+00
	0.40	1.027E+00	1.875E+00	5.627E-01	4.080E+00
	0.50	8.626E-01	1.587E+00	4.687E-01	5.353E+00
	0.75	5.809E-01	1.089E+00	3.099E-01	8.111E+00
	1.0	4.192E-01	7.912E-01	2.222E-01	1.041E+01
	1.5	2.371E-01	4.535E-01	1.239E-01	1.324E+01
	2.0	1.456E-01	2.811E-01	7.541E-02	1.446E+01
	3.0	6.879E-02	1.338E-01	3.538E-02	1.537E+01
	4.0	4.152E-02	8.140E-02	2.118E-02	1.649E+01
	5.0	2.856E-02	5.789E-02	1.409E-02	1.772E+01
	7.5	1.299E-02	2.743E-02	6.150E-03	1.814E+01
	10.0	7.113E-03	1.549E-02	3.266E-03	1.766E+01
PGA (g)	0	5.202E-01	8.799E-01	3.076E-01	
PGV (c/s)	-1	3.967E+01	6.851E+01	2.297E+01	



DEFINITION OF PARAMETERS:

N = Number of standard deviations to be considered in the calculations
PSA = Pseudo-absolute acceleration response spectrum (g; 5% damping)
PGA = Peak ground acceleration (g)
PGV = Peak ground velocity (cm/s)
SD = Relative displacement response spectrum (cm; 5% damping)
M = Moment magnitude
R_{RUP} = Closest distance to coseismic rupture (km), used in AS08, CB08 and CY08. See Figures a, b and c for illustation
R_{JB} = Closest distance to surface projection of coseismic rupture (km). See Figures a, b and c for illustation
R_X = Horizontal distance from top of rupture measured perpendicular to fault strike (km), used in AS08 and CY08. See Figures a, b and c for illustation
U = Unspecified-mechanism factor: 1 for unspecified; 0 otherwise, used in BA08
F_{RV} = Reverse-faulting factor: 0 for strike slip, normal, normal-oblique; 1 for reverse, reverse-oblique and thrust
F_{NM} = Normal-faulting factor: 0 for strike slip, reverse, reverse-oblique, thrust and normal-oblique; 1 for normal
F_{HW} = Hanging-wall factor: 1 for site on down-dip side of top of rupture; 0 otherwise, used in AS08 and CY08
Z_{TOR} = Depth to top of coseismic rupture (km), used in AS08, CB08 and CY08
δ = Average dip of rupture plane (degrees), used in AS08, CB08 and CY08
V_{S30} = Average shear-wave velocity in top 30m of site profile
$F_{Measured}$ = Vs30 Factor: 1 if VS30 is measured, 0 if Vs30 is inferred, used in AS08 and CY08
$Z_{1.0}$ = Depth to 1.0 km/sec velocity horizon (m), used in AS08 and CY08. Enter "DEFAULT" in order to use the default values or enter your site specific number
$Z_{2.5}$ = Depth of 2.5 km/s shear-wave velocity horizon (km), used in CB08. Enter "DEFAULT" in order to use the default value or enter your site specific number
W = Fault rupture width (km), used in AS08
F_{AS} = Aftershock factor: 0 for mainshock; 1 for aftershock, used in AS08 and CY08
HW Taper = To choose the hanging wall taper to be used in AS08. Enter 0 to use the hanging wall taper as published in Abrahamson and Silva (2008), or enter 1 to use the revised hanging wall taper suggested by Norm Abrahamson

CALCULATION OF WEIGHTED AVERAGE 2008 NGA MODELS: ***by Linda Al Atik, PEER - Sep, 2009 - l_atik@berkeley.edu***

This Excel file calculates the weighted average of the natural logarithm of the spectral values from the NGA models

NGA Model:	AS08	BA08	CB08	CY08	I08
Weight:	0.25	0.25	0.25	0.25	0

N	0.58

Project: ***Scholl Canyon LF***
Fault: ***Raymond***

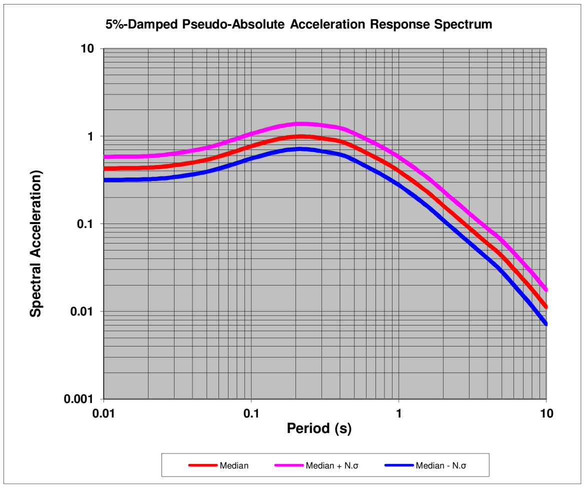
AS08: Abrahamson & Silva 2008 NGA Model
BA08: Boore & Atkinson 2008 NGA Model
CB08: Campbell & Bozorgnia 2008 NGA Model
CY08: Chiou & Youngs 2008 NGA Model
I08: Idriss 2008 NGA Model

Explanatory Variables

M	6.80
R_{RUP} (km)	4.79
R_{JB} (km)	1.83
R_X (km)	4.88
U	0
F_{RV}	1
F_{NM}	0
F_{HW}	0
Z_{TOR} (km)	0.00
δ	79
V_{S30} (m/sec)	500
$F_{Measured}$	1
$Z_{1.0}$ (m)	DEFAULT
$Z_{2.5}$ (km)	DEFAULT
***W* (km)**	16
F_{AS}	0
HW Taper	1

Geometric Mean Horizontal Component

GMP	***T* (s)**	**SA Median**	**SA Median + N.σ**	**SA Median - N.σ**	**SD Median**
PSA (g)	**0.010**	4.293E-01	5.818E-01	3.168E-01	1.066E-03
SD (cm)	**0.020**	4.375E-01	5.932E-01	3.227E-01	4.345E-03
	0.030	4.656E-01	6.349E-01	3.415E-01	1.040E-02
	0.050	5.386E-01	7.387E-01	3.927E-01	3.343E-02
	0.075	6.583E-01	9.083E-01	4.771E-01	9.192E-02
	0.10	7.691E-01	1.064E+00	5.561E-01	1.909E-01
	0.15	9.232E-01	1.280E+00	6.660E-01	5.156E-01
	0.20	9.904E-01	1.378E+00	7.117E-01	9.834E-01
	0.25	9.835E-01	1.374E+00	7.037E-01	1.526E+00
	0.30	9.474E-01	1.333E+00	6.733E-01	2.117E+00
	0.40	8.745E-01	1.238E+00	6.179E-01	3.473E+00
	0.50	7.549E-01	1.074E+00	5.307E-01	4.685E+00
	0.75	5.337E-01	7.674E-01	3.712E-01	7.452E+00
	1.0	3.997E-01	5.772E-01	2.768E-01	9.922E+00
	1.5	2.438E-01	3.550E-01	1.675E-01	1.362E+01
	2.0	1.618E-01	2.368E-01	1.105E-01	1.606E+01
	3.0	8.993E-02	1.322E-01	6.117E-02	2.009E+01
	4.0	5.941E-02	8.777E-02	4.022E-02	2.360E+01
	5.0	4.283E-02	6.452E-02	2.843E-02	2.658E+01
	7.5	2.019E-02	3.115E-02	1.309E-02	2.820E+01
	10.0	1.127E-02	1.769E-02	7.173E-03	2.796E+01
PGA (g)	**0**	4.275E-01	5.795E-01	3.154E-01	
PGV (c/s)	**-1**	4.239E+01	5.808E+01	3.094E+01	



DEFINITION OF PARAMETERS:

N = Number of standard deviations to be considered in the calculations
PSA = Pseudo-absolute acceleration response spectrum (g; 5% damping)
PGA = Peak ground acceleration (g)
PGV = Peak ground velocity (cm/s)
SD = Relative displacement response spectrum (cm; 5% damping)
M = Moment magnitude
R_{RUP} = Closest distance to coseismic rupture (km), used in AS08, CB08 and CY08. See Figures a, b and c for illustation
R_{JB} = Closest distance to surface projection of coseismic rupture (km). See Figures a, b and c for illustation
R_X = Horizontal distance from top of rupture measured perpendicular to fault strike (km), used in AS08 and CY08. See Figures a, b and c for illustation
U = Unspecified-mechanism factor: 1 for unspecified; 0 otherwise, used in BA08
F_{RV} = Reverse-faulting factor: 0 for strike slip, normal, normal-oblique; 1 for reverse, reverse-oblique and thrust
F_{NM} = Normal-faulting factor: 0 for strike slip, reverse, reverse-oblique, thrust and normal-oblique; 1 for normal
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Z_{TOR} = Depth to top of coseismic rupture (km), used in AS08, CB08 and CY08
δ = Average dip of rupture plane (degrees), used in AS08, CB08 and CY08
V_{S30} = Average shear-wave velocity in top 30m of site profile
$F_{Measured}$ = Vs30 Factor: 1 if VS30 is measured, 0 if Vs30 is inferred, used in AS08 and CY08
$Z_{1.0}$ = Depth to 1.0 km/sec velocity horizon (m), used in AS08 and CY08. Enter "DEFAULT" in order to use the default values or enter your site specific number
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W = Fault rupture width (km), used in AS08
F_{AS} = Aftershock factor: 0 for mainshock; 1 for aftershock, used in AS08 and CY08
HW Taper = To choose the hanging wall taper to be used in AS08. Enter 0 to use the hanging wall taper as published in Abrahamson and Silva (2008), or enter 1 to use the revised hanging wall taper suggested by Norm Abrahamson

CALCULATION OF WEIGHTED AVERAGE 2008 NGA MODELS:

by Linda Al Atik, PEER - Sep, 2009 - l_atik@berkeley.edu

This Excel file calculates the weighted average of the natural logarithm of the spectral values from the NGA models

NGA Model:	AS08	BA08	CB08	CY08	I08
Weight:	0.25	0.25	0.25	0.25	0

N	1

Project: ***Scholl Canyon LF***
Fault: ***Sierra Madre (Connected)***

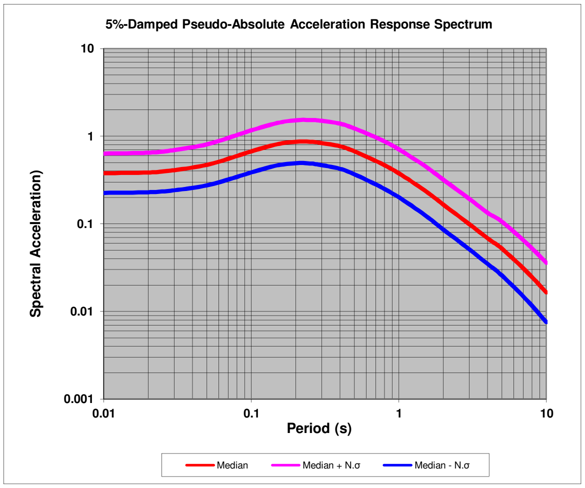
AS08: Abrahamson & Silva 2008 NGA Model
BA08: Boore & Atkinson 2008 NGA Model
CB08: Campbell & Bozorgnia 2008 NGA Model
CY08: Chiou & Youngs 2008 NGA Model
I08: Idriss 2008 NGA Model

Explanatory Variables

M	7.20
R_{RUP} (km)	5.88
R_{JB} (km)	5.88
R_X (km)	-5.88
U	0
F_{RV}	1
F_{NM}	0
F_{HW}	0
Z_{TOR} (km)	0.00
δ	53
V_{S30} (m/sec)	500
$F_{Measured}$	1
$Z_{1.0}$ (m)	DEFAULT
$Z_{2.5}$ (km)	DEFAULT
W (km)	18
F_{AS}	0
HW Taper	1

Geometric Mean Horizontal Component

GMP	*T* (s)	SA Median	SA Median + N.σ	SA Median - N.σ	SD Median
PSA (g)	0.010	3.780E-01	6.346E-01	2.252E-01	9.385E-04
SD (cm)	0.020	3.854E-01	6.473E-01	2.295E-01	3.827E-03
	0.030	4.092E-01	6.940E-01	2.413E-01	9.142E-03
	0.050	4.705E-01	8.058E-01	2.747E-01	2.920E-02
	0.075	5.746E-01	9.943E-01	3.321E-01	8.023E-02
	0.10	6.713E-01	1.167E+00	3.862E-01	1.666E-01
	0.15	8.106E-01	1.414E+00	4.645E-01	4.527E-01
	0.20	8.651E-01	1.520E+00	4.924E-01	8.590E-01
	0.25	8.654E-01	1.532E+00	4.889E-01	1.343E+00
	0.30	8.364E-01	1.498E+00	4.671E-01	1.869E+00
	0.40	7.678E-01	1.389E+00	4.244E-01	3.049E+00
	0.50	6.714E-01	1.226E+00	3.678E-01	4.167E+00
	0.75	4.929E-01	9.180E-01	2.646E-01	6.882E+00
	1.0	3.770E-01	7.082E-01	2.007E-01	9.359E+00
	1.5	2.402E-01	4.579E-01	1.260E-01	1.342E+01
	2.0	1.660E-01	3.197E-01	8.621E-02	1.648E+01
	3.0	9.955E-02	1.932E-01	5.129E-02	2.224E+01
	4.0	6.826E-02	1.337E-01	3.485E-02	2.711E+01
	5.0	5.216E-02	1.057E-01	2.573E-02	3.237E+01
	7.5	2.757E-02	5.821E-02	1.306E-02	3.850E+01
	10.0	1.649E-02	3.590E-02	7.577E-03	4.094E+01
PGA (g)	0	3.766E-01	6.318E-01	2.245E-01	
PGV (c/s)	-1	4.290E+01	7.330E+01	2.510E+01	



DEFINITION OF PARAMETERS:

N = Number of standard deviations to be considered in the calculations
PSA = Pseudo-absolute acceleration response spectrum (g; 5% damping)
PGA = Peak ground acceleration (g)
PGV = Peak ground velocity (cm/s)
SD = Relative displacement response spectrum (cm; 5% damping)
M = Moment magnitude
R_{RUP} = Closest distance to coseismic rupture (km), used in AS08, CB08 and CY08. See Figures a, b and c for illustation
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F_{RV} = Reverse-faulting factor: 0 for strike slip, normal, normal-oblique; 1 for reverse, reverse-oblique and thrust
F_{NM} = Normal-faulting factor: 0 for strike slip, reverse, reverse-oblique, thrust and normal-oblique; 1 for normal
F_{HW} = Hanging-wall factor: 1 for site on down-dip side of top of rupture; 0 otherwise, used in AS08 and CY08
Z_{TOR} = Depth to top of coseismic rupture (km), used in AS08, CB08 and CY08
δ = Average dip of rupture plane (degrees), used in AS08, CB08 and CY08
V_{S30} = Average shear-wave velocity in top 30m of site profile
$F_{Measured}$ = Vs30 Factor: 1 if VS30 is measured, 0 if Vs30 is inferred, used in AS08 and CY08
$Z_{1.0}$ = Depth to 1.0 km/sec velocity horizon (m), used in AS08 and CY08. Enter "DEFAULT" in order to use the default values or enter your site specific number
$Z_{2.5}$ = Depth of 2.5 km/s shear-wave velocity horizon (km), used in CB08. Enter "DEFAULT" in order to use the default value or enter your site specific number
W = Fault rupture width (km), used in AS08
F_{AS} = Aftershock factor: 0 for mainshock; 1 for aftershock, used in AS08 and CY08
HW Taper = To choose the hanging wall taper to be used in AS08. Enter 0 to use the hanging wall taper as published in Abrahamson and Silva (2008), or enter 1 to use the revised hanging wall taper suggested by Norm Abrahamson

CALCULATION OF WEIGHTED AVERAGE 2008 NGA MODELS: ***by Linda Al Atik, PEER - Sep, 2009 - l_atik@berkeley.edu***

This Excel file calculates the weighted average of the natural logarithm of the spectral values from the NGA models

NGA Model:	AS08	BA08	CB08	CY08	I08
Weight:	0.25	0.25	0.25	0.25	0

N	1

AS08: Abrahamson & Silva 2008 NGA Model
BA08: Boore & Atkinson 2008 NGA Model
CB08: Campbell & Bozorgnia 2008 NGA Model
CY08: Chiou & Youngs 2008 NGA Model
I08: Idriss 2008 NGA Model

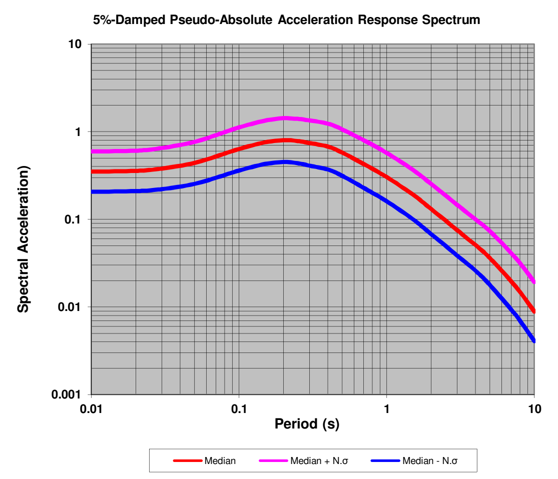
Project: ***Scholl Canyon LF***
Fault: ***Hollywood***

Explanatory Variables

M	6.70
R_{RUP} (km)	5.32
R_{JB} (km)	5.32
R_X (km)	5.32
U	0
F_{RV}	0
F_{NM}	0
F_{HW}	0
Z_{TOR} (km)	0.00
δ	70
V_{S30} (m/sec)	500
$F_{Measured}$	1
$Z_{1.0}$ (m)	DEFAULT
$Z_{2.5}$ (km)	DEFAULT
***W* (km)**	18
F_{AS}	0
HW Taper	1

Geometric Mean Horizontal Component

GMP	***T* (s)**	**SA Median**	**SA Median + N.σ**	**SA Median - N.σ**	**SD Median**
PSA (g)	**0.010**	3.503E-01	5.949E-01	2.063E-01	8.697E-04
SD (cm)	**0.020**	3.569E-01	6.064E-01	2.101E-01	3.544E-03
	0.030	3.792E-01	6.512E-01	2.209E-01	8.473E-03
	0.050	4.402E-01	7.641E-01	2.537E-01	2.732E-02
	0.075	5.433E-01	9.530E-01	3.097E-01	7.587E-02
	0.10	6.349E-01	1.118E+00	3.605E-01	1.576E-01
	0.15	7.566E-01	1.338E+00	4.280E-01	4.226E-01
	0.20	8.010E-01	1.425E+00	4.504E-01	7.954E-01
	0.25	7.818E-01	1.400E+00	4.367E-01	1.213E+00
	0.30	7.418E-01	1.343E+00	4.098E-01	1.657E+00
	0.40	6.760E-01	1.235E+00	3.701E-01	2.685E+00
	0.50	5.773E-01	1.063E+00	3.136E-01	3.582E+00
	0.75	4.010E-01	7.516E-01	2.139E-01	5.599E+00
	1.0	3.035E-01	5.728E-01	1.608E-01	7.533E+00
	1.5	1.927E-01	3.686E-01	1.007E-01	1.076E+01
	2.0	1.314E-01	2.537E-01	6.806E-02	1.305E+01
	3.0	7.529E-02	1.464E-01	3.872E-02	1.682E+01
	4.0	5.078E-02	9.956E-02	2.590E-02	2.017E+01
	5.0	3.615E-02	7.329E-02	1.783E-02	2.243E+01
	7.5	1.701E-02	3.592E-02	8.053E-03	2.375E+01
	10.0	8.849E-03	1.927E-02	4.063E-03	2.197E+01
PGA (g)	**0**	3.491E-01	5.930E-01	2.055E-01	
PGV (c/s)	**-1**	3.167E+01	5.471E+01	1.834E+01	



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V_{S30} = Average shear-wave velocity in top 30m of site profile
$F_{Measured}$ = Vs30 Factor: 1 if VS30 is measured, 0 if Vs30 is inferred, used in AS08 and CY08
$Z_{1.0}$ = Depth to 1.0 km/sec velocity horizon (m), used in AS08 and CY08. Enter "DEFAULT" in order to use the default values or enter your site specific number
$Z_{2.5}$ = Depth of 2.5 km/s shear-wave velocity horizon (km), used in CB08. Enter "DEFAULT" in order to use the default value or enter your site specific number
W = Fault rupture width (km), used in AS08
F_{AS} = Aftershock factor: 0 for mainshock; 1 for aftershock, used in AS08 and CY08
HW Taper = To choose the hanging wall taper to be used in AS08. Enter 0 to use the hanging wall taper as published in Abrahamson and Silva (2008), or enter 1 to use the revised hanging wall taper suggested by Norm Abrahamson

APPENDIX C-2

VS-30 SHEAR WAVE VELOCITY CALCULATIONS

2007-0138 Scholl Canyon Landfill
5/27/2011 RMW

Estimate Shear Wave Velocity in top 30 m (Vs-30) from Measured P-Wave Velocities (Vp)

Site Vp data from Woodward-Clyde, 1986

Avg. Vp soil	1200	fps
Avg. Vp Rock	11000	fps

Convert Vp to Vs

Est. Poisson's Ratio for soil 0.35 = value for wet silty sands (Fdn. Eng. Handbook, 2nd. Ed., edited by Fang, 1991)
Est. Poisson's Ratio for rock 0.25 = value for rock (ibid.)

$$Vs = {}^{Vp}\Big/\sqrt{\frac{2-2\upsilon}{1-\upsilon}}$$

Soil:	Vs,soil =	576	f/s =	176	m/s
Soil:	Vs,rock =	6351	f/s =	1936	m/s

Calc. Avg. Vp in top 30 m

Avg. depth soil	30	ft. =	9.1	m
Thickness Rock in Calc	68.4	ft. =	20.9	m

Travel time soil	0.052042	seconds
Travel time rock	0.00622	seconds
Total travel time to 30 m	0.058262	seconds

Vs-30 = 515 m/s
1689 f/s

Use: Vs30 = 500 m/s

Woodward-Clyde Consultants

FINAL REPORT
SUBSURFACE GEOLOGIC STUDY
PROPOSED SCHOLL CANYON LANDFILL
LEACHATE BARRIER

Prepared For

County Sanitation Districts
Los Angeles County
P.O. Box 4998
Whittier, California 90607

203 North Golden Circle Drive
Santa Ana, CA 92705
(714) 835-6886
(213) 581-7164
Telex 68-3420

Woodward-Clyde Consultants

22 August 1986
Project No. 42174A

County Sanitation Districts
Los Angeles County
P.O. Box 4998
Whittier, California 90607

Attention: Mr. Scott Purdy

SUBJECT: FINAL REPORT - SUBSURFACE GEOLOGIC STUDY
PROPOSED SCHOLL CANYON LANDFILL
LEACHATE BARRIER

Gentlemen:

In accordance with your written authorization dated 2 June 1986 and your Purchase Order No. 23225, we have conducted a geologic investigation of the surface and subsurface conditions at the site of the proposed Scholl Canyon leachate barrier system.

Attached is our report which presents a description of the field and laboratory work and the results of the tests that were completed in general accordance with our proposal dated 21 May 1986.

If you have any questions regarding this report, please call us at your convenience.

Sincerely,

WOODWARD-CLYDE CONSULTANTS

John T. Waggoner
Project Geologist

JTW/hab
Attachments

Consulting Engineers, Geologists
and Environmental Scientists

Offices in Other Principal Cities

thicknesses of fill. Above the canyon bottoms, the terrain is underlain by bedrock covered by a thin veneer of soil. Unfortunately, because the ridges and slopes are generally covered by heavy brush, few natural exposures of bedrock occur at the site. However, several man made cuts are present, which provide exposures of the bedrock. The locations of these exposures, which were examined in more detail during the mapping effort, are shown in Plate 1. A discussion of the character of bedrock exposed at the site is presented in Section 3.1.

2.2 Geophysics

As shown in Plate 1, five seismic refraction traverses were conducted along the proposed barrier alignments. The purpose of these traverses was to obtain seismic velocity and depth relationships in order to refine estimates of the soil and rock interface and thereby refine the subsurface exploration boring plan, which is discussed in the following section. A 12-channel signal-enhancement seismograph (EG&G Geometrics ES1210F) with a 275-foot long cable was used to complete the refraction traverses. The geophone spacing was 25 feet. Five shot points were generally used (ends, middle and offsets) for each cable length. The energy source was typically four to eight blows of a 16-pound sledgehammer to a ground plate or rock. The results of the geophysical investigation are discussed in Section 3.2.

2.3 Auger and Core Borings

Fifteen borings were advanced along the alignment of the barriers at an approximate 50-foot spacing. The borings are numbered BH-1 to BH-15 and their approximate locations are shown in Plate 1. Two drilling methods were used to advance these borings; hollow stem auger and rotary wash coring.

3.2 Results of Geophysics

The seismic records collected in the field were used to produce the time-distance graphs for numerical analysis using the time-term approach. This was done to assess the depth and seismic velocities of the bedrock. The time-distance graphs are shown in Figures 4 and 5. Graphically determined values were also used as an independent check on the calculations. All calculated raw depths were mutliplied by a factor of 1.6 to account for the masked layer effect of the water table and weathered rock transition. (Masked layers occur when an intermediate layer is too thin or has insufficient velocity contrast to be separately detected.) This correction factor is derived from the theoretical worst case error and also acts as a calibration factor, resulting in calculated depths close to those derived from other site information. The accuracy for seismic refraction results under these conditions is such that results should be within 20 to 30 percent.

The interpretation of the reduced seismic refraction data was plotted in profile form and is presented in Figure 6. Two to three seismic layers are generally present. The surficial layer has velocities generally in the 1,100 feet per second (fps) to 1,400 fps range and varies in thickness from about 15 feet to 50 feet. A variable intermediate layer is present with typical velocities of 5,000 fps or more but is not definable since it is a masked layer which is too thin to be separately detected. For this reason it is included within the upper velocity zone, and probably makes up the lower third to fourth of the soil section. The highest velocity layer had measured velocities in the range of 9,000 fps to 13,000 fps. The velocity variations primarily reflect differences in the number and aperature of joints and fractures as well as changes in rock composition and weathering. The ridge at the east end of RS-86-5 shows unusually low velocities, in the 7,000 fps range, which may result from deeper weathering of the bedrock.

3.3 Results of Borings

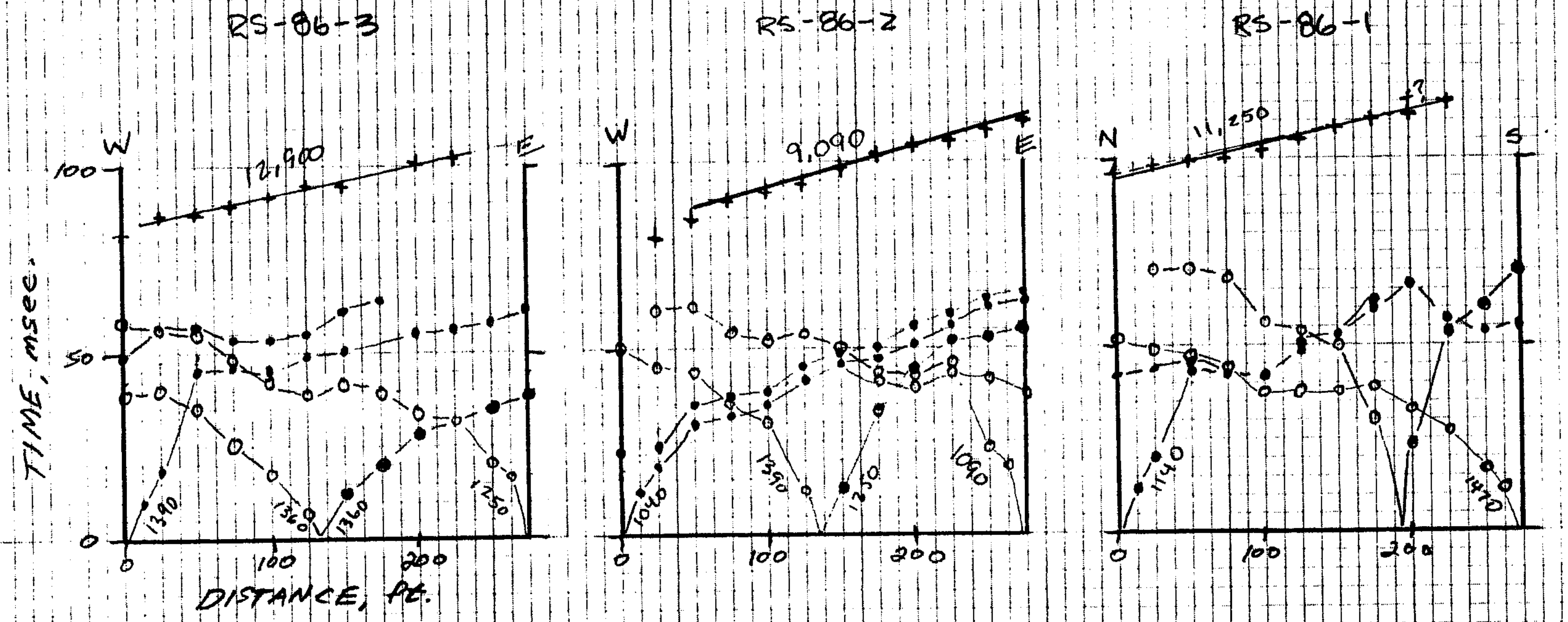
The results of the borings are summarized in Figures 7 and 8 (Sections A-A' and B-B'). These sections show the depths where bedrock was encountered, and the approximate depth to groundwater. Also shown in Figures 7 and 8 are the numerical results of the laboratory tests and the packer permeability tests. The alluvium was found to be generally a medium dense, moist, silty sand, with local zones of poorly graded sands. Minor amounts of gravel were encountered in many of the borings, and an apparent cobble layer was encountered in Boring BH-13, at about 18 feet.

The bedrock was relatively easily penetrated by the coring process, presumable due to the weathered nature of the rock. Core recovery was generally low, but ranged from 0% to 100%. No core was recovered in Boring BH-9 for the entire 30 feet that was core drilled. The RQD values were above 0% in only a few cases. The rock was generally weak enough that by the time it was extracted from the core barrel it had broken into a gravel with only a few larger fragments that approached full size NQ core (approximately 1.9 inches in diameter). No notable losses of circulation water were detected during the drilling of the core holes.

The bedrock recovered from the core holes appears to be quartz diorite to diorite, and is generally highly weathered and highly fractured. The fractures are often stained with iron oxide and locally filled with calcite. The uppermost portion of the bedrock was often slightly friable, usually becoming firm to hard within 5 to 10 feet deeper into

Woodward-Clyde Consultants
ORANGE COUNTY, CALIFORNIA

PREPARED BY:
DATE:
CHECKED BY: Rcm
DATE: 6-11-86
PROJECT NO.:
TASK:
PROJECT NAME:
Schall Landfill - Seismic Refraction
SHEET:
OF:
REFERENCE:



RS-86-3

t	58	56	55	47	42	39	41	39	34	32	20	17
	39	40	35	25	17	7	13	20	28	32	35	38
	10	18	45	46	45	48	50		55	56	58	61
	49	56	56	53	53	55	61	64				
TA	42	49	49	46	45	49	50		55	56	58	61
TB	58	56	58	47	42	39	41	39	34	32		
½Δt	8	35	9	.5	15	5	45		10.5	12		

tab = 59 V_0 = 1300 V_1 = 12900
V_{01} = 1306

t_g	20½	23	22½	17	14	14½	16		15	14½		
Z_0	28	30	29	22	18	19	21		20	19		
Z_0'	45	48	46	35	29	30	34	•	32	30	•	•

RS-86-2

t		60	61	54	52	54	50	44	43	46	29	19
	50	45	44	35	30	12	13	33	44	52	53	55
	12	18	30	32	35	41	46	47	51	56	61	62
	22	24	35	36	38	45	47	50	56	57	63	64
							46	42	40	44	42	38
TA	16	18	30	32	35	41	46	47	51	56	61	62
TB		60	61	54	52	54	50	44	43	46	44	40
½Δt		(21)	15.5	11	8.5	6.5	2	1.5	4	6	8.5	11

tab = 62 V_0 = 1150 V_1 = 9090
V_{01} = 1160

t_g			14½	12	12½	16½	17	14½	16	20	21½	20
Z_0			17	14	14.5	19	20	17	19	23	25	23
Z_0'	•	•	27	22	23	30	32	27	30	37	40	37

RS-86-1

t	12	20	44	42	42	40	53	60	66	57	57	55
	42	44	45	42	42	50	53	64				
	39	49	46	43	38	38	57	39	33	27	17	12
		70	70	67	56	54	60	30	23	54	60	70
TA	42	44	44	42	42	40	53	60	66	57	59	55
TB	51	49	46	45	38	38	57	35	33	27		
½Δt	4.5	2.5	1	.5	2	5	8	10.5	16.5	15		

tab = 53 V_0 = 1150 V_1 = 11250
V_{01} = 1160

t_g	20	20	18½	16	13½	16½	18½	23	~~16~~ 15	15½		
Z_0	23	23	21	19	16	19	21	27	~~24~~	18		
Z_0'	37	37	34	30	26	30	34	43	•	29	•	•

Z_0' corrected value based on factor of 1.6 correction for masked layer (water — gradiational contact)

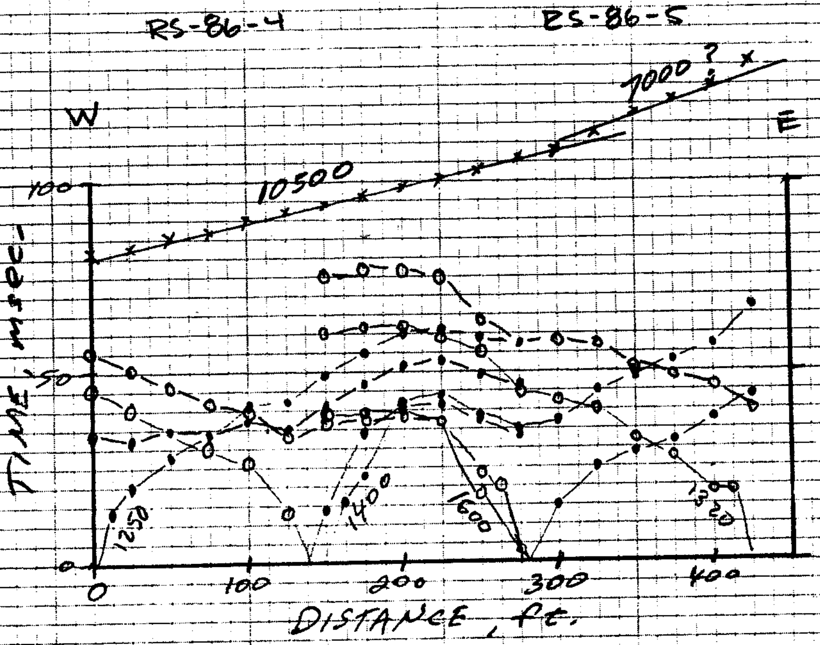
FIGURE 4

PREPARED BY:
DATE:
CHECKED BY: RLM
DATE: 6-11-86

Woodward-Clyde Consultants
ORANGE COUNTY, CALIFORNIA

Schell Landfill – Seismic Refract

PROJECT NO.:
TASK:
PROJECT NAME:
SHEET:
OF:
REFERENCE:



t
55 50 46 42 40 33 36 37 38 37 24 20
45 40 35 30 26 13 14 34 40 41 37 33
14 20 27 34 41 42 49 55 60 61 55 57
24 32 35 34 37 35 41 47 51 53 49 46

t
16 33 41 44 38 35 37 45 48 53 57 67
28 49 39 37 18 15 15 25 29 32 38 44
60 62 61 59 55 45 43 40 33 27 19 18
75 77 77 75 64 57 58 57 50 49 46 40

T_A 41 39 42 41 44 42 49 55 60 61 59 57 59 67 70 75 79 85
T_B 79 74 70 66 64 57 60 62 61 59 52 45 43 40 33 32 29 23

$\frac{1}{2}\Delta t$ 19 17½ 14 12½ 10 7½ 5½ 3½ ½ 1 3½ 6 8½ 13½ 18½ 21½ 25 31½

$t_{ab} = 82$ $V_0 = 1300$ $V_1 = 10500$
$V_{01} = 1310$

t_g 24 15½ 15 12½ 13 8½ 13½ 17½ 19½ 19 14½ 15 10 12½ 10½ 12½ 13 13

Z_0 31 20 19 17 17 11 18 23 26 25 15 19 13 17 14 17 18 18

Z'_0 50 32 30 27 27 18 29 37 40 40 30 30 20 27 22 27 29 29
corrected value based on factor of 1.6 correction for masked layer (water – gradiational contact).

FIGURE 5

PREPARED BY: | DATE:

CHECKED BY: | DATE:

Woodward-Clyde Consultants
ORANGE COUNTY, CALIFORNIA

PROJECT NO.: | TASK:

PROJECT NAME:

SHEET: ____
OF: ____

REFERENCE:

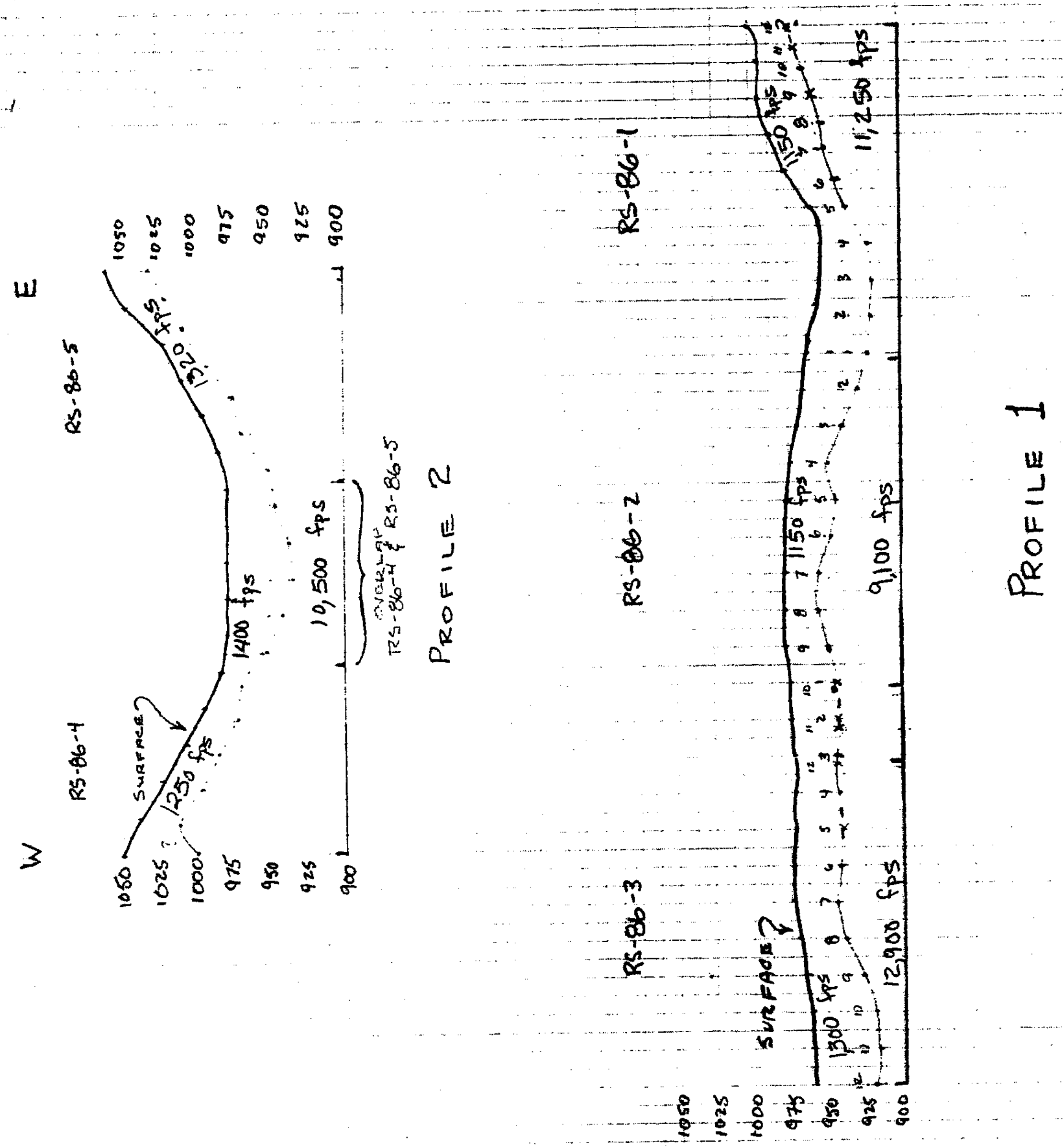


FIGURE 6

APPENDIX D

LIQUEFACTION ASSESSMENT AND DYNAMIC SETTLEMENT CALCULATIONS

APPENDIX D-1

LIQUEFACTION ASSESSMENT BY CPT

2004-049 Newby Island Landfill
1/16/2012 RMW

Boring Elevation:	977.0 ft.
Groundwater Elevation:	940.0 ft. @ time = CPT
Liquefaction GW El.:	940.0 ft. @ time = EQ

CPT-1

0

Material	Unit Weight:
Alluvium	120 pcf
Bedrock	135 pcf
0	0 pcf
0	0 pcf

EQ Mag. (M_w)	PGA
6.9	0.67

CPT Max Depth = 37.9 ft.
El. @ Max Depth = 939.1 ft.

Adj. Rotary Boring:

P_a = 1 atm =	1.058 tsf
1.0 MPa =	10.443 tsf
1.00 tsf =	13.889 psi

09:27:04 16:11 GREGG
CPT-31 sta52+50 R. WARNER NEWBY IS. L/F

Depth Profile: Top of Layer

0	Alluvium	
37.9	Bedrock	
0		0
0		0
0		0
0		0
0		0
0		0

Note: **BLUE** fields require user input

I_c	Soil Behavior Type
0	7 - Grvly to Dense Sand
1.31	6 - Cln. Sand to Silty Sand
2.05	5 - Silty Sand to Sandy Silt
2.6	4 - Clayey Silt to Silty Clay
2.95	3 - Silty Clay to Clay
3.6	2 - Organic Soils

Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:
1.10	1.10	1.10	1.10

Depth (ft)	Elevation (ft)	q_c (tsf)	f_s (tsf)	u (psi)	Corrected q_t (tsf)	R_f (%)	Material	GW	Roberston (1990) Soil Behavior Type	Youd et al. (2001) FS_{LIQ}	Moss et al. 2006 Age Corrected FS_{LIQ}	Idriss & Boulanger 2007 Age Corrected FS_{LIQ}	Avg. FS_{LIQ} [check: may be above groundwater]
0.16	976.84	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.33	976.67	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.49	976.51	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.66	976.34	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.82	976.18	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.98	976.02	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.15	975.85	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.31	975.69	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.48	975.52	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.64	975.36	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.80	975.20	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.97	975.03	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.13	974.87	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.30	974.70	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.46	974.54	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.62	974.38	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.79	974.21	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.95	974.05	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.12	973.88	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.28	973.72	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.44	973.56	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.61	973.39	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.77	973.23	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.94	973.06	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.10	972.90	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.27	972.73	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.43	972.57	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.59	972.41	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.76	972.24	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.92	972.08	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
5.09	971.91	57.00	0.52	1.89	57.02	0.90%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.57	0.44	0.41	0.47
5.25	971.75	56.03	0.56	2.03	56.05	0.99%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.56	0.44	0.41	0.47
5.41	971.59	55.55	0.51	1.87	55.57	0.91%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.53	0.41	0.40	0.45
5.58	971.42	49.43	0.41	2.10	49.45	0.84%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.48	0.36	0.38	0.41
5.74	971.26	44.65	0.36	2.10	44.68	0.79%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.44	0.32	0.36	0.37
5.91	971.09	40.90	0.37	2.03	40.92	0.91%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.43	0.31	0.36	0.37
6.07	970.93	45.76	0.44	2.10	45.79	0.96%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.50	0.36	0.39	0.42
6.23	970.77	61.38	0.53	2.29	61.40	0.86%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.62	0.49	0.43	0.52
6.40	970.60	76.11	0.57	2.20	76.13	0.74%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.91	0.74	0.52	0.72
6.56	970.44	98.52	0.91	2.26	98.55	0.92%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.16	1.12	0.60	0.96
6.73	970.27	104.32	0.67	2.33	104.35	0.64%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.20	1.05	0.62	0.96
6.89	970.11	81.29	0.72	2.49	81.31	0.88%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.96	0.92	0.54	0.81
7.05	969.95	74.60	0.52	2.63	74.63	0.69%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.76	0.64	0.47	0.62
7.22	969.78	70.39	0.52	2.54	70.42	0.73%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.67	0.59	0.44	0.57
7.38	969.62	70.85	0.49	2.74	70.88	0.69%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.65	0.57	0.43	0.55
7.55	969.45	73.18	0.52	2.79	73.21	0.71%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.67	0.61	0.44	0.57
7.71	969.29	79.01	0.52	2.88	79.04	0.66%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.69	0.64	0.45	0.59
7.87	969.13	79.30	0.48	2.90	79.33	0.60%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.66	0.62	0.43	0.57
8.04	968.96	70.39	0.41	2.88	70.42	0.58%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.58	0.54	0.41	0.51
8.20	968.80	63.11	0.40	2.84	63.14	0.64%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.52	0.47	0.39	0.46
8.37	968.63	63.31	0.40	2.83	63.34	0.63%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.51	0.44	0.39	0.44
8.53	968.47	65.10	0.48	2.70	65.13	0.74%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.52	0.43	0.40	0.45
8.69	968.31	62.83	0.60	2.70	62.86	0.96%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.55	0.43	0.42	0.47
8.86	968.14	64.73	0.63	2.72	64.76	0.97%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.58	0.44	0.44	0.49
9.02	967.98	69.37	0.71	2.79	69.40	1.02%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.62	0.47	0.45	0.52
9.19	967.81	74.77	0.72	2.83	74.80	0.96%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.66	0.52	0.46	0.55
9.35	967.65	79.72	0.68	2.88	79.75	0.85%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.69	0.57	0.46	0.57
9.51	967.49	83.96	0.63	2.88	83.99	0.75%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.70	0.60	0.46	0.58
9.68	967.32	83.56	0.64	2.84	83.59	0.77%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.66	0.55	0.45	0.55
9.84	967.16	69.68	0.70	2.70	69.71	1.00%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.61	0.47	0.45	0.51
10.01	966.99	60.89	0.70	2.54	60.92	1.15%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.55	0.39	0.44	0.46
10.17	966.83	57.40	0.68	2.24	57.42	1.18%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.54	0.36	0.44	0.44
10.33	966.67	58.59	0.80	2.22	58.61	1.36%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.53	0.38	0.43	0.45
10.50	966.50	66.38	0.62	2.28	66.41	0.94%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.53	0.40	0.42	0.45
10.66	966.34	72.61	0.50	2.29	72.64	0.68%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.52	0.45	0.40	0.46
10.83	966.17	76.99	0.45	2.31	77.02	0.58%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.53	0.49	0.39	0.47
10.99	966.01	81.03	0.41	2.40	81.06	0.51%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.54	0.53	0.39	0.49
11.15	965.85	84.22	0.39	2.42	84.24	0.46%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.55	0.56	0.40	0.50
11.32	965.68	86.38	0.42	2.42	86.40	0.48%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.57	0.59	0.41	0.52
11.48	965.52	89.73	0.42	2.42	89.76	0.47%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.59	0.60	0.42	0.54
11.65	965.35	91.38	0.47	2.42	91.41	0.52%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.61	0.63	0.43	0.56
11.81	965.19	93.32	0.46	2.42	93.34	0.50%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.62	0.63	0.43	0.56
11.98	965.02	93.46	0.47	2.44	93.49	0.51%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.61	0.63	0.43	0.56
12.14	964.86	92.04	0.46	2.44	92.06	0.50%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.59	0.60	0.42	0.54
12.30	964.70	88.23	0.43	2.42	88.25	0.49%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.56	0.55	0.40	0.50
12.47	964.53	82.28	0.43	2.44	82.31	0.53%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.52	0.50	0.38	0.47
12.63	964.37	76.76	0.45	2.44	76.79	0.59%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.51	0.48	0.38	0.46
12.80	964.20	82.08	0.53	2.44	82.11	0.64%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.57	0.51	0.41	0.50
12.96	964.04	95.65	0.88	2.44	95.68	0.92%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.66	0.62	0.45	0.58
13.12	963.88	103.07	0.72	2.45	103.10	0.70%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.79	0.76	0.51	0.69
13.29	963.71	120.79	0.72	2.40	120.82	0.60%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.86	0.91	0.55	0.77
13.45	963.55	127.50	0.61	2.47	127.53	0.48%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.94	1.05	0.60	0.86
13.62	963.38	128.78	0.62	2.49	128.81	0.48%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.91	1.06	0.59	0.85

2004-049 Newby Island Landfill Boring Elevation: 977.0 ft.
1/16/2012 RMW Groundwater Elevation: 940.0 ft. @ time = CPT
Liquefaction GW El.: 940.0 ft. @ time = EQ

CPT-1

0

Material	Unit Weight:
Alluvium	120 pcf
Bedrock	135 pcf
0	0 pcf
0	0 pcf

EQ Mag. (M_w)	PGA
6.9	0.67

CPT Max Depth = 37.9 ft.
El. @ Max Depth = 939.1 ft.

Depth Profile: Top of Layer:

0	Alluvium	
37.9	Bedrock	
0		0
0		0
0		0
0		0
0		0
0		0

Note: **BLUE** fields require user input

I_c	Soil Behavior Type
0	7 - Grvly to Dense Sand
1.31	6 - Cln. Sand to Silty Sand
2.05	5 - Silty Sand to Sandy Silt
2.6	4 - Clayey Silt to Silty Clay
2.95	3 - Silty Clay to Clay
3.6	2 - Organic Soils

Adj. Rotary Boring:

09:27:04 16:11 GREGG
CPT-31 sta52+50 R. WARNER NEWBY IS. L/F

P_a = 1 atm =	1.058 tsf
1.0 MPa =	10.443 tsf
1.00 tsf =	13.889 psi

Depth (ft)	Elevation (ft)	q_c (tsf)	f_s (tsf)	u (psi)	Corrected q_t (tsf)	R_f (%)	Material	GW	Roberston (1990) Soil Behavior Type	Youd et al. (2001) FS_{LIQ}	Moss et al. 2006 Age Corrected FS_{LIQ}	Idriss & Boulanger 2007 Age Corrected FS_{LIQ}	Avg. FS_{LIQ} [check: may be above groundwater]
										Conditional Format & CAD Export FS Criteria: 1.10	Conditional Format & CAD Export FS Criteria: 1.10	Conditional Format & CAD Export FS Criteria: 1.10	Conditional Format & CAD Export FS Criteria: 1.10
13.78	963.22	121.28	0.41	2.49	121.30	0.34%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.81	0.91	0.55	0.76
13.94	963.06	109.27	0.44	2.58	109.30	0.40%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.67	0.74	0.48	0.63
14.11	962.89	94.77	0.45	2.63	94.80	0.47%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.58	0.61	0.42	0.54
14.27	962.73	90.02	0.46	2.63	90.05	0.51%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.53	0.53	0.39	0.48
14.44	962.56	85.84	0.43	2.63	85.87	0.50%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.50	0.49	0.37	0.45
14.60	962.40	82.82	0.41	2.63	82.85	0.49%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.48	0.47	0.37	0.44
14.76	962.24	85.38	0.41	2.63	85.41	0.48%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.48	0.48	0.37	0.45
14.93	962.07	91.90	0.40	2.63	91.92	0.43%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.52	0.53	0.39	0.48
15.09	961.91	100.34	0.43	2.63	100.37	0.43%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.57	0.60	0.42	0.53
15.26	961.74	108.56	0.54	2.65	108.59	0.50%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.65	0.71	0.46	0.61
15.42	961.58	119.17	0.59	2.67	119.20	0.49%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.72	0.81	0.50	0.67
15.58	961.42	123.95	0.58	2.68	123.98	0.47%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.85	0.93	0.55	0.78
15.75	961.25	135.04	1.10	2.72	135.07	0.82%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.99	1.23	0.63	0.95
15.91	961.09	151.45	0.83	2.70	151.48	0.55%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.12	1.30	0.70	1.04
16.08	960.92	147.98	0.73	2.70	148.01	0.49%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.02	1.20	0.66	0.96
16.24	960.76	126.54	0.73	2.72	126.57	0.58%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.82	0.95	0.55	0.77
16.40	960.60	109.44	0.49	2.70	109.47	0.45%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.64	0.68	0.45	0.59
16.57	960.43	96.33	0.49	2.74	96.36	0.51%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.54	0.56	0.40	0.50
16.73	960.27	91.30	0.51	2.76	91.33	0.55%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.50	0.51	0.38	0.46
16.90	960.10	89.82	0.46	2.77	89.85	0.52%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.49	0.48	0.37	0.45
17.06	959.94	90.19	0.45	2.77	90.22	0.49%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.48	0.48	0.37	0.45
17.22	959.78	94.14	0.47	2.77	94.17	0.49%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.49	0.51	0.37	0.45
17.39	959.61	98.35	0.34	2.79	98.38	0.35%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.51	0.50	0.39	0.47
17.55	959.45	94.20	0.77	2.81	94.23	0.82%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.54	0.54	0.41	0.50
17.72	959.28	91.75	0.83	2.84	91.78	0.90%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.56	0.52	0.43	0.51
17.88	959.12	90.56	0.84	2.83	90.59	0.92%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.54	0.49	0.43	0.49
18.04	958.96	82.71	0.76	3.02	82.74	0.91%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.56	0.45	0.44	0.48
18.21	958.79	77.22	1.23	2.67	77.25	1.59%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.60	0.49	0.45	0.51
18.37	958.63	81.74	1.36	2.65	81.77	1.66%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.67	0.53	0.49	0.56
18.54	958.46	96.45	1.26	2.52	96.47	1.30%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.77	0.62	0.54	0.64
18.70	958.30	117.66	1.63	-0.23	117.66	1.39%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.81	0.75	0.56	0.71
18.86	958.14	122.36	1.14	-0.18	122.35	0.93%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.80	0.73	0.54	0.69
19.03	957.97	105.92	1.01	-0.09	105.92	0.95%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.65	0.67	0.46	0.59
19.19	957.81	103.53	0.50	0.02	103.53	0.48%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.55	0.56	0.41	0.51
19.36	957.64	102.93	0.45	0.04	102.93	0.44%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.50	0.54	0.38	0.48
19.52	957.48	103.53	0.49	0.04	103.53	0.47%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.52	0.56	0.39	0.49
19.69	957.31	108.48	0.63	0.07	108.48	0.58%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.54	0.58	0.40	0.51
19.85	957.15	109.39	0.62	0.09	109.39	0.56%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.56	0.61	0.42	0.53
20.01	956.99	113.48	0.69	0.12	113.48	0.60%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.57	0.63	0.42	0.54
20.18	956.82	115.19	0.64	0.14	115.19	0.55%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.61	0.66	0.44	0.57
20.34	956.66	117.15	0.90	0.12	117.15	0.77%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.62	0.71	0.45	0.59
20.51	956.49	122.01	0.71	0.18	122.02	0.58%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.64	0.70	0.46	0.60
20.67	956.33	118.49	0.84	0.18	118.49	0.71%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.59	0.67	0.44	0.57
20.83	956.17	116.16	0.08	0.20	116.16	0.07%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.54	0.57	0.42	0.51
21.00	956.00	99.46	0.71	0.23	99.46	0.72%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.48	0.53	0.39	0.47
21.16	955.84	94.78	0.54	0.16	94.78	0.57%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.45	0.48	0.37	0.43
21.33	955.67	91.41	0.49	0.23	91.41	0.54%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.49	0.45	0.39	0.44
21.49	955.51	87.97	1.36	0.23	87.97	1.54%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.53	0.54	0.42	0.50
21.65	955.35	100.54	1.03	0.27	100.54	1.03%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.56	0.52	0.45	0.51
21.82	955.18	97.67	0.81	0.30	97.67	0.83%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.51	0.51	0.42	0.48
21.98	955.02	90.84	0.73	0.32	90.85	0.81%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.49	0.46	0.41	0.45
22.15	954.85	81.46	1.08	0.36	81.46	1.33%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.47	0.45	0.40	0.44
22.31	954.69	76.62	0.81	0.34	76.63	1.06%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.45	0.39	0.39	0.41
22.47	954.53	67.15	0.74	0.37	67.16	1.10%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.43	0.35	0.37	0.38
22.64	954.36	61.95	0.92	0.39	61.95	1.48%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.47	0.34	0.36	0.39
22.80	954.20	57.77	1.27	0.43	57.77	2.20%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.50	0.36	0.37	0.41
22.97	954.03	61.80	1.12	0.45	61.81	1.80%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.50	0.37	0.37	0.41
23.13	953.87	76.54	0.84	0.46	76.54	1.09%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.43	0.38	0.36	0.39
23.29	953.71	82.20	0.51	0.48	82.20	0.62%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.39	0.38	0.35	0.37
23.46	953.54	81.29	0.44	0.46	81.29	0.55%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.36	0.38	0.33	0.36
23.62	953.38	75.34	0.48	0.46	75.35	0.63%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.35	0.35	0.33	0.34
23.79	953.21	66.33	0.53	0.45	66.33	0.80%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.36	0.32	0.33	0.34
23.95	953.05	50.08	0.79	0.45	50.09	1.57%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.37	0.32	0.33	0.34
24.11	952.89	39.25	1.11	0.45	39.25	2.83%	Alluvium	AboveGW	4 - Clayey Silt to Silty Clay				
24.28	952.72	32.88	0.67	0.45	32.88	2.05%	Alluvium	AboveGW	4 - Clayey Silt to Silty Clay				
24.44	952.56	41.13	0.59	0.52	41.13	1.44%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.39	0.36	0.34	0.36
24.61	952.39	91.01	0.80	0.50	91.02	0.88%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.42	0.39	0.36	0.39
24.77	952.23	101.74	0.86	0.48	101.74	0.85%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.47	0.52	0.41	0.47
24.93	952.07	103.30	0.99	0.36	103.30	0.95%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.52	0.59	0.43	0.51
25.10	951.90	112.29	1.14	-0.05	112.29	1.01%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.71	0.69	0.52	0.64
25.26	951.74	128.39	2.89	0.12	128.39	2.25%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.98	1.20	0.67	0.95
25.43	951.57	164.73	2.58	0.21	164.74	1.56%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.19	1.18	0.80	1.06
25.59	951.41	132.20	2.56	0.20	132.20	1.94%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	1.01	1.28	0.71	1.00
25.75	951.25	131.83	1.45	0.16	131.83	1.10%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.70	0.80	0.52	0.67
25.92	951.08	114.39	0.49	0.23	114.39	0.43%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.52	0.60	0.42	0.51
26.08	950.92	99.63	0.76	0.18	99.63	0.76%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.45	0.55	0.38	0.46
26.25	950.75	104.61	0.79	0.20	104.61	0.76%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.47	0.54	0.41	0.47
26.41	950.59	104.58	1.13	0.14	104.58	1.08%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.53	0.60	0.44	0.53
26.57	950.43	107.85	1.54	0.20	107.85	1.42%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.68	0.79	0.53	0.67
26.74	950.26	144.54	2.08	0.30	144.54	1.44%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.86	1.05	0.63	0.85
26.90	950.10	162.57	2.20	0.21	162.57	1.35%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.20	1.76	0.89	1.28
27.07	949.93	214.31	2.59	0.30	214.31	1.21%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.52	2.74	1.48	1.91
27.23	949.77	253.19	1.55	0.37	253.19	0.61%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.91	3.61	3.12	2.88

2004-049 Newby Island Landfill Boring Elevation: 977.0 ft.
1/16/2012 RMW Groundwater Elevation: 940.0 ft. @ time = CPT
Liquefaction GW El.: 940.0 ft. @ time = EQ

CPT-1

0

Material	Unit Weight:
Alluvium	120 pcf
Bedrock	135 pcf
0	0 pcf
0	0 pcf

EQ Mag. (M_w)	PGA
6.9	0.67

CPT Max Depth = 37.9 ft.
El. @ Max Depth = 939.1 ft.

Adj. Rotary Boring:

09:27:04 16:11 GREGG
CPT-31 sta52+50 R. WARNER NEWBY IS. L/F

P_a = 1 atm =	1.058 tsf
1.0 MPa =	10.443 tsf
1.00 tsf =	13.889 psi

Depth Profile: Top of Layer

0	Alluvium	
37.9	Bedrock	
0		0
0		0
0		0
0		0
0		0
0		0

Note: **BLUE** fields require user input

I_c	Soil Behavior Type
0	7 - Grvly to Dense Sand
1.31	6 - Cln. Sand to Silty Sand
2.05	5 - Silty Sand to Sandy Silt
2.6	4 - Clayey Silt to Silty Clay
2.95	3 - Silty Clay to Clay
3.6	2 - Organic Soils

Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:
1.10	1.10	1.10	1.10

Depth (ft)	Elevation (ft)	q_c (tsf)	f_s (tsf)	u (psi)	Corrected q_t (tsf)	R_f (%)	Material	GW	Roberston (1990) Soil Behavior Type	Youd et al. (2001) FS_{LIQ}	Moss et al. 2006 Age Corrected FS_{LIQ}	Idriss & Boulanger 2007 Age Corrected FS_{LIQ}	Avg. FS_{LIQ} [check: may be above groundwater]
27.40	949.60	257.20	2.65	0.43	257.20	1.03%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.88	4.25	3.22	3.11
27.56	949.44	226.00	2.11	0.45	226.00	0.93%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.49	2.82	1.38	1.90
27.72	949.28	168.52	1.56	0.48	168.52	0.93%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.98	1.62	0.72	1.10
27.89	949.11	148.75	0.81	0.53	148.76	0.54%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.68	1.00	0.52	0.74
28.05	948.95	146.84	0.68	0.55	146.85	0.46%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.57	0.84	0.47	0.63
28.22	948.78	141.16	0.66	0.59	141.16	0.46%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.53	0.78	0.44	0.59
28.38	948.62	134.73	0.55	0.59	134.73	0.41%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.49	0.71	0.42	0.54
28.54	948.46	126.85	0.52	0.60	126.86	0.41%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.46	0.65	0.39	0.50
28.71	948.29	122.19	0.51	0.60	122.19	0.42%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.45	0.62	0.38	0.48
28.87	948.13	122.44	0.60	0.62	122.45	0.49%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.44	0.62	0.38	0.48
29.04	947.96	124.12	0.46	0.62	124.13	0.37%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.44	0.61	0.38	0.47
29.20	947.80	118.12	0.65	0.64	118.12	0.55%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.45	0.60	0.39	0.48
29.36	947.64	109.16	1.01	0.66	109.17	0.93%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.46	0.64	0.40	0.50
29.53	947.47	116.92	0.86	0.68	116.93	0.74%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.53	0.74	0.45	0.57
29.69	947.31	158.53	0.98	0.73	158.54	0.62%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.59	0.90	0.48	0.65
29.86	947.14	166.61	0.86	0.73	166.62	0.52%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.62	0.98	0.50	0.70
30.02	946.98	148.32	0.69	0.75	148.33	0.46%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.53	0.83	0.46	0.61
30.18	946.82	128.10	0.43	0.75	128.11	0.33%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.49	0.68	0.43	0.53
30.35	946.65	114.56	1.17	0.76	114.57	1.02%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.48	0.67	0.42	0.52
30.51	946.49	112.20	1.15	0.75	112.21	1.03%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.55	0.71	0.47	0.58
30.68	946.32	128.10	1.58	0.76	128.11	1.23%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.64	0.89	0.52	0.68
30.84	946.16	153.04	1.94	0.68	153.05	1.26%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.69	1.03	0.54	0.76
31.00	946.00	147.21	1.25	0.14	147.22	0.85%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.67	1.00	0.52	0.73
31.17	945.83	144.11	0.94	0.36	144.12	0.65%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.60	0.92	0.48	0.66
31.33	945.67	150.68	0.97	0.36	150.69	0.64%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.63	0.99	0.50	0.71
31.50	945.50	164.45	1.47	0.37	164.45	0.89%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.72	1.27	0.57	0.85
31.66	945.34	193.52	1.13	0.43	193.52	0.58%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.89	1.53	0.69	1.04
31.82	945.18	203.10	1.98	0.48	203.11	0.98%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.05	2.21	0.92	1.39
31.99	945.01	234.16	1.50	0.52	234.17	0.64%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.45	2.96	2.00	2.14
32.15	944.85	292.12	1.25	-0.59	292.12	0.43%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.53	3.24	2.89	2.55
32.32	944.68	245.91	1.59	-0.25	245.90	0.64%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.46	2.95	2.44	2.29
32.48	944.52	218.72	0.60	-0.21	218.71	0.27%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.46	2.90	2.41	2.26
32.64	944.36	289.71	2.55	-0.23	289.70	0.88%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.10	10.21	6.39	6.57
32.81	944.19	500.32	3.01	1.24	500.33	0.60%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.00	7.59	6.39	5.66
32.97	944.03	142.12	2.64	1.12	142.14	1.86%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	2.13	5.57	7.05	4.92
33.14	943.86	131.03	0.99	0.32	131.03	0.76%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.70	0.81	0.53	0.68
33.30	943.70	114.17	2.13	0.30	114.17	1.86%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.60	0.85	0.48	0.64
33.46	943.54	115.13	1.59	0.30	115.14	1.38%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.65	0.79	0.51	0.65
33.63	943.37	125.74	1.87	-0.21	125.74	1.48%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.68	0.99	0.54	0.74
33.79	943.21	166.55	1.73	-0.21	166.55	1.04%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.65	0.86	0.51	0.68
33.96	943.04	99.75	1.64	0.50	99.75	1.64%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.55	0.81	0.46	0.61
34.12	942.88	93.97	0.73	0.45	93.98	0.78%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.41	0.51	0.37	0.43
34.28	942.72	93.74	0.48	0.41	93.75	0.52%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.35	0.47	0.32	0.38
34.45	942.55	104.47	0.38	0.32	104.47	0.36%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.34	0.48	0.31	0.38
34.61	942.39	114.14	0.28	0.23	114.14	0.25%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.35	0.51	0.32	0.40
34.78	942.22	126.25	0.33	0.27	126.25	0.26%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.37	0.55	0.35	0.42
34.94	942.06	136.95	0.25	0.20	136.95	0.18%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.39	0.57	0.37	0.44
35.10	941.90	134.70	0.20	0.11	134.70	0.15%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.40	0.59	0.37	0.45
35.27	941.73	133.19	0.41	0.09	133.19	0.31%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.45	0.66	0.40	0.50
35.43	941.57	138.28	1.32	0.04	138.28	0.95%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.54	0.91	0.46	0.63
35.60	941.40	163.43	1.44	0.02	163.43	0.88%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.83	1.57	0.68	1.02
35.76	941.24	252.90	2.04	0.04	252.90	0.81%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.34	3.23	1.57	2.04
35.93	941.07	308.05	3.35	0.20	308.05	1.09%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	2.07	6.96	6.31	5.11
36.09	940.91	310.47	3.93	0.30	310.47	1.27%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	2.56	10.13	6.30	6.33
36.25	940.75	310.36	3.95	0.32	310.36	1.27%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	2.82	11.47	6.30	6.86
36.42	940.58	326.17	4.80	0.36	326.17	1.47%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.32	15.99	6.30	8.53
36.58	940.42	357.40	5.91	0.41	357.40	1.65%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.90	25.01	6.29	11.73
36.75	940.25	390.25	4.81	0.71	390.25	1.23%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.50	29.26	6.29	13.35
36.91	940.09	398.50	5.68	0.75	398.50	1.43%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.06	37.44	6.29	16.26
37.07	939.93	382.06	8.36	0.80	382.06	2.19%	Alluvium	BelowGW	6 - Cln. Sand to Silty Sand	5.53	51.40	6.27	21.07
37.24	939.76	364.54	8.51	0.80	364.54	2.34%	Alluvium	BelowGW	6 - Cln. Sand to Silty Sand	5.55	41.78	6.26	17.86
37.40	939.60	329.35	8.58	0.80	329.36	2.60%	Alluvium	BelowGW	6 - Cln. Sand to Silty Sand	4.65	38.44	6.25	16.45
37.57	939.43	365.42	4.18	0.85	365.43	1.14%	Alluvium	BelowGW	6 - Cln. Sand to Silty Sand	4.20	5.80	6.24	5.41
37.73	939.27	403.59	0.02	4.48	403.63	0.00%	Alluvium	BelowGW	6 - Cln. Sand to Silty Sand	5.82	2.00	6.22	4.68
37.89	939.11	574.49	0.02	4.85	574.54	0.00%	Alluvium	BelowGW	6 - Cln. Sand to Silty Sand	7.34	0.77	6.21	4.77

2004-049 Newby Island Landfill Boring Elevation: 976.0 ft.
1/16/2012 RMW Groundwater Elevation: 940.0 ft. @ time = CPT
Liquefaction GW El.: 940.0 ft. @ time = EQ

CPT-2

0

Material	Unit Weight:
Alluvium	120 pcf
Bedrock	135 pcf
0	0 pcf
0	0 pcf

EQ Mag. (M_w)	PGA
6.9	0.67

CPT Max Depth = 20.5 ft.
El. @ Max Depth = 955.5 ft.

Adj. Rotary Boring:

09:27:04 16:11 GREGG
CPT-31 sta52+50 R. WARNER NEWBY IS. L/F

P_a = 1 atm =	1.058 tsf
1.0 MPa =	10.443 tsf
1.00 tsf =	13.889 psi

Depth Profile: Top of Layer

0	Alluvium	
20.51	Bedrock	
0		0
0		0
0		0
0		0
0		0
0		0

Note: **BLUE** fields require user input

I_c	Soil Behavior Type
0	7 - Grvly to Dense Sand
1.31	6 - Cln. Sand to Silty Sand
2.05	5 - Silty Sand to Sandy Silt
2.6	4 - Clayey Silt to Silty Clay
2.95	3 - Silty Clay to Clay
3.6	2 - Organic Soils

Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:
1.10	1.10	1.10	1.10

Depth (ft)	Elevation (ft)	q_c (tsf)	f_s (tsf)	u (psi)	Corrected q_t (tsf)	R_f (%)	Material	GW	Roberston (1990) Soil Behavior Type	Youd et al. (2001) FS_{LIQ}	Moss et al. 2006 Age Corrected FS_{LIQ}	Idriss & Boulanger 2007 Age Corrected FS_{LIQ}	Avg. FS_{LIQ} [check: may be above groundwater]
0.16	975.84	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.33	975.67	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.49	975.51	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.66	975.34	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.82	975.18	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.98	975.02	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.15	974.85	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.31	974.69	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.48	974.52	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.64	974.36	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.80	974.20	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.97	974.03	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.13	973.87	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.30	973.70	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.46	973.54	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.62	973.38	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.79	973.21	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.95	973.05	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.12	972.88	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.28	972.72	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.44	972.56	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.61	972.39	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.77	972.23	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.94	972.06	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.10	971.90	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.27	971.73	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.43	971.57	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.59	971.41	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.76	971.24	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.92	971.08	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
5.09	970.91	28.67	0.09	1.87	28.69	0.32%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.27	0.18	0.23	0.23
5.25	970.75	28.16	0.08	1.83	28.18	0.27%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.27	0.18	0.24	0.23
5.41	970.59	25.48	0.12	1.87	25.50	0.45%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.28	0.18	0.25	0.24
5.58	970.42	25.06	0.18	1.85	25.08	0.72%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.29	0.18	0.27	0.25
5.74	970.26	27.19	0.21	1.87	27.21	0.79%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.31	0.20	0.29	0.27
5.91	970.09	32.00	0.23	1.88	32.02	0.72%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.33	0.22	0.30	0.28
6.07	969.93	36.83	0.20	1.87	36.85	0.54%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.33	0.23	0.29	0.28
6.23	969.77	37.71	0.16	1.87	37.73	0.42%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.33	0.24	0.28	0.28
6.40	969.60	38.14	0.16	1.87	38.16	0.41%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.33	0.24	0.28	0.28
6.56	969.44	39.56	0.18	1.87	39.58	0.44%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.33	0.24	0.29	0.29
6.73	969.27	40.56	0.19	1.85	40.58	0.46%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.33	0.24	0.29	0.29
6.89	969.11	37.60	0.17	1.85	37.62	0.44%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.32	0.23	0.29	0.28
7.05	968.95	33.05	0.15	1.85	33.07	0.46%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.31	0.21	0.29	0.27
7.22	968.78	28.10	0.20	1.83	28.12	0.69%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.31	0.19	0.29	0.26
7.38	968.62	24.83	0.27	1.83	24.85	1.09%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.33	0.19	0.30	0.27
7.55	968.45	24.72	0.34	1.83	24.74	1.37%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.33	0.19	0.31	0.28
7.71	968.29	29.67	0.25	1.83	29.68	0.85%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.33	0.20	0.32	0.28
7.87	968.13	33.62	0.24	1.85	33.64	0.71%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.32	0.21	0.32	0.28
8.04	967.96	37.20	0.23	1.78	37.22	0.62%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.33	0.24	0.32	0.30
8.20	967.80	44.26	0.28	1.80	44.27	0.63%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.35	0.26	0.33	0.32
8.37	967.63	46.67	0.30	1.83	46.69	0.65%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.37	0.29	0.33	0.33
8.53	967.47	48.98	0.26	1.83	49.00	0.52%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.36	0.28	0.33	0.32
8.69	967.31	47.58	0.24	1.83	47.60	0.50%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.36	0.28	0.31	0.32
8.86	967.14	51.17	0.21	1.83	51.19	0.42%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.36	0.28	0.31	0.32
9.02	966.98	53.53	0.19	1.87	53.55	0.35%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.36	0.29	0.30	0.32
9.19	966.81	55.38	0.18	1.88	55.40	0.33%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.36	0.30	0.30	0.32
9.35	966.65	56.60	0.18	1.88	56.62	0.31%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.37	0.31	0.30	0.33
9.51	966.49	57.85	0.18	1.88	57.87	0.31%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.38	0.32	0.31	0.34
9.68	966.32	61.75	0.19	1.88	61.77	0.31%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.39	0.34	0.32	0.35
9.84	966.16	65.99	0.20	1.88	66.01	0.30%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.41	0.36	0.33	0.37
10.01	965.99	70.00	0.20	1.90	70.02	0.28%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.43	0.39	0.35	0.39
10.17	965.83	73.61	0.22	1.90	73.63	0.29%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.47	0.43	0.37	0.42
10.33	965.67	81.40	0.41	1.90	81.42	0.50%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.54	0.51	0.40	0.48
10.50	965.50	91.53	0.40	1.92	91.55	0.43%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.65	0.63	0.45	0.58
10.66	965.34	103.61	0.41	1.94	103.63	0.39%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.66	0.69	0.47	0.60
10.83	965.17	91.13	0.35	1.96	91.15	0.39%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.66	0.70	0.46	0.60
10.99	965.01	91.58	0.40	1.97	91.60	0.44%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.56	0.61	0.42	0.53
11.15	964.85	82.74	0.17	1.99	82.76	0.20%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.49	0.48	0.38	0.45
11.32	964.68	66.04	0.20	1.96	66.06	0.31%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.40	0.38	0.34	0.37
11.48	964.52	52.59	0.29	1.94	52.61	0.54%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.36	0.29	0.32	0.33
11.65	964.35	40.93	0.40	1.94	40.95	0.98%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.36	0.25	0.33	0.32
11.81	964.19	36.92	0.51	1.96	36.94	1.38%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.38	0.24	0.34	0.32
11.98	964.02	39.16	0.50	1.97	39.19	1.26%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.38	0.24	0.34	0.32
12.14	963.86	43.86	0.44	1.97	43.88	1.01%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.37	0.25	0.34	0.32
12.30	963.70	48.21	0.40	1.96	48.23	0.84%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.41	0.29	0.37	0.35
12.47	963.53	61.83	0.75	1.97	61.85	1.21%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.48	0.39	0.40	0.42
12.63	963.37	81.68	0.78	2.08	81.71	0.95%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.57	0.47	0.43	0.49
12.80	963.20	83.62	0.66	2.06	83.64	0.78%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.58	0.53	0.43	0.51
12.96	963.04	90.02	0.46	2.06	90.04	0.51%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.53	0.48	0.39	0.47
13.12	962.88	80.52	0.35	2.06	80.54	0.43%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.46	0.41	0.36	0.41
13.29	962.71	61.15	0.32	2.06	61.17	0.52%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.38	0.31	0.33	0.34
13.45	962.55	43.80	0.31	2.04	43.82	0.70%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.34	0.24	0.31	0.30
13.62	962.38	32.96	0.37	2.06	32.99	1.12%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.33	0.22	0.30	0.28
13.78	962.22	32.68	0.35	2.10	32.70	1.06%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.32	0.21	0.30	0.28
13.94	962.06	35.35	0.30	2.10	35.38	0.83%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.31	0.21	0.29	0.27
14.11	961.89	37.20	0.25	2.08	37.22	0.67%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.30	0.21	0.28	0.26
14.27	961.73	40.93	0.14	2.10	40.95	0.35%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.29	0.21	0.28	0.26
14.44	961.56	41.16	0.23	2.12	41.18	0.57%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.29	0.21	0.28	0.26

2004-049 Newby Island Landfill Boring Elevation: 976.0 ft.
1/16/2012 RMW Groundwater Elevation: 940.0 ft. @ time = CPT
Liquefaction GW El.: 940.0 ft. @ time = EQ

CPT-2

0

Material	Unit Weight:
Alluvium	120 pcf
Bedrock	135 pcf
0	0 pcf
0	0 pcf

EQ Mag. (M_w)	PGA
6.9	0.67

CPT Max Depth = 20.5 ft.
El. @ Max Depth = 955.5 ft.

Depth Profile: Top of Layer

0	Alluvium	
20.51	Bedrock	
0		0
0		0
0		0
0		0
0		0
0		0

Note: **BLUE** fields require user input

I_c	Soil Behavior Type
0	7 - Grvly to Dense Sand
1.31	6 - Cln. Sand to Silty Sand
2.05	5 - Silty Sand to Sandy Silt
2.6	4 - Clayey Silt to Silty Clay
2.95	3 - Silty Clay to Clay
3.6	2 - Organic Soils

Adj. Rotary Boring:

09:27:04 16:11 GREGG
CPT-31 sta52+50 R. WARNER NEWBY IS. L/F

P_a = 1 atm =	1.058 tsf
1.0 MPa =	10.443 tsf
1.00 tsf =	13.889 psi

Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:
1.10	1.10	1.10	1.10

Depth (ft)	**Elevation (ft)**	**q_c (tsf)**	**f_s (tsf)**	**u (psi)**	**Corrected q_t (tsf)**	**R_f (%)**	**Material**	**GW**	**Roberston (1990) Soil Behavior Type**	**Youd et al. (2001) FS_{LIQ}**	**Moss et al. 2006 Age Corrected FS_{LIQ}**	**Idriss & Boulanger 2007 Age Corrected FS_{LIQ}**	**Avg. FS_{LIQ} [check: may be above groundwater]**
14.60	961.40	38.60	0.21	2.03	38.62	0.53%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.31	0.21	0.29	0.27
14.76	961.24	33.42	0.38	2.03	33.44	1.14%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.32	0.22	0.30	0.28
14.93	961.07	40.90	0.43	2.03	40.92	1.04%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.35	0.21	0.30	0.29
15.09	960.91	34.13	0.46	2.01	34.15	1.36%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.34	0.22	0.30	0.29
15.26	960.74	34.30	0.38	2.04	34.32	1.10%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.33	0.21	0.29	0.28
15.42	960.58	36.12	0.26	2.04	36.14	0.72%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.32	0.21	0.30	0.28
15.58	960.42	40.81	0.42	2.03	40.84	1.02%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.35	0.24	0.32	0.30
15.75	960.25	51.37	0.68	2.04	51.39	1.33%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.39	0.31	0.34	0.35
15.91	960.09	71.22	0.45	2.04	71.24	0.63%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.44	0.34	0.37	0.38
16.08	959.92	78.67	0.63	2.03	78.69	0.80%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.44	0.41	0.37	0.41
16.24	959.76	77.48	0.54	2.01	77.50	0.69%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.48	0.41	0.40	0.43
16.40	959.60	75.91	0.81	1.88	75.93	1.06%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.54	0.44	0.43	0.47
16.57	959.43	78.73	1.29	2.01	78.75	1.64%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	0.76	0.51	0.50	0.59
16.73	959.27	87.00	2.27	2.03	87.02	2.60%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	1.03	0.78	0.61	0.81
16.90	959.10	111.29	2.20	2.08	111.31	1.98%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	1.22	0.95	0.69	0.95
17.06	958.94	132.65	1.58	1.96	132.67	1.19%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.05	0.87	0.65	0.86
17.22	958.78	105.52	1.20	2.13	105.54	1.13%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.92	0.89	0.58	0.80
17.39	958.61	117.95	1.16	2.17	117.97	0.98%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.79	0.77	0.52	0.69
17.55	958.45	115.99	0.87	2.19	116.01	0.75%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.82	0.81	0.53	0.72
17.72	958.28	125.46	1.10	2.20	125.48	0.88%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	0.92	0.98	0.57	0.82
17.88	958.12	147.75	1.35	2.35	147.78	0.91%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.21	1.15	0.72	1.03
18.04	957.96	145.02	2.50	2.35	145.05	1.73%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.64	1.73	1.04	1.47
18.21	957.79	157.79	3.19	2.38	157.82	2.02%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	2.19	2.26	1.82	2.09
18.37	957.63	179.50	3.69	2.49	179.52	2.06%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	2.87	3.07	3.93	3.29
18.54	957.46	195.42	4.56	2.52	195.45	2.33%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.50	4.14	7.13	4.92
18.70	957.30	191.47	5.04	2.60	191.50	2.63%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	4.29	6.25	7.12	5.89
18.86	957.14	241.61	5.01	2.65	241.64	2.07%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.13	9.01	7.07	7.07
19.03	956.97	284.56	4.68	2.72	284.59	1.64%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.99	13.51	7.06	8.85
19.19	956.81	293.75	4.51	2.88	293.78	1.53%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	6.87	21.52	7.05	11.81
19.36	956.64	329.55	4.50	3.04	329.59	1.37%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	7.78	27.82	7.03	14.21
19.52	956.48	349.38	5.00	3.15	349.41	1.43%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	8.49	39.43	7.02	18.32
19.69	956.31	351.94	3.04	3.25	351.97	0.86%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	8.88	33.63	7.01	16.51
19.85	956.15	361.18	4.63	3.45	361.22	1.28%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	9.11	48.32	7.00	21.48
20.01	955.99	374.63	2.79	3.93	374.68	0.74%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	9.53	39.11	6.99	18.54
20.18	955.82	374.06	2.88	4.12	374.11	0.77%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	9.80	42.92	6.98	19.90
20.34	955.66	376.71	0.02	7.27	376.79	0.01%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	9.87	27.98	6.96	14.94
20.51	955.49	383.19	0.02	7.54	383.28	0.01%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	9.94	29.00	6.95	15.30

2004-049 Newby Island Landfill
1/16/2012 RMW

Boring Elevation:	1025.0 ft.
Groundwater Elevation:	950.0 ft. @ time = CPT
Liquefaction GW El.:	950.0 ft. @ time = EQ

CPT-3

0

Material Unit Weight:

Alluvium	120 pcf
Bedrock	135 pcf
0	0 pcf
0	0 pcf

EQ Mag. (M_w)	PGA
6.9	0.67

CPT Max Depth = 16.6 ft.
El. @ Max Depth = 1008.4 ft.

Adj. Rotary Boring:

09:27:04 16:11 GREGG
CPT-31 sta52+50 R. WARNER NEWBY IS. L/F

P_a = 1 atm =	1.058 tsf
1.0 MPa =	10.443 tsf
1.00 tsf =	13.889 psi

Depth Profile: Top of Layer

0	Alluvium	
16.57	Bedrock	
0		0
0		0
0		0
0		0
0		0
0		0

Note: **BLUE** fields require user input

I_c	Soil Behavior Type
0	7 - Grvly to Dense Sand
1.31	6 - Cln. Sand to Silty Sand
2.05	5 - Silty Sand to Sandy Silt
2.6	4 - Clayey Silt to Silty Clay
2.95	3 - Silty Clay to Clay
3.6	2 - Organic Soils

Depth (ft)	Elevation (ft)	q_c (tsf)	f_s (tsf)	u (psi)	Corrected q_t (tsf)	R_f (%)	Material	GW	Roberston (1990) Soil Behavior Type	Conditional Format & CAD Export FS Criteria: 1.10 **Youd et al. (2001) FS_{LIQ}**	Conditional Format & CAD Export FS Criteria: 1.10 **Moss et al. 2006 Age Corrected FS_{LIQ}**	Conditional Format & CAD Export FS Criteria: 1.10 **Idriss & Boulanger 2007 Age Corrected FS_{LIQ}**	Conditional Format & CAD Export FS Criteria: 1.10 **Avg. FS_{LIQ} [check: may be above groundwater]**
0.16	1024.84	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.33	1024.67	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.49	1024.51	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.66	1024.34	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.82	1024.18	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
0.98	1024.02	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.15	1023.85	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.31	1023.69	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.48	1023.52	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.64	1023.36	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.80	1023.20	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
1.97	1023.03	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.13	1022.87	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.30	1022.70	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.46	1022.54	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.62	1022.38	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.79	1022.21	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
2.95	1022.05	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.12	1021.88	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.28	1021.72	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.44	1021.56	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.61	1021.39	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.77	1021.23	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
3.94	1021.06	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.10	1020.90	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.27	1020.73	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.43	1020.57	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.59	1020.41	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.76	1020.24	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
4.92	1020.08	0.00	0.00	0.00	0.00	#DIV/0!	Alluvium	AboveGW	#N/A				
5.09	1019.91	91.72	0.68	1.56	91.74	0.74%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.38	1.40	0.77	1.18
5.25	1019.75	105.58	0.98	1.58	105.59	0.93%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	1.66	1.87	0.91	1.48
5.41	1019.59	123.61	0.97	1.67	123.63	0.79%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	2.04	2.34	1.13	1.84
5.58	1019.42	120.48	1.05	1.71	120.50	0.87%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	2.31	2.83	1.32	2.15
5.74	1019.26	125.68	1.11	1.74	125.70	0.88%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	2.49	2.71	1.34	2.18
5.91	1019.09	128.13	1.42	1.81	128.15	1.10%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	2.86	2.73	1.47	2.36
6.07	1018.93	126.45	1.82	1.85	126.47	1.44%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.25	2.54	1.72	2.51
6.23	1018.77	122.27	2.29	1.88	122.29	1.88%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.52	2.35	2.14	2.67
6.40	1018.60	118.03	2.58	1.88	118.05	2.19%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.52	2.23	2.38	2.71
6.56	1018.44	118.23	2.34	1.88	118.25	1.98%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.53	2.22	2.37	2.70
6.73	1018.27	130.40	2.27	1.87	130.42	1.74%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.44	2.70	2.11	2.75
6.89	1018.11	143.60	1.69	1.87	143.62	1.18%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.42	2.84	1.98	2.74
7.05	1017.95	141.30	1.67	1.80	141.32	1.18%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.28	3.16	1.82	2.75
7.22	1017.78	141.47	1.71	1.99	141.49	1.21%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.22	3.11	1.78	2.70
7.38	1017.62	144.54	1.73	2.01	144.56	1.20%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.38	3.07	1.94	2.80
7.55	1017.45	147.13	2.14	2.04	147.15	1.46%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.02	3.80	2.88	3.57
7.71	1017.29	166.55	2.79	2.08	166.58	1.68%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.26	5.32	6.63	5.74
7.87	1017.13	188.20	3.35	2.13	188.22	1.78%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	7.00	7.63	6.86	7.16
8.04	1016.96	197.36	4.14	2.15	197.38	2.10%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	8.15	10.39	6.86	8.47
8.20	1016.80	196.93	4.06	2.19	196.95	2.06%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	8.43	8.72	6.87	8.01
8.37	1016.63	177.13	4.66	2.38	177.16	2.63%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	8.07	8.95	6.87	7.96
8.53	1016.47	179.98	4.54	2.35	180.00	2.52%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	7.40	6.17	6.87	6.81
8.69	1016.31	162.26	4.41	2.33	162.28	2.71%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	6.45	5.30	6.88	6.21
8.86	1016.14	152.13	3.91	2.35	152.16	2.57%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.30	3.83	6.88	5.34
9.02	1015.98	146.59	3.41	2.33	146.61	2.32%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.75	3.15	6.89	4.93
9.19	1015.81	147.87	3.77	2.35	147.89	2.55%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.98	3.10	6.89	4.99
9.35	1015.65	146.16	4.75	2.36	146.19	3.25%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	5.86	3.67	6.90	5.47
9.51	1015.49	148.69	5.35	2.36	148.72	3.59%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	6.65	4.09	6.90	5.88
9.68	1015.32	153.95	5.31	2.40	153.98	3.45%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	6.72	4.47	6.91	6.03
9.84	1015.16	163.40	4.70	2.42	163.42	2.88%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	6.45	4.81	6.91	6.06
10.01	1014.99	178.33	4.36	2.49	178.36	2.45%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	6.02	4.94	6.92	5.96
10.17	1014.83	174.40	4.17	2.52	174.43	2.39%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.77	4.96	6.92	5.88
10.33	1014.67	167.35	4.29	2.58	167.38	2.56%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.23	4.99	6.93	5.72
10.50	1014.50	172.33	3.46	2.58	172.36	2.01%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.63	4.10	6.93	5.22
10.66	1014.34	170.91	2.90	2.58	170.93	1.70%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.05	3.84	5.08	4.32
10.83	1014.17	169.88	2.76	2.58	169.91	1.63%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	3.93	3.56	4.76	4.08
10.99	1014.01	167.35	3.46	2.60	167.38	2.06%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.21	3.90	6.95	5.02
11.15	1013.85	169.65	4.02	2.61	169.68	2.37%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.63	4.24	6.95	5.27
11.32	1013.68	173.69	4.05	2.63	173.72	2.33%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.27	4.53	6.96	5.59
11.48	1013.52	182.37	4.89	2.67	182.40	2.68%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	6.11	5.89	6.96	6.32
11.65	1013.35	193.83	5.56	2.79	193.86	2.87%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	6.84	5.72	6.97	6.51
11.81	1013.19	166.44	5.88	2.90	166.48	3.53%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	6.93	6.14	6.97	6.68
11.98	1013.02	167.01	5.59	2.84	167.04	3.35%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	6.02	4.52	6.98	5.84
12.14	1012.86	162.97	4.56	2.76	163.00	2.80%	Alluvium	AboveGW	5 - Silty Sand to Sandy Silt	5.41	3.92	6.98	5.44
12.30	1012.70	169.11	4.67	2.74	169.14	2.76%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.24	4.36	6.99	5.53
12.47	1012.53	183.65	5.01	2.79	183.68	2.73%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.83	5.14	6.99	5.99
12.63	1012.37	189.39	5.52	2.83	189.42	2.91%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	6.36	6.60	7.00	6.65
12.80	1012.20	197.02	5.36	2.81	197.05	2.72%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	6.46	6.89	7.00	6.78
12.96	1012.04	199.75	4.98	2.81	199.78	2.49%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	6.04	7.04	7.01	6.70
13.12	1011.88	203.10	4.26	2.83	203.13	2.10%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.15	6.83	7.01	6.33
13.29	1011.71	209.13	2.64	2.86	209.16	1.26%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.62	5.87	7.02	5.83
13.45	1011.55	219.23	2.79	2.90	219.26	1.27%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.39	6.50	7.02	5.97
13.62	1011.38	218.20	3.09	2.83	218.23	1.42%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.74	7.92	7.03	6.56
13.78	1011.22	233.56	3.01	2.67	233.59	1.29%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.96	8.53	7.04	6.84
13.94	1011.06	240.62	2.88	2.63	240.64	1.20%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.02	8.38	7.04	6.81
14.11	1010.89	223.72	3.27	2.93	223.75	1.46%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.77	7.50	7.05	6.44
14.27	1010.73	204.64	3.58	2.88	204.67	1.75%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.46	6.28	7.05	5.93
14.44	1010.56	202.05	3.55	2.84	202.08	1.76%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.30	5.72	7.06	5.69

2004-049 Newby Island Landfill
1/16/2012 RMW

Boring Elevation:	1025.0 ft.
Groundwater Elevation:	950.0 ft. @ time = CPT
Liquefaction GW El.:	950.0 ft. @ time = EQ

CPT-3

0

Material Unit Weight:

Alluvium	120 pcf
Bedrock	135 pcf
0	0 pcf
0	0 pcf

EQ Mag. (M_w)	PGA
6.9	0.67

CPT Max Depth = 16.6 ft.
El. @ Max Depth = 1008.4 ft.

Adj. Rotary Boring:

P_a = 1 atm =	1.058 tsf
1.0 MPa =	10.443 tsf
1.00 tsf =	13.889 psi

09:27:04 16:11 GREGG
CPT-31 sta52+50 R. WARNER NEWBY IS. L/F

Depth Profile: Top of Layer

0	Alluvium	
16.57	Bedrock	
0		0
0		0
0		0
0		0
0		0
0		0

Note: **BLUE** fields require user input

I_c	Soil Behavior Type
0	7 - Grvly to Dense Sand
1.31	6 - Cln. Sand to Silty Sand
2.05	5 - Silty Sand to Sandy Silt
2.6	4 - Clayey Silt to Silty Clay
2.95	3 - Silty Clay to Clay
3.6	2 - Organic Soils

Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:	Conditional Format & CAD Export FS Criteria:
1.10	1.10	1.10	1.10

Depth (ft)	Elevation (ft)	q_c (tsf)	f_s (tsf)	u (psi)	Corrected q_t (tsf)	R_f (%)	Material	GW	Roberston (1990) Soil Behavior Type	Youd et al. (2001) FS_{LIQ}	Moss et al. 2006 Age Corrected FS_{LIQ}	Idriss & Boulanger 2007 Age Corrected FS_{LIQ}	Avg. FS_{LIQ} [check: may be above groundwater]
14.60	1010.40	211.95	3.38	2.76	211.98	1.60%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	4.68	6.58	7.06	6.11
14.76	1010.24	236.63	3.80	2.76	236.66	1.61%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	5.63	10.00	7.07	7.57
14.93	1010.07	267.69	4.15	2.79	267.72	1.55%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	6.88	14.42	7.07	9.46
15.09	1009.91	274.95	4.60	2.84	274.98	1.67%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	8.64	22.04	7.08	12.58
15.26	1009.74	297.41	6.06	2.93	297.44	2.04%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	10.30	33.95	7.09	17.11
15.42	1009.58	311.98	6.39	3.40	312.01	2.05%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	11.75	44.63	7.09	21.15
15.58	1009.42	318.32	6.05	3.40	318.35	1.90%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	12.53	50.40	7.10	23.34
15.75	1009.25	329.58	6.50	3.66	329.62	1.97%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	13.28	71.66	7.10	30.68
15.91	1009.09	361.69	5.89	3.54	361.73	1.63%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	14.17	87.35	7.11	36.21
16.08	1008.92	378.47	4.55	3.52	378.51	1.20%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	15.35	105.24	7.11	42.57
16.24	1008.76	399.01	4.76	6.63	399.08	1.19%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	15.43	170.56	7.12	64.37
16.40	1008.60	382.85	0.02	8.78	382.95	0.01%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	15.55	141.90	7.13	54.86
16.57	1008.43	387.06	0.02	8.82	387.16	0.01%	Alluvium	AboveGW	6 - Cln. Sand to Silty Sand	14.89	178.05	7.13	66.69

APPENDIX D-2

LIQUEFACTION ASSESSMENT BY SPT

2006-0138 Scholl Canyon Landfill
5/18/2011 RMW

Liquefaction Assessment per Youd, et al., ASCE, 2001

Boring: BH-2

Material	**Unit Weight:**
Alluvium	120 pcf
Bedrock	120 pcf

P_{atm} = 1.058 tsf

Groundwater Elev. @ drill:	958 ft
Design Groundwater Elev.:	940 ft
Boring Elevation:	982 ft

Note: BLUE fields require user input

Depth Profile: Top of Layer	Fines Content, FC (%)	Sand Particle Size, D_{50} (mm)	Age of Deposit (years)	Overconsol. Ratio, OCR
0 Alluvium	20.0%	0.5	1.00E+02	1.0
30.01 Bedrock				

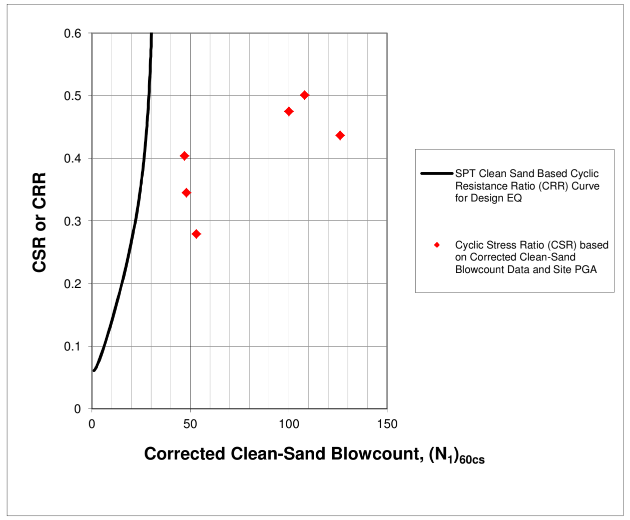
Note: In above table, data in columns FC to OCR are only required for potentially liquefiable layers

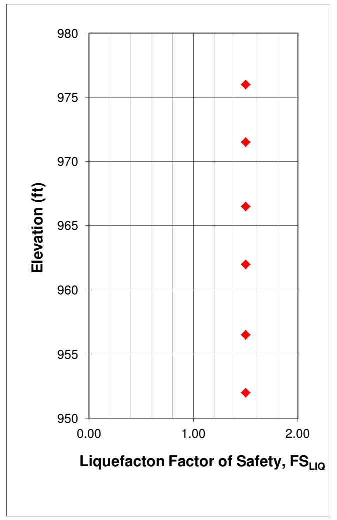
EQ Mag. (M_w)	**PGA**
6.9	0.67

Static Normal Stress Correction, $K\sigma$	
D_r (%)	*f*
0	0.8
0.6	0.7
0.8	0.6

Mod Cal to SPT Correction
0.62

SPT Equipment Variable Corrections		
Range	Used	
Energy Ratio, C_E		
0.5-1.0	1.0	Donut Hammer
0.7-1.2		Safety Hammer
0.8-1.3		Automatic-trip Donut-type Hammer
Borehole Diameter, C_B		
1.0	1.05	2.5 inch to 4.5 inch
1.05		6 inch
1.15		8 inch
Sampling Method, C_S		
1.0	1.2	Standard Sampler
1.1-1.3		Sampler without liners
Rod Length, C_R		
0	0.75	< 3 m
3	0.8	3-4 m
4	0.85	4-6 m
6	0.95	6-10 m
10	1.0	10-30 m
30	1.0	





Note: Calculations per this method are **only valid for $(N_1)_{60cs}$ < 30. For $(N_1)_{60cs}$ >30, soils are classed as non-liquefiable.**
These procedures have been validated for level to gently-sloping sites with potentially liquefiable materials at shallow depths (<15 m = 49 ft.).

														D_R corrections per Kulhawy and Mayne, 1990										Design Groundwater Level			Groundwater level at time of Drilling				
Depth (ft)	**Depth (m)**	**Elevation (ft)**	**Material**	**SPT or Modified California Sampler? [SPT or MC]**	**Measured 12-inch Drive Blowcount**	**FS_{LIQ}**	**Equivalent SPT N-value**	**Overburden Stress Factor, C_N**	**Rod Length Factor, C_R**	**Corrected SPT $(N_1)_{60}$** (≥30 shaded yellow = non-liquefieable)	**Fines Content Adj. Coeff., α**	**Fines Content Adj. Coeff., β**	**Clean-Sand $(N_1)_{60cs}$**	**Relative Density: Particle Size Correction, C_P**	**Relative Density: Aging Correction, C_A**	**Relative Density: Overconsol. Correction, C_{OCR}**	**Relative Density, D_r (%)**	**$CRR_{7.5}$**	**Stress Reduction Coefficient (r_d)**	**CSR_{EQ}**	**MSF**	**Corr. Static Normal Stress, K_σ**	**GW**	**γ' (psf)**	**σ'_{vo} (tsf)**	**GW**	**γ (psf)**	**γ' (psf)**	**σ_{vo} (tsf)**	**σ'_{vo} (tsf)**
6.00	1.83	976.00	Alluvium	SPT	34	AboveGW	34	1.4283	0.75	46	3.6147	1.0794	53	52.4743	1.2000	1.0000	85.5%	0.3351	0.9860	0.429	1.24	1.539	AboveGW	120	0.36	AboveGW	120	120	0.36	0.36
10.50	3.20	971.50	Alluvium	SPT	33	AboveGW	33	1.2253	0.8	41	3.6147	1.0794	48	52.4743	1.2000	1.0000	80.7%	0.2793	0.9755	0.425	1.24	1.230	AboveGW	120	0.63	AboveGW	120	120	0.63	0.63
15.50	4.72	966.50	Alluvium	SPT	35	AboveGW	35	1.0582	0.85	40	3.6147	1.0794	47	52.4743	1.2000	1.0000	79.7%	0.2664	0.9639	0.420	1.24	1.039	AboveGW	120	0.93	AboveGW	120	120	0.93	0.93
20.00	6.10	962.00	Alluvium	SPT	100	AboveGW	100	0.9425	0.95	113	3.6147	1.0794	126	52.4743	1.2000	1.0000	134.0%	0.9175	0.9534	0.415	1.24	0.951	AboveGW	120	1.20	AboveGW	120	120	1.20	1.20
25.50	7.77	956.50	Alluvium	SPT	87	AboveGW	87	0.8504	0.95	89	3.6147	1.0794	100	52.4743	1.2000	1.0000	118.9%	0.7206	0.9405	0.410	1.24	0.863	AboveGW	120	1.53	BelowGW	120	57.6	1.53	1.47
30.00	9.14	952.00	Alluvium	SPT	100	AboveGW	100	0.8119	0.95	97	3.6147	1.0794	108	52.4743	1.2000	1.0000	124.1%	0.7815	0.9300	0.405	1.24	0.809	AboveGW	120	1.80	BelowGW	120	57.6	1.80	1.60

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2006-0138 Scholl Canyon Landfill
5/18/2011 RMW

Liquefaction Assessment per Youd, et al., ASCE, 2001

Boring: BH-3

Material	Unit Weight:
Alluvium	120 pcf
Bedrock	120 pcf

P_{atm} = 1.058 tsf

Groundwater Elev. @ drill: 0 ft
Design Groundwater Elev.: 950 ft
Boring Elevation: 975 ft

Note: BLUE fields require user input

Depth Profile: Top of Layer	Fines Content, FC (%)	Sand Particle Size, D_{50} (mm)	Age of Deposit (years)	Overconsol. Ratio, OCR
0 Alluvium	20.0%	0.5	1.00E+02	1.0
25.01 Bedrock				

Note: In above table, data in columns FC to OCR are only required for potentially liquefiable layers

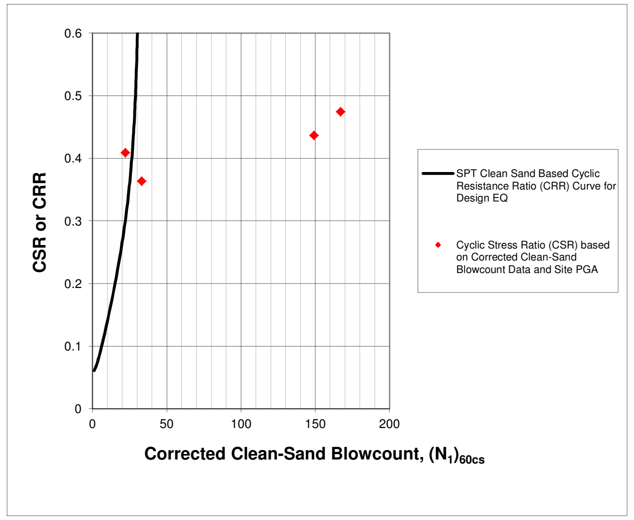
EQ Mag. (M_w)	PGA
6.9	0.67

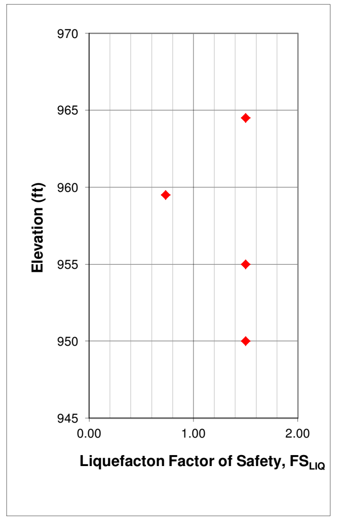
Static Normal Stress Correction, K_σ

D_r (%)	f
0	0.8
0.6	0.7
0.8	0.6

Mod Cal to SPT Correction
0.62

SPT Equipment Variable Corrections		
Range	Used	
Energy Ratio, C_E		
0.5-1.0	1.0	Donut Hammer
0.7-1.2		Safety Hammer
0.8-1.3		Automatic-trip Donut-type Hammer
Borehole Diameter, C_B		
1.0	1.05	2.5 inch to 4.5 inch
1.05		6 inch
1.15		8 inch
Sampling Method, C_S		
1.0	1.2	Standard Sampler
1.1-1.3		Sampler without liners
Rod Length, C_R		
0	0.75	< 3 m
3	0.8	3-4 m
4	0.85	4-6 m
6	0.95	6-10 m
10	1.0	10-30 m
30	1.0	





Note: Calculations per this method are **only valid for $(N_1)_{60cs}$ < 30. For $(N_1)_{60cs}$ >30, soils are classed as non-liquefiable.**
These procedures have been validated for level to gently-sloping sites with potentially liquefiable materials at shallow depths (<15 m = 49 ft.).

														D_R corrections per Kulhawy and Mayne, 1990									Design Groundwater Level			Groundwater level at time of Drilling				
Depth (ft)	**Depth (m)**	**Elevation (ft)**	**Material**	**SPT or Modified California Sampler? [SPT or MC]**	**Measured 12-inch Drive Blowcount**	**FS_{LIQ}**	**Equivalent SPT N-value**	**Overburden Stress Factor, C_N**	**Rod Length Factor, C_R**	**Corrected SPT $(N_1)_{60}$** (≥30 shaded yellow = non-liquefieable)	**Fines Content Adj. Coeff., α**	**Fines Content Adj. Coeff., β**	**Clean-Sand $(N_1)_{60cs}$**	**Relative Density: Particle Size Correction, C_P**	**Relative Density: Aging Correction, C_A**	**Relative Density: Overconsol. Correction, C_{OCR}**	**Relative Density, D_r (%)**	**$CRR_{7.5}$**	**Stress Reduction Coefficient (r_d)**	**CSR_{EQ}**	**MSF**	**Corr. Static Normal Stress, K_σ**	**GW**	**γ' (psf)**	**σ'_{vo} (tsf)**	**GW**	**γ (psf)**	**γ' (psf)**	**σ_{vo} (tsf)**	**σ'_{vo} (tsf)**
5.50	1.68	969.50	Alluvium	SPT	17	AboveGW	17	1.4551	0.75	23	3.6147	1.0794	28	52.4743	1.2000	1.0000	60.4%	0.3695	0.9872	0.430	1.24	1.418	AboveGW	120	0.33	AboveGW	120	120	0.33	0.33
10.50	3.20	964.50	Alluvium	SPT	22	AboveGW	22	1.2253	0.8	27	3.6147	1.0794	33	52.4743	1.2000	1.0000	65.5%	1.2398	0.9755	0.425	1.24	1.168	AboveGW	120	0.63	AboveGW	120	120	0.63	0.63
15.50	4.72	959.50	Alluvium	SPT	15	AboveGW	15	1.0582	0.85	17	3.6147	1.0794	22	52.4743	1.2000	1.0000	52.0%	0.2420	0.9639	0.420	1.24	1.026	AboveGW	120	0.93	AboveGW	120	120	0.93	0.93
20.00	6.10	955.00	Alluvium	SPT	120	AboveGW	120	0.9425	0.95	135	3.6147	1.0794	149	52.4743	1.2000	1.0000	146.4%	1.0900	0.9534	0.415	1.24	0.951	AboveGW	120	1.20	AboveGW	120	120	1.20	1.20
25.00	7.62	950.00	Alluvium	SPT	150	(N1)60>30: Non-Liq.	150	0.8404	0.95	151	3.6147	1.0794	167	52.4743	1.2000	1.0000	154.9%	1.2245	0.9417	0.414	1.24	0.873	BelowGW	57.6	1.48	AboveGW	120	120	1.50	1.50

2006-0138 Scholl Canyon Landfill
5/18/2011 RMW

Liquefaction Assessment per Youd, et al., ASCE, 2001

Boring: BH-4

Material	Unit Weight:
Alluvium	120 pcf
Bedrock	120 pcf

P_{atm} = 1.058 tsf

Groundwater Elev. @ drill: 947 ft
Design Groundwater Elev.: 950 ft
Boring Elevation: 975 ft

Note: BLUE fields require user input

Depth Profile: Top of Layer	Fines Content, FC (%)	Sand Particle Size, D_{50} (mm)	Age of Deposit (years)	Overconsol. Ratio, OCR
0 Alluvium	20.0%	0.5	1.00E+02	1.0
29 Bedrock				

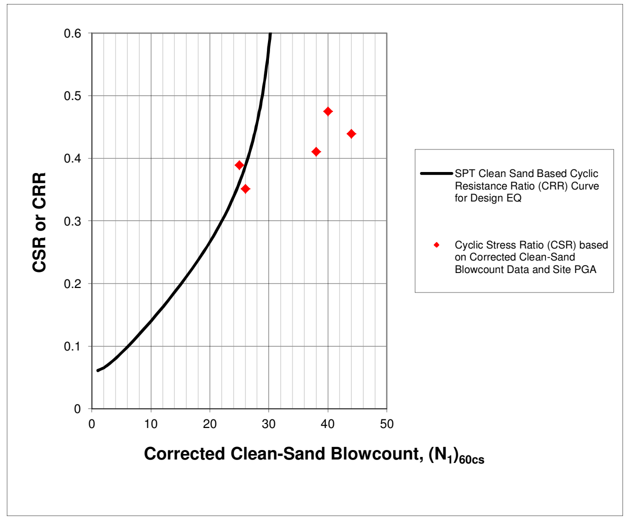
Note: In above table, data in columns FC to OCR are only required for potentially liquefiable layers

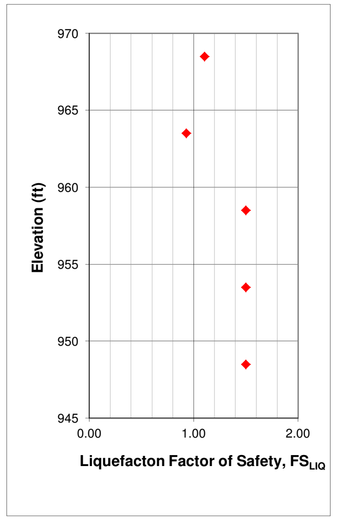
EQ Mag. (M_w)	PGA
6.9	0.67

Static Normal Stress Correction, K_σ	
D_r (%)	*f*
0	0.8
0.6	0.7
0.8	0.6

Mod Cal to SPT Correction
0.62

SPT Equipment Variable Corrections		
Range	Used	
Energy Ratio, C_E		
0.5-1.0	1.0	Donut Hammer
0.7-1.2		Safety Hammer
0.8-1.3		Automatic-trip Donut-type Hammer
Borehole Diameter, C_B		
1.0	1.05	2.5 inch to 4.5 inch
1.05		6 inch
1.15		8 inch
Sampling Method, C_S		
1.0	1.2	Standard Sampler
1.1-1.3		Sampler without liners
Rod Length, C_R		
0	0.75	< 3 m
3	0.8	3-4 m
4	0.85	4-6 m
6	0.95	6-10 m
10	1.0	10-30 m
30	1.0	





Note: Calculations per this method are **only valid for $(N_1)_{60cs}$ < 30. For $(N_1)_{60cs}$ >30, soils are classed as non-liquefiable.**
These procedures have been validated for level to gently-sloping sites with potentially liquefiable materials at shallow depths (<15 m = 49 ft.).

														D_R corrections per Kulhawy and Mayne, 1990									Design Groundwater Level			Groundwater level at time of Drilling				
Depth (ft)	Depth (m)	Elevation (ft)	Material	SPT or Modified California Sampler? [SPT or MC]	Measured 12-inch Drive Blowcount	FS_{LIQ}	Equivalent SPT N-value	Overburden Stress Factor, C_N	Rod Length Factor, C_R	Corrected SPT $(N_1)_{60}$ (≥30 shaded yellow = non-liquefiable)	Fines Content Adj. Coeff., α	Fines Content Adj. Coeff., β	Clean-Sand $(N_1)_{60cs}$	Relative Density: Particle Size Correction, C_P	Relative Density: Aging Correction, C_A	Relative Density: Overconsol. Correction, C_{OCR}	Relative Density, D_r (%)	$CRR_{7.5}$	Stress Reduction Coefficient (r_d)	CSR_{EQ}	MSF	Corr. Static Normal Stress, K_σ	GW	γ' (psf)	σ'_{vo} (tsf)	GW	γ (psf)	γ' (psf)	σ_{vo} (tsf)	σ'_{vo} (tsf)
6.50	1.98	968.50	Alluvium	SPT	16	AboveGW	16	1.4025	0.75	21	3.6147	1.0794	26	52.4743	1.2000	1.0000	57.7%	0.3131	0.9848	0.429	1.24	1.221	AboveGW	120	0.39	AboveGW	120	120	0.39	0.39
11.50	3.51	963.50	Alluvium	SPT	17	AboveGW	17	1.1878	0.8	20	3.6147	1.0794	25	52.4743	1.2000	1.0000	56.4%	0.2919	0.9732	0.424	1.24	1.089	AboveGW	120	0.69	AboveGW	120	120	0.69	0.69
16.50	5.03	958.50	Alluvium	SPT	29	AboveGW	29	1.0301	0.85	32	3.6147	1.0794	38	52.4743	1.2000	1.0000	71.3%	0.0268	0.9615	0.419	1.24	1.020	AboveGW	120	0.99	AboveGW	120	120	0.99	0.99
21.50	6.55	953.50	Alluvium	SPT	34	AboveGW	34	0.9094	0.95	37	3.6147	1.0794	44	52.4743	1.2000	1.0000	76.7%	0.2211	0.9499	0.414	1.24	0.942	AboveGW	120	1.29	AboveGW	120	120	1.29	1.29
26.50	8.08	948.50	Alluvium	SPT	35	(N1)60>30: Non-Liq.	35	0.8140	0.95	34	3.6147	1.0794	40	52.4743	1.2000	1.0000	73.5%	0.1249	0.9382	0.425	1.24	0.896	BelowGW	57.6	1.53	AboveGW	120	120	1.59	1.59

2006-0138 Scholl Canyon Landfill
5/18/2011 RMW

Liquefaction Assessment per Youd, et al., ASCE, 2001

Boring: EW1B

Material	Unit Weight:
Alluvium	120 pcf
Bedrock	120 pcf

P_{atm} = 1.058 tsf

Groundwater Elev. @ drill: 962 ft
Design Groundwater Elev.: 940 ft
Boring Elevation: 975 ft

Note: BLUE fields require user input

Depth Profile: Top of Layer	Fines Content, FC (%)	Sand Particle Size, D_{50} (mm)	Age of Deposit (years)	Overconsol. Ratio, OCR
0 Alluvium	20.0%	0.5	1.00E+02	1.0
29 Bedrock				

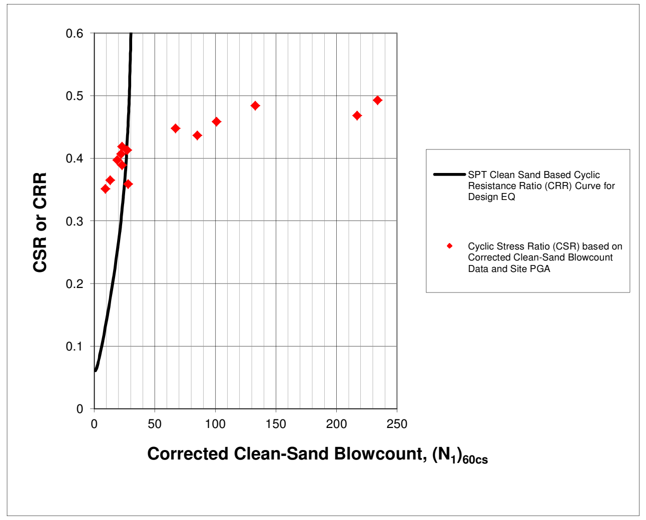
Note: In above table, data in columns FC to OCR are only required for potentially liquefiable layers

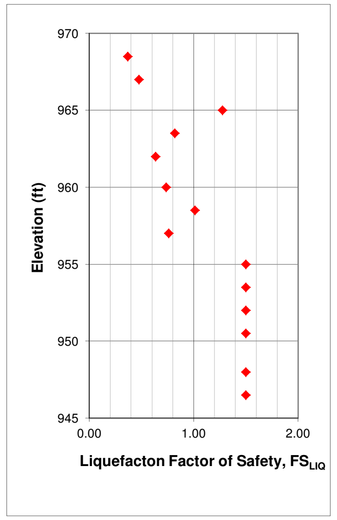
EQ Mag. (M_w)	PGA
6.9	0.67

Static Normal Stress Correction, K_σ	
D_r (%)	*f*
0	0.8
0.6	0.7
0.8	0.6

Mod Cal to SPT Correction
0.62

SPT Equipment Variable Corrections		
Range	Used	
Energy Ratio, C_E		
0.5-1.0	1.0	Donut Hammer
0.7-1.2		Safety Hammer
0.8-1.3		Automatic-trip Donut-type Hammer
Borehole Diameter, C_B		
1.0	1.05	2.5 inch to 4.5 inch
1.05		6 inch
1.15		8 inch
Sampling Method,C_S		
1.0	1.2	Standard Sampler
1.1-1.3		Sampler without liners
Rod Length, C_R		
0	0.75	< 3 m
3	0.8	3-4 m
4	0.85	4-6 m
6	0.95	6-10 m
10	1.0	10-30 m
30	1.0	





Note: Calculations per this method are **only valid for $(N_1)_{60cs}$ < 30. For $(N_1)_{60cs}$ >30, soils are classed as non-liquefiable.**
These procedures have been validated for level to gently-sloping sites with potentially liquefiable materials at shallow depths (<15 m = 49 ft.).

														D_R corrections per Kulhawy and Mayne, 1990									Design Groundwater Level			Groundwater level at time of Drilling				
Depth (ft)	Depth (m)	Elevation (ft)	Material	SPT or Modified California Sampler? [SPT or MC]	Measured 12-inch Drive Blowcount	FS_{LIQ}	Equivalent SPT N-value	Overburden Stress Factor, C_N	Rod Length Factor, C_R	Corrected SPT $(N_1)_{60}$ (≥30 shaded yellow = non-liquefieable)	Fines Content Adj. Coeff., α	Fines Content Adj. Coeff., β	Clean-Sand $(N_1)_{60cs}$	Relative Density: Particle Size Correction, C_P	Relative Density: Aging Correction, C_A	Relative Density: Overconsol. Correction, C_{OCR}	Relative Density, D_r (%)	$CRR_{7.5}$	Stress Reduction Coefficient (r_d)	CSR_{EQ}	MSF	Corr. Static Normal Stress, K_σ	GW	γ' (psf)	σ'_{vo} (tsf)	GW	γ (psf)	γ' (psf)	σ_{vo} (tsf)	σ'_{vo} (tsf)
6.50	1.98	968.50	Alluvium	MC	7	AboveGW	4	1.4025	0.75	5	3.6147	1.0794	9	52.4743	1.2000	1.0000	28.2%	0.1044	0.9848	0.429	1.24	1.221	AboveGW	120	0.39	AboveGW	120	120	0.39	0.39
8.00	2.44	967.00	Alluvium	MC	12	AboveGW	7	1.3304	0.75	9	3.6147	1.0794	13	52.4743	1.2000	1.0000	37.8%	0.1405	0.9813	0.427	1.24	1.171	AboveGW	120	0.48	AboveGW	120	120	0.48	0.48
10.00	3.05	965.00	Alluvium	MC	29	AboveGW	18	1.2450	0.8	23	3.6147	1.0794	28	52.4743	1.2000	1.0000	60.4%	0.3695	0.9767	0.425	1.24	1.185	AboveGW	120	0.60	AboveGW	120	120	0.60	0.60
11.50	3.51	963.50	Alluvium	MC	24	AboveGW	15	1.1878	0.8	18	3.6147	1.0794	23	52.4743	1.2000	1.0000	53.5%	0.2569	0.9732	0.424	1.24	1.089	AboveGW	120	0.69	AboveGW	120	120	0.69	0.69
13.00	3.96	962.00	Alluvium	MC	20	AboveGW	12	1.1443	0.8	14	3.6147	1.0794	19	52.4743	1.2000	1.0000	47.2%	0.2033	0.9697	0.422	1.24	1.063	AboveGW	120	0.78	BelowGW	120	57.6	0.78	0.76
15.00	4.57	960.00	Alluvium	MC	23	AboveGW	14	1.1128	0.85	17	3.6147	1.0794	22	52.4743	1.2000	1.0000	52.0%	0.2420	0.9650	0.420	1.24	1.033	AboveGW	120	0.90	BelowGW	120	57.6	0.90	0.82
16.50	5.03	958.50	Alluvium	MC	30	AboveGW	19	1.0903	0.85	22	3.6147	1.0794	27	52.4743	1.2000	1.0000	59.1%	0.3384	0.9615	0.419	1.24	1.013	AboveGW	120	0.99	BelowGW	120	57.6	0.99	0.87
18.00	5.49	957.00	Alluvium	MC	26	AboveGW	16	1.0687	0.85	18	3.6147	1.0794	23	52.4743	1.2000	1.0000	53.5%	0.2569	0.9580	0.417	1.24	0.996	AboveGW	120	1.08	BelowGW	120	57.6	1.08	0.91
20.00	6.10	955.00	Alluvium	MC	97	AboveGW	60	1.0412	0.95	75	3.6147	1.0794	85	52.4743	1.2000	1.0000	109.1%	0.6051	0.9534	0.415	1.24	0.951	AboveGW	120	1.20	BelowGW	120	57.6	1.20	0.97
21.50	6.55	953.50	Alluvium	MC	77	AboveGW	48	1.0214	0.95	59	3.6147	1.0794	67	52.4743	1.2000	1.0000	96.8%	0.4611	0.9499	0.414	1.24	0.924	AboveGW	120	1.29	BelowGW	120	57.6	1.29	1.01
23.00	7.01	952.00	Alluvium	MC	121	AboveGW	75	1.0024	0.95	90	3.6147	1.0794	101	52.4743	1.2000	1.0000	119.6%	0.7283	0.9464	0.412	1.24	0.899	AboveGW	120	1.38	BelowGW	120	57.6	1.38	1.05
24.50	7.47	950.50	Alluvium	MC	271	AboveGW	168	0.9841	0.95	198	3.6147	1.0794	217	52.4743	1.2000	1.0000	177.3%	1.5970	0.9429	0.411	1.24	0.877	AboveGW	120	1.47	BelowGW	120	57.6	1.47	1.10
27.00	8.23	948.00	Alluvium	MC	169	AboveGW	105	0.9550	0.95	120	3.6147	1.0794	133	52.4743	1.2000	1.0000	138.0%	0.9701	0.9370	0.408	1.24	0.843	AboveGW	120	1.62	BelowGW	120	57.6	1.62	1.17
28.50	8.69	946.50	Alluvium	MC	306	AboveGW	190	0.9384	0.95	213	3.6147	1.0794	234	52.4743	1.2000	1.0000	183.9%	1.7233	0.9335	0.407	1.24	0.825	AboveGW	120	1.71	BelowGW	120	57.6	1.71	1.21

2006-0138 Scholl Canyon Landfill
5/18/2011 RMW

Liquefaction Assessment per Youd, et al., ASCE, 2001

Boring: EW2B

Material	Unit Weight:
Alluvium	120 pcf
Bedrock	120 pcf

P_{atm} = 1.058 tsf

Groundwater Elev. @ drill: 962 ft
Design Groundwater Elev.: 940 ft
Boring Elevation: 975 ft

Note: BLUE fields require user input

Depth Profile: Top of Layer	Fines Content, FC (%)	Sand Particle Size, D_{50} (mm)	Age of Deposit (years)	Overconsol. Ratio, OCR
0 Alluvium	20.0%	0.5	1.00E+02	1.0
34.51 Bedrock				

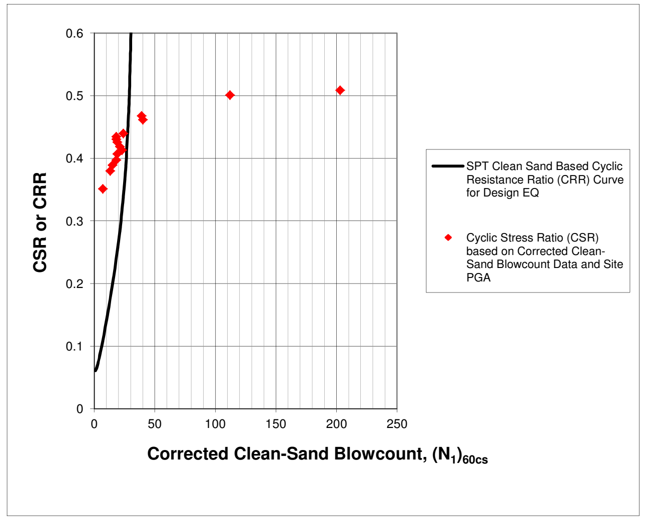
Note: In above table, data in columns FC to OCR are only required for potentially liquefiable layers

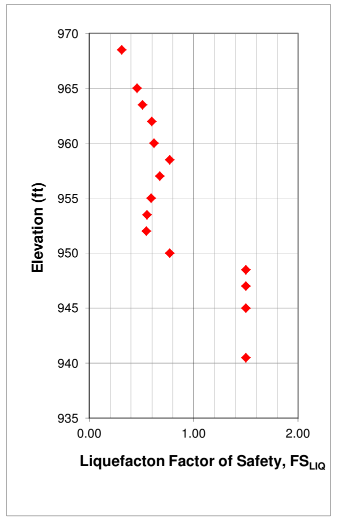
EQ Mag. (M_w)	PGA
6.9	0.67

Static Normal Stress Correction, $K\sigma$	
D_r (%)	*f*
0	0.8
0.6	0.7
0.8	0.6

Mod Cal to SPT Correction
0.62

SPT Equipment Variable Corrections		
Range	Used	
Energy Ratio, C_E		
0.5-1.0	1.0	Donut Hammer
0.7-1.2		Safety Hammer
0.8-1.3		Automatic-trip Donut-type Hammer
Borehole Diameter, C_B		
1.0	1.05	2.5 inch to 4.5 inch
1.05		6 inch
1.15		8 inch
Sampling Method, C_S		
1.0	1.2	Standard Sampler
1.1-1.3		Sampler without liners
Rod Length, C_R		
0	0.75	< 3 m
3	0.8	3-4 m
4	0.85	4-6 m
6	0.95	6-10 m
10	1.0	10-30 m
30	1.0	





Note: Calculations per this method are **only valid for $(N_1)_{60cs}$ < 30. For $(N_1)_{60cs}$ >30, soils are classed as non-liquefiable.**
These procedures have been validated for level to gently-sloping sites with potentially liquefiable materials at shallow depths (<15 m = 49 ft.).

														D_R corrections per Kulhawy and Mayne, 1990									Design Groundwater Level			Groundwater level at time of Drilling				
Depth (ft)	Depth (m)	Elevation (ft)	Material	SPT or Modified California Sampler? [SPT or MC]	Measured 12-inch Drive Blowcount	FS_{LIQ}	Equivalent SPT N-value	Overburden Stress Factor, C_N	Rod Length Factor, C_R	Corrected SPT $(N_1)_{60}$ (≥30 shaded yellow = non-liquefieable)	Fines Content Adj. Coeff., α	Fines Content Adj. Coeff., β	Clean-Sand $(N_1)_{60cs}$	Relative Density: Particle Size Correction, C_P	Relative Density: Aging Correction, C_A	Relative Density: Overconsol. Correction, C_{OCR}	Relative Density, D_r (%)	$CRR_{7.5}$	Stress Reduction Coefficient (r_d)	CSR_{EQ}	MSF	Corr. Static Normal Stress, K_σ	GW	γ' (psf)	σ'_{vo} (tsf)	GW	γ (psf)	γ' (psf)	σ_{vo} (tsf)	σ'_{vo} (tsf)
6.50	1.98	968.50	Alluvium	MC	3	AboveGW	2	1.4025	0.75	3	3.6147	1.0794	7	52.4743	1.2000	1.0000	21.8%	0.0877	0.9848	0.429	1.24	1.221	AboveGW	120	0.39	AboveGW	120	120	0.39	0.39
10.00	3.05	965.00	Alluvium	MC	11	AboveGW	7	1.2450	0.8	9	3.6147	1.0794	13	52.4743	1.2000	1.0000	37.8%	0.1405	0.9767	0.425	1.24	1.120	AboveGW	120	0.60	AboveGW	120	120	0.60	0.60
11.50	3.51	963.50	Alluvium	MC	15	AboveGW	9	1.1878	0.8	11	3.6147	1.0794	15	52.4743	1.2000	1.0000	41.8%	0.1601	0.9732	0.424	1.24	1.089	AboveGW	120	0.69	AboveGW	120	120	0.69	0.69
13.00	3.96	962.00	Alluvium	MC	18	AboveGW	11	1.1443	0.8	13	3.6147	1.0794	18	52.4743	1.2000	1.0000	45.4%	0.1918	0.9697	0.422	1.24	1.063	AboveGW	120	0.78	BelowGW	120	57.6	0.78	0.76
15.00	4.57	960.00	Alluvium	MC	19	AboveGW	12	1.1128	0.85	14	3.6147	1.0794	19	52.4743	1.2000	1.0000	47.2%	0.2033	0.9650	0.420	1.24	1.033	AboveGW	120	0.90	BelowGW	120	57.6	0.90	0.82
16.50	5.03	958.50	Alluvium	MC	24	AboveGW	15	1.0903	0.85	18	3.6147	1.0794	23	52.4743	1.2000	1.0000	53.5%	0.2569	0.9615	0.419	1.24	1.013	AboveGW	120	0.99	BelowGW	120	57.6	0.99	0.87
18.00	5.49	957.00	Alluvium	MC	23	AboveGW	14	1.0687	0.85	16	3.6147	1.0794	21	52.4743	1.2000	1.0000	50.4%	0.2282	0.9580	0.417	1.24	0.996	AboveGW	120	1.08	BelowGW	120	57.6	1.08	0.91
20.00	6.10	955.00	Alluvium	MC	17	AboveGW	11	1.0412	0.95	14	3.6147	1.0794	19	52.4743	1.2000	1.0000	47.2%	0.2033	0.9534	0.415	1.24	0.975	AboveGW	120	1.20	BelowGW	120	57.6	1.20	0.97
21.50	6.55	953.50	Alluvium	MC	17	AboveGW	11	1.0214	0.95	13	3.6147	1.0794	18	52.4743	1.2000	1.0000	45.4%	0.1918	0.9499	0.414	1.24	0.961	AboveGW	120	1.29	BelowGW	120	57.6	1.29	1.01
23.00	7.01	952.00	Alluvium	MC	17	AboveGW	11	1.0024	0.95	13	3.6147	1.0794	18	52.4743	1.2000	1.0000	45.4%	0.1918	0.9464	0.412	1.24	0.948	AboveGW	120	1.38	BelowGW	120	57.6	1.38	1.05
25.00	7.62	950.00	Alluvium	MC	26	AboveGW	16	0.9781	0.95	19	3.6147	1.0794	24	52.4743	1.2000	1.0000	54.9%	0.2734	0.9417	0.410	1.24	0.933	AboveGW	120	1.50	BelowGW	120	57.6	1.50	1.11
26.50	8.08	948.50	Alluvium	MC	48	AboveGW	30	0.9607	0.95	34	3.6147	1.0794	40	52.4743	1.2000	1.0000	73.5%	0.1249	0.9382	0.409	1.24	0.885	AboveGW	120	1.59	BelowGW	120	57.6	1.59	1.15
28.00	8.53	947.00	Alluvium	MC	46	AboveGW	29	0.9439	0.95	33	3.6147	1.0794	39	52.4743	1.2000	1.0000	72.4%	0.0842	0.9347	0.407	1.24	0.870	AboveGW	120	1.68	BelowGW	120	57.6	1.68	1.20
30.00	9.14	945.00	Alluvium	MC	146	AboveGW	91	0.9223	0.95	100	3.6147	1.0794	112	52.4743	1.2000	1.0000	126.0%	0.8118	0.9300	0.405	1.24	0.809	AboveGW	120	1.80	BelowGW	120	57.6	1.80	1.25
34.50	10.52	940.50	Alluvium	MC	269	AboveGW	167	0.8773	1	185	3.6147	1.0794	203	52.4743	1.2000	1.0000	171.4%	1.4928	0.8932	0.389	1.24	0.765	AboveGW	120	2.07	BelowGW	120	57.6	2.07	1.38

2006-0138 Scholl Canyon Landfill
5/18/2011 RMW

Liquefaction Assessment per Youd, et al., ASCE, 2001

Boring: EW3B

Material	Unit Weight:
Alluvium	120 pcf
Bedrock	120 pcf

P_{atm} = 1.058 tsf

Groundwater Elev. @ drill:	962 ft
Design Groundwater Elev.:	940 ft
Boring Elevation:	975 ft

Note: BLUE fields require user input

Depth Profile: Top of Layer	Fines Content, FC (%)	Sand Particle Size, D_{50} (mm)	Age of Deposit (years)	Overconsol. Ratio, OCR
0 Alluvium	20.0%	0.5	1.00E+02	1.0
36 Bedrock				

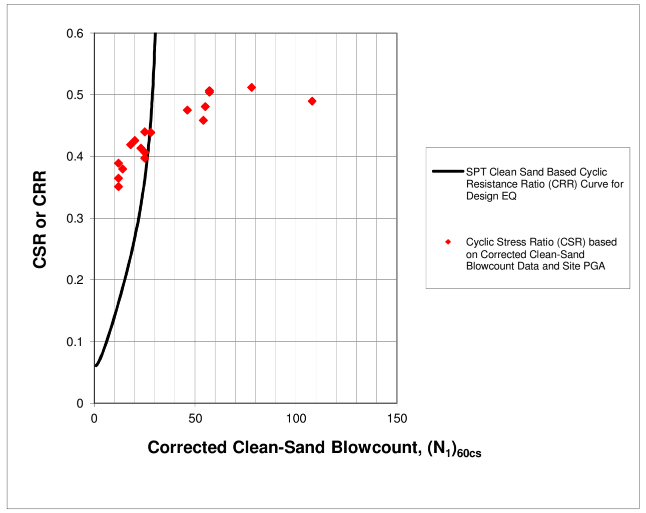
Note: In above table, data in columns FC to OCR are only required for potentially liquefiable layers

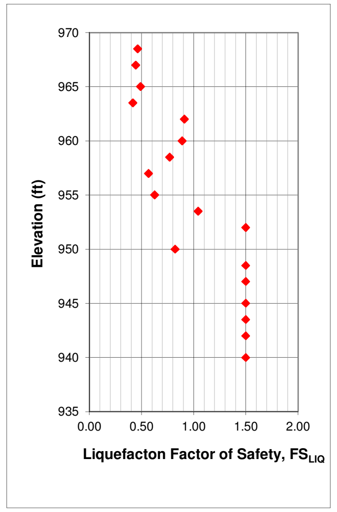
EQ Mag. (M_w)	PGA
6.9	0.67

Static Normal Stress Correction, $K\sigma$	
D_r (%)	f
0	0.8
0.6	0.7
0.8	0.6

Mod Cal to SPT Correction
0.62

SPT Equipment Variable Corrections		
Range	Used	
Energy Ratio, C_E		
0.5-1.0	1.0	Donut Hammer
0.7-1.2		Safety Hammer
0.8-1.3		Automatic-trip Donut-type Hammer
Borehole Diameter, C_B		
1.0	1.05	2.5 inch to 4.5 inch
1.05		6 inch
1.15		8 inch
Sampling Method, C_S		
1.0	1.2	Standard Sampler
1.1-1.3		Sampler without liners
Rod Length, C_R		
0	0.75	< 3 m
3	0.8	3-4 m
4	0.85	4-6 m
6	0.95	6-10 m
10	1.0	10-30 m
30	1.0	





Note: Calculations per this method are **only valid for $(N_1)_{60cs}$ < 30. For $(N_1)_{60cs}$ >30, soils are classed as non-liquefiable.**
These procedures have been validated for level to gently-sloping sites with potentially liquefiable materials at shallow depths (<15 m = 49 ft.).

														D_R corrections per Kulhawy and Mayne, 1990									Design Groundwater Level			Groundwater level at time of Drilling				
Depth (ft)	Depth (m)	Elevation (ft)	Material	SPT or Modified California Sampler? [SPT or MC]	Measured 12-inch Drive Blowcount	FS_{LIQ}	Equivalent SPT N-value	Overburden Stress Factor, C_N	Rod Length Factor, C_R	Corrected SPT $(N_1)_{60}$ (≥30 shaded yellow = non-liquefieable)	Fines Content Adj. Coeff., α	Fines Content Adj. Coeff., β	Clean-Sand $(N_1)_{60cs}$	Relative Density: Particle Size Correction, C_P	Relative Density: Aging Correction, C_A	Relative Density: Overconsol. Correction, C_{OCR}	Relative Density, D_r (%)	$CRR_{7.5}$	Stress Reduction Coefficient (r_d)	CSR_{EQ}	MSF	Corr. Static Normal Stress, K_σ	GW	γ' (psf)	σ'_{vo} (tsf)	GW	γ (psf)	γ' (psf)	σ_{vo} (tsf)	σ'_{vo} (tsf)
6.50	1.98	968.50	Alluvium	MC	10	AboveGW	6	1.4025	0.75	8	3.6147	1.0794	12	52.4743	1.2000	1.0000	35.6%	0.1312	0.9848	0.429	1.24	1.221	AboveGW	120	0.39	AboveGW	120	120	0.39	0.39
8.00	2.44	967.00	Alluvium	MC	9	AboveGW	6	1.3304	0.75	8	3.6147	1.0794	12	52.4743	1.2000	1.0000	35.6%	0.1312	0.9813	0.427	1.24	1.171	AboveGW	120	0.48	AboveGW	120	120	0.48	0.48
10.00	3.05	965.00	Alluvium	MC	13	AboveGW	8	1.2450	0.8	10	3.6147	1.0794	14	52.4743	1.2000	1.0000	39.9%	0.1502	0.9767	0.425	1.24	1.120	AboveGW	120	0.60	AboveGW	120	120	0.60	0.60
11.50	3.51	963.50	Alluvium	MC	12	AboveGW	7	1.1878	0.8	8	3.6147	1.0794	12	52.4743	1.2000	1.0000	35.6%	0.1312	0.9732	0.424	1.24	1.089	AboveGW	120	0.69	AboveGW	120	120	0.69	0.69
13.00	3.96	962.00	Alluvium	MC	28	AboveGW	17	1.1443	0.8	20	3.6147	1.0794	25	52.4743	1.2000	1.0000	56.4%	0.2919	0.9697	0.422	1.24	1.063	AboveGW	120	0.78	BelowGW	120	57.6	0.78	0.76
15.00	4.57	960.00	Alluvium	MC	27	AboveGW	17	1.1128	0.85	20	3.6147	1.0794	25	52.4743	1.2000	1.0000	56.4%	0.2919	0.9650	0.420	1.24	1.033	AboveGW	120	0.90	BelowGW	120	57.6	0.90	0.82
16.50	5.03	958.50	Alluvium	MC	24	AboveGW	15	1.0903	0.85	18	3.6147	1.0794	23	52.4743	1.2000	1.0000	53.5%	0.2569	0.9615	0.419	1.24	1.013	AboveGW	120	0.99	BelowGW	120	57.6	0.99	0.87
18.00	5.49	957.00	Alluvium	MC	18	AboveGW	11	1.0687	0.85	13	3.6147	1.0794	18	52.4743	1.2000	1.0000	45.4%	0.1918	0.9580	0.417	1.24	0.996	AboveGW	120	1.08	BelowGW	120	57.6	1.08	0.91
20.00	6.10	955.00	Alluvium	MC	20	AboveGW	12	1.0412	0.95	15	3.6147	1.0794	20	52.4743	1.2000	1.0000	48.8%	0.2154	0.9534	0.415	1.24	0.975	AboveGW	120	1.20	BelowGW	120	57.6	1.20	0.97
21.50	6.55	953.50	Alluvium	MC	31	AboveGW	19	1.0214	0.95	23	3.6147	1.0794	28	52.4743	1.2000	1.0000	60.4%	0.3695	0.9499	0.414	1.24	0.942	AboveGW	120	1.29	BelowGW	120	57.6	1.29	1.01
23.00	7.01	952.00	Alluvium	MC	63	AboveGW	39	1.0024	0.95	47	3.6147	1.0794	54	52.4743	1.2000	1.0000	86.4%	0.3451	0.9464	0.412	1.24	0.899	AboveGW	120	1.38	BelowGW	120	57.6	1.38	1.05
25.00	7.62	950.00	Alluvium	MC	27	AboveGW	17	0.9781	0.95	20	3.6147	1.0794	25	52.4743	1.2000	1.0000	56.4%	0.2919	0.9417	0.410	1.24	0.933	AboveGW	120	1.50	BelowGW	120	57.6	1.50	1.11
26.50	8.08	948.50	Alluvium	MC	68	AboveGW	42	0.9607	0.95	48	3.6147	1.0794	55	52.4743	1.2000	1.0000	87.3%	0.3549	0.9382	0.409	1.24	0.850	AboveGW	120	1.59	BelowGW	120	57.6	1.59	1.15
28.00	8.53	947.00	Alluvium	MC	139	AboveGW	86	0.9439	0.95	97	3.6147	1.0794	108	52.4743	1.2000	1.0000	124.1%	0.7815	0.9347	0.407	1.24	0.831	AboveGW	120	1.68	BelowGW	120	57.6	1.68	1.20
30.00	9.14	945.00	Alluvium	MC	57	AboveGW	35	0.9223	0.95	39	3.6147	1.0794	46	52.4743	1.2000	1.0000	78.7%	0.2526	0.9300	0.405	1.24	0.853	AboveGW	120	1.80	BelowGW	120	57.6	1.80	1.25
31.50	9.60	943.50	Alluvium	MC	72	AboveGW	45	0.9068	0.95	49	3.6147	1.0794	57	52.4743	1.2000	1.0000	88.2%	0.3739	0.9176	0.400	1.24	0.793	AboveGW	120	1.89	BelowGW	120	57.6	1.89	1.30
33.00	10.06	942.00	Alluvium	MC	71	AboveGW	44	0.8918	1	49	3.6147	1.0794	57	52.4743	1.2000	1.0000	88.2%	0.3739	0.9054	0.394	1.24	0.778	AboveGW	120	1.98	BelowGW	120	57.6	1.98	1.34
35.00	10.67	940.00	Alluvium	MC	102	(N1)60>30: Non-Liq.	63	0.8725	1	69	3.6147	1.0794	78	52.4743	1.2000	1.0000	104.7%	0.5501	0.8892	0.390	1.24	0.762	BelowGW	57.6	2.08	BelowGW	120	57.6	2.10	1.40

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2006-0138 Scholl Canyon Landfill
5/18/2011 RMW

Liquefaction Assessment per Youd, et al., ASCE, 2001

Boring: EW4B

Material	**Unit Weight:**
Alluvium	120 pcf
Bedrock	120 pcf

P_{atm} = 1.058 tsf

Groundwater Elev. @ drill:	954 ft
Design Groundwater Elev.:	940 ft
Boring Elevation:	975 ft

Note: BLUE fields require user input

Depth Profile: Top of Layer	Fines Content, FC (%)	Sand Particle Size, D_{50} (mm)	Age of Deposit (years)	Overconsol. Ratio, OCR
0 Alluvium	20.0%	0.5	1.00E+02	1.0
23.01 Bedrock				

Note: In above table, data in columns FC to OCR are only required for potentially liquefiable layers

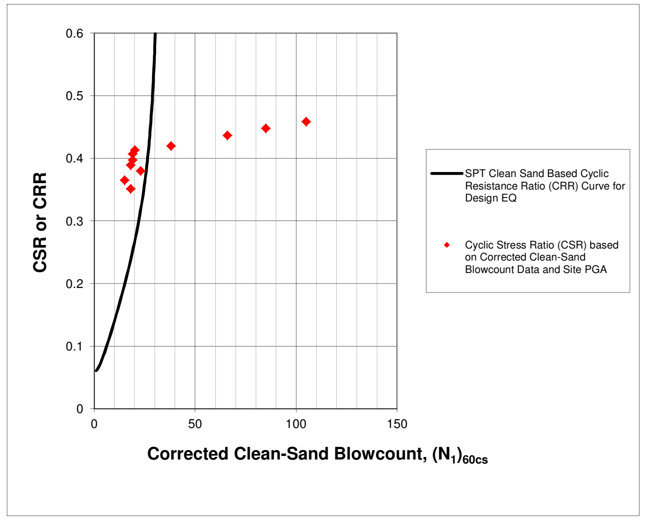
EQ Mag. (M_w)	**PGA**
6.9	0.67

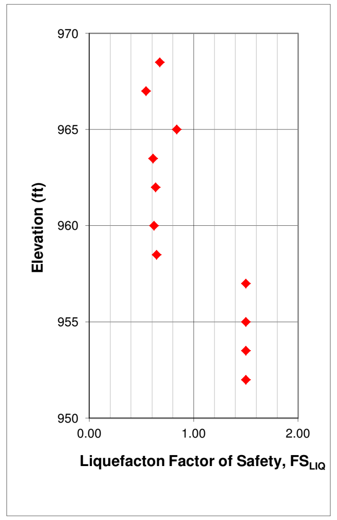
Static Normal Stress Correction, K_σ

D_r (%)	*f*
0	0.8
0.6	0.7
0.8	0.6

Mod Cal to SPT Correction
0.62

SPT Equipment Variable Corrections		
Range	Used	
Energy Ratio, C_E		
0.5-1.0	1.0	Donut Hammer
0.7-1.2		Safety Hammer
0.8-1.3		Automatic-trip Donut-type Hammer
Borehole Diameter, C_B		
1.0	1.05	2.5 inch to 4.5 inch
1.05		6 inch
1.15		8 inch
Sampling Method, C_S		
1.0	1.2	Standard Sampler
1.1-1.3		Sampler without liners
Rod Length, C_R		
0	0.75	< 3 m
3	0.8	3-4 m
4	0.85	4-6 m
6	0.95	6-10 m
10	1.0	10-30 m
30	1.0	





Note: Calculations per this method are **only valid for $(N_1)_{60cs}$ < 30. For $(N_1)_{60cs}$ >30, soils are classed as non-liquefiable.**
These procedures have been validated for level to gently-sloping sites with potentially liquefiable materials at shallow depths (<15 m = 49 ft.).

														D_R corrections per Kulhawy and Mayne, 1990									Design Groundwater Level			Groundwater level at time of Drilling				
Depth (ft)	**Depth (m)**	**Elevation (ft)**	**Material**	**SPT or Modified California Sampler? [SPT or MC]**	**Measured 12-inch Drive Blowcount**	**FS_{LIQ}**	**Equivalent SPT N-value**	**Overburden Stress Factor, C_N**	**Rod Length Factor, C_R**	**Corrected SPT $(N_1)_{60}$** (≥30 shaded yellow = non-liquefieable)	**Fines Content Adj. Coeff., α**	**Fines Content Adj. Coeff., β**	**Clean-Sand $(N_1)_{60cs}$**	**Relative Density: Particle Size Correction, C_P**	**Relative Density: Aging Correction, C_A**	**Relative Density: Overconsol. Correction, C_{OCR}**	**Relative Density, D_r (%)**	**$CRR_{7.5}$**	**Stress Reduction Coefficient (r_d)**	**CSR_{EQ}**	**MSF**	**Corr. Static Normal Stress, K_σ**	**GW**	**γ' (psf)**	**σ'$_{vo}$ (tsf)**	**GW**	**γ (psf)**	**γ' (psf)**	**σ$_{vo}$ (tsf)**	**σ'$_{vo}$ (tsf)**
6.50	1.98	968.50	Alluvium	MC	16	AboveGW	10	1.4025	0.75	13	3.6147	1.0794	18	52.4743	1.2000	1.0000	45.4%	0.1918	0.9848	0.429	1.24	1.221	AboveGW	120	0.39	AboveGW	120	120	0.39	0.39
8.00	2.44	967.00	Alluvium	MC	15	AboveGW	9	1.3304	0.75	11	3.6147	1.0794	15	52.4743	1.2000	1.0000	41.8%	0.1601	0.9813	0.427	1.24	1.171	AboveGW	120	0.48	AboveGW	120	120	0.48	0.48
10.00	3.05	965.00	Alluvium	MC	23	AboveGW	14	1.2450	0.8	18	3.6147	1.0794	23	52.4743	1.2000	1.0000	53.5%	0.2569	0.9767	0.425	1.24	1.120	AboveGW	120	0.60	AboveGW	120	120	0.60	0.60
11.50	3.51	963.50	Alluvium	MC	17	AboveGW	11	1.1878	0.8	13	3.6147	1.0794	18	52.4743	1.2000	1.0000	45.4%	0.1918	0.9732	0.424	1.24	1.089	AboveGW	120	0.69	AboveGW	120	120	0.69	0.69
13.00	3.96	962.00	Alluvium	MC	19	AboveGW	12	1.1356	0.8	14	3.6147	1.0794	19	52.4743	1.2000	1.0000	47.2%	0.2033	0.9697	0.422	1.24	1.063	AboveGW	120	0.78	AboveGW	120	120	0.78	0.78
15.00	4.57	960.00	Alluvium	MC	20	AboveGW	12	1.0728	0.85	14	3.6147	1.0794	19	52.4743	1.2000	1.0000	47.2%	0.2033	0.9650	0.420	1.24	1.033	AboveGW	120	0.90	AboveGW	120	120	0.90	0.90
16.50	5.03	958.50	Alluvium	MC	22	AboveGW	14	1.0301	0.85	15	3.6147	1.0794	20	52.4743	1.2000	1.0000	48.8%	0.2154	0.9615	0.419	1.24	1.013	AboveGW	120	0.99	AboveGW	120	120	0.99	0.99
18.00	5.49	957.00	Alluvium	MC	48	AboveGW	30	0.9906	0.85	32	3.6147	1.0794	38	52.4743	1.2000	1.0000	71.3%	0.0268	0.9580	0.417	1.24	0.994	AboveGW	120	1.08	AboveGW	120	120	1.08	1.08
20.00	6.10	955.00	Alluvium	MC	83	AboveGW	51	0.9425	0.95	58	3.6147	1.0794	66	52.4743	1.2000	1.0000	96.0%	0.4527	0.9534	0.415	1.24	0.951	AboveGW	120	1.20	AboveGW	120	120	1.20	1.20
21.50	6.55	953.50	Alluvium	MC	110	AboveGW	68	0.9206	0.95	75	3.6147	1.0794	85	52.4743	1.2000	1.0000	109.1%	0.6051	0.9499	0.414	1.24	0.924	AboveGW	120	1.29	BelowGW	120	57.6	1.29	1.26
23.00	7.01	952.00	Alluvium	MC	141	AboveGW	87	0.9051	0.95	94	3.6147	1.0794	105	52.4743	1.2000	1.0000	122.2%	0.7587	0.9464	0.412	1.24	0.899	AboveGW	120	1.38	BelowGW	120	57.6	1.38	1.30

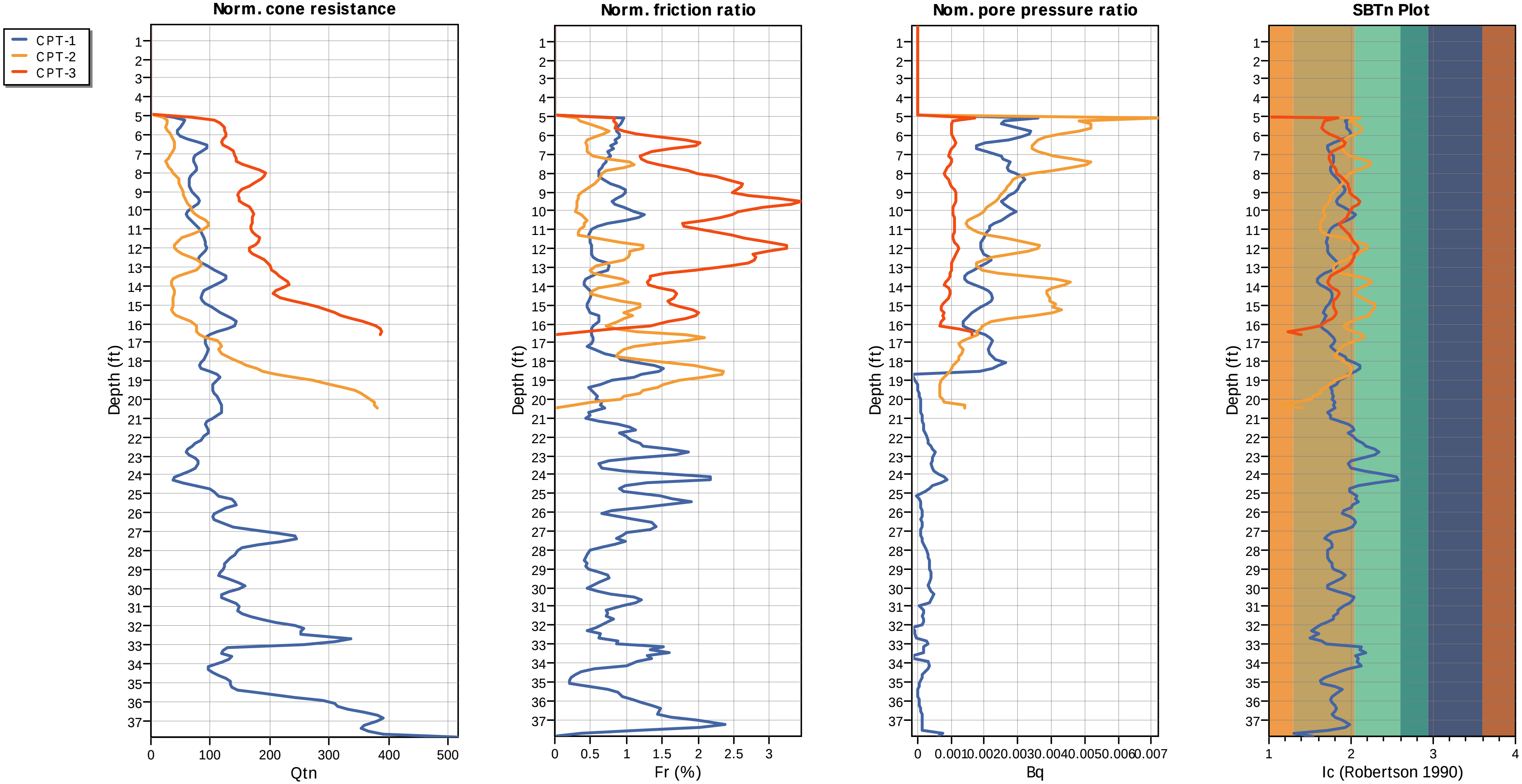
APPENDIX D-3

SEISMICALLY-INDUCED DYNAMIC SETTLEMENT CALCULATIONS

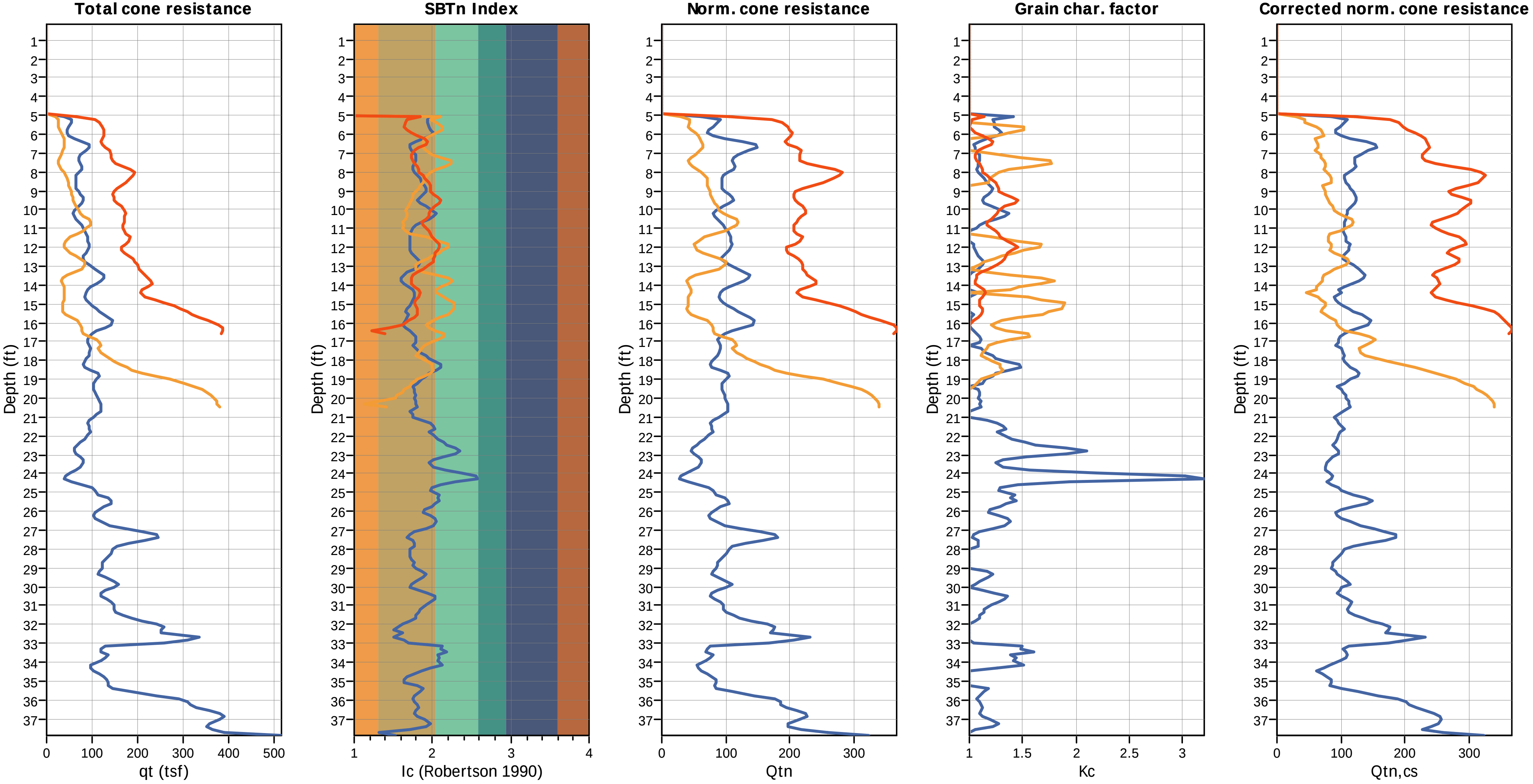
GeoLogic Associates, Inc.
Geotechnical Engineers
San Diego, CA
www.Geo-logic.com

Project: Scholl Canyon Landfill

Overlay Normalized Plots

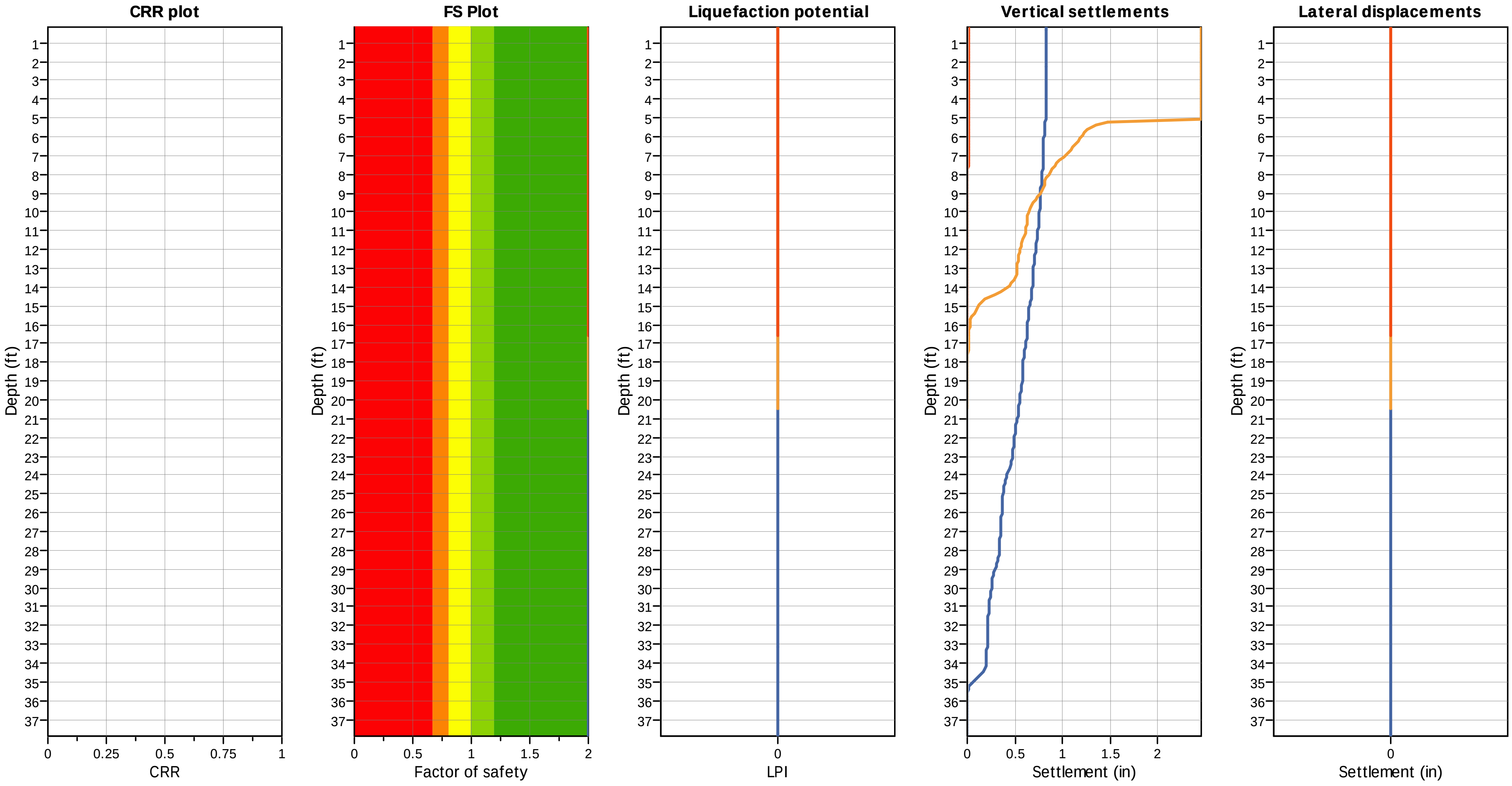


Overlay Intermediate Results



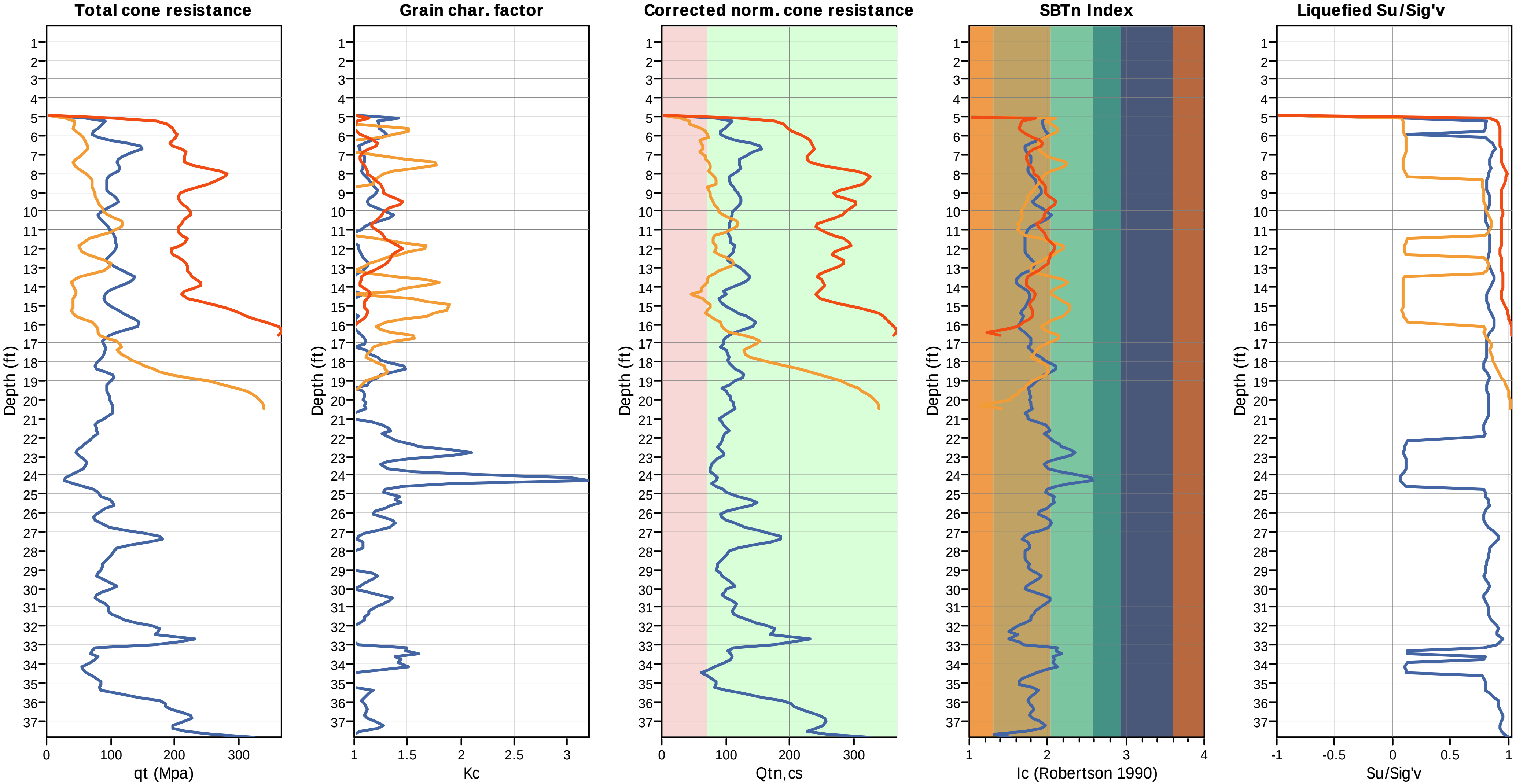
Project: Scholl Canyon Landfill

Overlay Cyclic Liquefaction Plots



Project: Scholl Canyon Landfill

Overlay Strength Loss Plots



APPENDIX E

SLOPE STABILITY CALCULATIONS

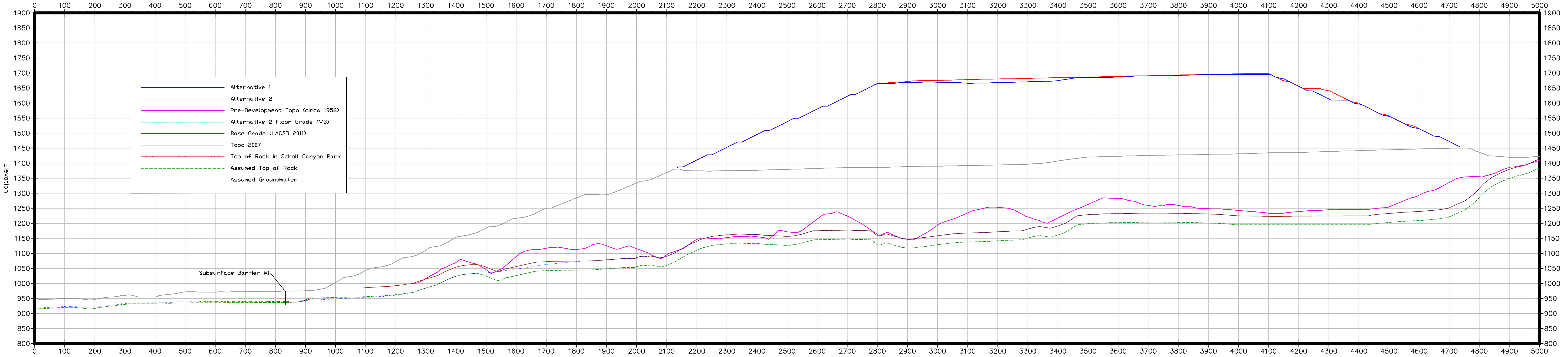
APPENDIX E-1

SLOPE STABILITY CROSS SECTIONS

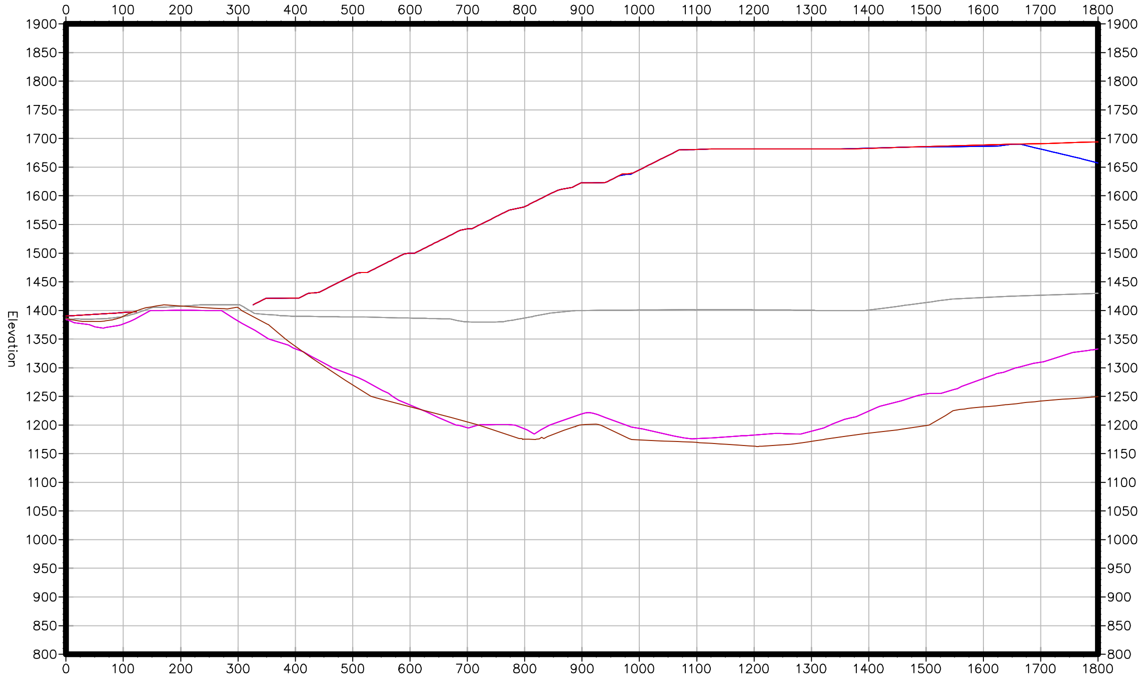
2007-0138 SCHOLL CANYON LANDFILL
3/13/2012 RMW

CROSS SECTIONS

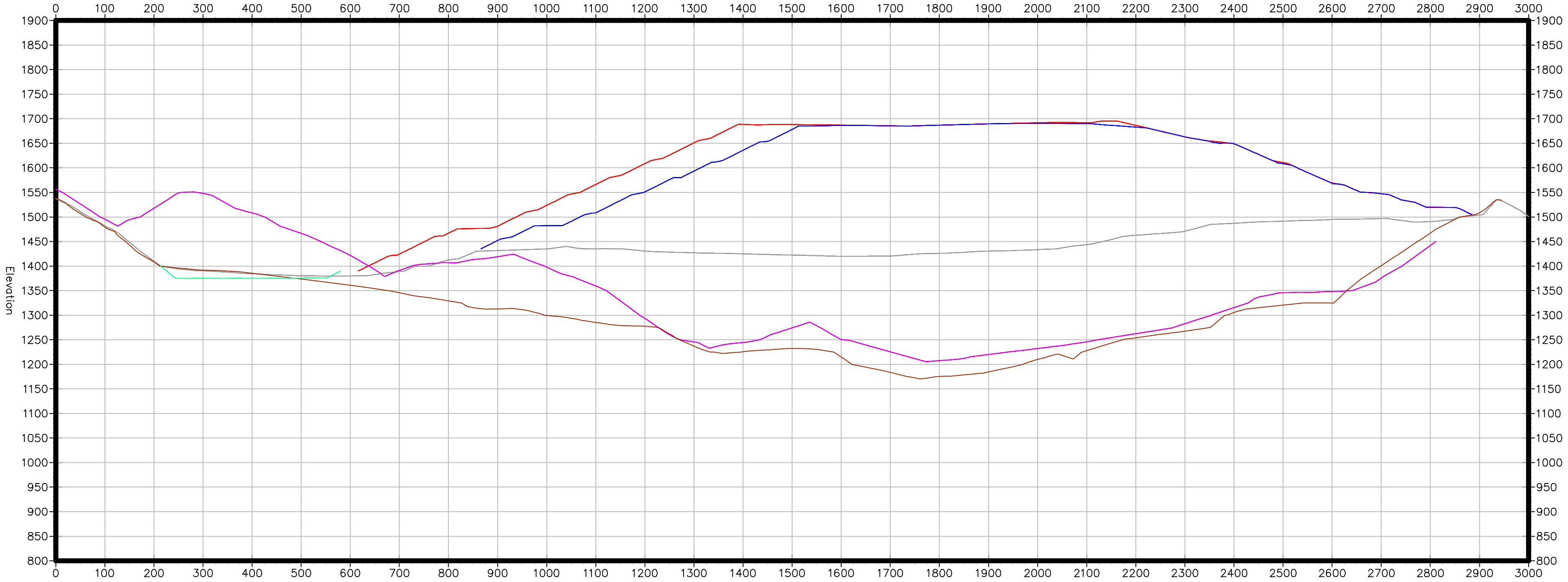
A–A' PROFILE



B–B' PROFILE



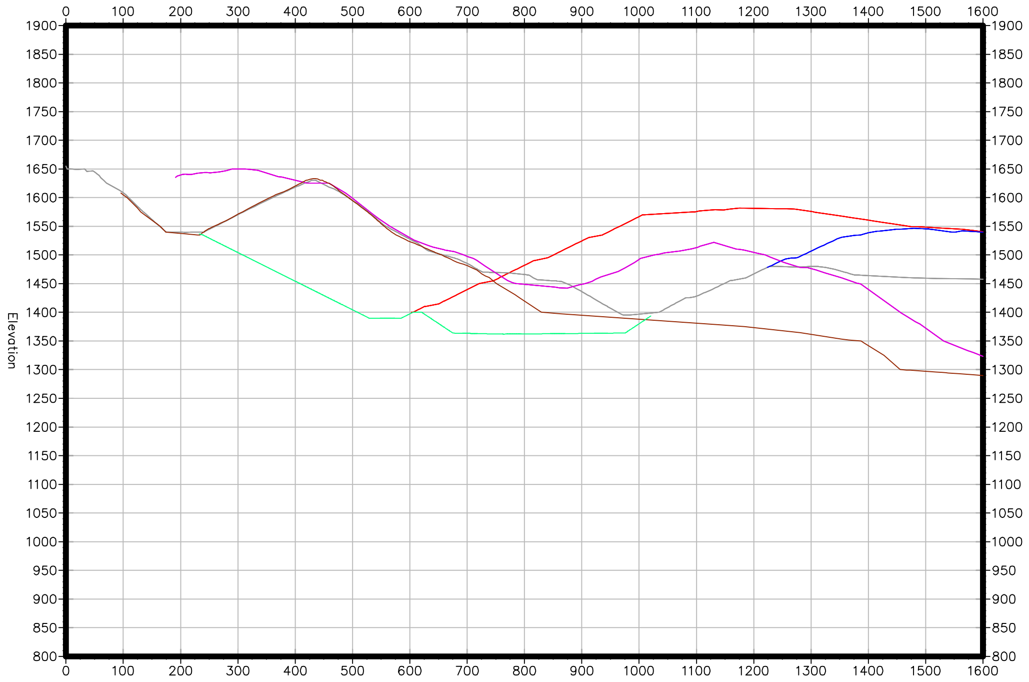
C–C' PROFILE



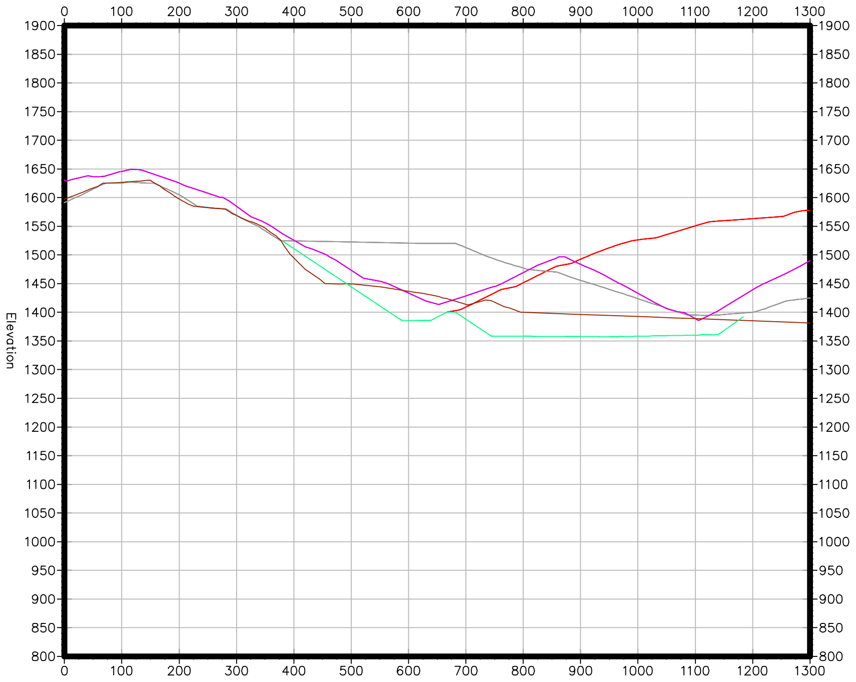
2007-0138 SCHOLL CANYON LANDFILL
3/13/2012 RMW

CROSS SECTIONS

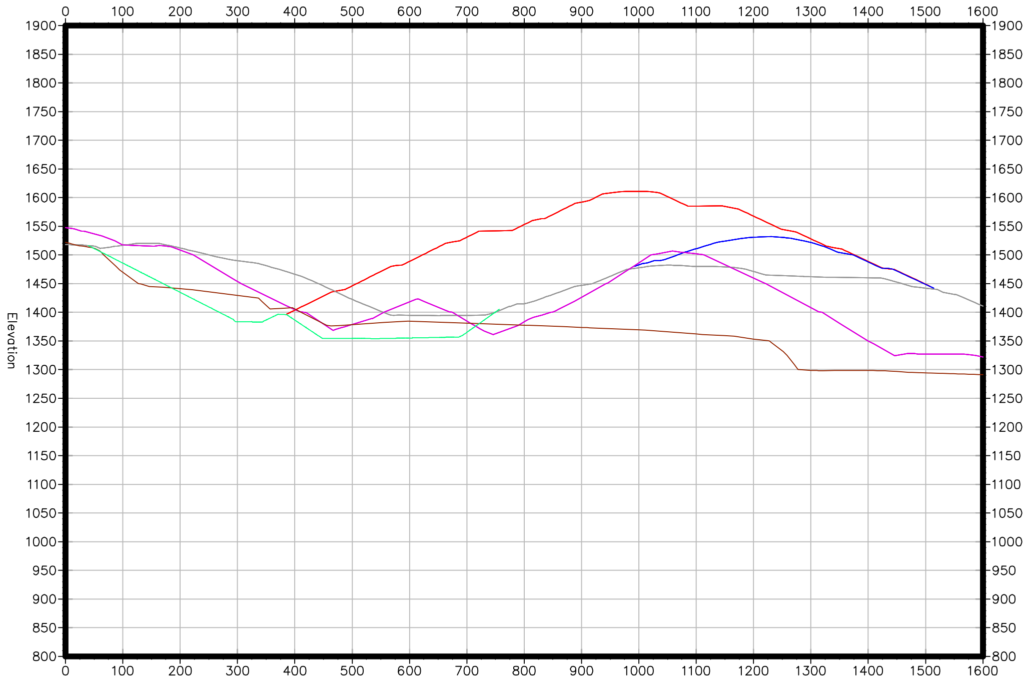
D–D' PROFILE



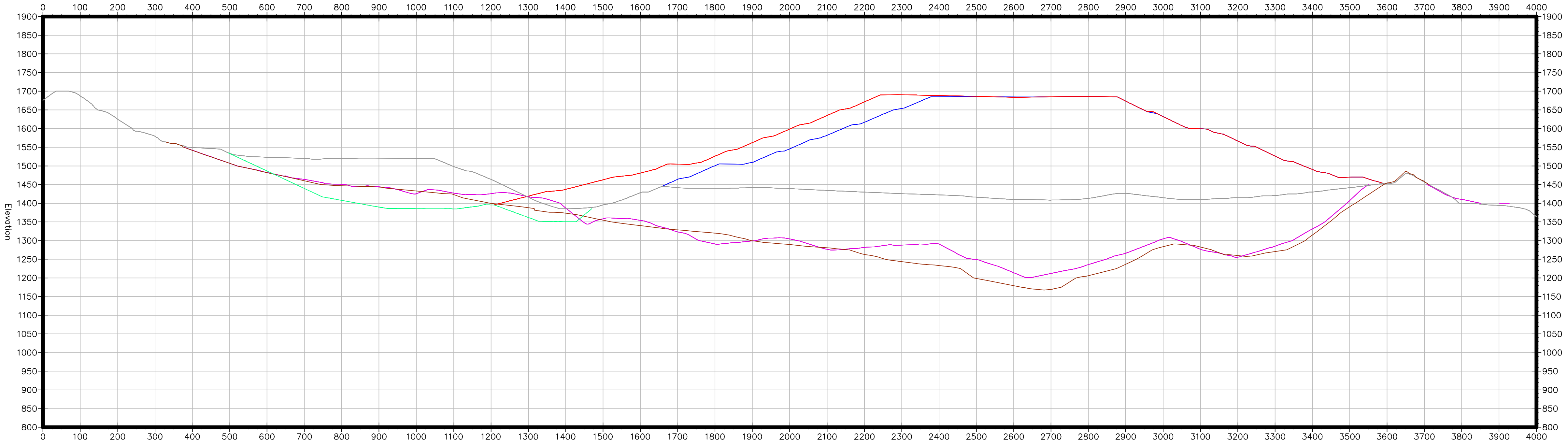
E–E' PROFILE

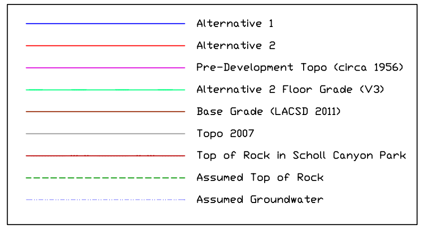


F–F' PROFILE



G–G' PROFILE

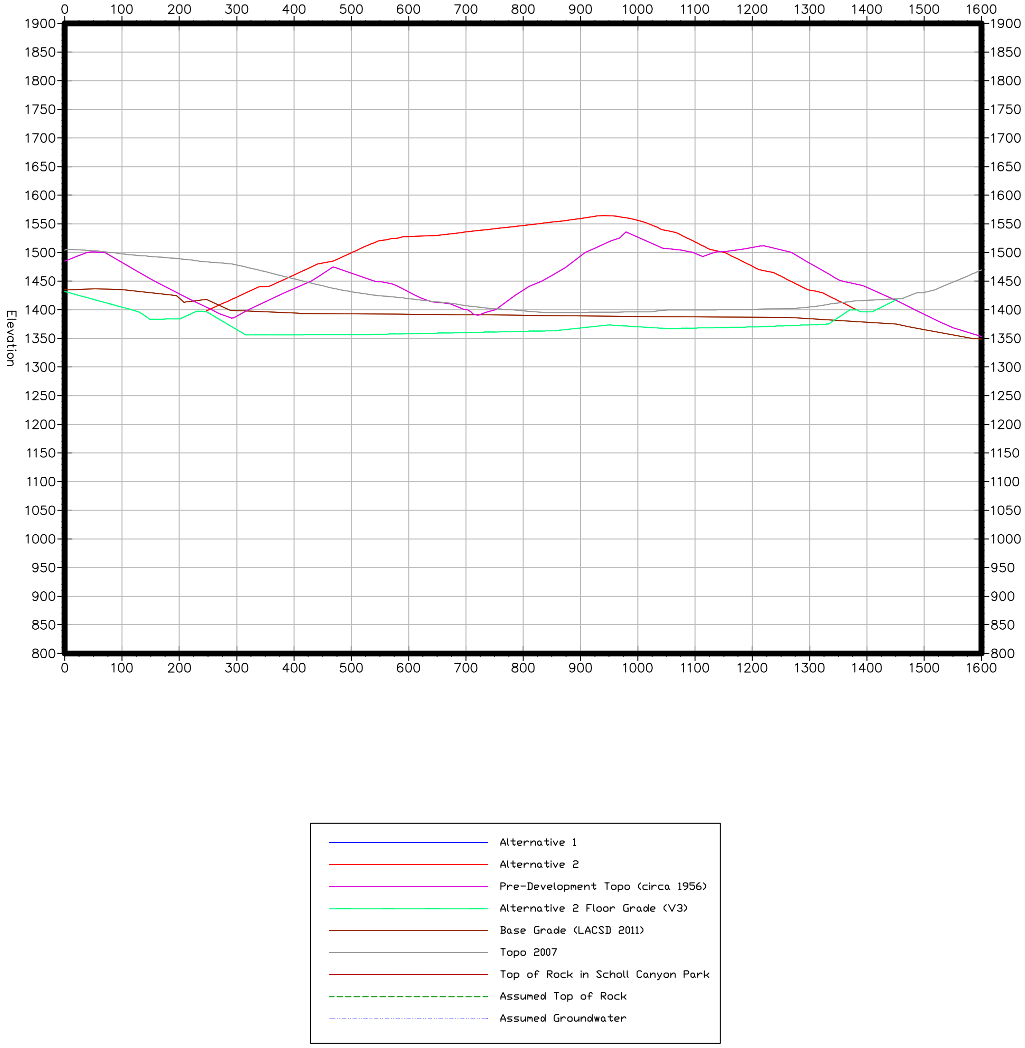




2007-0138 SCHOLL CANYON LANDFILL
3/13/2012 RMW

CROSS SECTIONS

H-H' PROFILE



APPENDIX E-2

LIMIT-EQUILIBRIUM STABILITY ANALYSES OF LANDFILL SLOPES

Scholl Canyon Landfill
Cross-Section A-A'
SectionA_0006.gsz
Date: 1/17/2012
Time: 2:57:54 PM
Method: Morgenstern-Price
Slip Surface Option: Auto-Search
Optimization: Yes

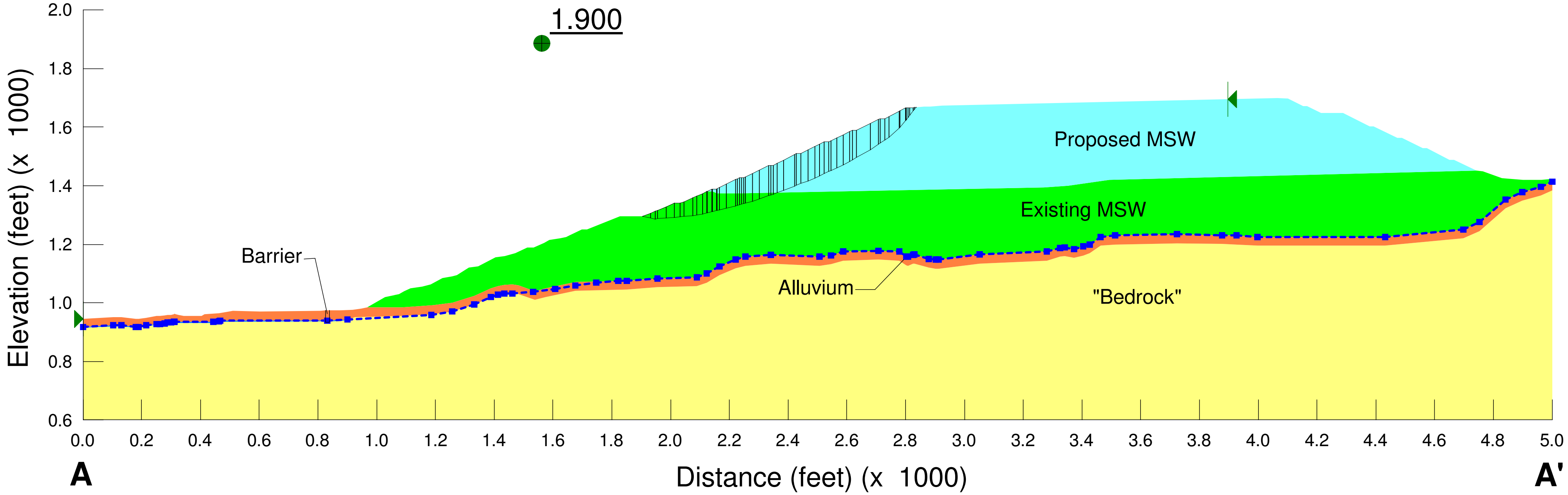
Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Alluvium
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 100 psf
Phi: 34 °

Name: Bedrock
Model: Bedrock (Impenetrable)

Condition: Alternative 1 & 2
Potential waste mass failure



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section A-A'
SectionA_0021.gsz
Date: 1/20/2012
Time: 9:50:21 AM
Method: Morgenstern-Price
Slip Surface Option: Fully-Specified
Optimization: Yes

Condition: Alternative 1& 2
Failure through potentially liquifiable alluvium

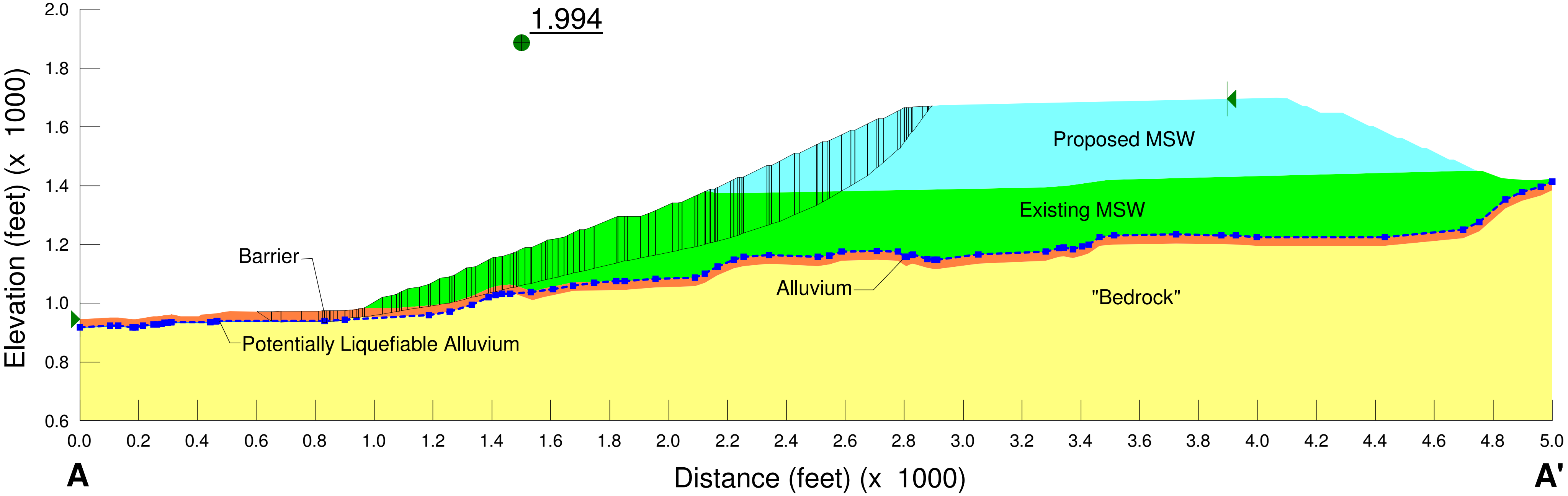
Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Bedrock
Model: Bedrock (Impenetrable)

Name: Alluvium
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 100 psf
Phi: 34 °

Name: Liquefiable Alluvium
Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Cohesion: 400 psf



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section A-A'
SectionA_0021_S01.gsz
Date: 1/20/2012
Time: 10:31:07 AM
Method: Morgenstern-Price
Slip Surface Option: Fully-Specified
Optimization: Yes
Horz Seismic Load: 0.362

Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

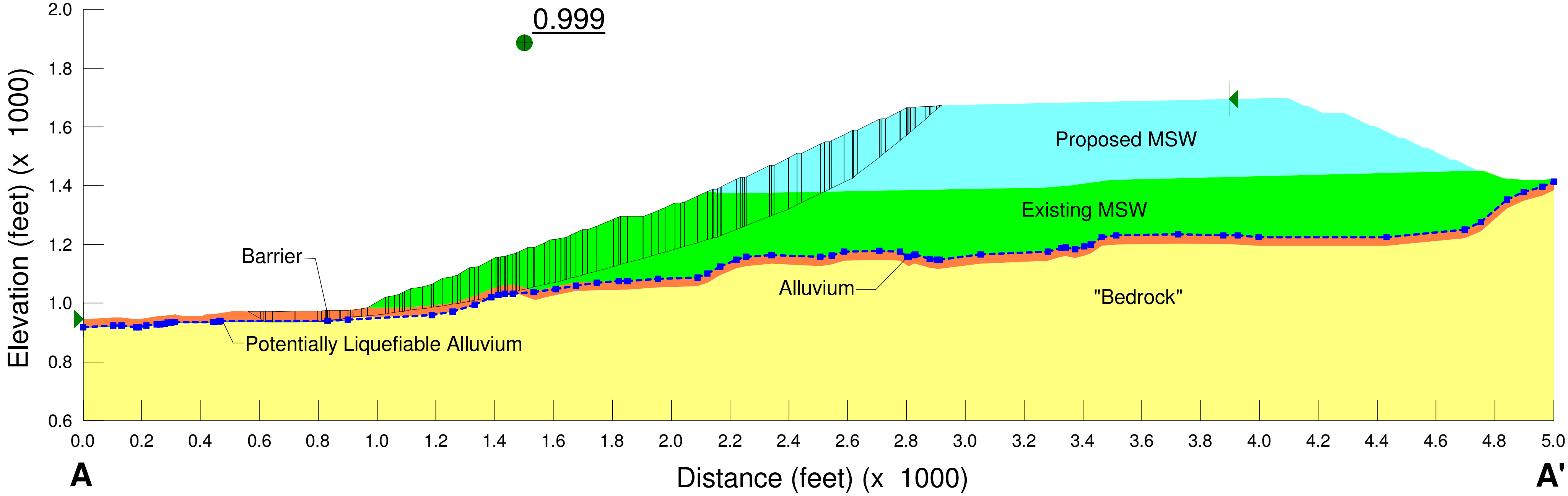
Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

Name: Bedrock
Model: Bedrock (Impenetrable)

Name: Alluvium
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 100 psf
Phi: 34 °

Name: Liquefiable Alluvium
Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Cohesion: 400 psf

Condition: Alternative 1& 2
Failure through potentially liquifiable alluvium
Potential seismic deformation for Verdugo fault MCE = 0.9 inches



Geo-Logic ASSOCIATES

Scholl Canyon Landfill
Cross-Section A-A'
SectionA_0031.gsz
Date: 1/20/2012
Time: 3:37:45 PM
Method: Morgenstern-Price
Slip Surface Option: Fully-Specified
Optimization: Yes

Condition: Alternative 1& 2
Failure through potentially liquifiable alluvium

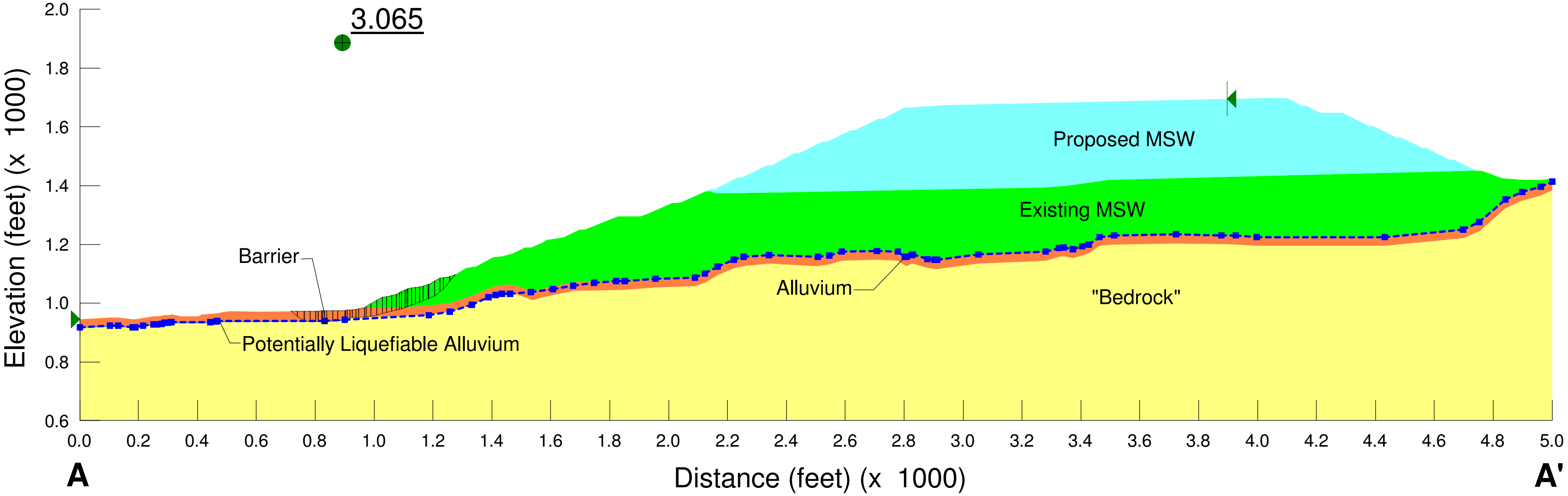
Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Bedrock
Model: Bedrock (Impenetrable)

Name: Alluvium
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 100 psf
Phi: 34 °

Name: Liquefiable Alluvium
Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Cohesion: 400 psf



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section A-A'
SectionA_0031_S01.gsz
Date: 1/20/2012
Time: 3:52:31 PM
Method: Morgenstern-Price
Slip Surface Option: Fully-Specified
Optimization: Yes
Horz Seismic Load: 0.406

Condition: Alternative 1& 2
Failure through potentially liquifiable alluvium
Potential seismic deformation for Verdugo fault MCE = 5.3 inches

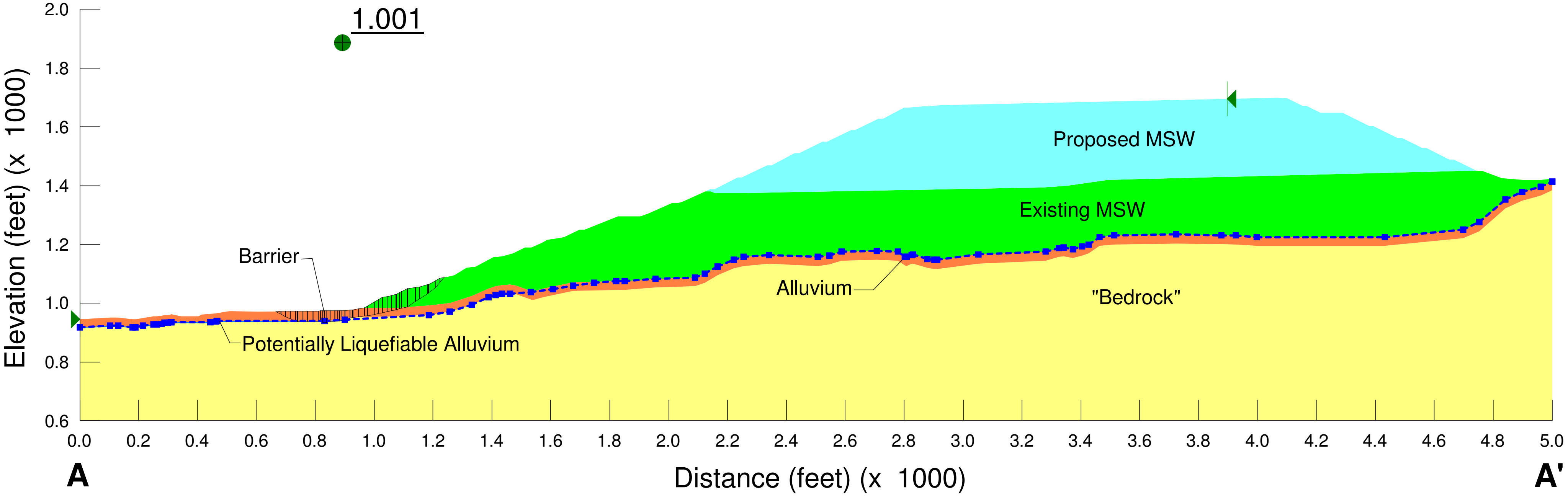
Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

Name: Bedrock
Model: Bedrock (Impenetrable)

Name: Alluvium
Model: Mohr-Coulomb
Unit Weight: 120 pcf
Cohesion: 100 psf
Phi: 34 °

Name: Liquefiable Alluvium
Model: Undrained (Phi=0)
Unit Weight: 120 pcf
Cohesion: 400 psf



Geo-Logic
ASSOCIATES

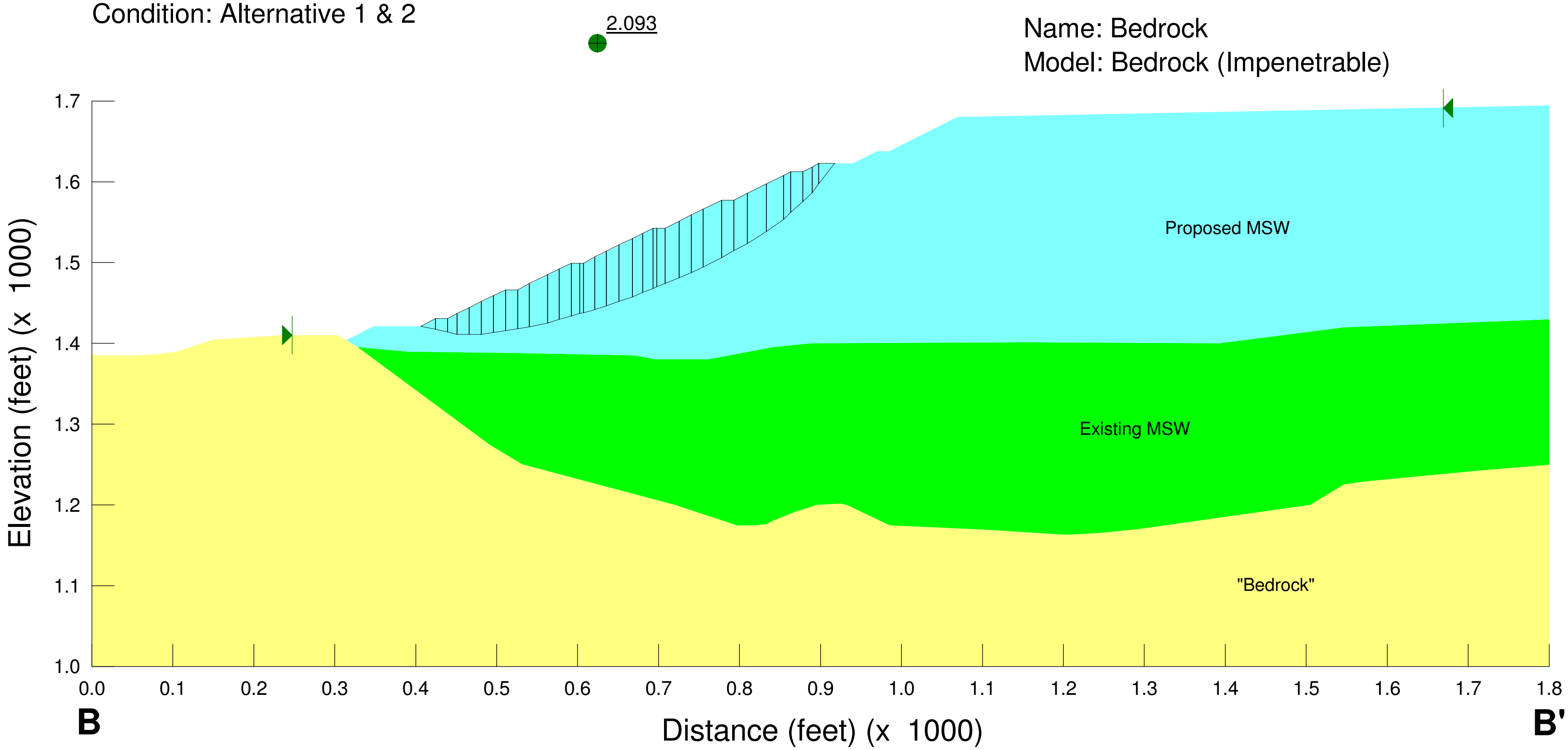
Scholl Canyon Landfill
Cross-Section B-B'
SectionB_0001.gsz
Date: 1/18/2012
Time: 1:33:02 PM
Method: Morgenstern-Price
Slip Surface Option: Auto-Search
Optimization: Yes

Condition: Alternative 1 & 2

Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Bedrock
Model: Bedrock (Impenetrable)



Geo-Logic
ASSOCIATES

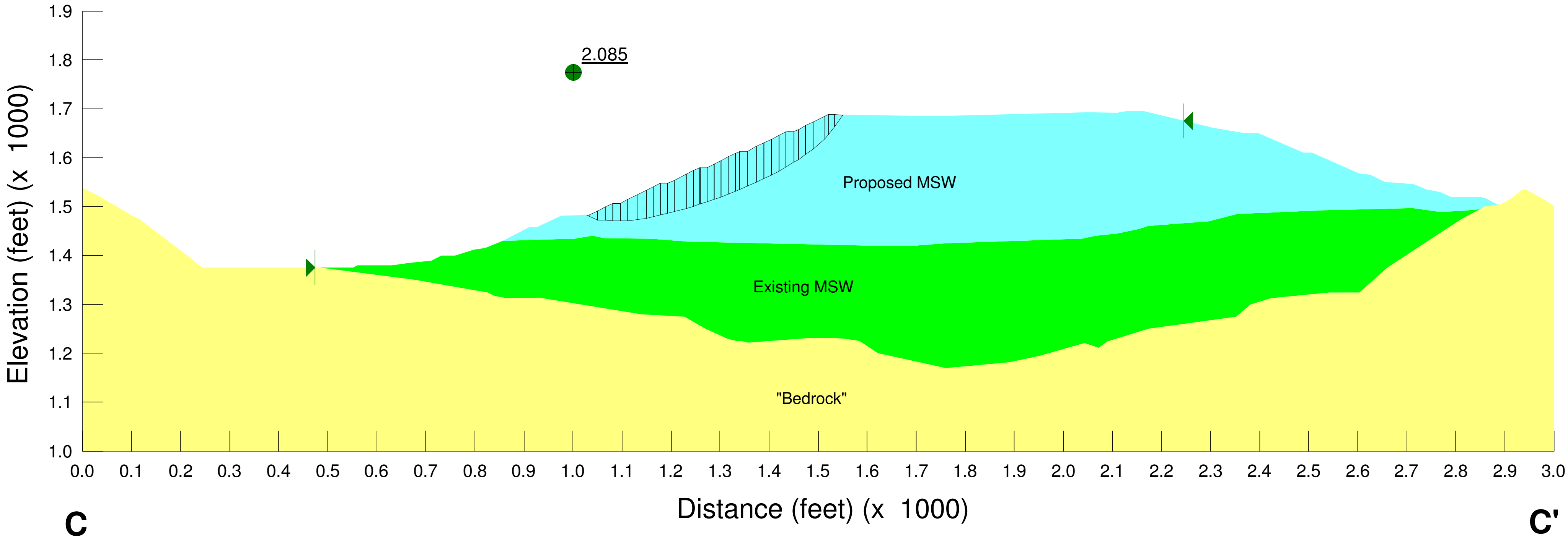
Scholl Canyon Landfill
Cross-Section C-C'
SectionC_0001.gsz
Date: 1/18/2012
Time: 1:35:58 PM
Method: Morgenstern-Price
Slip Surface Option: Auto-Search
Optimization: Yes

Condition: Alternative 1

Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Bedrock
Model: Bedrock (Impenetrable)



Geo-Logic
ASSOCIATES

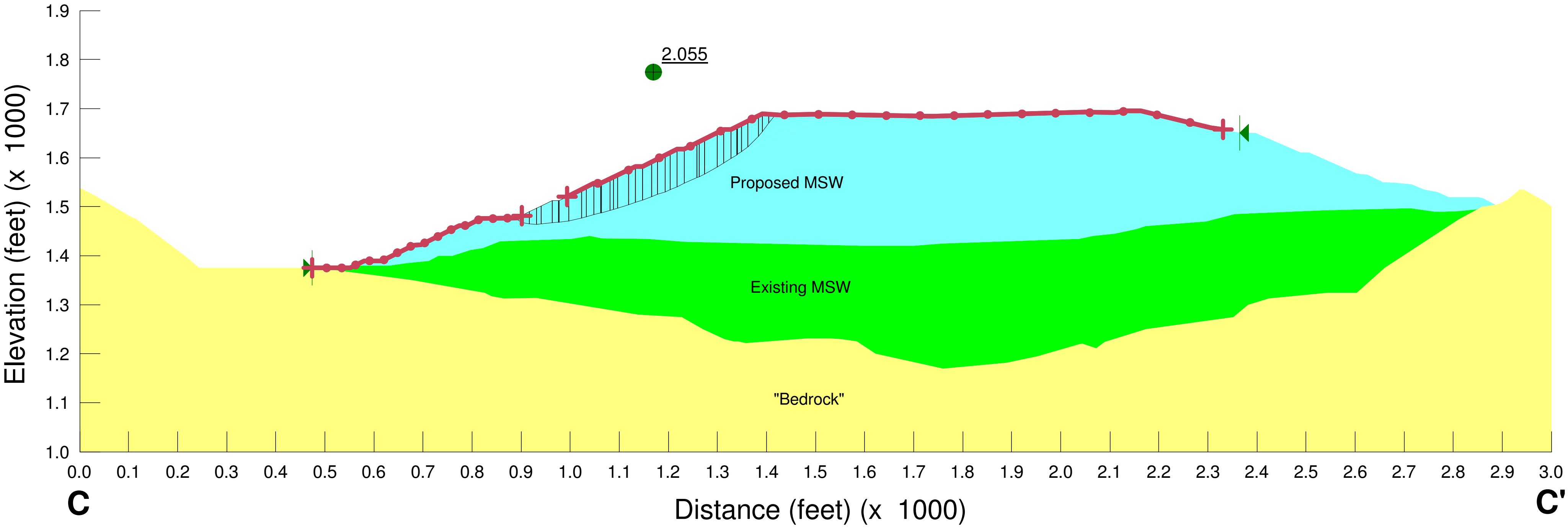
Scholl Canyon Landfill
Cross-Section C-C'
SectionC_0011.gsz
Date: 1/18/2012
Time: 1:38:22 PM
Method: Morgenstern-Price
Slip Surface Option: Entry and Exit
Optimization: Yes

Condition: Alternative 2

Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Bedrock
Model: Bedrock (Impenetrable)



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section D-D'
SectionD_0020.gsz
Date: 1/17/2012
Time: 3:58:26 PM
Method: Morgenstern-Price
Slip Surface Option: Fully-Specified
Optimization: Yes

Condition: Alternative 2 Liner stability

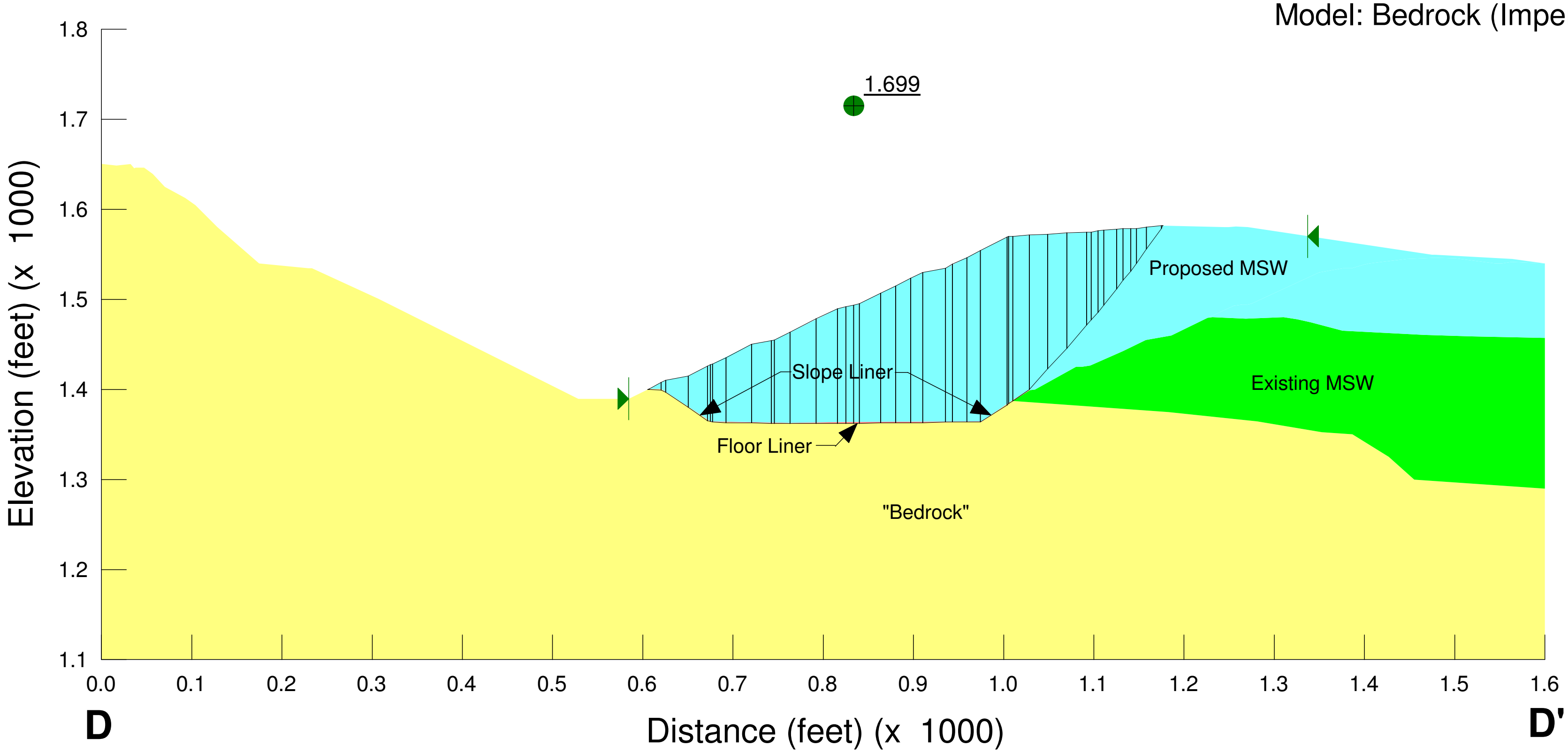
Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: CALF-2B Floor Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Floor

Name: CALF-2B Slope Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Slope

Name: Bedrock
Model: Bedrock (Impenetrable)



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section D-D'
SectionD_0020_S01.gsz
Date: 1/17/2012
Time: 3:56:41 PM
Method: Morgenstern-Price
Slip Surface Option: Fully-Specified
Optimization: Yes
Horz Seismic Load: 0.217

Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

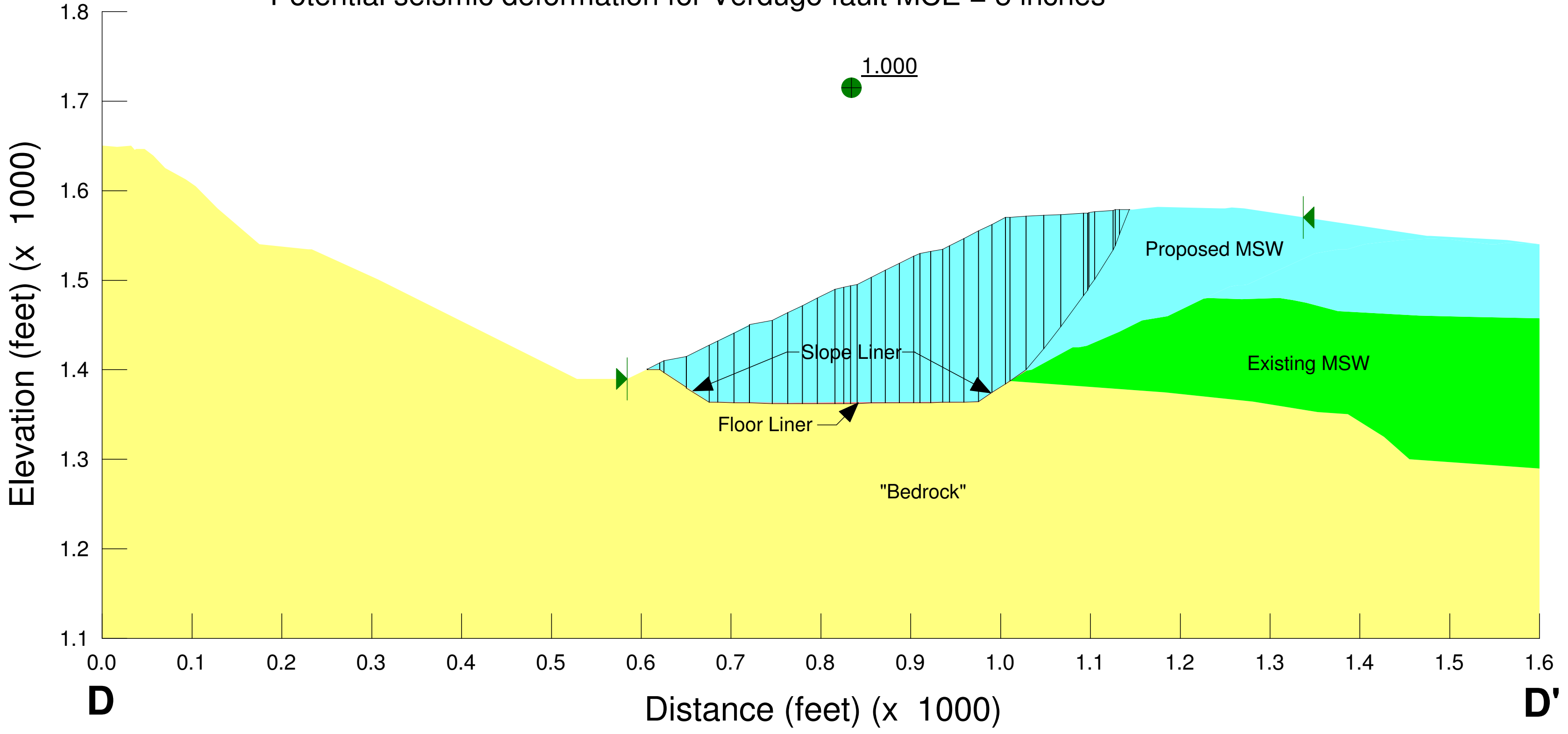
Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

Name: CALF-2B Floor Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Floor

Name: CALF-2B Slope Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Slope

Name: Bedrock
Model: Bedrock (Impenetrable)

Condition: Alternative 2 Liner stability
Potential seismic deformation for Verdugo fault MCE = 5 inches



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section E-E'
SectionE_0010.gsz
Date: 1/17/2012
Time: 4:00:22 PM
Method: Morgenstern-Price
Slip Surface Option: Auto-Search
Optimization: Yes

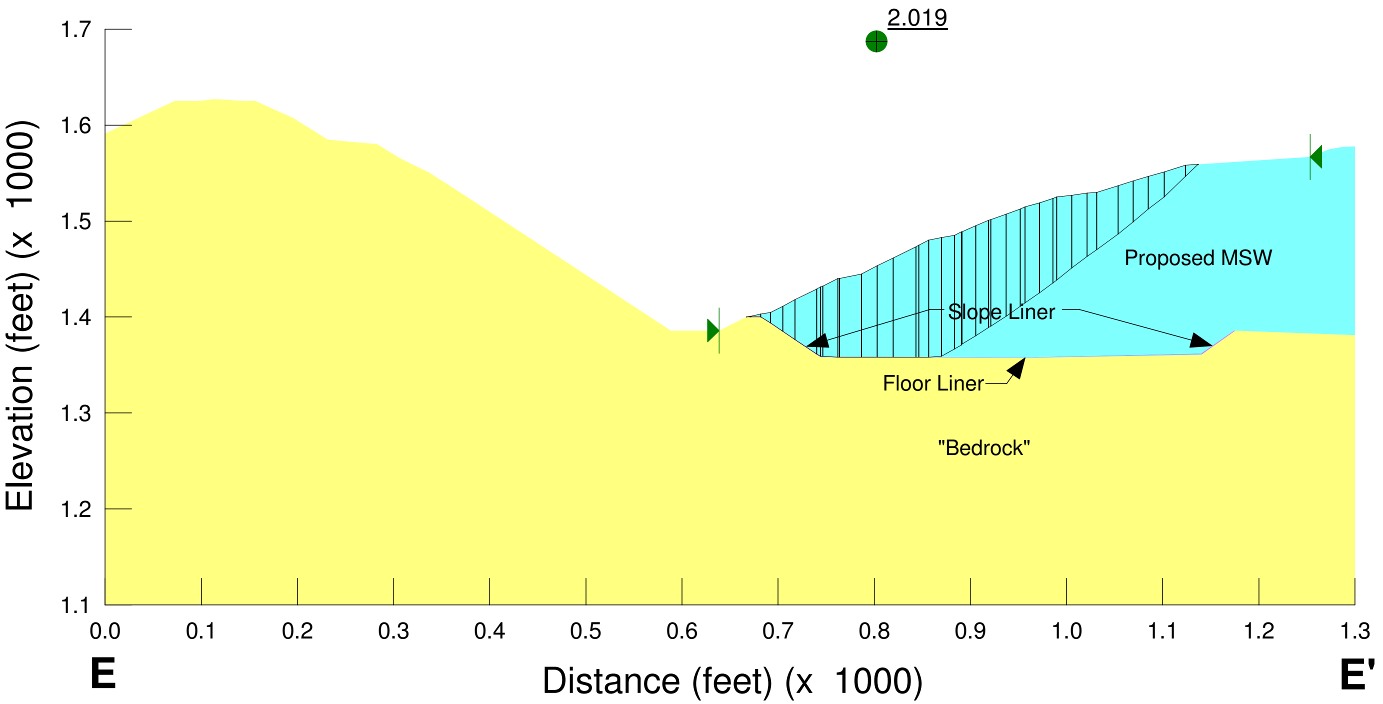
Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Bedrock
Model: Bedrock (Impenetrable)

Name: CALF-2B Floor Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Floor

Name: CALF-2B Slope Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Slope

Condition: Alternative 2



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section E-E'
SectionE_0010_S01.gsz
Date: 1/17/2012
Time: 4:00:35 PM
Method: Morgenstern-Price
Slip Surface Option: Auto-Search
Optimization: Yes
Horz Seismic Load: 0.333

Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

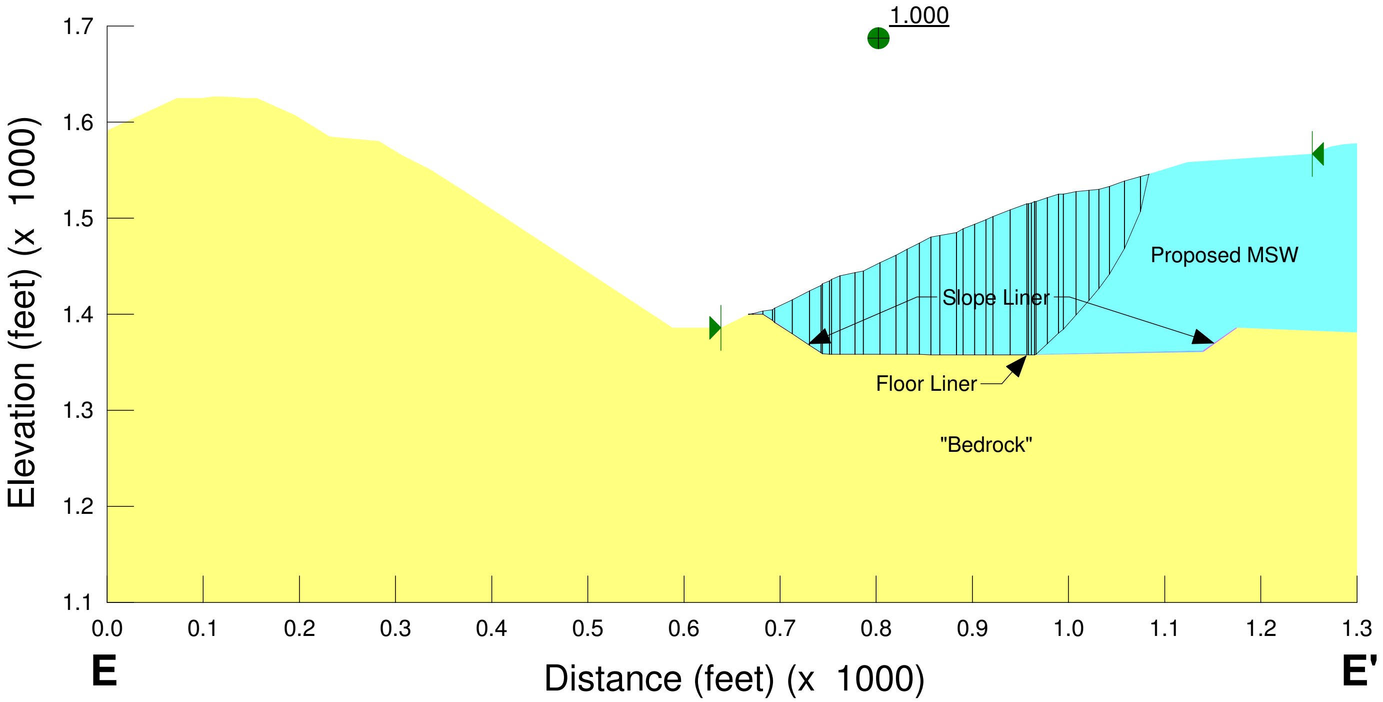
Name: Bedrock
Model: Bedrock (Impenetrable)

Name: CALF-2B Floor Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Floor

Name: CALF-2B Slope Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Slope

Condition: Alternative 2

Potential seismic deformation for Verdugo fault MCE = 1.8 inches



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section F-F'
SectionF_0320.gsz
Date: 1/18/2012
Time: 12:52:04 PM
Method: Morgenstern-Price
Slip Surface Option: Fully-Specified
Optimization: Yes

Condition: Alternative 2

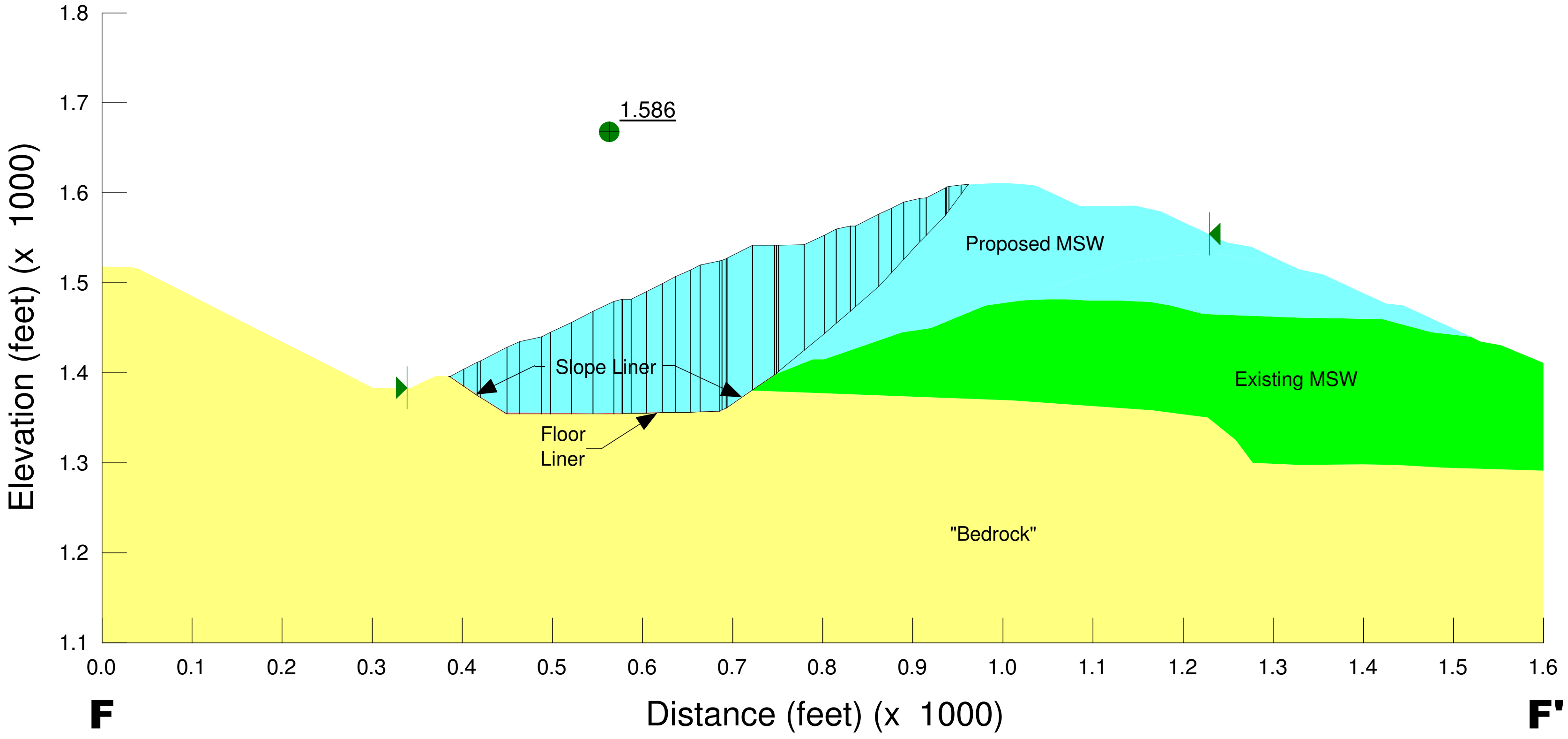
Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: CALF-2B Floor Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Floor

Name: CALF-2B Slope Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Slope

Name: Bedrock
Model: Bedrock (Impenetrable)



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section F-F'
SectionF_0320_S02.gsz
Date: 1/18/2012
Time: 1:07:00 PM
Method: Morgenstern-Price
Slip Surface Option: Fully-Specified
Optimization: Yes
Horz Seismic Load: 0.226

Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

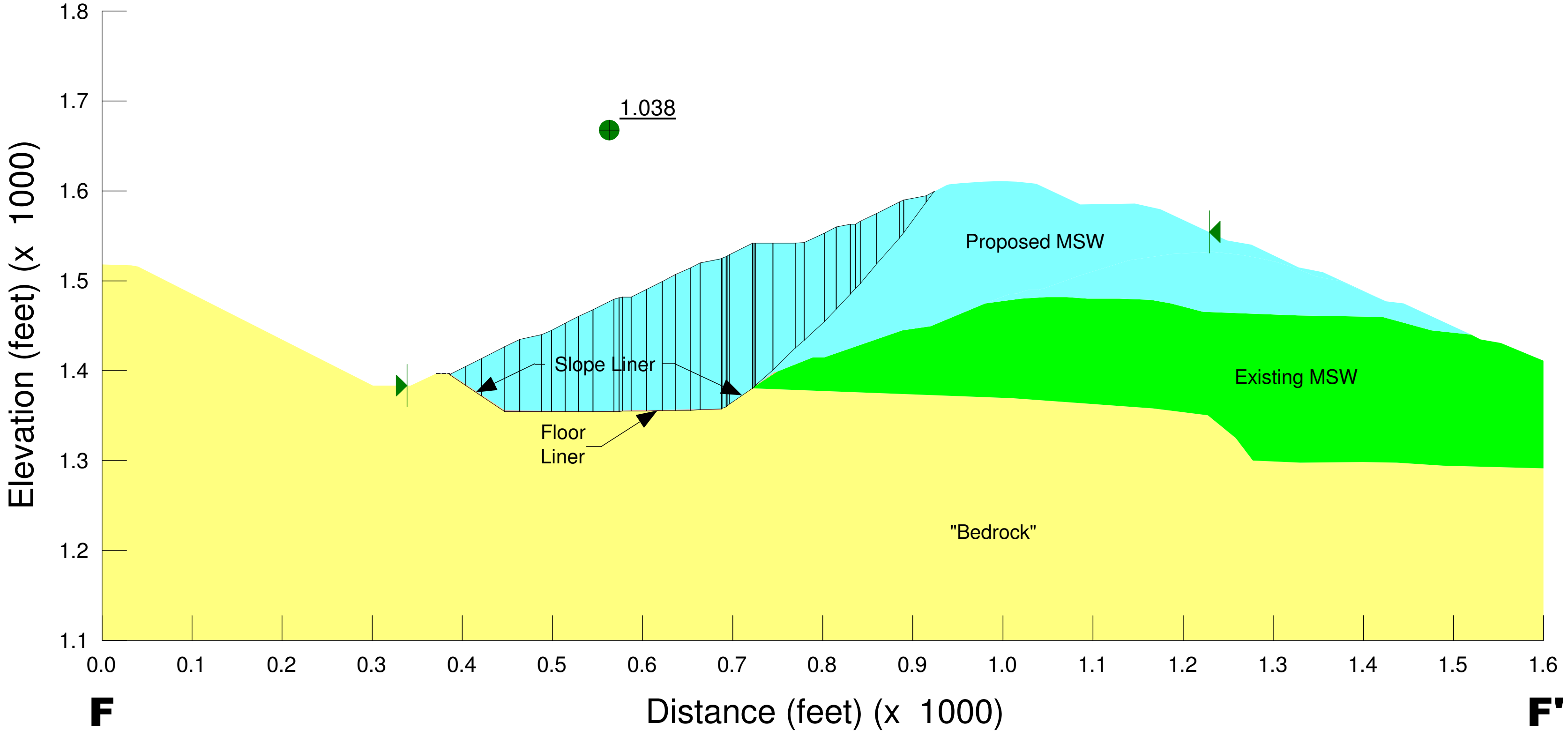
Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

Name: CALF-2B Floor Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Floor

Name: CALF-2B Slope Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Slope

Name: Bedrock
Model: Bedrock (Impenetrable)

Condition: Alternative 2
Potential seismic deformation for Verdugo fault MCE = 5.6 inches



Geo-Logic
ASSOCIATES

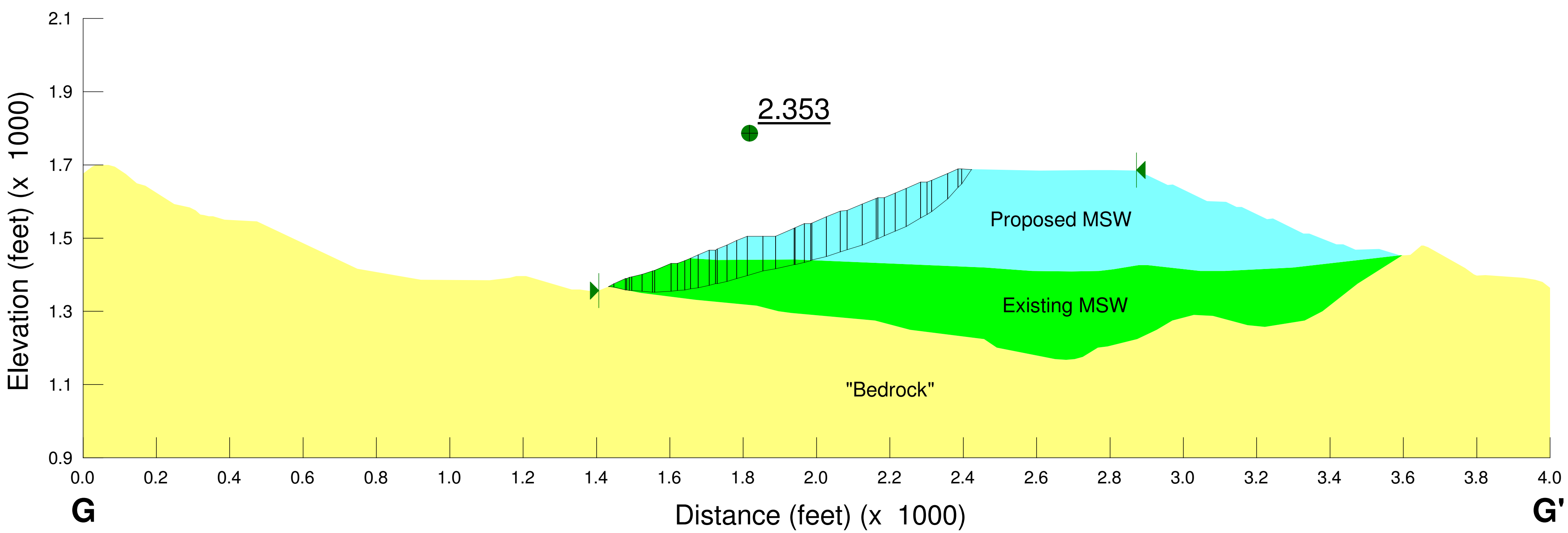
Scholl Canyon Landfill
Cross-Section G-G'
SectionG_0001.gsz
Date: 1/17/2012
Time: 4:06:25 PM
Method: Morgenstern-Price
Slip Surface Option: Auto-Search
Optimization: Yes

Condition: Alternative 1

Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Bedrock
Model: Bedrock (Impenetrable)



Geo-Logic
ASSOCIATES

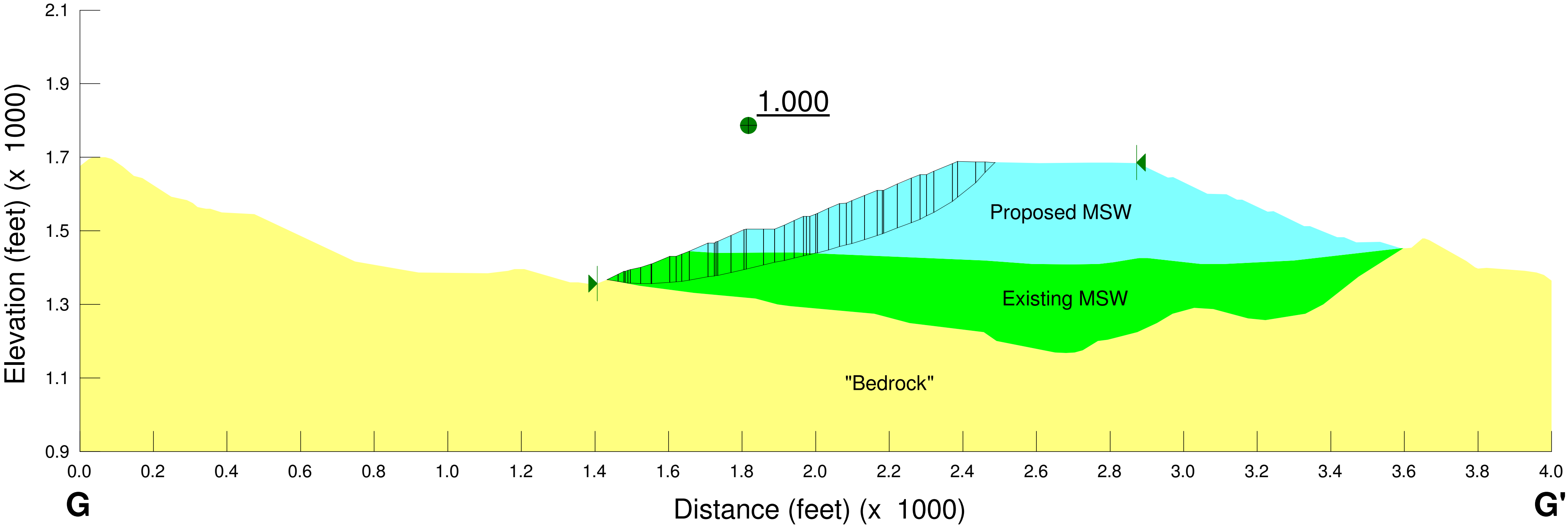
Scholl Canyon Landfill
Cross-Section G-G'
SectionG_0001_S01.gsz
Date: 1/17/2012
Time: 4:06:10 PM
Method: Morgenstern-Price
Slip Surface Option: Auto-Search
Optimization: Yes
Horz Seismic Load: 0.488

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

Name: Bedrock
Model: Bedrock (Impenetrable)

Condition: Alternative 1
Potential seismic deformation for Verdugo fault MCE = 0.6 inches



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section G-G'
SectionG_0020.gsz
Date: 1/17/2012
Time: 4:05:56 PM
Method: Morgenstern-Price
Slip Surface Option: Auto-Search
Optimization: Yes

Condition: Alternative 2

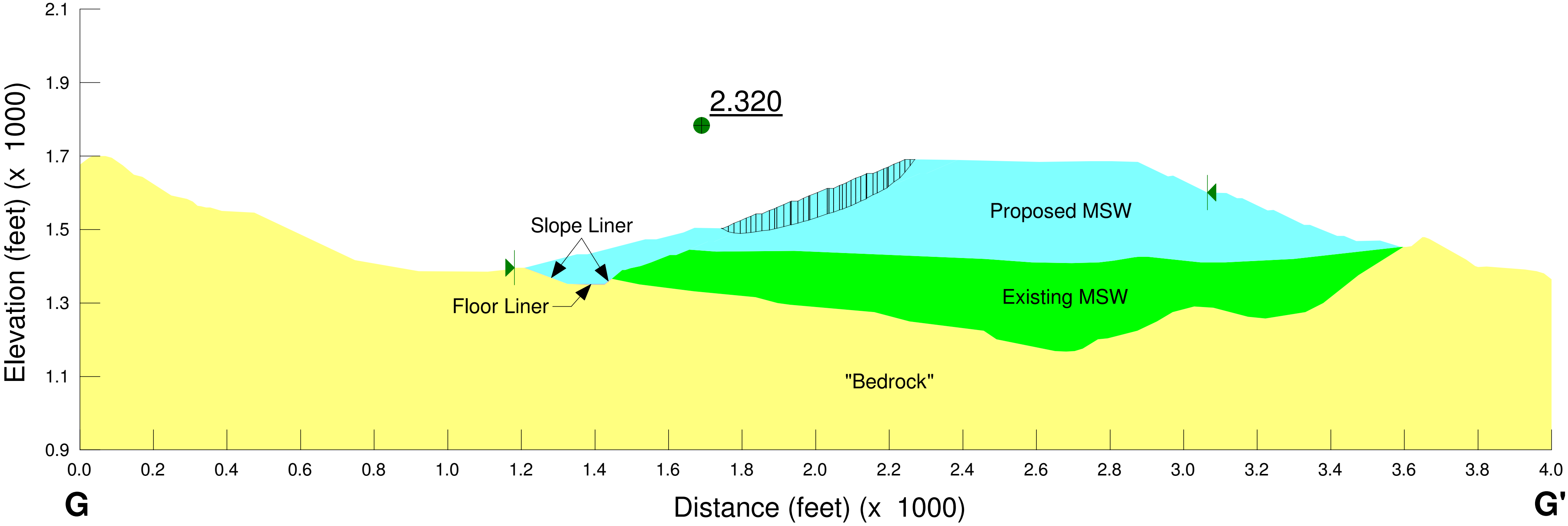
Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Bedrock
Model: Bedrock (Impenetrable)

Name: CALF-2B Floor Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Floor

Name: CALF-2B Slope Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Slope



Geo-Logic ASSOCIATES

Scholl Canyon Landfill
Cross-Section G-G'
SectionG_0020_S01.gsz
Date: 1/17/2012
Time: 4:05:40 PM
Method: Morgenstern-Price
Slip Surface Option: Auto-Search
Optimization: Yes
Horz Seismic Load: 0.52

Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

Name: Existing MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

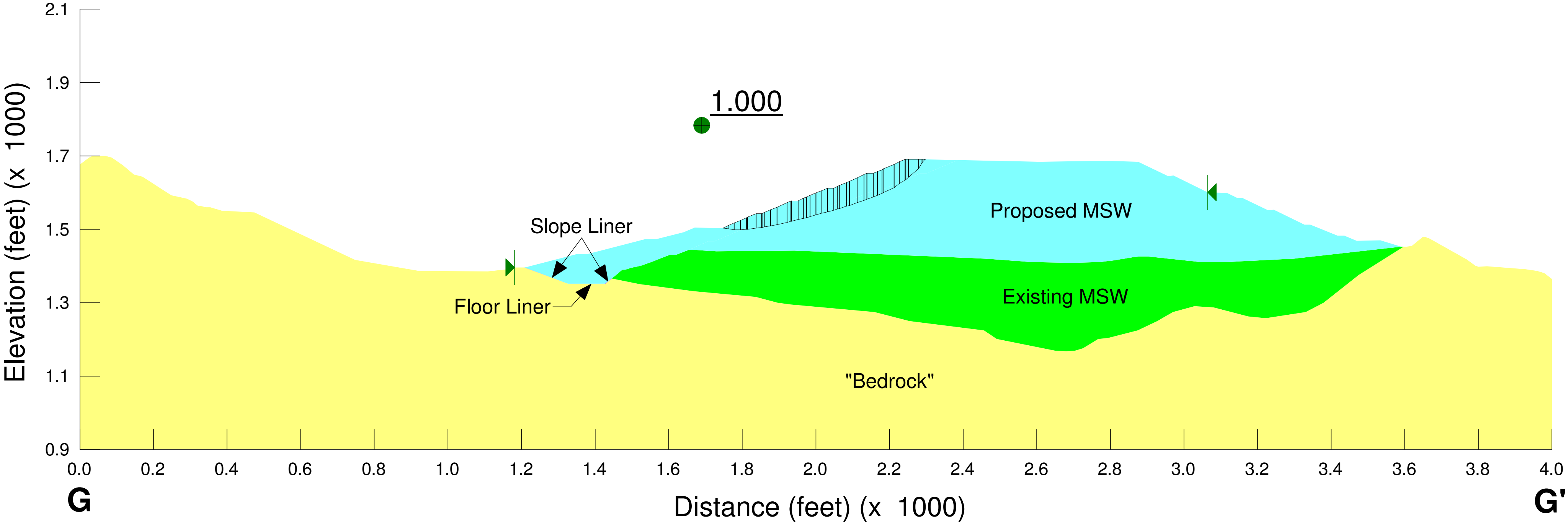
Name: Bedrock
Model: Bedrock (Impenetrable)

Name: CALF-2B Floor Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Floor

Name: CALF-2B Slope Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Slope

Condition: Alternative 2

Potential seismic deformation for Verdugo fault MCE = 2.2 inches



Geo-Logic ASSOCIATES

Scholl Canyon Landfill
Cross-Section H-H'
SectionH_0010.gsz
Date: 1/17/2012
Time: 4:12:52 PM
Method: Morgenstern-Price
Slip Surface Option: Fully-Specified
Optimization: Yes

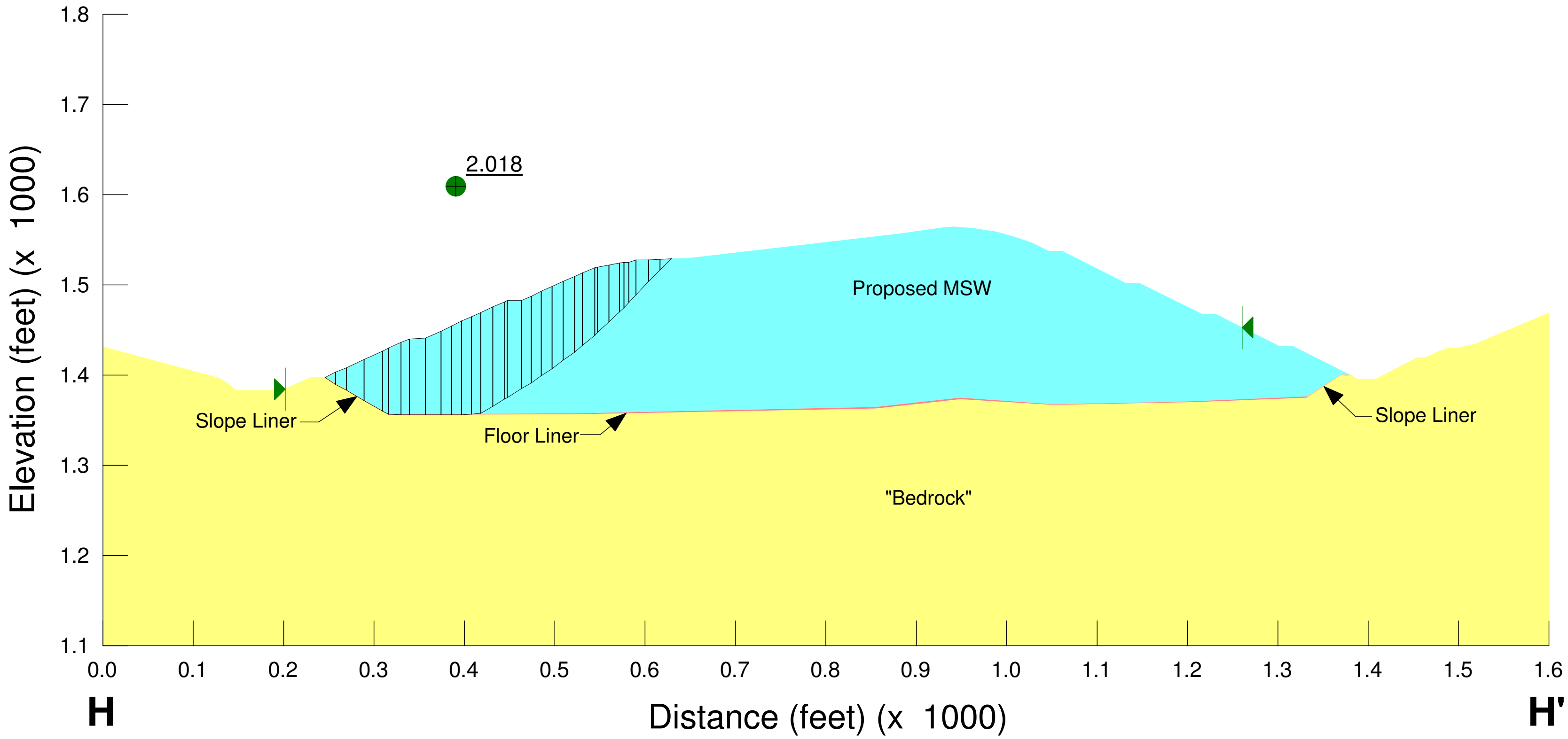
Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Bedrock
Model: Bedrock (Impenetrable)

Name: CALF-2B Floor Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Floor

Name: CALF-2B Slope Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Slope

Condition: Alternative 2



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section H-H'
SectionH_0010_S01.gsz
Date: 1/17/2012
Time: 4:13:06 PM
Method: Morgenstern-Price
Slip Surface Option: Fully-Specified
Optimization: Yes
Horz Seismic Load: 0.328

Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

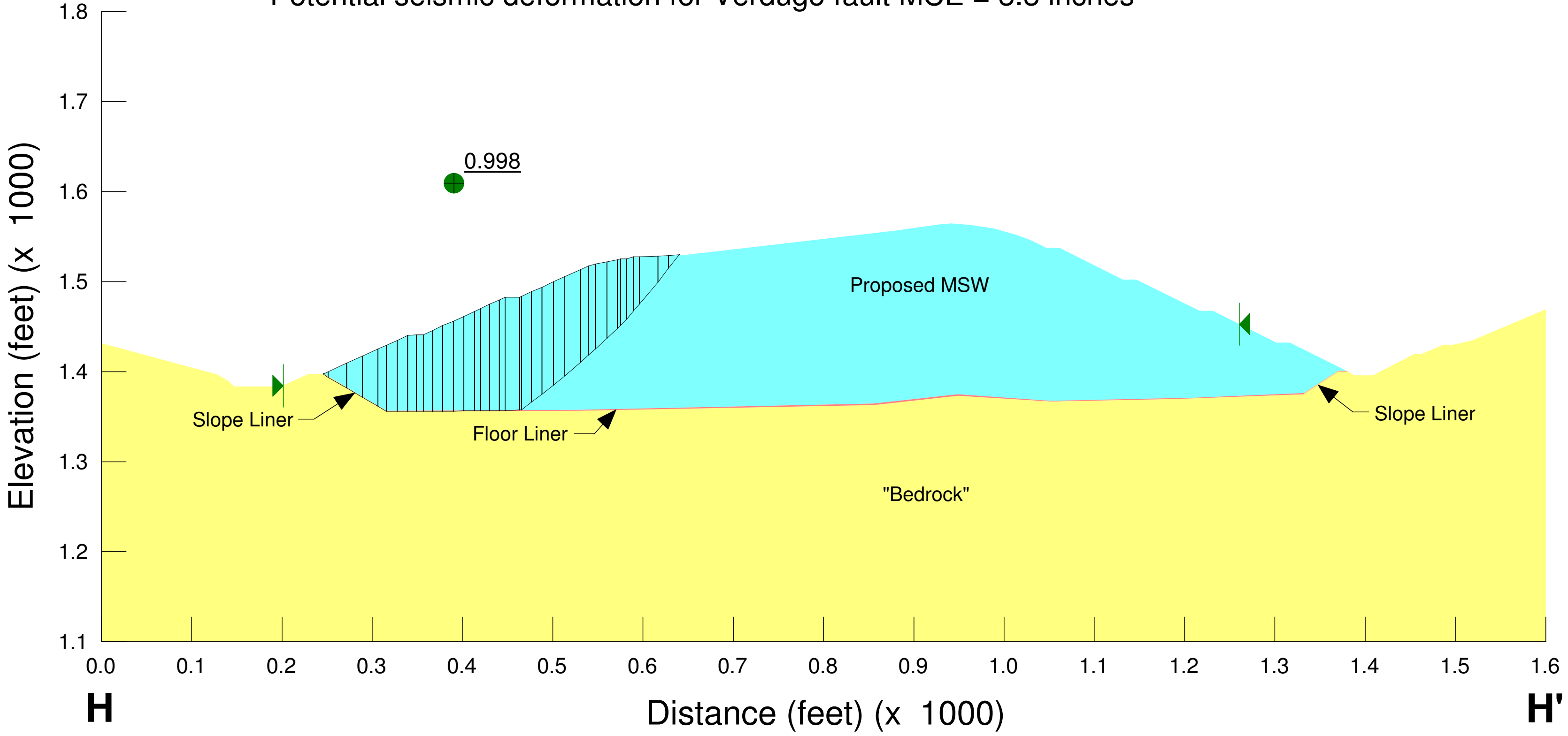
Name: Bedrock
Model: Bedrock (Impenetrable)

Name: CALF-2B Floor Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Floor

Name: CALF-2B Slope Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Slope

Condition: Alternative 2

Potential seismic deformation for Verdugo fault MCE = 3.3 inches



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section H-H'
SectionH_0020.gsz
Date: 1/18/2012
Time: 1:51:50 PM
Method: Morgenstern-Price
Slip Surface Option: Auto-Search
Optimization: Yes

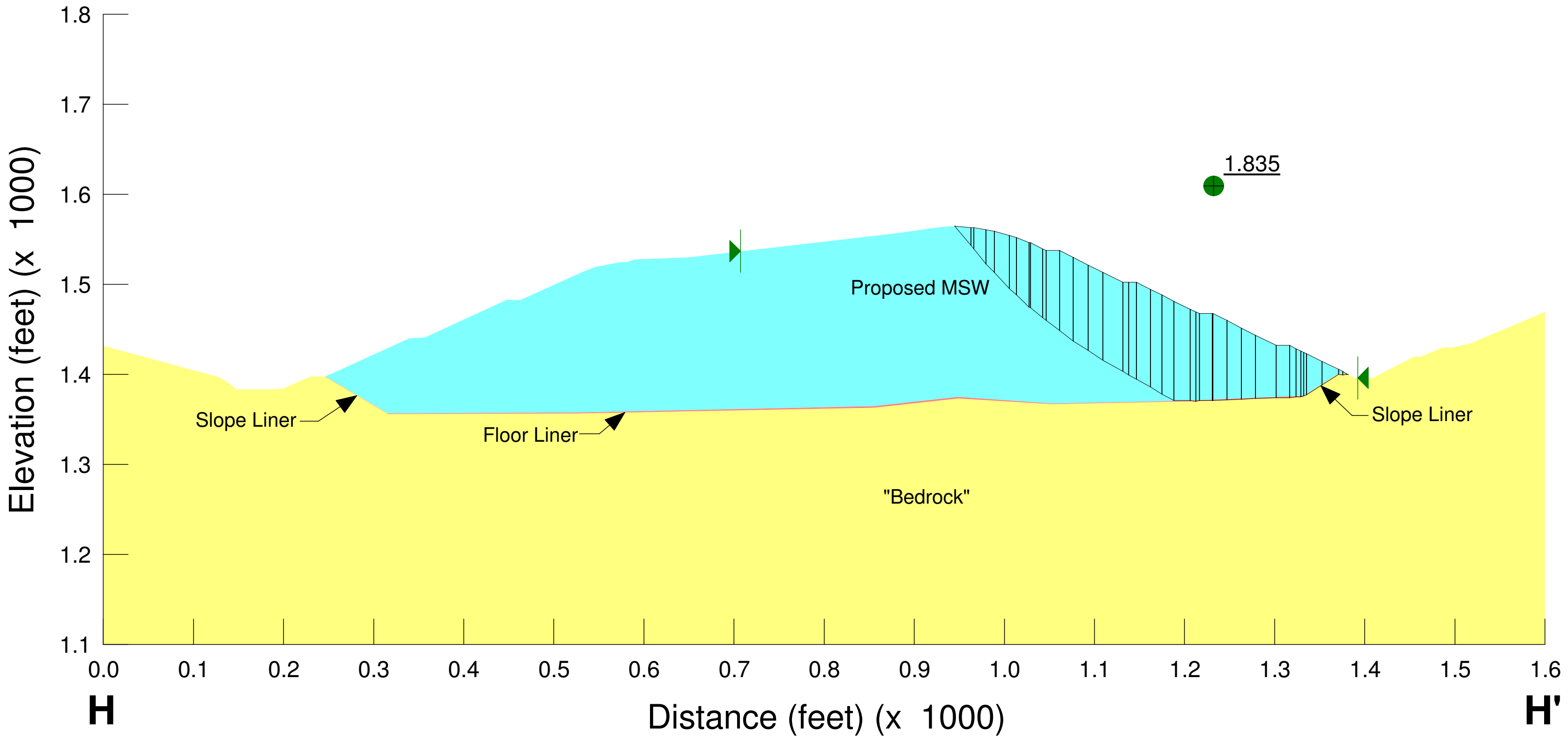
Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW

Name: Bedrock
Model: Bedrock (Impenetrable)

Name: CALF-2B Floor Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Floor

Name: CALF-2B Slope Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Slope

Condition: Alternative 2



Geo-Logic
ASSOCIATES

Scholl Canyon Landfill
Cross-Section H-H'
SectionH_0020_S01.gsz
Date: 1/18/2012
Time: 2:06:01 PM
Method: Morgenstern-Price
Slip Surface Option: Auto-Search
Optimization: Yes
Horz Seismic Load: 0.299

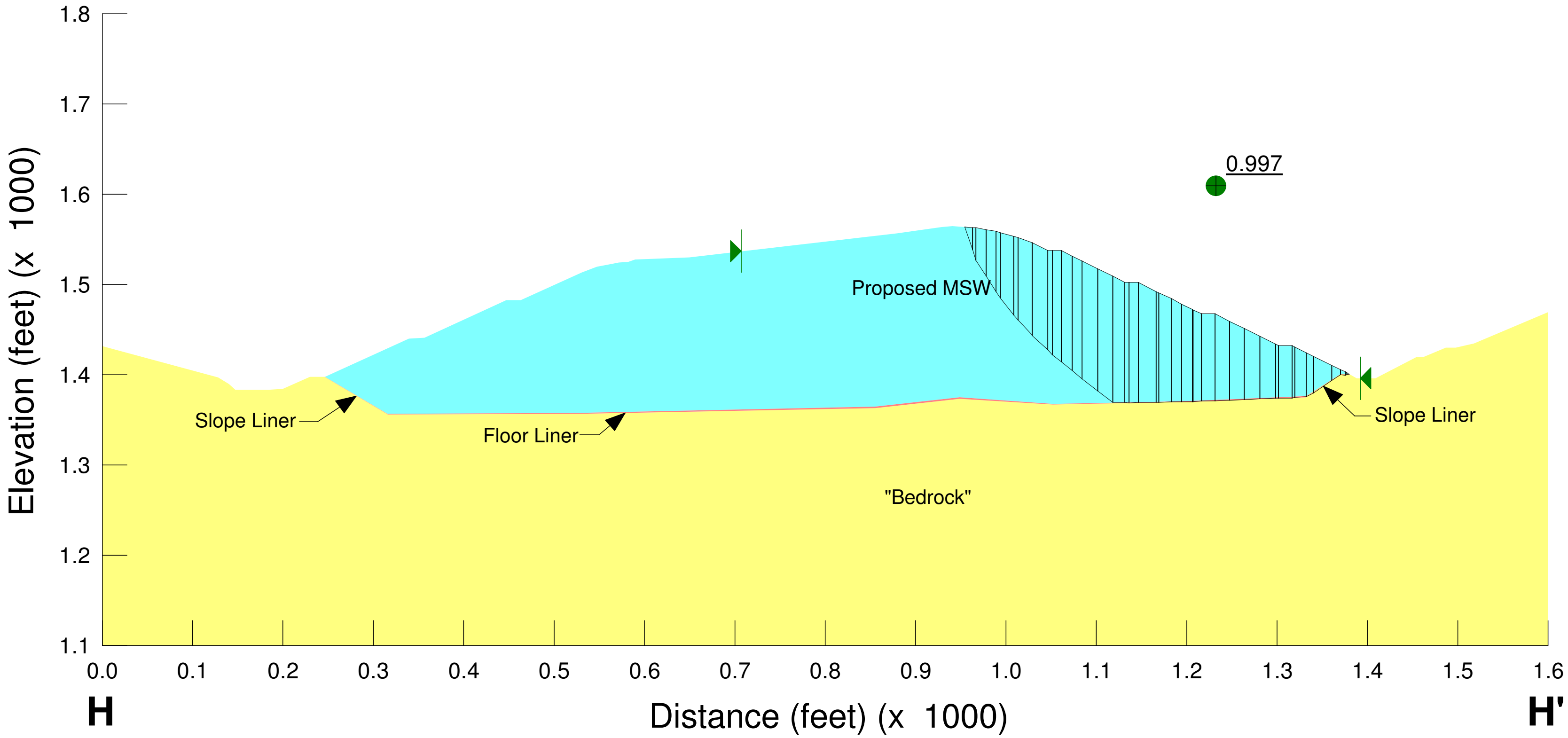
Name: Proposed MSW
Model: Shear/Normal Fn.
Unit Weight: 80 pcf
Strength Function: MSW (Dynamic)

Name: Bedrock
Model: Bedrock (Impenetrable)

Name: CALF-2B Floor Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Floor

Name: CALF-2B Slope Liner
Model: Shear/Normal Fn.
Unit Weight: 100 pcf
Strength Function: CALF-2B Slope

Condition: Alternative 2
Potential seismic deformation for Verdugo fault MCE = 3.6 inches



Geo-Logic
ASSOCIATES

APPENDIX E-3

POTENTIAL SEISMICALLY-INDUCED PERMANENT DEFORMATION CALCULATIONS

1/20/2012 Scholl Canyon Landfill
2010-0138 RC

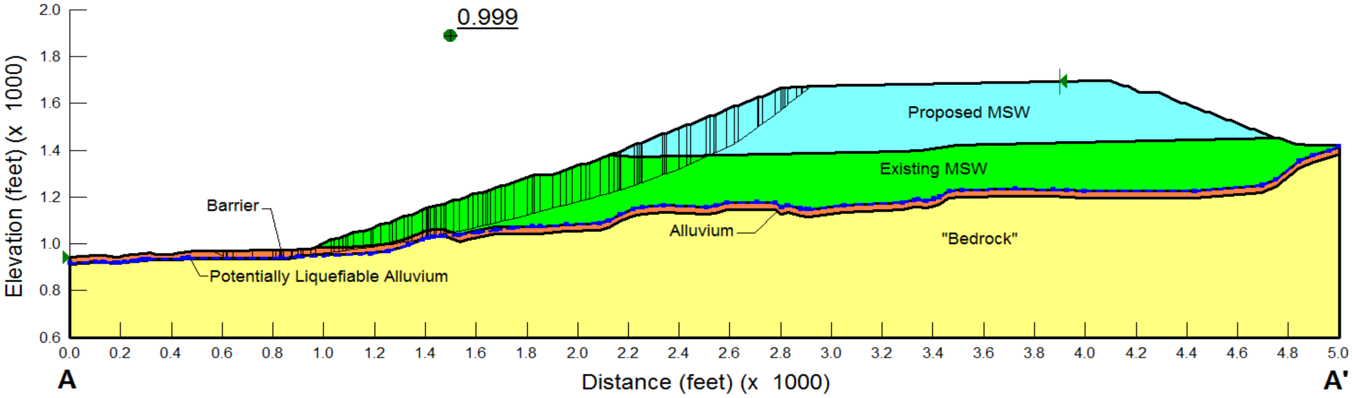
Calculate Estimated Seismically-Induced Permanent Displacement

<u>Source Parameters</u>

Fault: Verdugo
MCE/MPE?: MCE
EQ mag, Mw = 6.9 = Mmax from USGS 2008 fault database
Spectral Acceleration (Sa(1.5Ts)) = .495 g from Avg. NGA Sa for Ts = 1.2915 sec.
PGA = .67 g PGA for info only: NOT USED

<u>Slope Parameters</u>

H = 148.0 ft = 45.1 m 85 percent of max height
Ky = 0.362 from pseudo-static slope stability analysis (SectionA_0021_S01.gsz)
Vs,avg = V0 + V1 = 210 m/s = 687 ft/s
V0 = 130 m/s (@ top of waste)
V1 = 289 m/s (@ base of 45.1 m of waste)



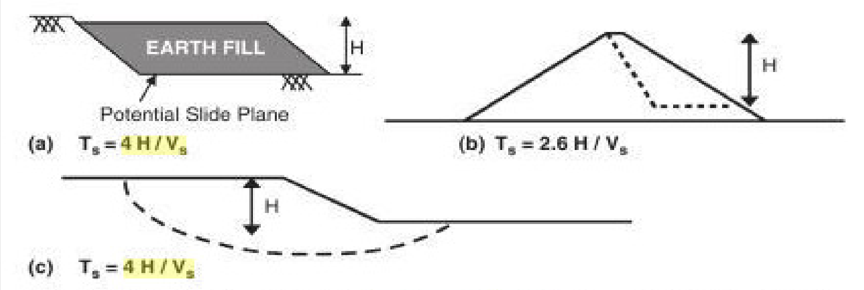


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Use: Ts = 4.0 H/Vs,avg
Ts = **0.861 sec.**
1.5Ts = **1.292 sec.**

<u>Results</u>

*Note: results calc'd per Bray and Travasarou (2008)** using spreadsheet developed by these authors.*

*** Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007*

Seismic Displacement, D, with 16% probability of exceedence:	**2.2 cm** **0.9 inches**

1/20/2012 Scholl Canyon Landfill
2010-0138 RC

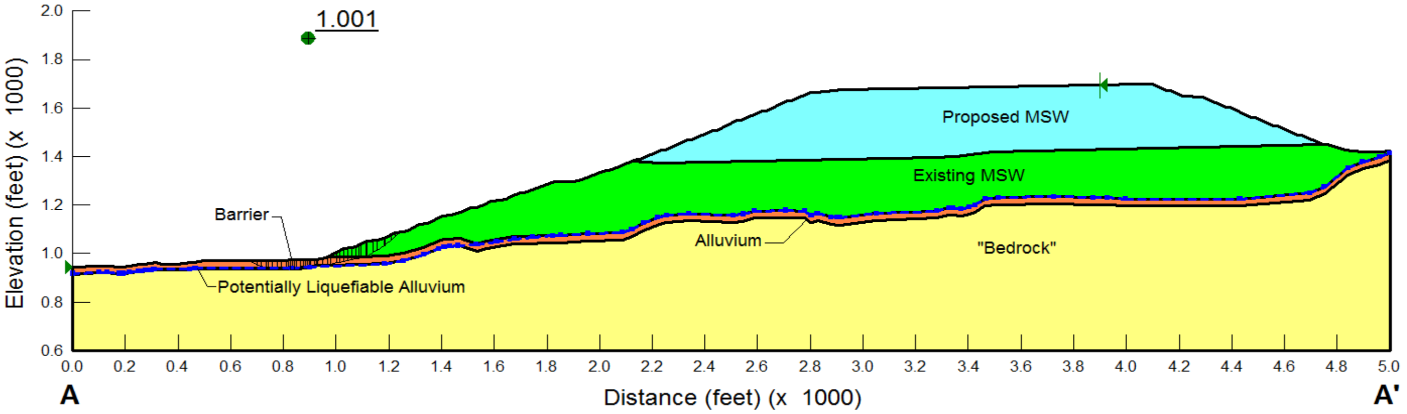
Calculate Estimated Seismically-Induced Permanent Displacement

Source Parameters

Fault: Verdugo
MCE/MPE?: MCE
EQ mag, Mw = 6.9 = Mmax from USGS 2008 fault database
Spectral Acceleration (Sa(1.5Ts)) = 1.100 g from Avg. NGA Sa for Ts = 0.582 sec.
PGA = .67 g PGA for info only: NOT USED

Slope Parameters

H = 53.0 ft = 16.2 m 85 percent of max height
Ky = 0.406 from pseudo-static slope stability analysis (SectionA_0031_S01.gsz)
Vs,avg = V0 + V1 = 167 m/s = 548 ft/s
V0 = 130 m/s (@ top of waste)
V1 = 204 m/s (@ base of 16.2 m of waste)



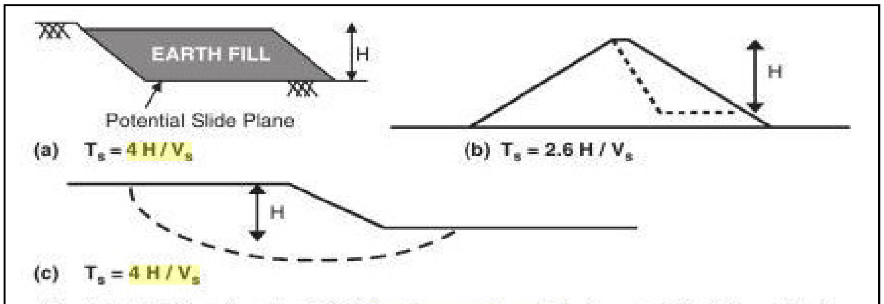


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Use: Ts = 4.0 H/Vs,avg
Ts = 0.388 sec.
1.5Ts = 0.582 sec.

Results

*Note: results calc'd per Bray and Travasarou (2008)** using spreadsheet developed by these authors.*

*** Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007*

Seismic Displacement, D, with 16% probability of exceedence: **13.6 cm**
5.3 inches

1/9/2012 Scholl Canyon Landfill
2010-0138 RC

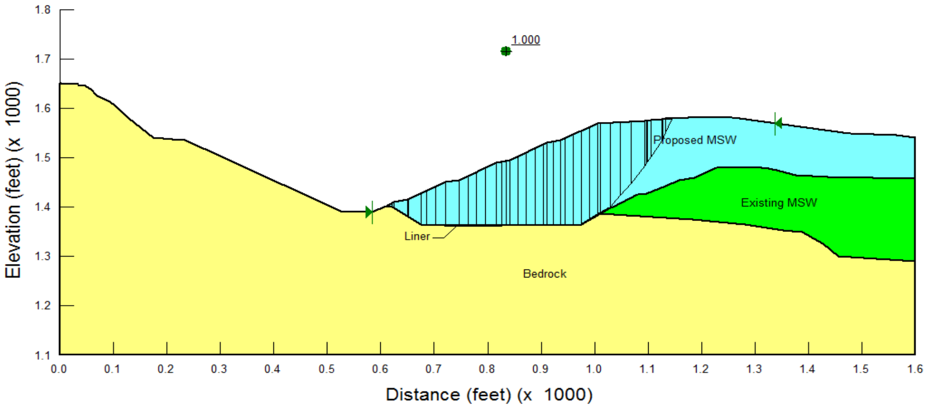
Calculate Estimated Seismically-Induced Permanent Displacement

Source Parameters

Fault: Verdugo
MCE/MPE?: MCE
EQ mag, Mw = 6.9 = Mmax from USGS 2008 fault database
Spectral Acceleration (Sa(1.5Ts)) = .460 g from Avg. NGA Sa for Ts = 1.365 sec.
PGA = .67 g PGA for info only: NOT USED

Slope Parameters

H = 160.0 ft = 48.8 m 85 percent of max height
Ky = 0.217 from pseudo-static slope stability analysis (SectionD_0020_S01.gsz)
Vs,avg = V0 + V1 = 215 m/s = 704 ft/s
V0 = 130 m/s (@ top of waste)
V1 = 299 m/s (@ base of 48.8 m of waste)



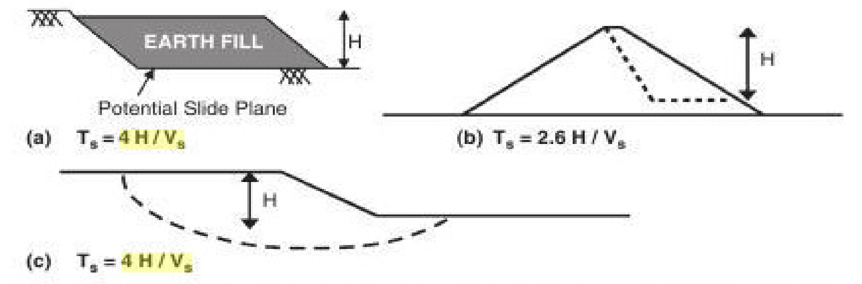


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Use: Ts = 4.0 H/Vs,avg
Ts = 0.910 sec.
1.5Ts = 1.365 sec.

Results

*Note: results calc'd per Bray and Travasarou (2008)** using spreadsheet developed by these authors.*
*** Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007*

Seismic Displacement, D, with 16% probability of exceedence: **12.7 cm**
5.0 inches

1/10/2012 Scholl Canyon Landfill
2010-0138 RC

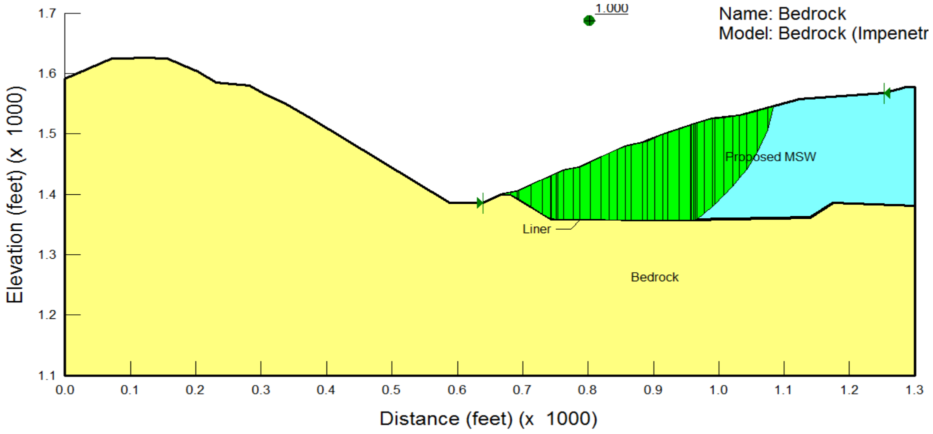
Calculate Estimated Seismically-Induced Permanent Displacement

Source Parameters

Fault: Verdugo
MCE/MPE?: MCE
EQ mag, Mw = 6.9 = Mmax from USGS 2008 fault database
Spectral Acceleration (Sa(1.5Ts)) = .540 g from Avg. NGA Sa for Ts = 1.206 sec.
PGA = .67 g PGA for info only: NOT USED

Slope Parameters

H = 135.0 ft = 41.1 m 85 percent of max height
Ky = 0.333 from pseudo-static slope stability analysis (SectionE_0010_S01.gsz)
Vs,avg = V0 + V1 = 205 m/s = 671 ft/s
V0 = 130 m/s (@ top of waste)
V1 = 279 m/s (@ base of 41.1 m of waste)



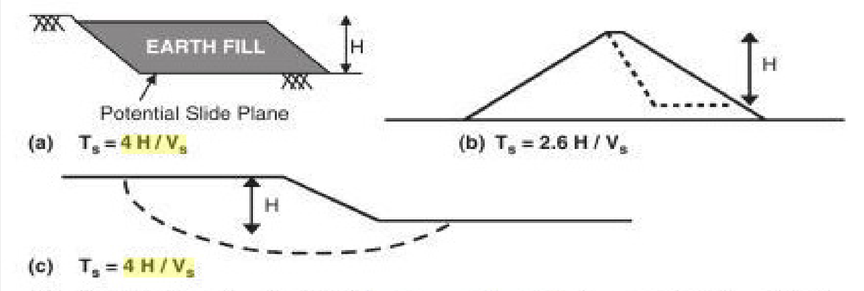


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Use: Ts = 4.0 H/Vs,avg
Ts = 0.804 sec.
1.5Ts = 1.206 sec.

Results

*Note: results calc'd per Bray and Travasarou (2008)** using spreadsheet developed by these authors.*

*** Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007*

Seismic Displacement, D, with 16% probability of exceedence: **4.6 cm**
1.8 inches

1/6/2012 Scholl Canyon Landfill
2010-0138 RC

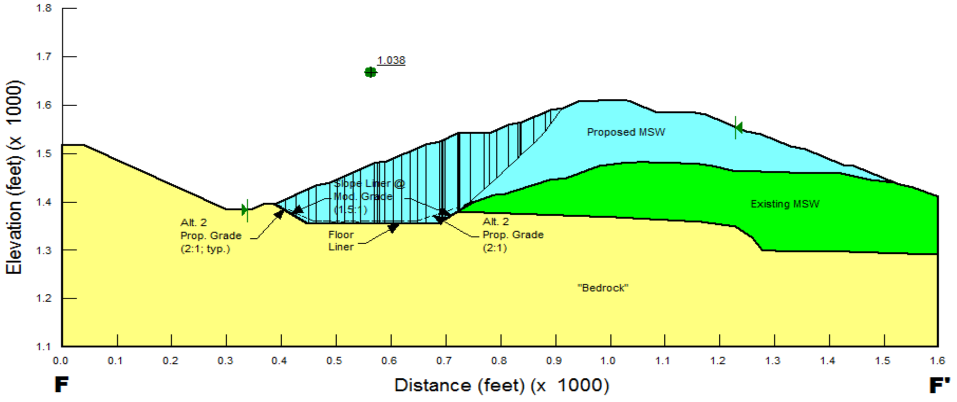
Calculate Estimated Seismically-Induced Permanent Displacement

Source Parameters

Fault: Verdugo
MCE/MPE?: MCE
EQ mag, Mw = 6.9 = Mmax from USGS 2008 fault database
Spectral Acceleration (Sa(1.5Ts)) = .520 g from Avg. NGA Sa for Ts = 1.2465 sec.
PGA = .67 g PGA for info only: NOT USED

Slope Parameters

H = 141 ft = 43 m 85 percent of max height
Ky = 0.226 from pseudo-static slope stability analysis (SectionF_0320_S02.gsz)
Vs,avg = V0 + V1 = 207 m/s = 679 ft/s
V0 = 130 m/s (@ top of waste)
V1 = 284 m/s (@ base of 43 m of waste)



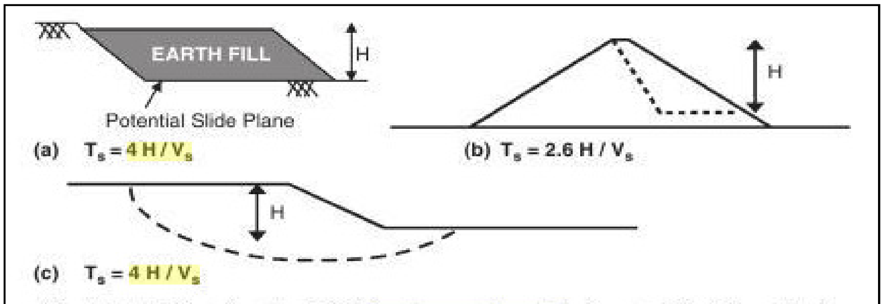


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Use: Ts = 4.0 H/Vs,avg
Ts = **0.831 sec.**
1.5Ts = **1.247 sec.**

Results

*Note: results calc'd per Bray and Travasarou (2008)** using spreadsheet developed by these authors.*
*** Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007*

Seismic Displacement, D, with 16% probability of exceedence: **14.3 cm**
5.6 inches

1/10/2012 Scholl Canyon Landfill
2010-0138 RC

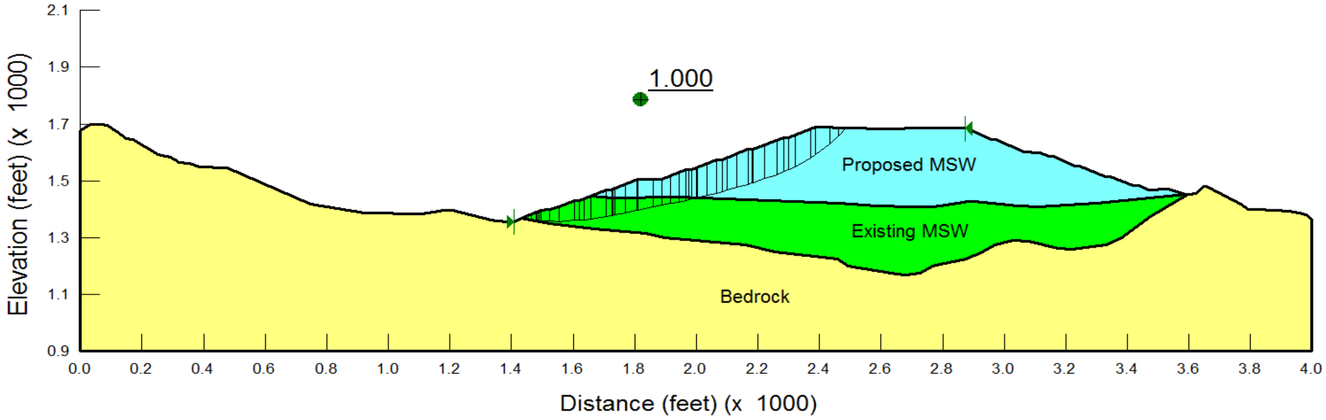
Calculate Estimated Seismically-Induced Permanent Displacement

Source Parameters

Fault: Verdugo
MCE/MPE?: MCE
EQ mag, Mw = 6.9 = Mmax from USGS 2008 fault database
Spectral Acceleration (Sa(1.5Ts)) = .670 g from Avg. NGA Sa for Ts = 0.987 sec.
PGA = .67 g PGA for info only: NOT USED

Slope Parameters

H = 103.0 ft = 31.4 m 85 percent of max height
Ky = 0.488 from pseudo-static slope stability analysis (SectionG_0001_S01.gsz)
Vs,avg = V0 + V1 = 191 m/s = 627 ft/s
V0 = 130 m/s (@ top of waste)
V1 = 252 m/s (@ base of 31.4 m of waste)



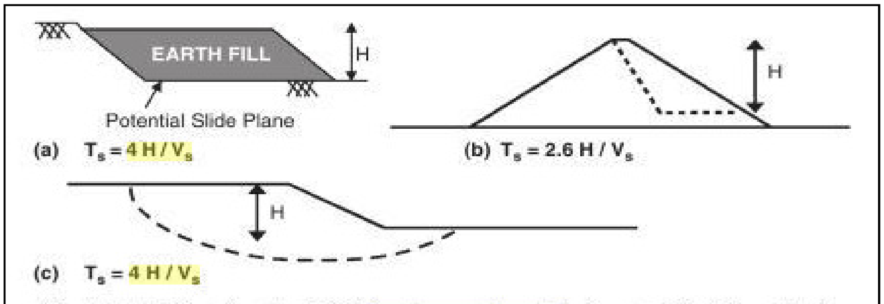


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Use: Ts = 4.0 H/Vs,avg
Ts = 0.658 sec.
1.5Ts = 0.987 sec.

Results

*Note: results calc'd per Bray and Travasarou (2008)** using spreadsheet developed by these authors.*

*** Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007*

Seismic Displacement, D, with 16% probability of exceedence: **1.6 cm**
0.6 inches

1/10/2012 Scholl Canyon Landfill
2010-0138 RC

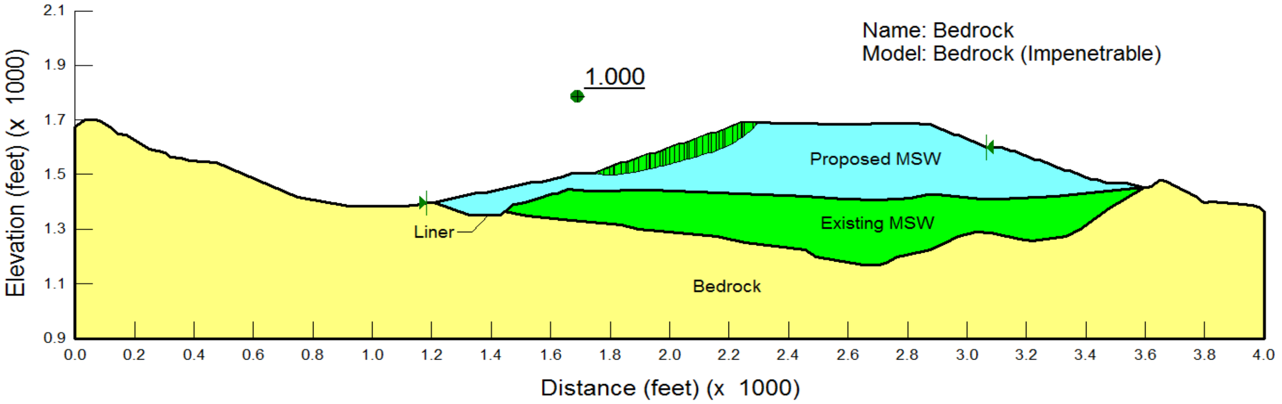
Calculate Estimated Seismically-Induced Permanent Displacement

Source Parameters

Fault: Verdugo
MCE/MPE?: MCE
EQ mag, Mw = 6.9 = Mmax from USGS 2008 fault database
Spectral Acceleration (Sa(1.5Ts)) = 1.010 g from Avg. NGA Sa for Ts = 0.6435 sec.
PGA = .67 g PGA for info only: NOT USED

Slope Parameters

H = 60.0 ft = 18.3 m 85 percent of max height
Ky = 0.52 from pseudo-static slope stability analysis (SectionG_0020_S01.gsz)
Vs,avg = V0 + V1 = 171 m/s = 559 ft/s
V0 = 130 m/s (@ top of waste)
V1 = 211 m/s (@ base of 18.3 m of waste)



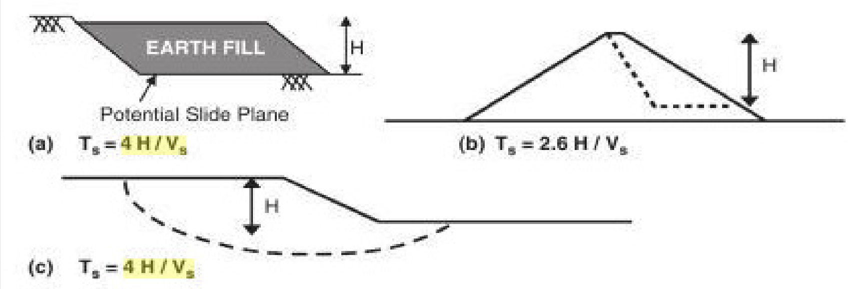


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Use: Ts = 4.0 H/Vs,avg
Ts = 0.429 sec.
1.5Ts = 0.644 sec.

Results

*Note: results calc'd per Bray and Travasarou (2008)** using spreadsheet developed by these authors.*

*** Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007*

Seismic Displacement, D, with 16% probability of exceedence: **5.7 cm**
2.2 inches

1/9/2012 Scholl Canyon Landfill
2010-0138 RC

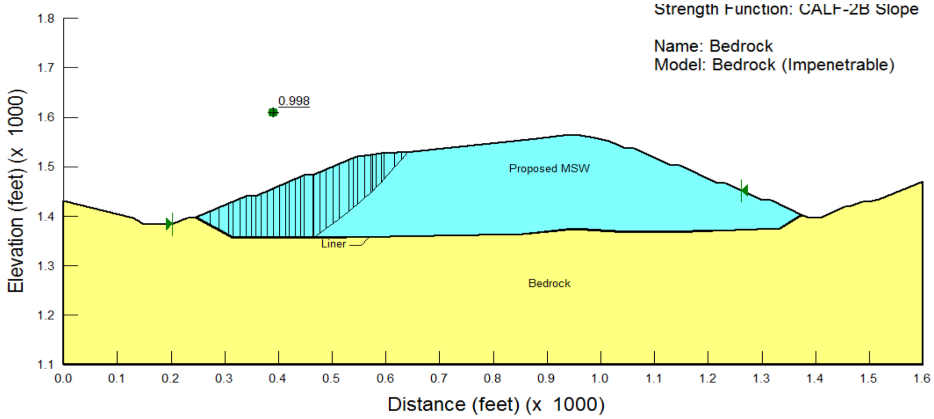
Calculate Estimated Seismically-Induced Permanent Displacement

Source Parameters

Fault: Verdugo
MCE/MPE?: MCE
EQ mag, Mw = 6.9 = Mmax from USGS 2008 fault database
Spectral Acceleration (Sa(1.5Ts)) = .660 g from Avg. NGA Sa for Ts = 1.0065 sec.
PGA = .67 g PGA for info only: NOT USED

Slope Parameters

H = 106.0 ft = 32.3 m 85 percent of max height
Ky = 0.328 from pseudo-static slope stability analysis (SectionH_0010_S01.gsz)
Vs,avg = V0 + V1 = 193 m/s = 632 ft/s
V0 = 130 m/s (@ top of waste)
V1 = 255 m/s (@ base of 32.3 m of waste)



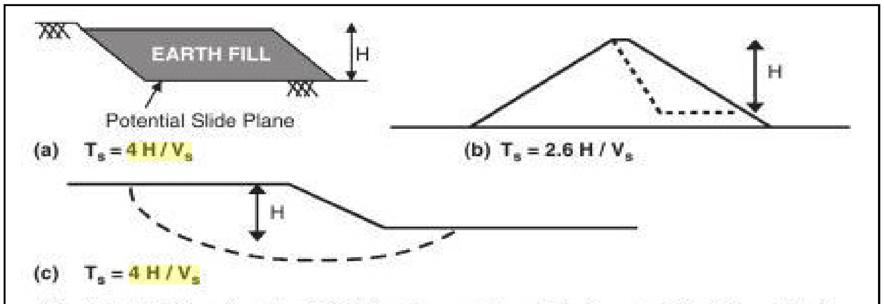


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Use: Ts = 4.0 H/Vs,avg
Ts = 0.671 sec.
1.5Ts = 1.007 sec.

Results

*Note: results calc'd per Bray and Travasarou (2008)** using spreadsheet developed by these authors.*

*** Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007*

Seismic Displacement, D, with 16% probability of exceedence: **8.3 cm**
3.3 inches

1/18/2012 Scholl Canyon Landfill
2010-0138 RC

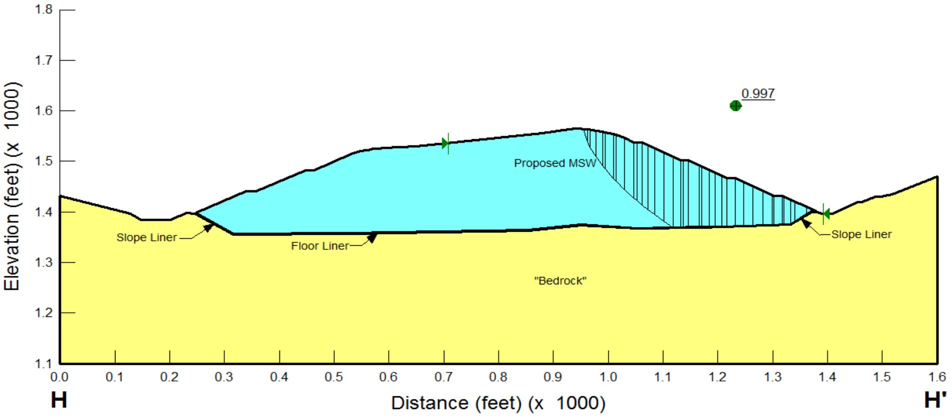
Calculate Estimated Seismically-Induced Permanent Displacement

Source Parameters

Fault: Verdugo
MCE/MPE?: MCE
EQ mag, Mw = 6.9 = Mmax from USGS 2008 fault database
Spectral Acceleration (Sa(1.5Ts)) = .610 g from Avg. NGA Sa for Ts = 1.0845 sec.
PGA = .67 g PGA for info only: NOT USED

Slope Parameters

H = 117.0 ft = 35.7 m 85 percent of max height
Ky = 0.299 from pseudo-static slope stability analysis (SectionH_0020_S01.gsz)
Vs,avg = V0 + V1 = 198 m/s = 648 ft/s
V0 = 130 m/s (@ top of waste)
V1 = 265 m/s (@ base of 35.7 m of waste)



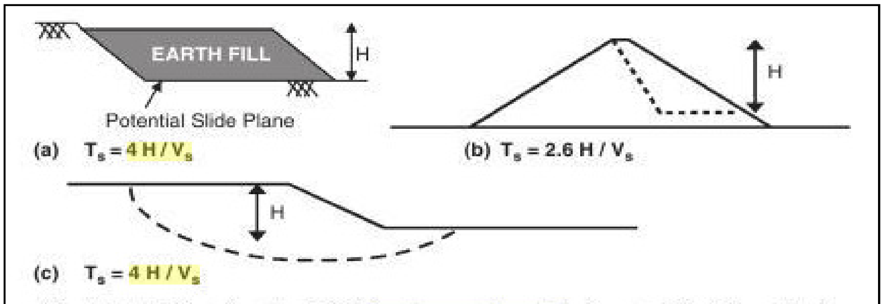


Fig. 14.4. Estimating the initial fundamental period of potential sliding blocks

Use: Ts = 4.0 H/Vs,avg
Ts = 0.723 sec.
1.5Ts = 1.085 sec.

Results

*Note: results calc'd per Bray and Travasarou (2008)** using spreadsheet developed by these authors.*

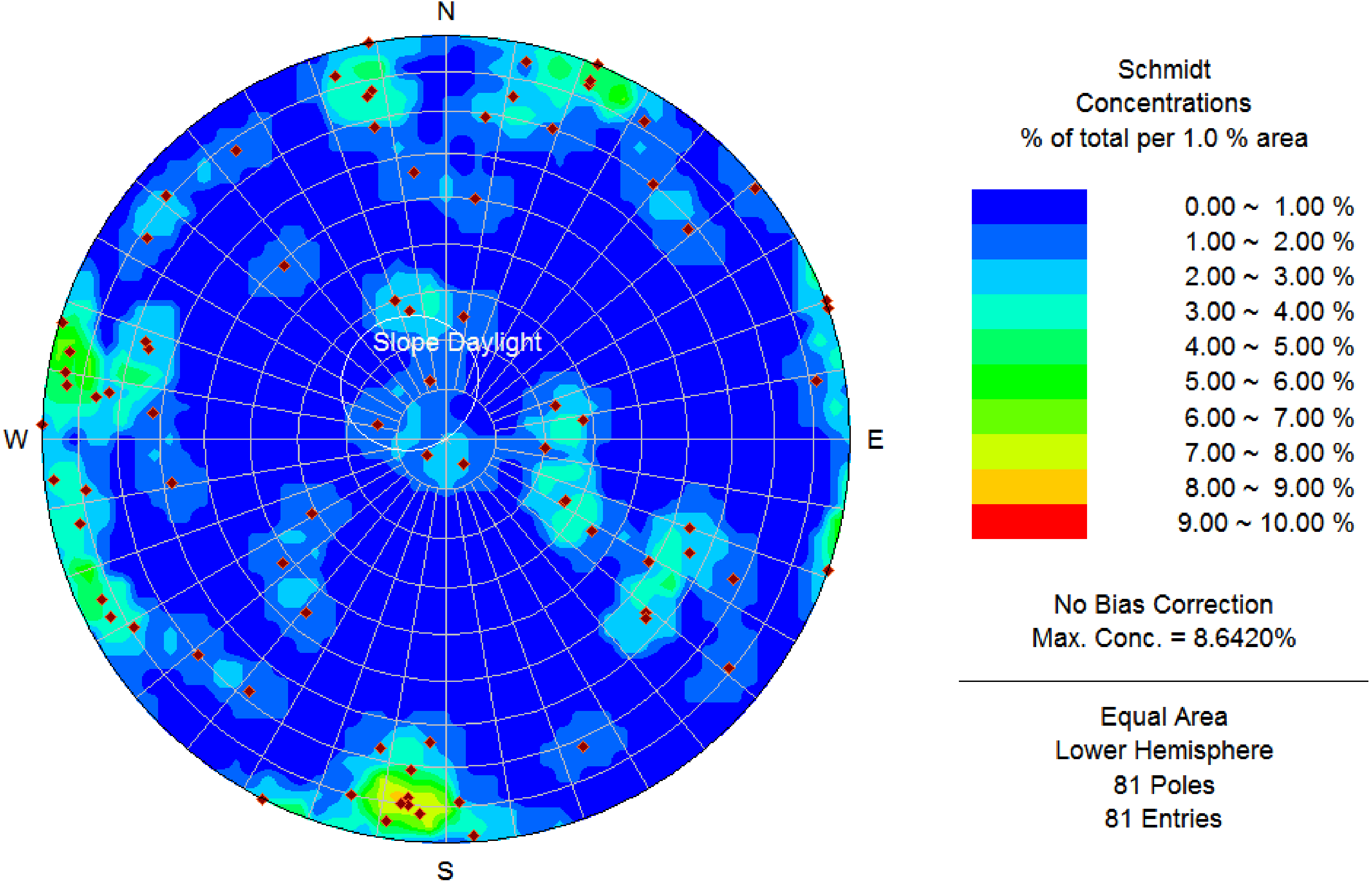
*** Journal of Geotechnical and Geonvironmental Engineering, ASCE, V. 133(4), pp. 381-392, April 2007*

Seismic Displacement, D, with 16% probability of exceedence:	**9.1 cm** **3.6 inches**

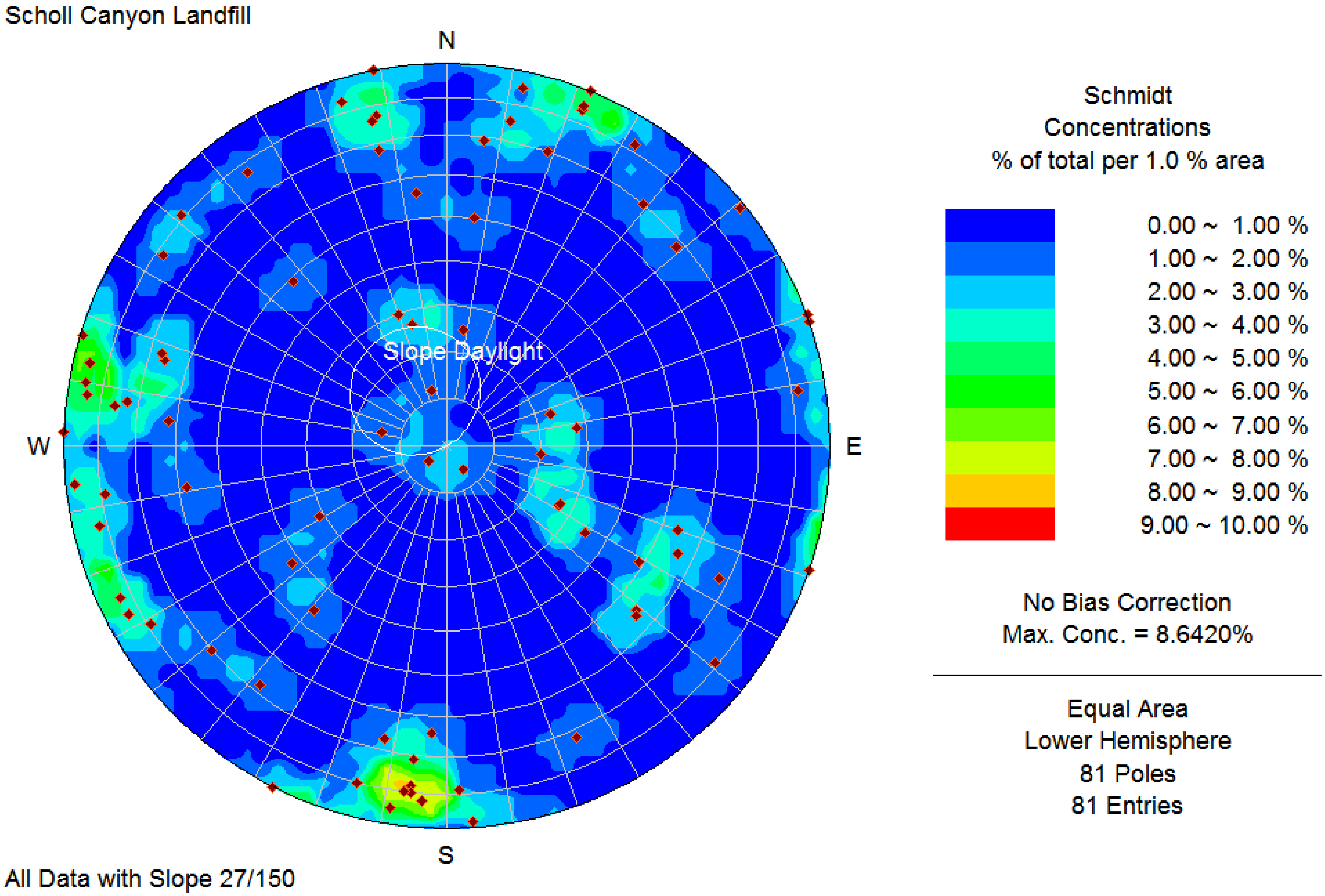
APPENDIX E-4

SINGLE-PLANE ROCK DISCONTINUITY STABILITY ANALYSES

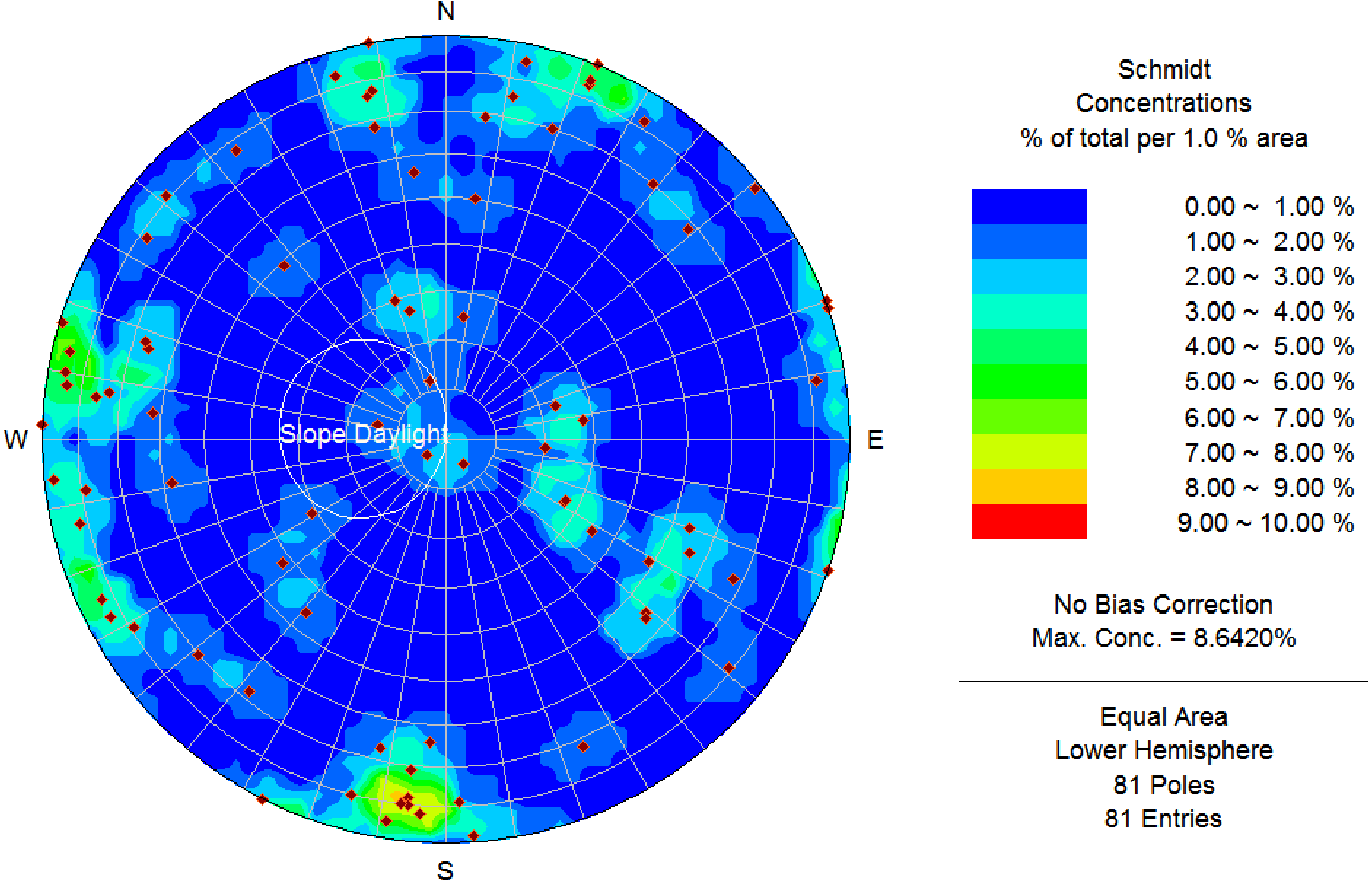
Scholl Canyon Landfill



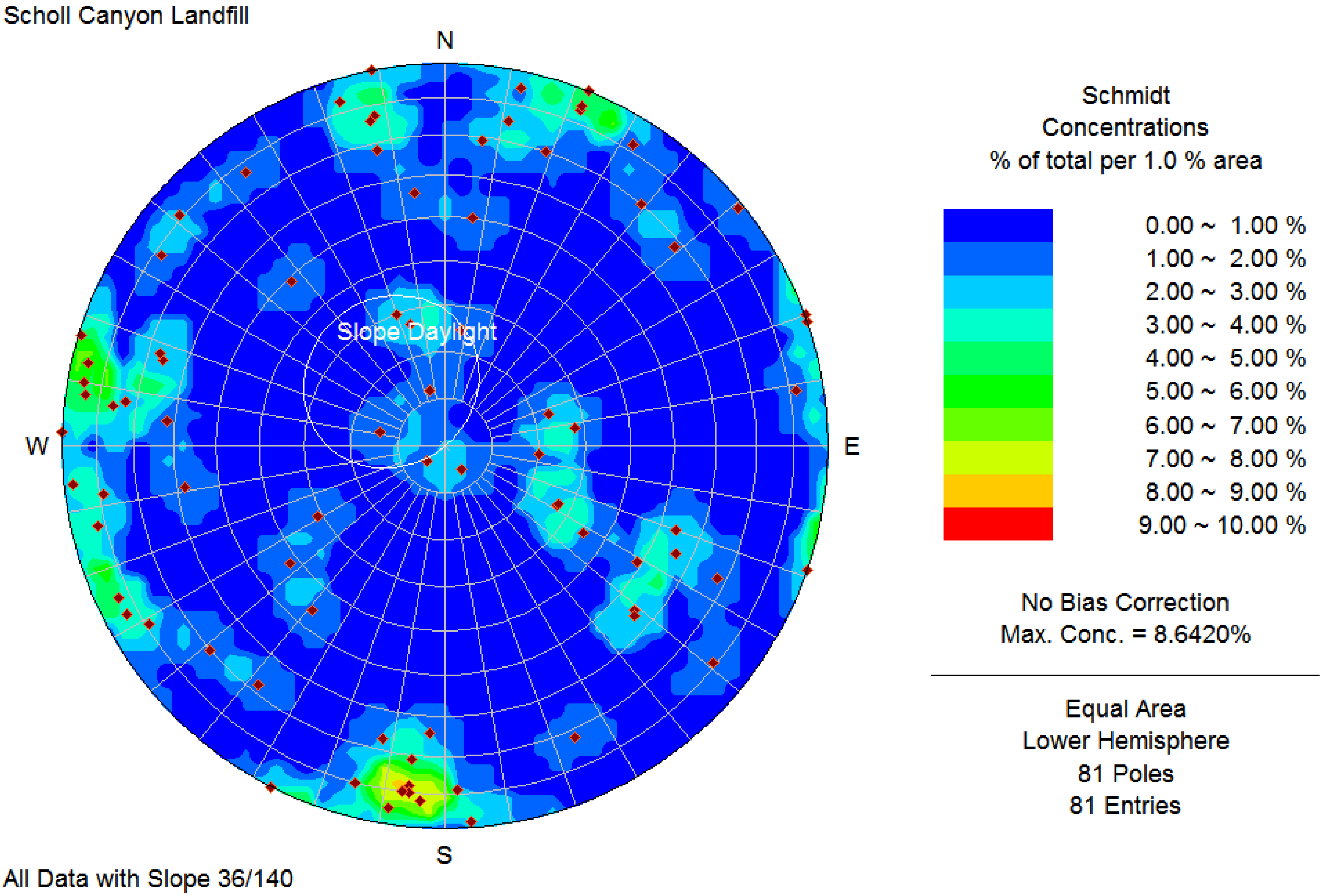
All Data with Slope 27/147


Scholl Canyon Landfill
N
W
E
S
Slope Daylight
All Data with Slope 27/150
Schmidt
Concentrations
% of total per 1.0 % area
0.00 ~ 1.00 %
1.00 ~ 2.00 %
2.00 ~ 3.00 %
3.00 ~ 4.00 %
4.00 ~ 5.00 %
5.00 ~ 6.00 %
6.00 ~ 7.00 %
7.00 ~ 8.00 %
8.00 ~ 9.00 %
9.00 ~ 10.00 %
No Bias Correction
Max. Conc. = 8.6420%
Equal Area
Lower Hemisphere
81 Poles
81 Entries

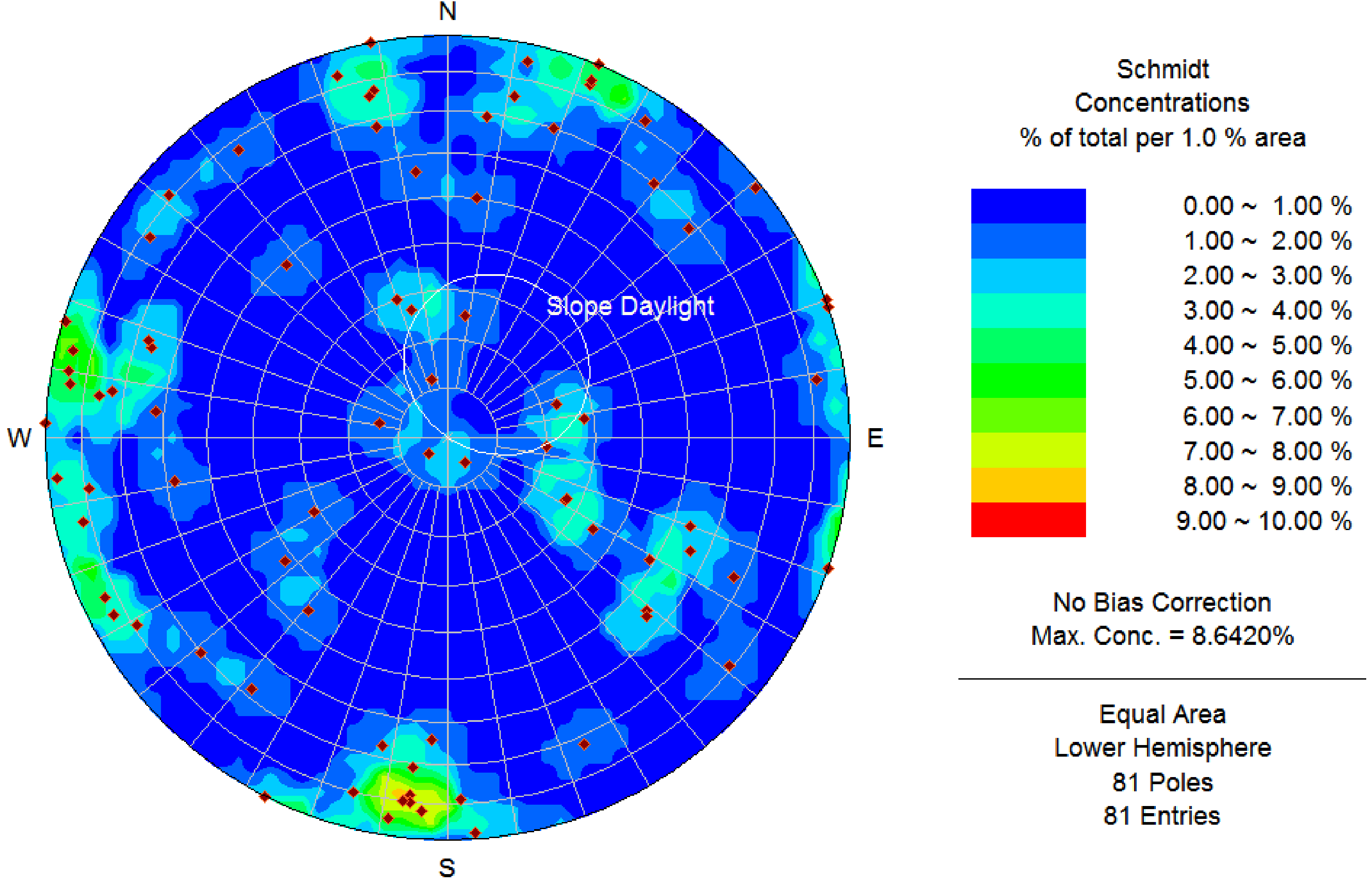
Scholl Canyon Landfill



All Data with Slope 34/097


Scholl Canyon Landfill
N
W
E
S
Slope Daylight
All Data with Slope 36/140
Schmidt
Concentrations
% of total per 1.0 % area
0.00 ~ 1.00 %
1.00 ~ 2.00 %
2.00 ~ 3.00 %
3.00 ~ 4.00 %
4.00 ~ 5.00 %
5.00 ~ 6.00 %
6.00 ~ 7.00 %
7.00 ~ 8.00 %
8.00 ~ 9.00 %
9.00 ~ 10.00 %
No Bias Correction
Max. Conc. = 8.6420%
Equal Area
Lower Hemisphere
81 Poles
81 Entries

Scholl Canyon Landfill



All Data with Slope 36/214

APPENDIX E-5

ROCK WEDGE STABILITY ANALYSES

Swedge Analysis Information

Document Name:

- Phi-C slope 27-147 planes 2-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained condition.

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 5.5377
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 17.60
- Wedge volume [ft^3]: 16431.578
- Wedge weight [tons]: 1232.368
- Wedge area (joint1) [ft^2]: 1341.83
- Wedge area (joint2) [ft^2]: 6405.71
- Wedge area (slope) [ft^2]: 6168.14
- Wedge area (upper face) [ft^2]: 328.63

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	176.28	1109.00
Effective Normal stress [t/ft^2]	0.13	0.17
Shear Strength [t/ft^2]	0.35	0.39
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 531.10
  - Resisting force [tons]: 2941.05

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	**Trend [deg]**	**Length [ft]**
25.53	153.61	348.06

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	332.08	17.82
Joint 2	337.88	38.78

Persistence:

- Joint 1 [ft]: 348.06
- Joint 2 [ft]: 348.06

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	6.31	72.00
Joint 1 & Crest	95.76	81.00
Joint 2 & Crest	77.93	27.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	66.00
Joint Set 2	27.00	174.00
Slope	27.00	147.00
Upper Face	0.00	147.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

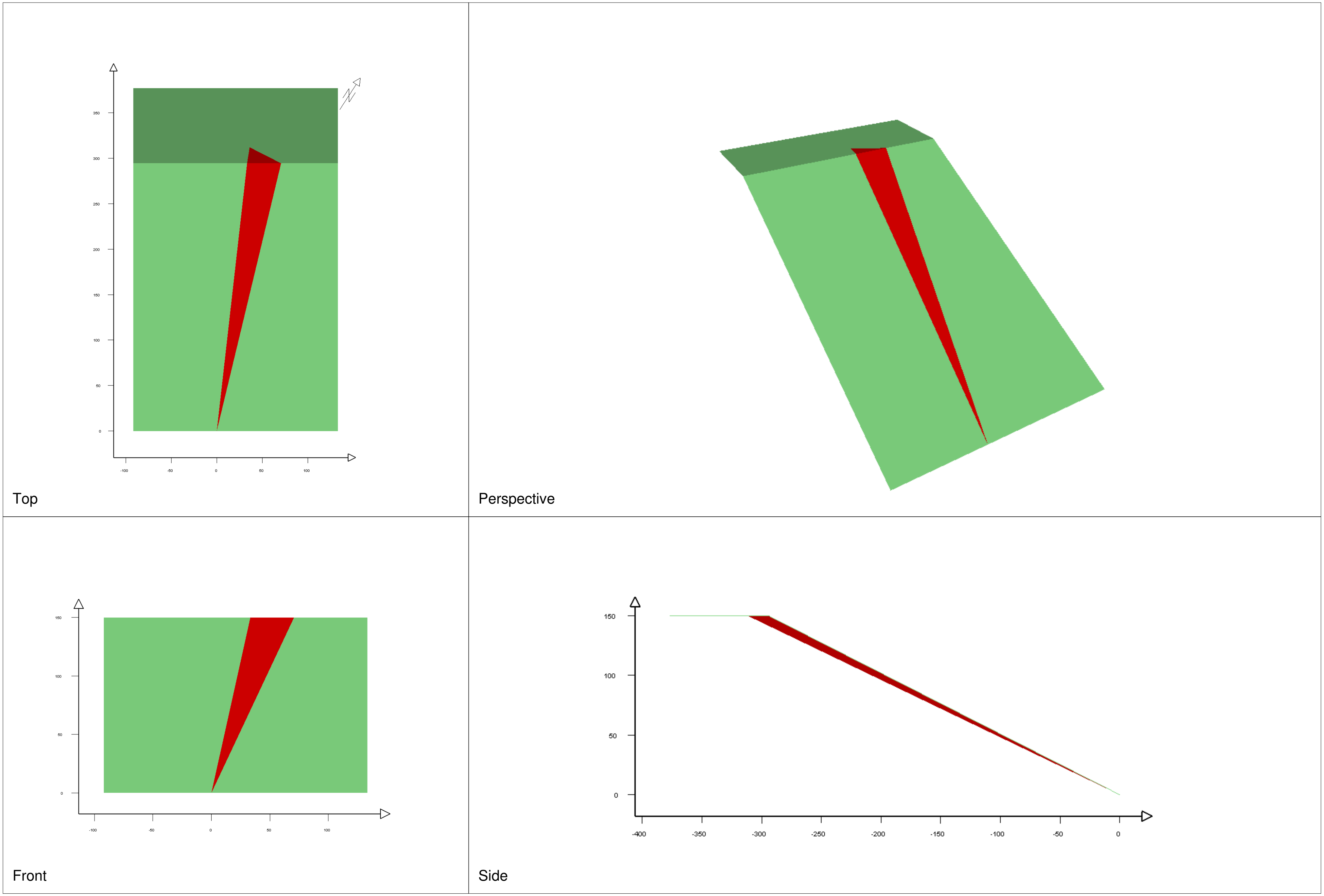
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-132.376	265.056	150.000
234	-101.062	285.391	150.000
123	-139.625	281.338	150.000



Phi-C slope 27-147 planes 2-9.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 27-147 planes 3-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 12.4073
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 616.71
- Wedge volume [ft^3]: 7329501.860
- Wedge weight [tons]: 549712.640
- Wedge area (joint1) [ft^2]: 73849.94
- Wedge area (joint2) [ft^2]: 224413.03
- Wedge area (slope) [ft^2]: 78535.97
- Wedge area (upper face) [ft^2]: 146590.04

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	249884.23	547416.95
Effective Normal stress [t/ft^2]	3.38	2.44
Shear Strength [t/ft^2]	2.89	2.16
Strength due to Waviness [t/ft^2]	0.00	0.00

- Driving force [tons]: 56215.78
- Resisting force [tons]: 697485.69

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
5.87	95.64	1466.79

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]

Joint 1	522.46	959.43
Joint 2	337.88	1358.42

Persistence:

- Joint 1 [ft]: 1466.79
- Joint 2 [ft]: 1466.79

Intersection Angles:

	Slope Face	**Upper Face**
Joint 1 & Joint 2	62.85	13.00
Joint 1 & Crest	39.23	140.00
Joint 2 & Crest	77.93	27.00

Dip and Dip Direction:

	Dip [deg]	**Dip Direction [deg]**
Joint Set 1	77.00	7.00
Joint Set 2	27.00	174.00
Slope	27.00	147.00
Upper Face	0.00	147.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

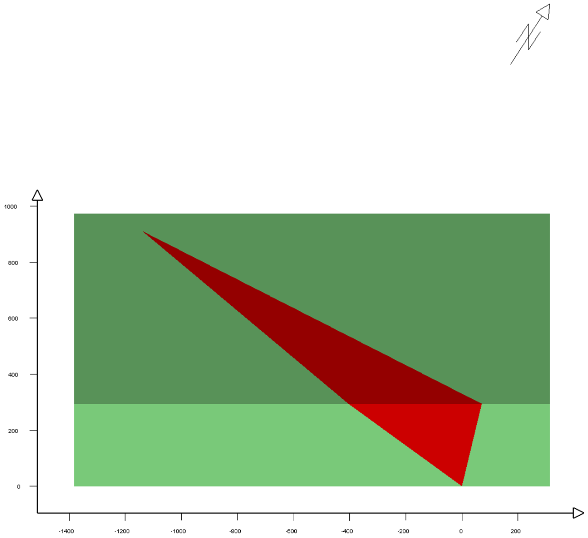
Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-499.762	26.473	150.000
234	-101.062	285.391	150.000
123	-1452.039	143.398	150.000



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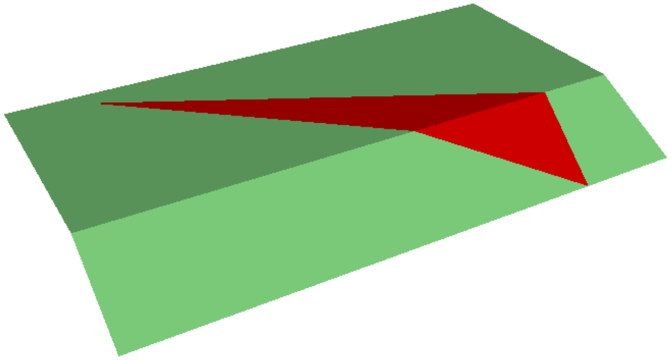
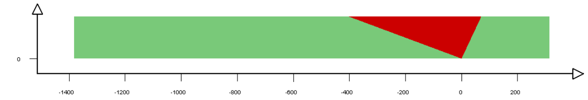
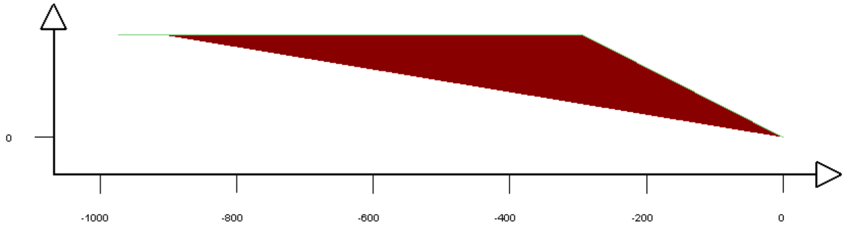


Perspective



Front



Side

Swedge Analysis Information

Document Name:

- Phi-C slope 27-147 planes 5-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

- Drained Condition.

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 5.7512
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 196.74
- Wedge volume [ft^3]: 1246413.192
- Wedge weight [tons]: 93480.989
- Wedge area (joint1) [ft^2]: 17866.06
- Wedge area (joint2) [ft^2]: 71590.21
- Wedge area (slope) [ft^2]: 41864.96
- Wedge area (upper face) [ft^2]: 24928.26

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	40289.83	102357.90
Effective Normal stress [t/ft^2]	2.26	1.43
Shear Strength [t/ft^2]	2.01	1.37
Strength due to Waviness [t/ft^2]	0.00	0.00

- Driving force [tons]: 23266.74
- Resisting force [tons]: 133812.68

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	**Trend [deg]**	**Length [ft]**
14.41	114.29	602.67

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	377.57	237.31
Joint 2	337.88	433.35

Persistence:

- Joint 1 [ft]: 602.67
- Joint 2 [ft]: 602.67

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	41.02	29.00
Joint 1 & Crest	61.05	124.00
Joint 2 & Crest	77.93	27.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	203.00
Joint Set 2	27.00	174.00
Slope	27.00	147.00
Upper Face	0.00	147.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

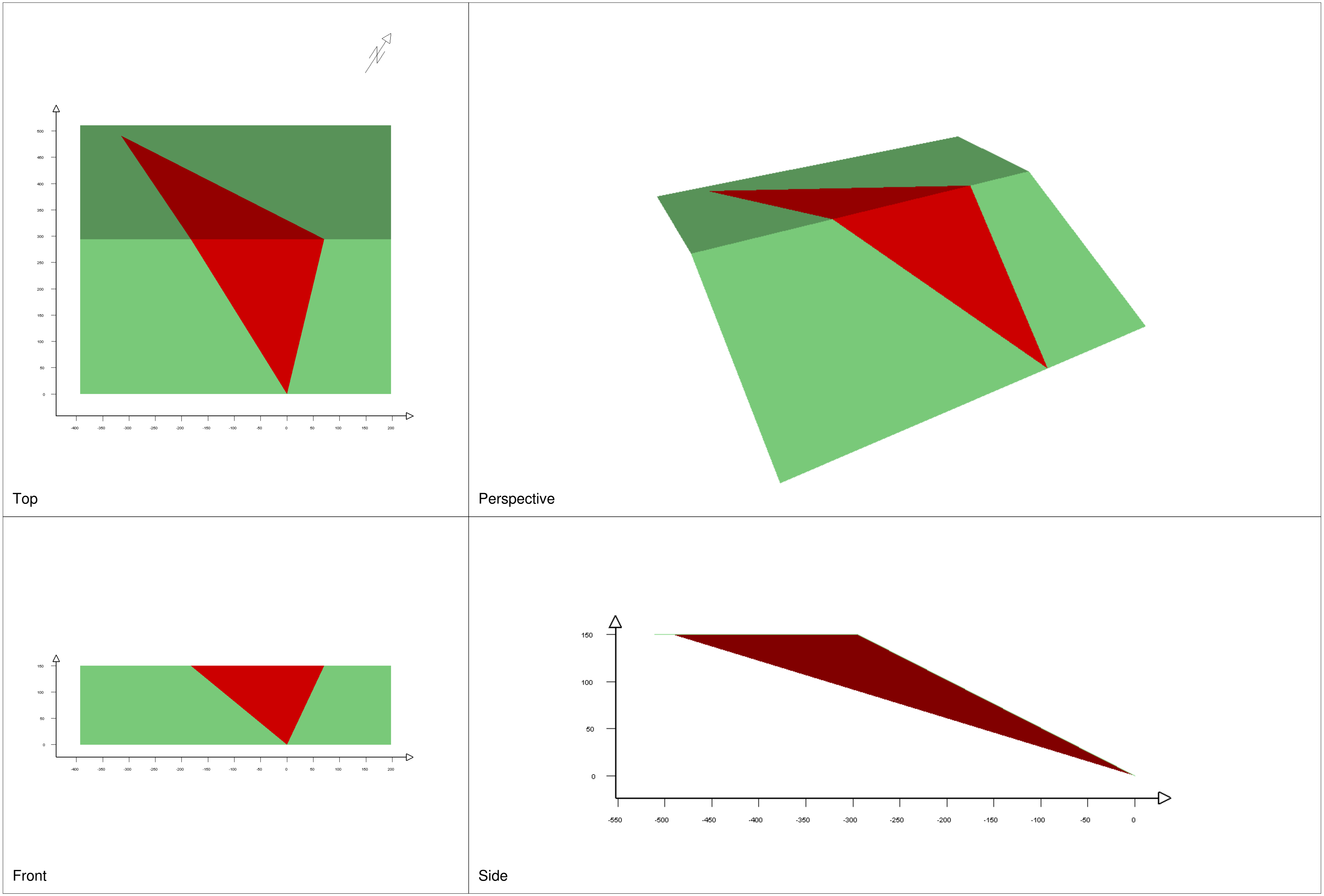
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-313.596	147.370	150.000
234	-101.062	285.391	150.000
123	-532.039	240.094	150.000



Phi-C slope 27-147 planes 5-9.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 27-147 planes 6-8.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 3.4594
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 307.97
- Wedge volume [ft^3]: 3688923.526
- Wedge weight [tons]: 276669.264
- Wedge area (joint1) [ft^2]: 58162.19
- Wedge area (joint2) [ft^2]: 79151.76
- Wedge area (slope) [ft^2]: 61134.82
- Wedge area (upper face) [ft^2]: 73778.47

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	150936.25	134533.83
Effective Normal stress [t/ft^2]	2.60	1.70
Shear Strength [t/ft^2]	2.28	1.58
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 74394.26
  - Resisting force [tons]: 257362.15

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
15.60	230.78	557.84

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	369.47	327.74
Joint 2	331.73	479.12

Persistence:

- Joint 1 [ft]: 557.84
- Joint 2 [ft]: 557.84

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	86.02	70.00
Joint 1 & Crest	43.69	70.00
Joint 2 & Crest	50.29	40.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	25.00	284.00
Joint Set 2	27.00	174.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

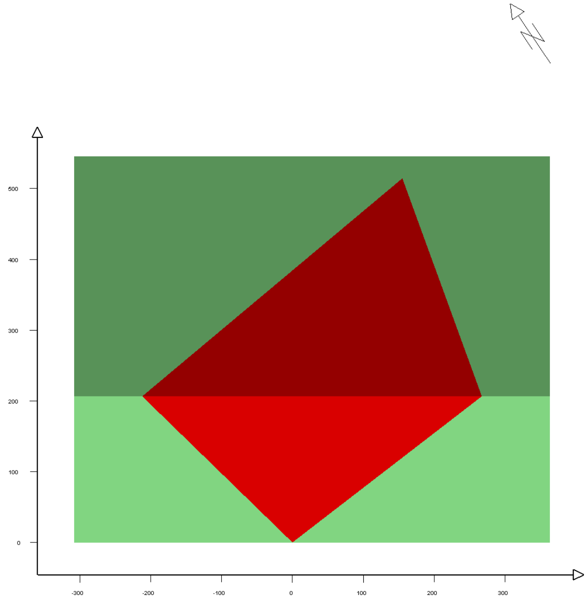
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	336.949	21.758	150.000
234	-60.262	289.679	150.000
123	416.236	339.761	150.000



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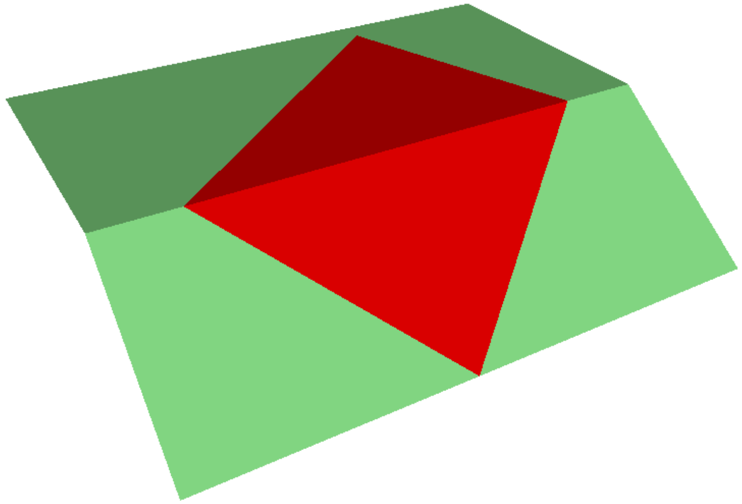
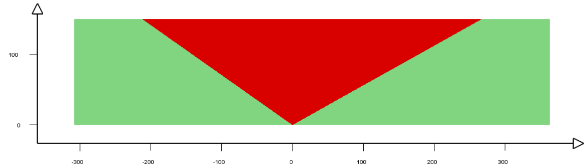


Perspective



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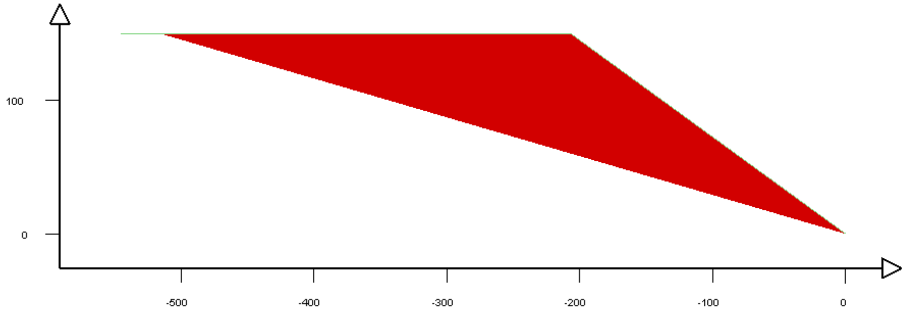


Side

Phi-C slope 27-147 planes 6-8.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 27-150 planes 2-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 5.2163
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 19.07
- Wedge volume [ft^3]: 21368.428
- Wedge weight [tons]: 1602.632
- Wedge area (joint1) [ft^2]: 1443.38
- Wedge area (joint2) [ft^2]: 7744.23
- Wedge area (slope) [ft^2]: 7405.77
- Wedge area (upper face) [ft^2]: 427.37

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	229.24	1442.19
Effective Normal stress [t/ft^2]	0.16	0.19
Shear Strength [t/ft^2]	0.37	0.40
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 690.67
  - Resisting force [tons]: 3602.77

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	**Trend [deg]**	**Length [ft]**
25.53	153.61	348.06

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	330.88	19.17
Joint 2	336.28	46.88

Persistence:

- Joint 1 [ft]: 348.06
- Joint 2 [ft]: 348.06

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	7.65	72.00
Joint 1 & Crest	93.07	84.00
Joint 2 & Crest	79.28	24.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	66.00
Joint Set 2	27.00	174.00
Slope	27.00	150.00
Upper Face	0.00	150.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

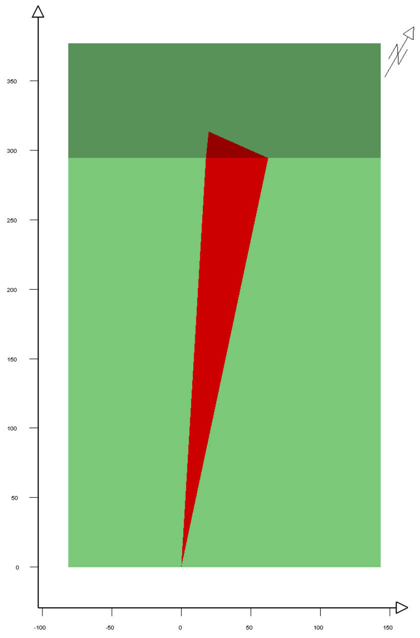
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

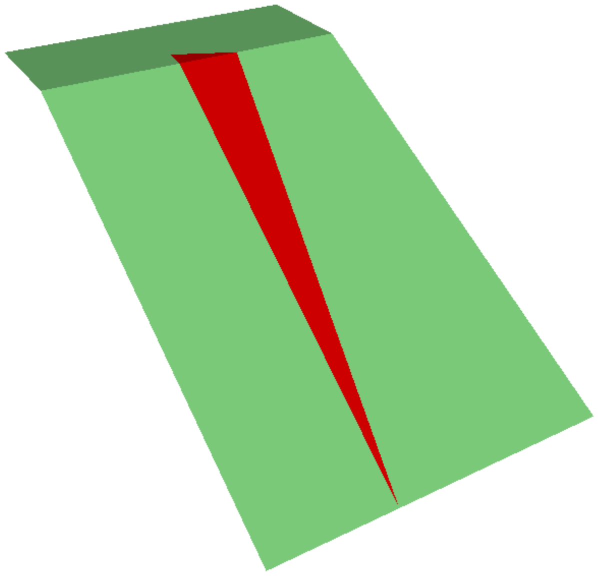
Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

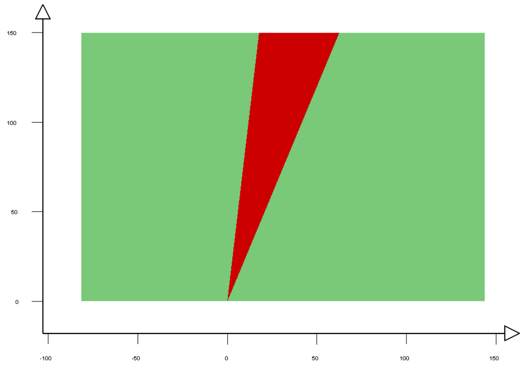
Point	x	y	z
124	0.000	0.000	0.000
134	-131.827	263.824	150.000
234	-93.004	286.238	150.000
123	-139.625	281.338	150.000



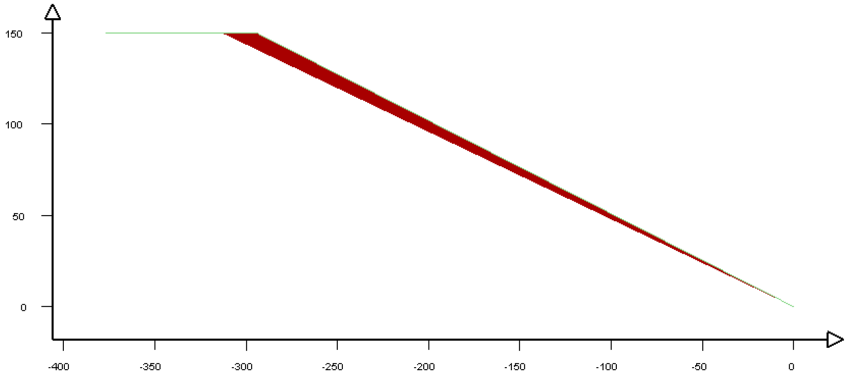
Top



Perspective



Front



Side

Swedge Analysis Information

Document Name:

- Phi-C slope 27-150 planes 3-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 12.4441
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 555.81
- Wedge volume [ft^3]: 7097588.011
- Wedge weight [tons]: 532319.101
- Wedge area (joint1) [ft^2]: 71089.23
- Wedge area (joint2) [ft^2]: 225751.55
- Wedge area (slope) [ft^2]: 84383.15
- Wedge area (upper face) [ft^2]: 141951.76

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	241977.61	530096.05
Effective Normal stress [t/ft^2]	3.40	2.35
Shear Strength [t/ft^2]	2.91	2.08
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 54437.05
  - Resisting force [tons]: 677420.24

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
5.87	95.64	1466.79

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	556.83	923.56
Joint 2	336.28	1366.52

Persistence:

- Joint 1 [ft]: 1466.79
- Joint 2 [ft]: 1466.79

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	64.33	13.00
Joint 1 & Crest	36.40	143.00
Joint 2 & Crest	79.28	24.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	77.00	7.00
Joint Set 2	27.00	174.00
Slope	27.00	150.00
Upper Face	0.00	150.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

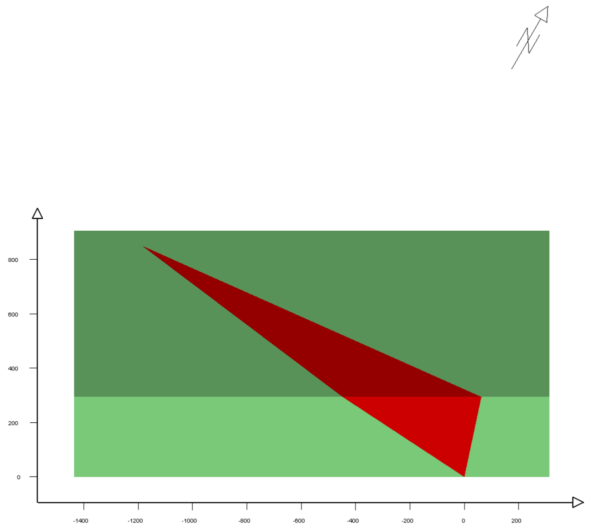
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-535.360	30.844	150.000
234	-93.004	286.238	150.000
123	-1452.039	143.398	150.000



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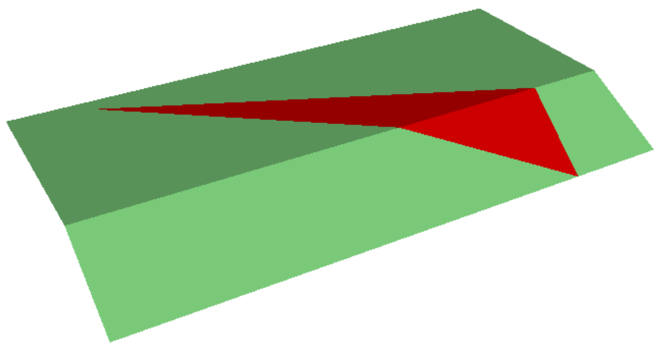

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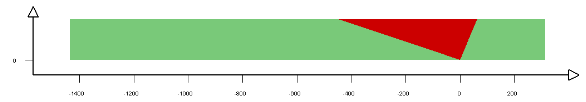

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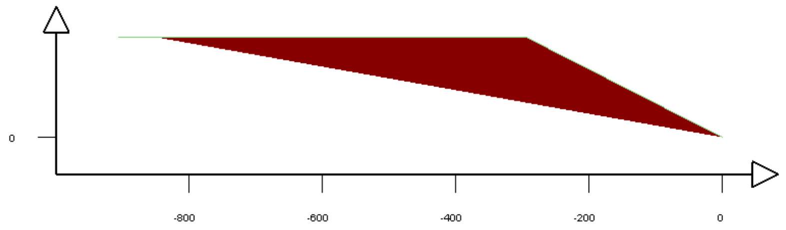


Side

Phi-C slope 27-150 planes 3-9.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 27-150 planes 5-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 5.7904
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 179.55
- Wedge volume [ft^3]: 1202940.451
- Wedge weight [tons]: 90220.534
- Wedge area (joint1) [ft^2]: 16926.45
- Wedge area (joint2) [ft^2]: 72928.72
- Wedge area (slope) [ft^2]: 44271.19
- Wedge area (upper face) [ft^2]: 24058.81

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	38884.59	98787.83
Effective Normal stress [t/ft^2]	2.30	1.35
Shear Strength [t/ft^2]	2.04	1.31
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 22455.24
  - Resisting force [tons]: 130025.27

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
14.41	114.29	602.67

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	389.05	224.83
Joint 2	336.28	441.45

Persistence:

- Joint 1 [ft]: 602.67
- Joint 2 [ft]: 602.67

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	42.59	29.00
Joint 1 & Crest	58.13	127.00
Joint 2 & Crest	79.28	24.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	203.00
Joint Set 2	27.00	174.00
Slope	27.00	150.00
Upper Face	0.00	150.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

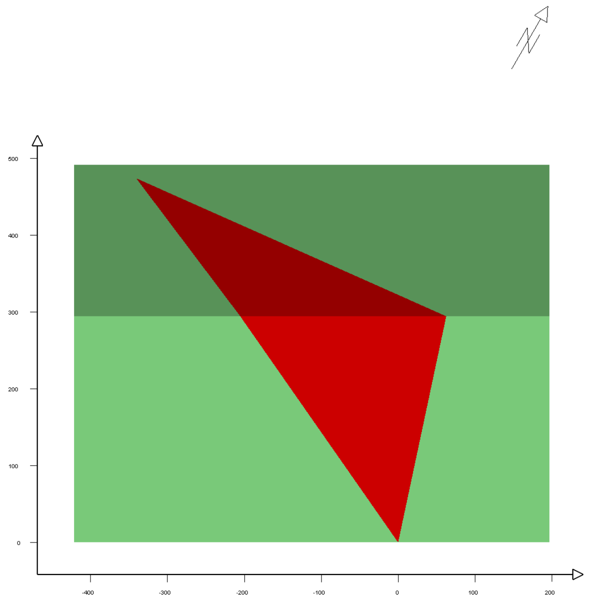
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-325.084	152.247	150.000
234	-93.004	286.238	150.000
123	-532.039	240.094	150.000



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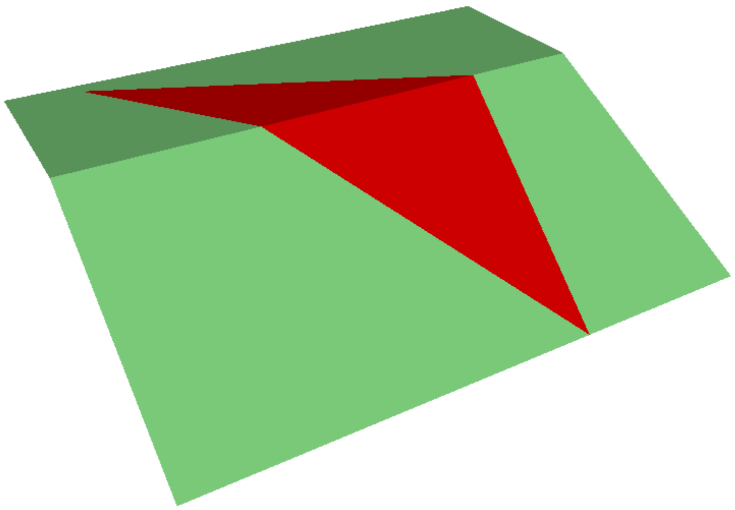

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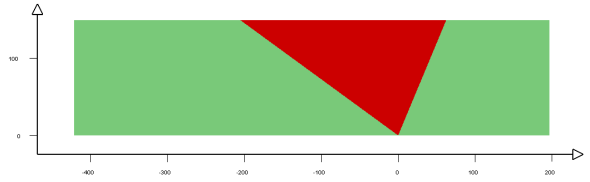

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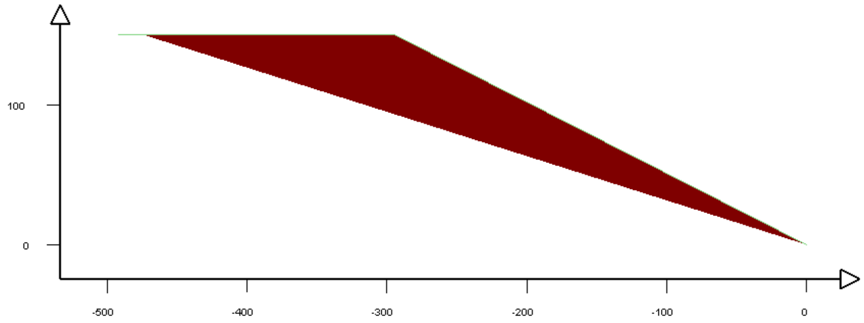


Side

Swedge Analysis Information

Document Name:

- Phi-C slope 34-097 planes 1-8.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 60.2236
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 51.14
- Wedge volume [ft^3]: 714952.017
- Wedge weight [tons]: 53621.401
- Wedge area (joint1) [ft^2]: 73830.17
- Wedge area (joint2) [ft^2]: 74463.26
- Wedge area (slope) [ft^2]: 75008.93
- Wedge area (upper face) [ft^2]: 14299.04

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	23756.13	55914.27
Effective Normal stress [t/ft^2]	0.32	0.75
Shear Strength [t/ft^2]	0.50	0.84
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 1649.16
  - Resisting force [tons]: 99318.69

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
1.76	10.22	4877.14

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	3900.66	977.06
Joint 2	4458.77	419.59

Persistence:

- Joint 1 [ft]: 4877.14
- Joint 2 [ft]: 4877.14

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	0.49	4.00
Joint 1 & Crest	176.06	3.00
Joint 2 & Crest	3.45	173.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	83.00	100.00
Joint Set 2	25.00	284.00
Slope	34.00	97.00
Upper Face	0.00	97.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

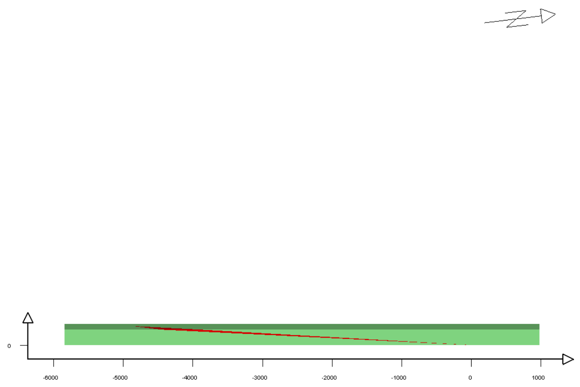
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-694.973	-3835.322	150.000
234	-763.129	-4390.413	150.000
123	-864.638	-4797.543	150.000



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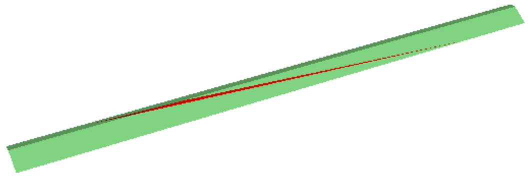

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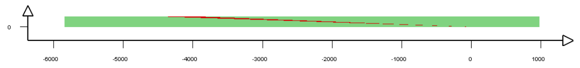

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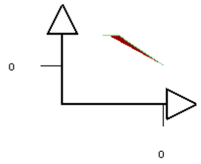


Side

Phi-C slope 34-097 planes 1-8.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 34-097 planes 3-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 12.2070
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 1236.31
- Wedge volume [ft^3]: 8821798.813
- Wedge weight [tons]: 661634.911
- Wedge area (joint1) [ft^2]: 95162.06
- Wedge area (joint2) [ft^2]: 209612.46
- Wedge area (slope) [ft^2]: 38281.61
- Wedge area (upper face) [ft^2]: 176435.98

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	300761.01	658871.81
Effective Normal stress [t/ft^2]	3.16	3.14
Shear Strength [t/ft^2]	2.72	2.71
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 67661.39
  - Resisting force [tons]: 825940.96

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
5.87	95.64	1466.79

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	270.47	1236.31
Joint 2	367.22	1268.83

Persistence:

- Joint 1 [ft]: 1466.79
- Joint 2 [ft]: 1466.79

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	50.43	13.00
Joint 1 & Crest	82.64	90.00
Joint 2 & Crest	46.93	77.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	77.00	7.00
Joint Set 2	27.00	174.00
Slope	34.00	97.00
Upper Face	0.00	97.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

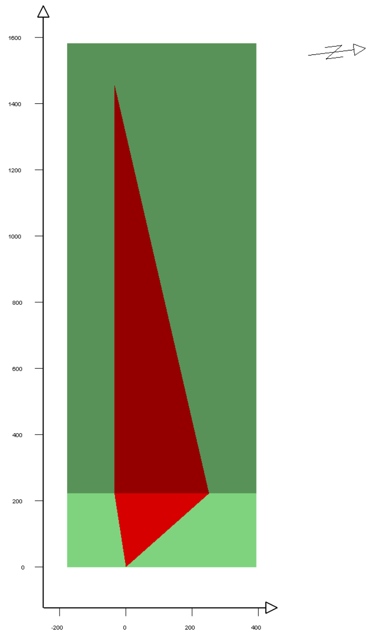
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-224.947	-7.270	150.000
234	-190.162	276.026	150.000
123	-1452.039	143.398	150.000



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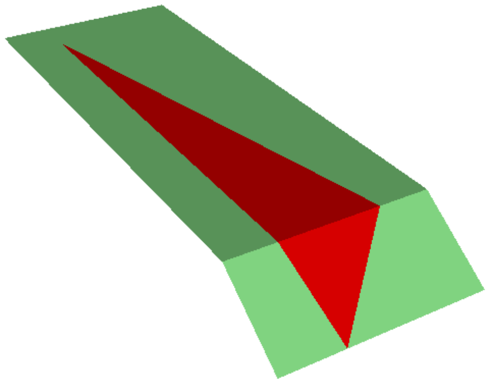

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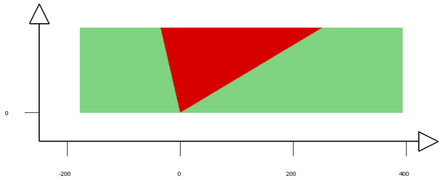

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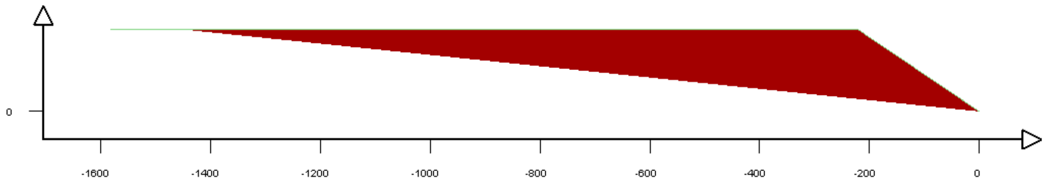


Side

Phi-C slope 34-097 planes 3-9.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 34-097 planes 5-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 5.5559
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 334.95
- Wedge volume [ft^3]: 1451786.108
- Wedge weight [tons]: 108883.958
- Wedge area (joint1) [ft^2]: 26233.36
- Wedge area (joint2) [ft^2]: 56789.63
- Wedge area (slope) [ft^2]: 23253.26
- Wedge area (upper face) [ft^2]: 29035.72

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	46928.43	119223.52
Effective Normal stress [t/ft^2]	1.79	2.10
Shear Strength [t/ft^2]	1.65	1.89
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 27100.43
  - Resisting force [tons]: 150567.88

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	**Trend [deg]**	**Length [ft]**
14.41	114.29	602.67

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	279.19	348.45
Joint 2	367.22	343.76

Persistence:

- Joint 1 [ft]: 602.67
- Joint 2 [ft]: 602.67

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	26.98	29.00
Joint 1 & Crest	106.10	74.00
Joint 2 & Crest	46.93	77.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	203.00
Joint Set 2	27.00	174.00
Slope	34.00	97.00
Upper Face	0.00	97.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

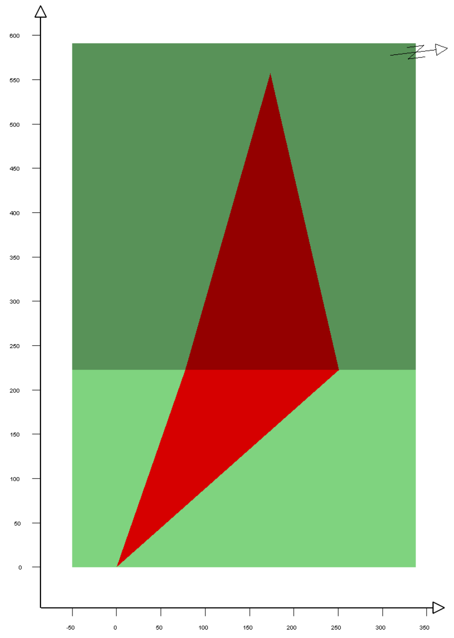
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	**x**	**y**	**z**
124	0.000	0.000	0.000
134	-211.291	103.945	150.000
234	-190.162	276.026	150.000
123	-532.039	240.094	150.000



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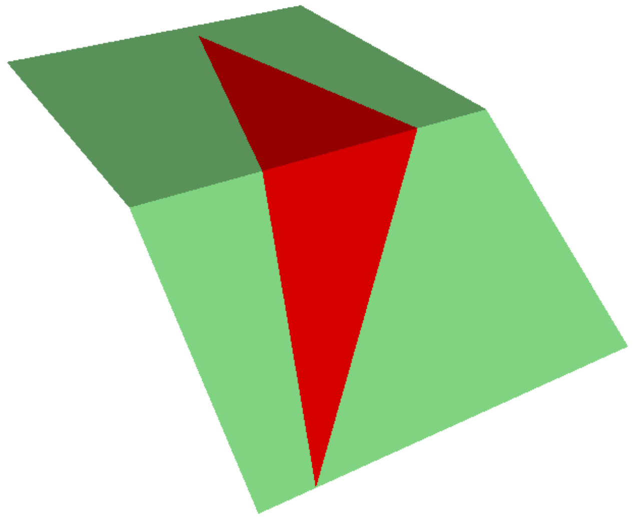

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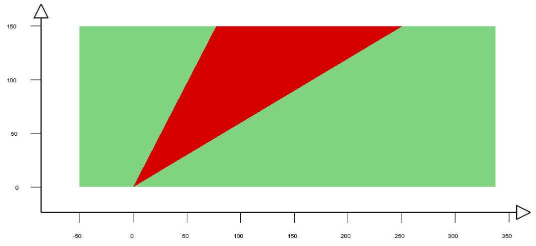

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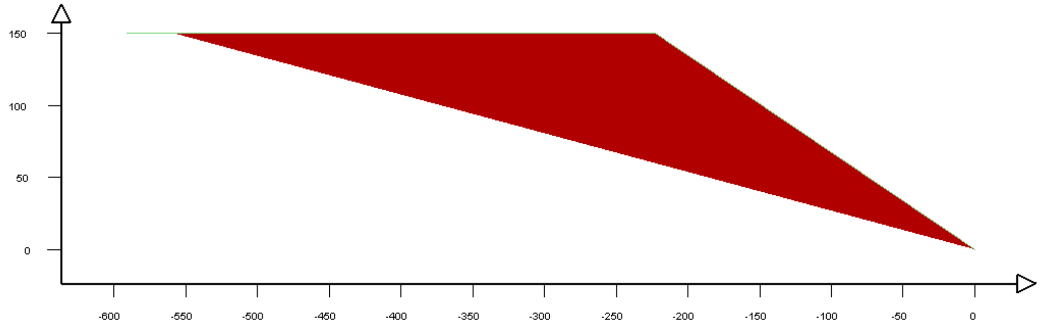


Side

Phi-C slope 34-097 planes 5-9.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 36-140 planes 10-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 2.6578
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 54.82
- Wedge volume [ft^3]: 148015.864
- Wedge weight [tons]: 11101.190
- Wedge area (joint1) [ft^2]: 4585.42
- Wedge area (joint2) [ft^2]: 16194.65
- Wedge area (slope) [ft^2]: 13781.36
- Wedge area (upper face) [ft^2]: 2960.32

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	471.22	9950.22
Effective Normal stress [t/ft^2]	0.10	0.61
Shear Strength [t/ft^2]	0.33	0.73
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 5018.10
  - Resisting force [tons]: 13337.14

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
26.87	168.03	331.83

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	278.84	60.99
Joint 2	337.18	98.03

Persistence:

- Joint 1 [ft]: 331.83
- Joint 2 [ft]: 337.18

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	17.05	82.00
Joint 1 & Crest	113.76	64.00
Joint 2 & Crest	49.19	34.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	86.00	256.00
Joint Set 2	27.00	174.00
Slope	36.00	140.00
Upper Face	0.00	140.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

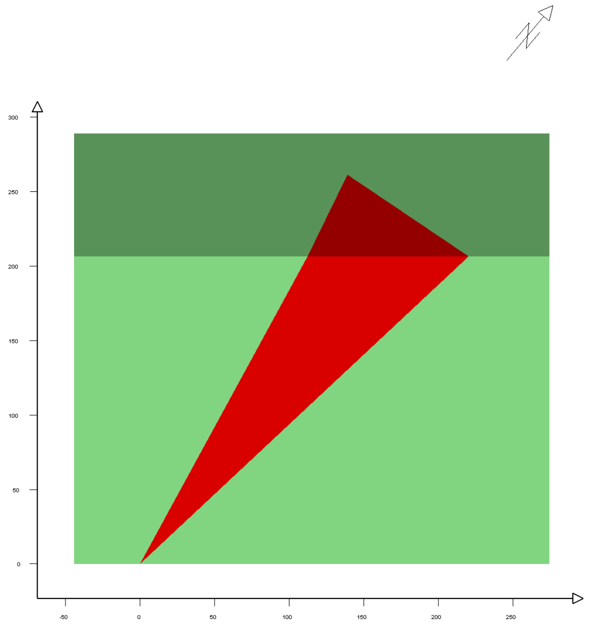
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-46.631	230.383	150.000
234	36.107	299.808	150.000
123	-61.386	289.561	150.000



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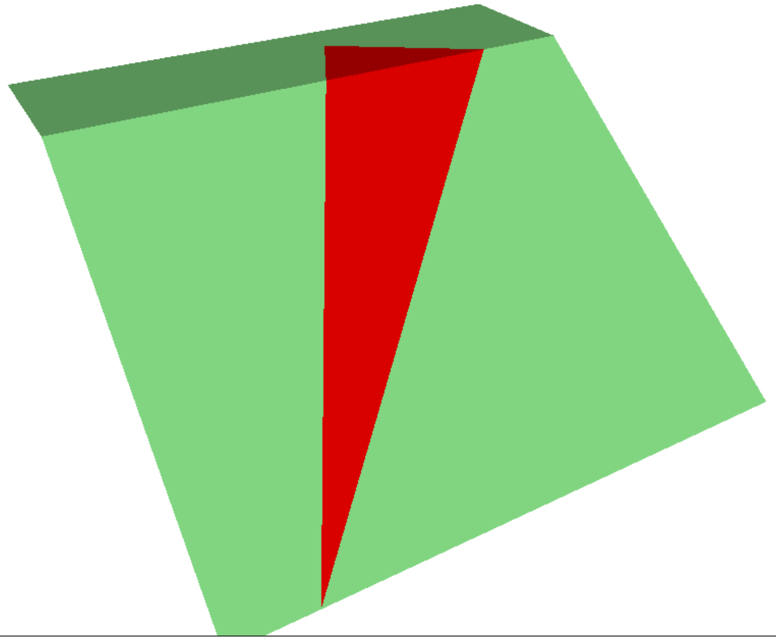

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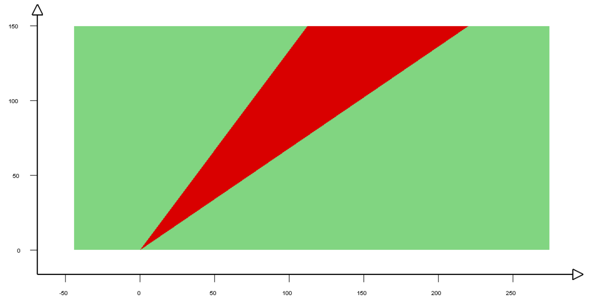

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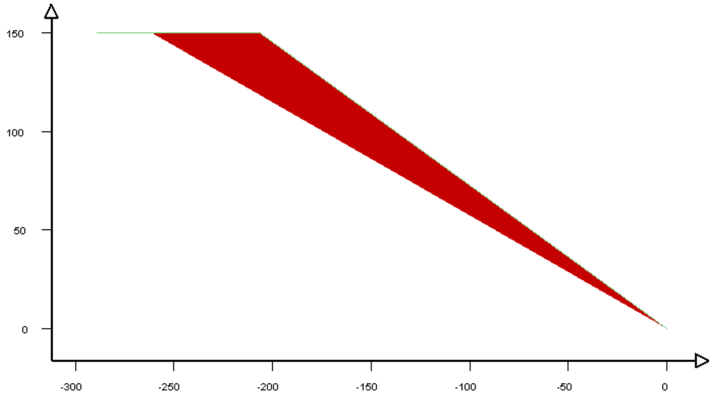


Side

Phi-C slope 36-140 planes 10-9.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 36-140 planes 2-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

- Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 2.5522
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 98.81
- Wedge volume [ft^3]: 431855.952
- Wedge weight [tons]: 32389.196
- Wedge area (joint1) [ft^2]: 7738.79
- Wedge area (joint2) [ft^2]: 29191.12
- Wedge area (slope) [ft^2]: 22307.12
- Wedge area (upper face) [ft^2]: 8637.12

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	4632.93	29146.69
Effective Normal stress [t/ft^2]	0.60	1.00
Shear Strength [t/ft^2]	0.72	1.03
Strength due to Waviness [t/ft^2]	0.00	0.00

- Driving force [tons]: 13958.43
- Resisting force [tons]: 35624.01

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
25.53	153.61	348.06

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	259.23	102.79
Joint 2	337.18	176.70

Persistence:

- Joint 1 [ft]: 348.06
- Joint 2 [ft]: 348.06

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	30.69	72.00
Joint 1 & Crest	100.12	74.00
Joint 2 & Crest	49.19	34.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	66.00
Joint Set 2	27.00	174.00
Slope	36.00	140.00
Upper Face	0.00	140.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

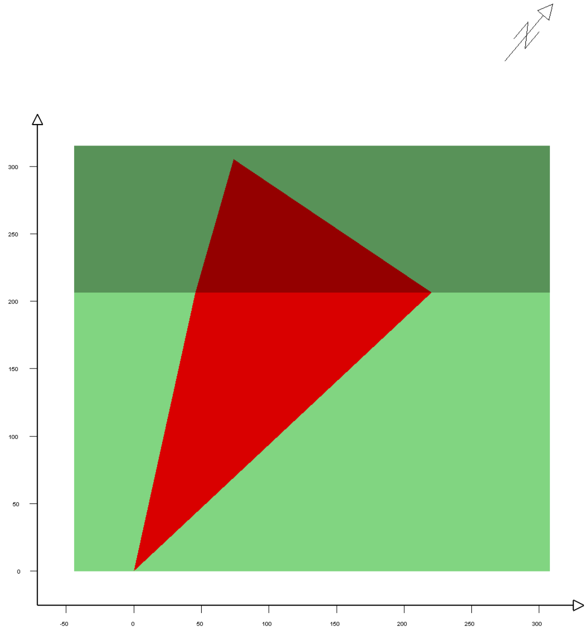
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-97.816	187.433	150.000
234	36.107	299.808	150.000
123	-139.625	281.338	150.000



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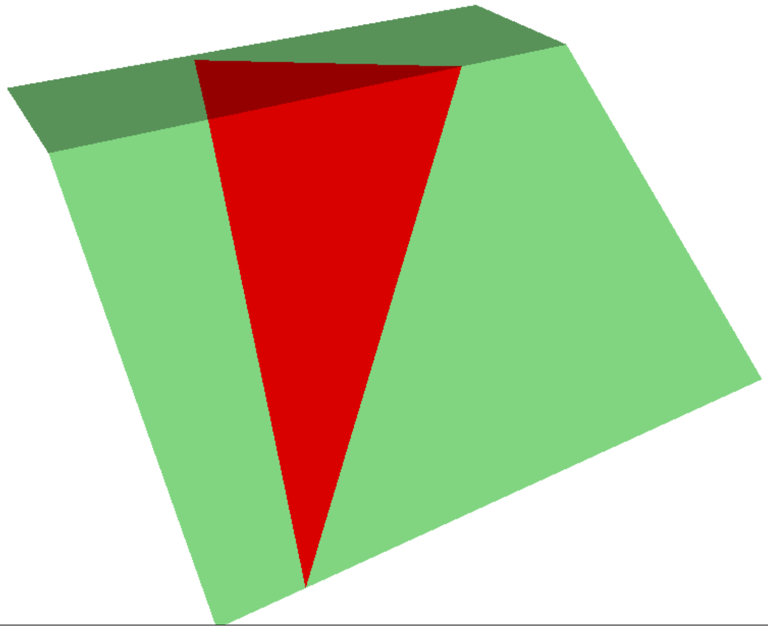

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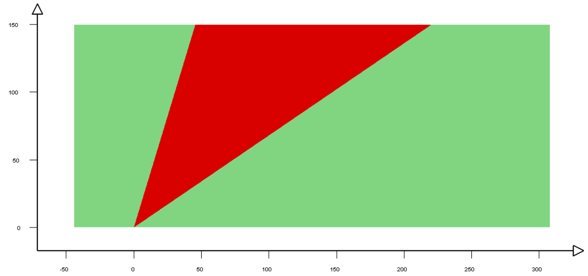

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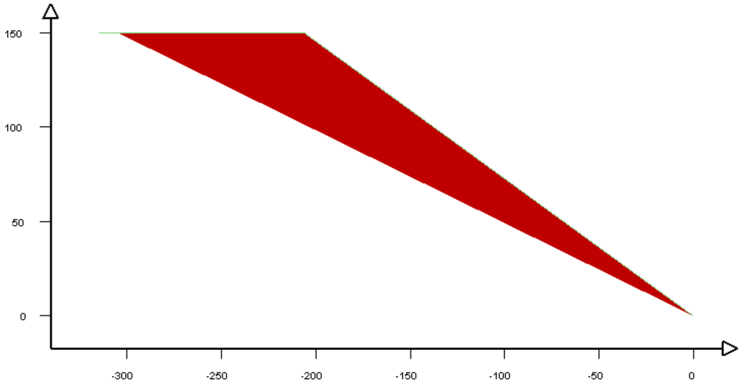


Side

Swedge Analysis Information

Document Name:

- Phi-C slope 36-140 planes 3-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 12.2159
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 836.74
- Wedge volume [ft^3]: 9627747.261
- Wedge weight [tons]: 722081.045
- Wedge area (joint1) [ft^2]: 88064.88
- Wedge area (joint2) [ft^2]: 247198.44
- Wedge area (slope) [ft^2]: 58726.53
- Wedge area (upper face) [ft^2]: 192554.95

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	328238.16	719065.51
Effective Normal stress [t/ft^2]	3.73	2.91
Shear Strength [t/ft^2]	3.16	2.52
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 73842.85
  - Resisting force [tons]: 902059.14

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
5.87	95.64	1466.79

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	350.24	1144.10
Joint 2	337.18	1496.34

Persistence:

- Joint 1 [ft]: 1466.79
- Joint 2 [ft]: 1496.34

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	84.04	13.00
Joint 1 & Crest	46.77	133.00
Joint 2 & Crest	49.19	34.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	77.00	7.00
Joint Set 2	27.00	174.00
Slope	36.00	140.00
Upper Face	0.00	140.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

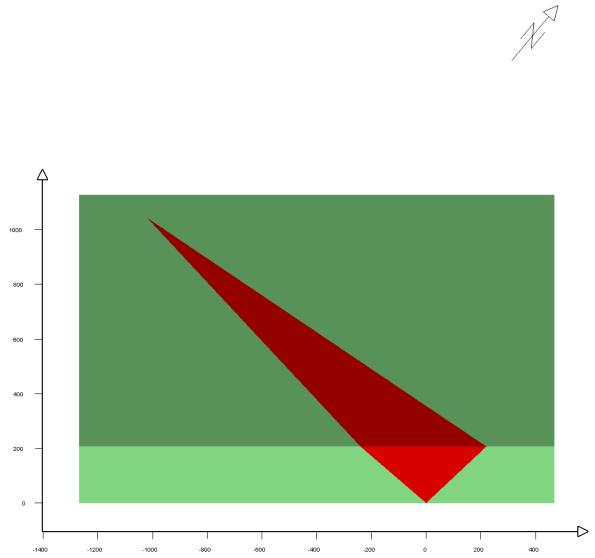
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-316.463	3.967	150.000
234	36.107	299.808	150.000
123	-1452.039	143.398	150.000



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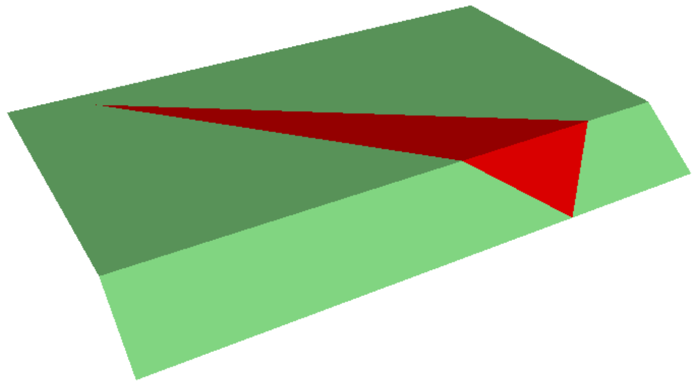

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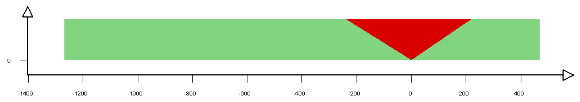

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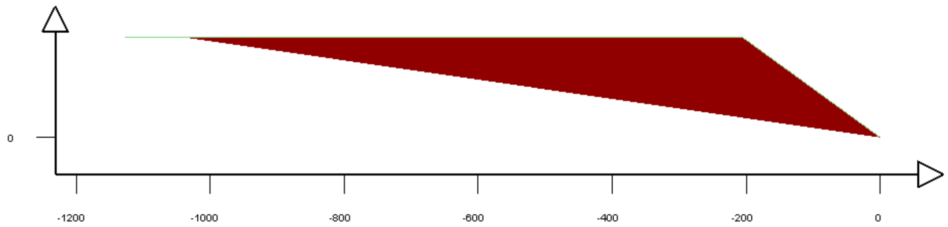


Side

Swedge Analysis Information

Document Name:

- Phi-C slope 36-140 planes 5-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 5.4448
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 319.45
- Wedge volume [ft^3]: 2482461.935
- Wedge weight [tons]: 186184.645
- Wedge area (joint1) [ft^2]: 26992.50
- Wedge area (joint2) [ft^2]: 94375.62
- Wedge area (slope) [ft^2]: 39662.33
- Wedge area (upper face) [ft^2]: 49649.24

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	80244.63	203864.65
Effective Normal stress [t/ft^2]	2.97	2.16
Shear Strength [t/ft^2]	2.57	1.94
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 46340.01
  - Resisting force [tons]: 252312.52

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	**Trend [deg]**	**Length [ft]**
14.41	114.29	602.67

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	270.76	358.53
Joint 2	337.18	571.28

Persistence:

- Joint 1 [ft]: 602.67
- Joint 2 [ft]: 602.67

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	60.33	29.00
Joint 1 & Crest	70.48	117.00
Joint 2 & Crest	49.19	34.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	203.00
Joint Set 2	27.00	174.00
Slope	36.00	140.00
Upper Face	0.00	140.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

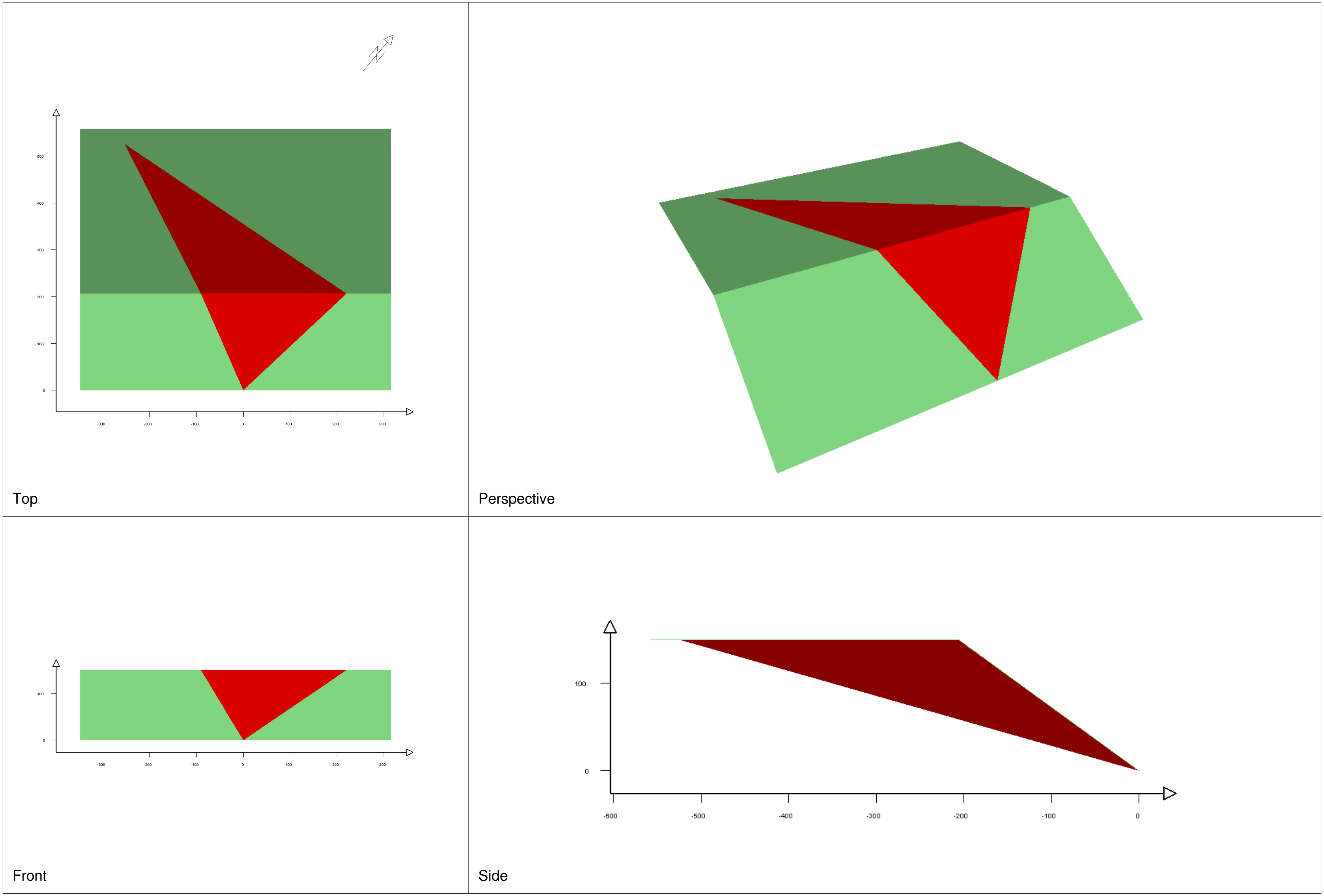
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-202.010	100.005	150.000
234	36.107	299.808	150.000
123	-532.039	240.094	150.000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-100
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Side

Swedge Analysis Information

Document Name:

- Phi-C slope 36-214 planes 1-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 26.1521
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 1673.38
- Wedge volume [ft^3]: 15825660.438
- Wedge weight [tons]: 1186924.533
- Wedge area (joint1) [ft^2]: 176645.13
- Wedge area (joint2) [ft^2]: 430072.26
- Wedge area (slope) [ft^2]: 48269.19
- Wedge area (upper face) [ft^2]: 316513.21

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	659187.01	1443398.69
Effective Normal stress [t/ft^2]	3.73	3.36
Shear Strength [t/ft^2]	3.17	2.87
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 68614.01
  - Resisting force [tons]: 1794399.33

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	**Trend [deg]**	**Length [ft]**
3.31	257.47	2594.79

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	304.62	2326.27
Joint 2	331.73	2603.32

Persistence:

- Joint 1 [ft]: 2594.79
- Joint 2 [ft]: 2603.32

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	72.81	6.00
Joint 1 & Crest	56.90	134.00
Joint 2 & Crest	50.29	40.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	81.00	168.00
Joint Set 2	27.00	174.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

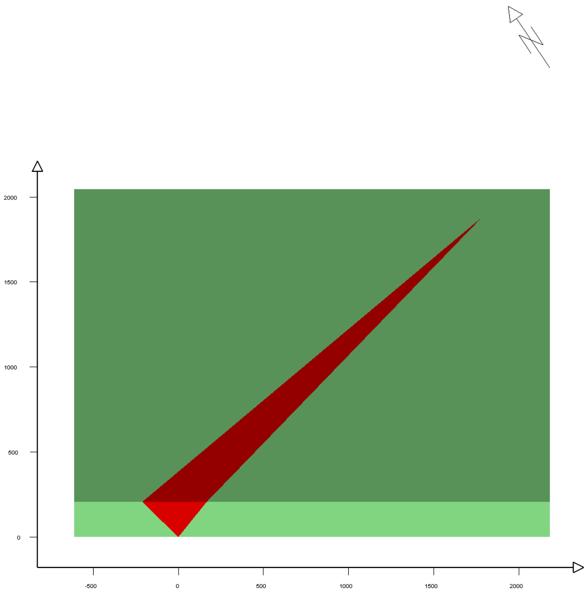
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	253.357	78.141	150.000
234	-60.262	289.679	150.000
123	2528.793	561.800	150.000



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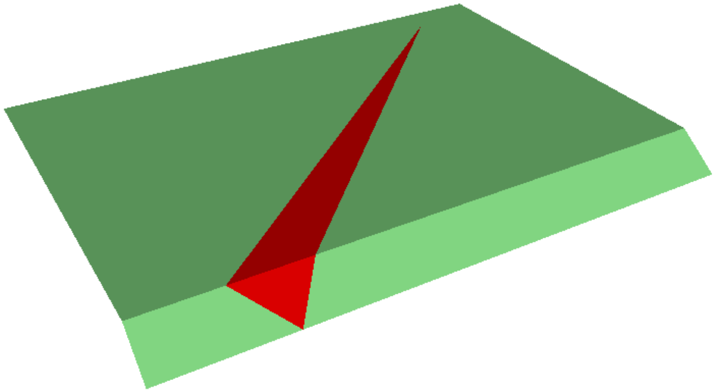

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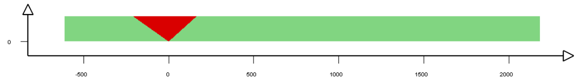

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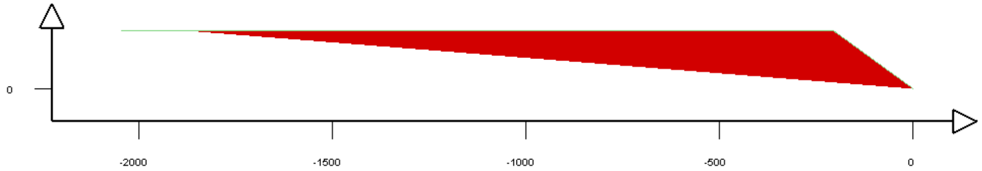


Side

Phi-C slope 36-214 planes 1-9.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 36-214 planes 4-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 26.1521
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 1673.38
- Wedge volume [ft^3]: 15825660.438
- Wedge weight [tons]: 1186924.533
- Wedge area (joint1) [ft^2]: 176645.13
- Wedge area (joint2) [ft^2]: 430072.26
- Wedge area (slope) [ft^2]: 48269.19
- Wedge area (upper face) [ft^2]: 316513.21

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	659187.01	1443398.69
Effective Normal stress [t/ft^2]	3.73	3.36
Shear Strength [t/ft^2]	3.17	2.87
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 68614.01
  - Resisting force [tons]: 1794399.33

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
3.31	257.47	2594.79

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	304.62	2326.27
Joint 2	331.73	2603.32

Persistence:

- Joint 1 [ft]: 2594.79
- Joint 2 [ft]: 2603.32

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	72.81	6.00
Joint 1 & Crest	56.90	134.00
Joint 2 & Crest	50.29	40.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	81.00	168.00
Joint Set 2	27.00	174.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

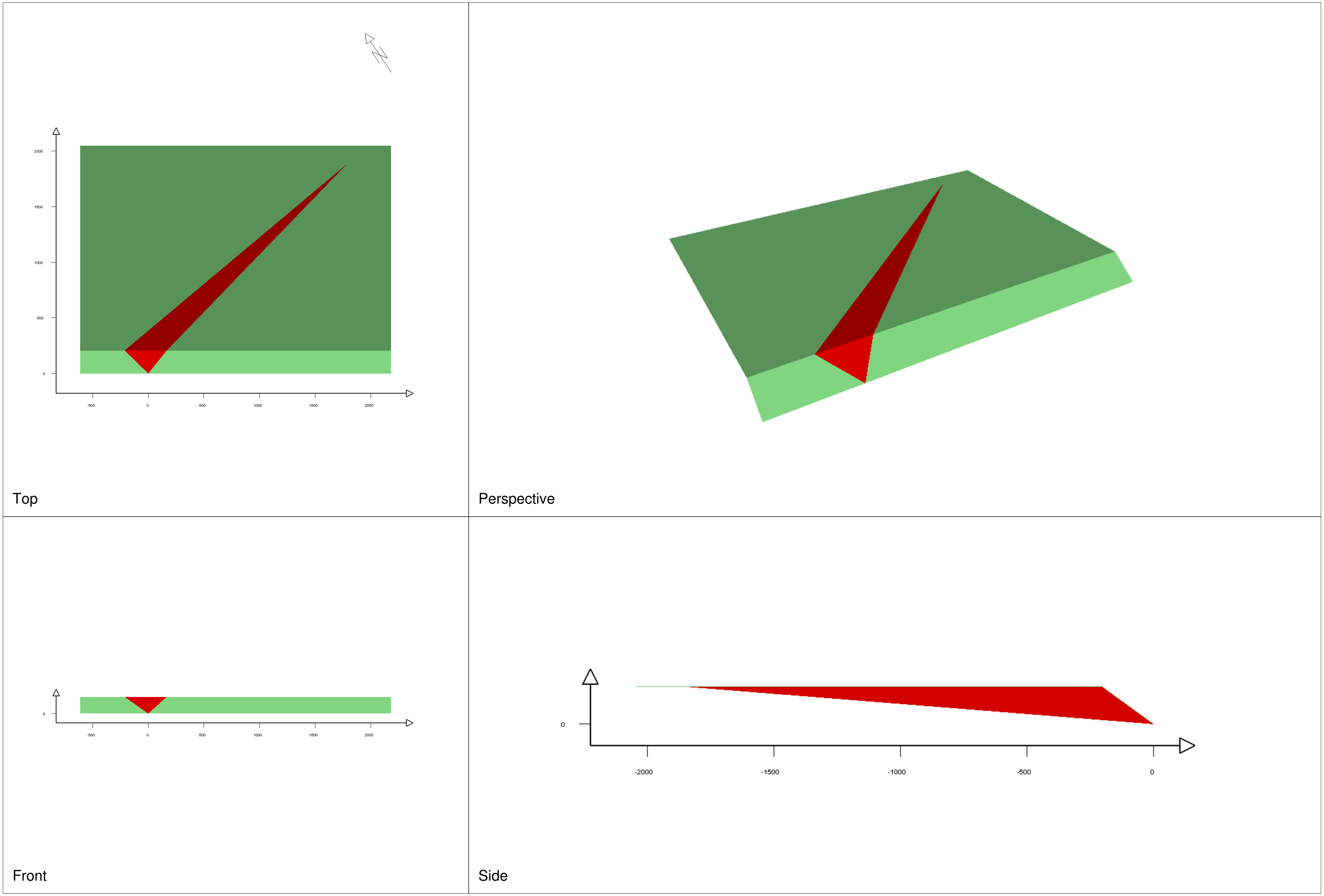
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	253.357	78.141	150.000
234	-60.262	289.679	150.000
123	2528.793	561.800	150.000



Phi-C slope 36-214 planes 4-9.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 36-214 planes 6-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 3.4594
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 307.97
- Wedge volume [ft^3]: 3688923.526
- Wedge weight [tons]: 276669.264
- Wedge area (joint1) [ft^2]: 58162.19
- Wedge area (joint2) [ft^2]: 79151.76
- Wedge area (slope) [ft^2]: 61134.82
- Wedge area (upper face) [ft^2]: 73778.47

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	150936.25	134533.83
Effective Normal stress [t/ft^2]	2.60	1.70
Shear Strength [t/ft^2]	2.28	1.58
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 74394.26
  - Resisting force [tons]: 257362.15

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	**Trend [deg]**	**Length [ft]**
15.60	230.78	557.84

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	369.47	327.74
Joint 2	331.73	479.12

Persistence:

- Joint 1 [ft]: 557.84
- Joint 2 [ft]: 557.84

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	86.02	70.00
Joint 1 & Crest	43.69	70.00
Joint 2 & Crest	50.29	40.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	25.00	284.00
Joint Set 2	27.00	174.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

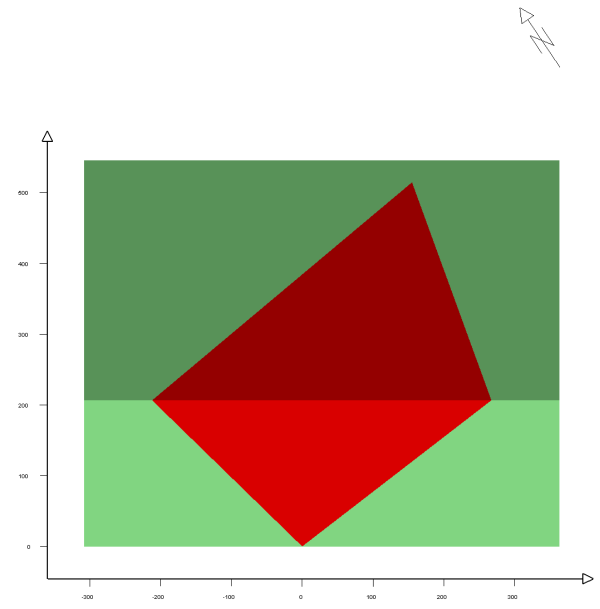
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	336.949	21.758	150.000
234	-60.262	289.679	150.000
123	416.236	339.761	150.000



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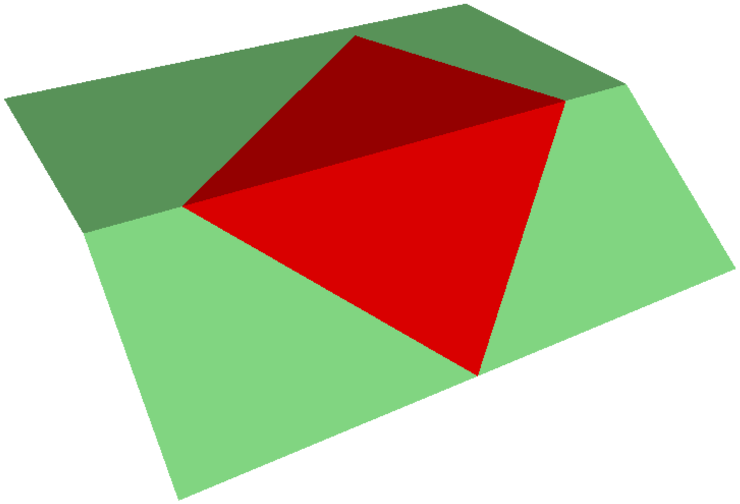

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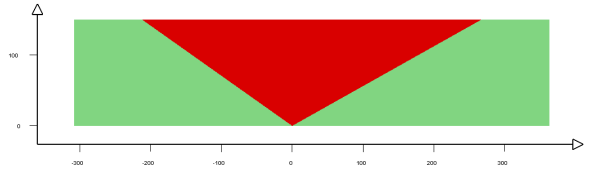

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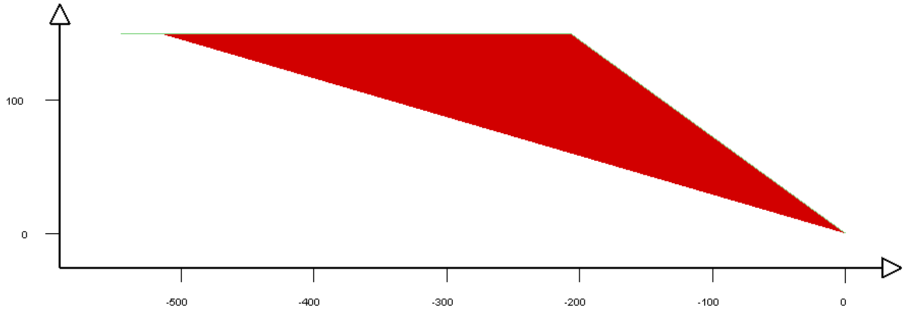


Side

Swedge Analysis Information

Document Name:

- Phi-C slope 36-214 planes 7-8.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 10.1995
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 541.99
- Wedge volume [ft^3]: 2288101.387
- Wedge weight [tons]: 171607.604
- Wedge area (joint1) [ft^2]: 102358.11
- Wedge area (joint2) [ft^2]: 50314.63
- Wedge area (slope) [ft^2]: 21546.80
- Wedge area (upper face) [ft^2]: 45762.03

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	263708.34	125836.39
Effective Normal stress [t/ft^2]	2.58	2.50
Shear Strength [t/ft^2]	2.26	2.20
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 33581.41
  - Resisting force [tons]: 342513.88

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	**Trend [deg]**	**Length [ft]**
11.28	219.34	766.53

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	369.47	576.78
Joint 2	273.48	542.74

Persistence:

- Joint 1 [ft]: 766.53
- Joint 2 [ft]: 766.53

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	25.25	17.00
Joint 1 & Crest	43.69	70.00
Joint 2 & Crest	111.07	93.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	25.00	284.00
Joint Set 2	54.00	301.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

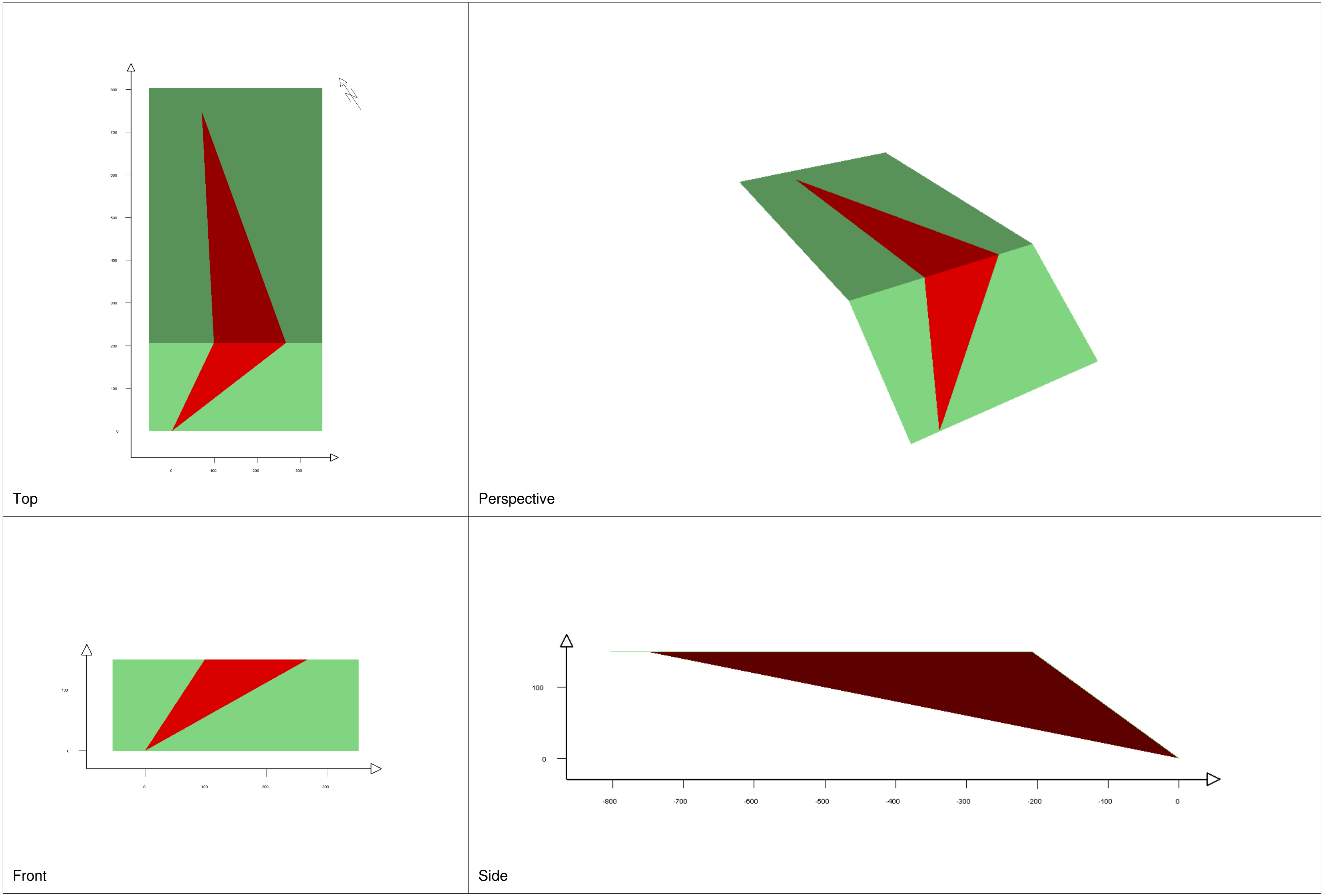
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	336.949	21.758	150.000
234	196.953	116.186	150.000
123	476.484	581.404	150.000



Phi-C slope 36-214 planes 7-8.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 36-214 planes 7-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 3.3703
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 249.37
- Wedge volume [ft^3]: 1934219.514
- Wedge weight [tons]: 145066.464
- Wedge area (joint1) [ft^2]: 64090.18
- Wedge area (joint2) [ft^2]: 23149.61
- Wedge area (slope) [ft^2]: 39588.02
- Wedge area (upper face) [ft^2]: 38684.39

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	113879.31	50798.68
Effective Normal stress [t/ft^2]	1.78	2.19
Shear Strength [t/ft^2]	1.64	1.96
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 44646.30
  - Resisting force [tons]: 150470.50

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	**Trend [deg]**	**Length [ft]**
17.92	224.59	487.39

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	331.73	387.95
Joint 2	273.48	249.71

Persistence:

- Joint 1 [ft]: 487.39
- Joint 2 [ft]: 487.39

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	60.78	53.00
Joint 1 & Crest	50.29	40.00
Joint 2 & Crest	68.93	87.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	27.00	174.00
Joint Set 2	54.00	301.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

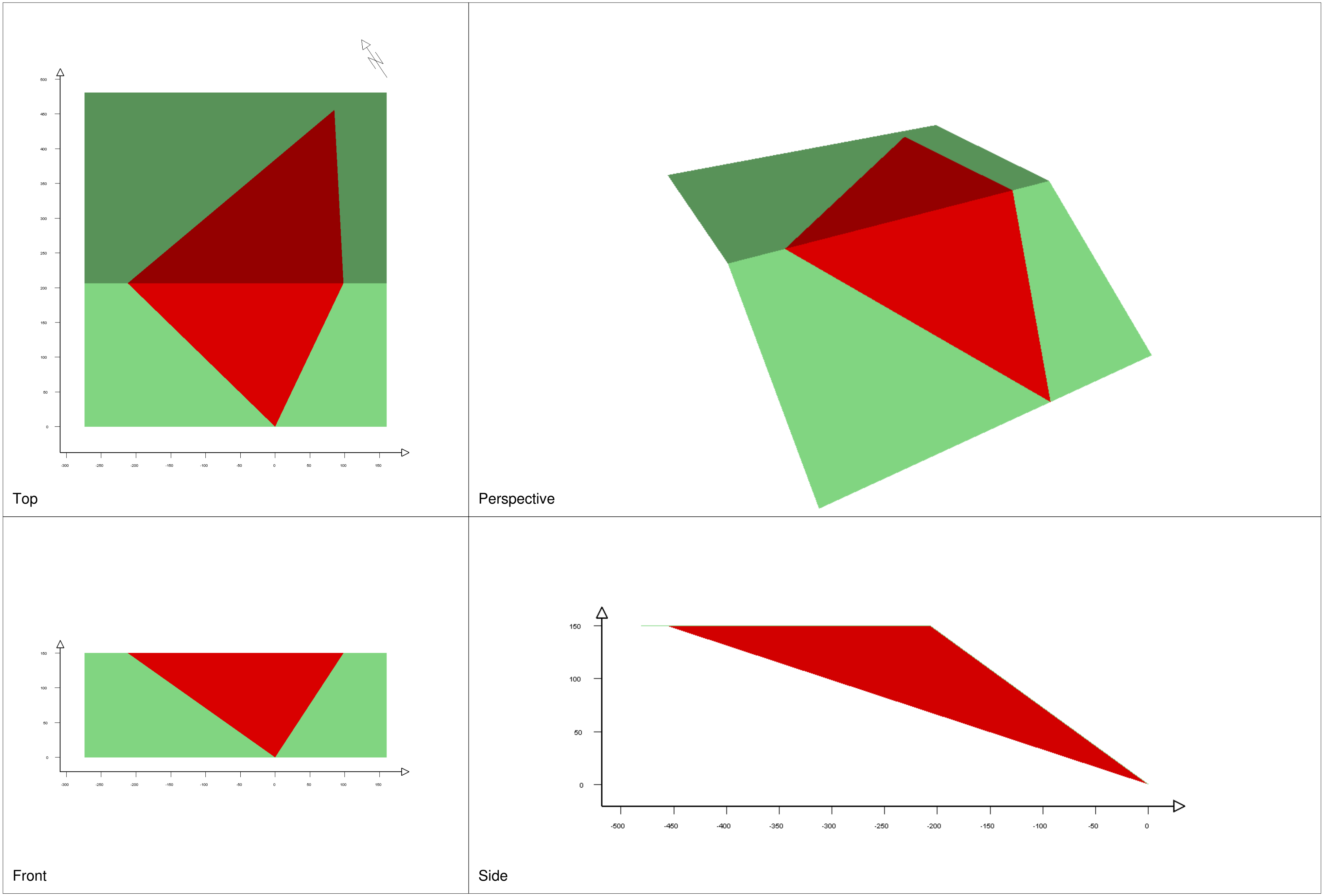
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-60.262	289.679	150.000
234	196.953	116.186	150.000
123	325.564	330.231	150.000



Phi-C slope 36-214 planes 7-9.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 36-214 planes 8-4.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 3.3431
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 75.83
- Wedge volume [ft^3]: 191151.193
- Wedge weight [tons]: 14336.340
- Wedge area (joint1) [ft^2]: 14321.07
- Wedge area (joint2) [ft^2]: 8004.89
- Wedge area (slope) [ft^2]: 12865.63
- Wedge area (upper face) [ft^2]: 3823.02

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	13107.80	2782.80
Effective Normal stress [t/ft^2]	0.92	0.35
Shear Strength [t/ft^2]	0.97	0.52
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 5383.14
  - Resisting force [tons]: 17996.59

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
22.05	254.32	399.48

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	369.47	80.70
Joint 2	304.62	105.42

Persistence:

- Joint 1 [ft]: 399.48
- Joint 2 [ft]: 399.48

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	13.22	64.00
Joint 1 & Crest	43.69	70.00
Joint 2 & Crest	123.10	46.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	25.00	284.00
Joint Set 2	81.00	168.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

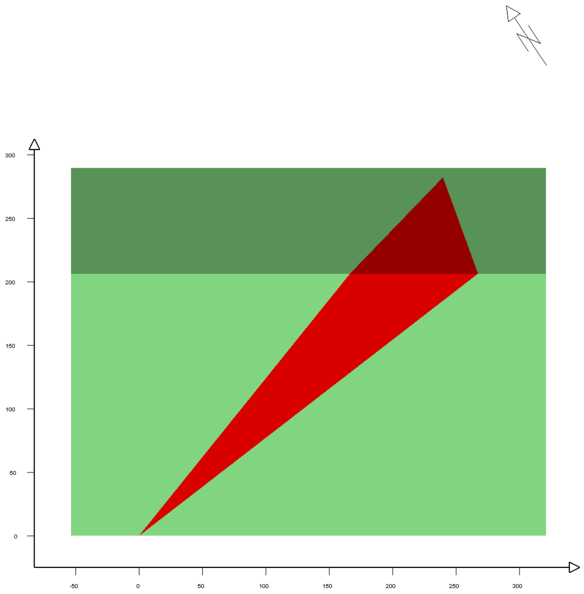
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	336.949	21.758	150.000
234	253.357	78.141	150.000
123	356.471	100.059	150.000



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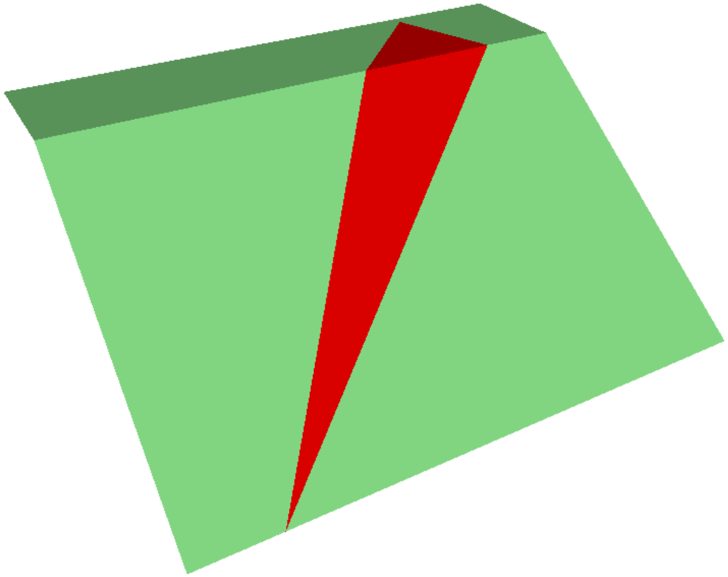

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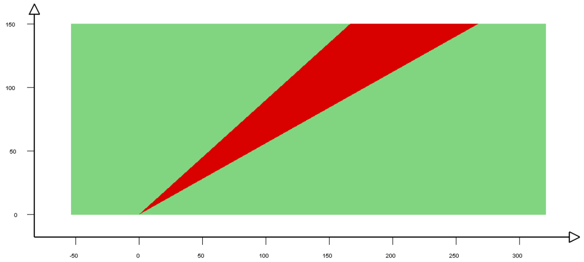

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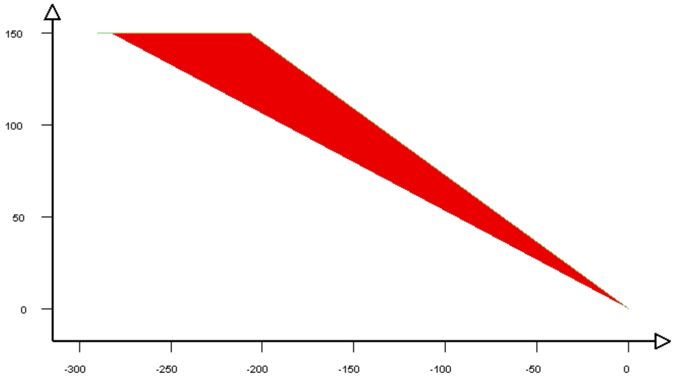


Side

Phi-C slope 36-214 planes 8-4.swd

Swedge Analysis Information

Document Name:

- Phi-C slope 36-214 planes 8-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Drained Condition

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 3.4594
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 307.97
- Wedge volume [ft^3]: 3688923.526
- Wedge weight [tons]: 276669.264
- Wedge area (joint1) [ft^2]: 58162.19
- Wedge area (joint2) [ft^2]: 79151.76
- Wedge area (slope) [ft^2]: 61134.82
- Wedge area (upper face) [ft^2]: 73778.47

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	150936.25	134533.83
Effective Normal stress [t/ft^2]	2.60	1.70
Shear Strength [t/ft^2]	2.28	1.58
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 74394.26
  - Resisting force [tons]: 257362.15

Failure Mode:

  - Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	**Trend [deg]**	**Length [ft]**
15.60	230.78	557.84

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	369.47	327.74
Joint 2	331.73	479.12

Persistence:

- Joint 1 [ft]: 557.84
- Joint 2 [ft]: 557.84

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	86.02	70.00
Joint 1 & Crest	43.69	70.00
Joint 2 & Crest	50.29	40.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	25.00	284.00
Joint Set 2	27.00	174.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

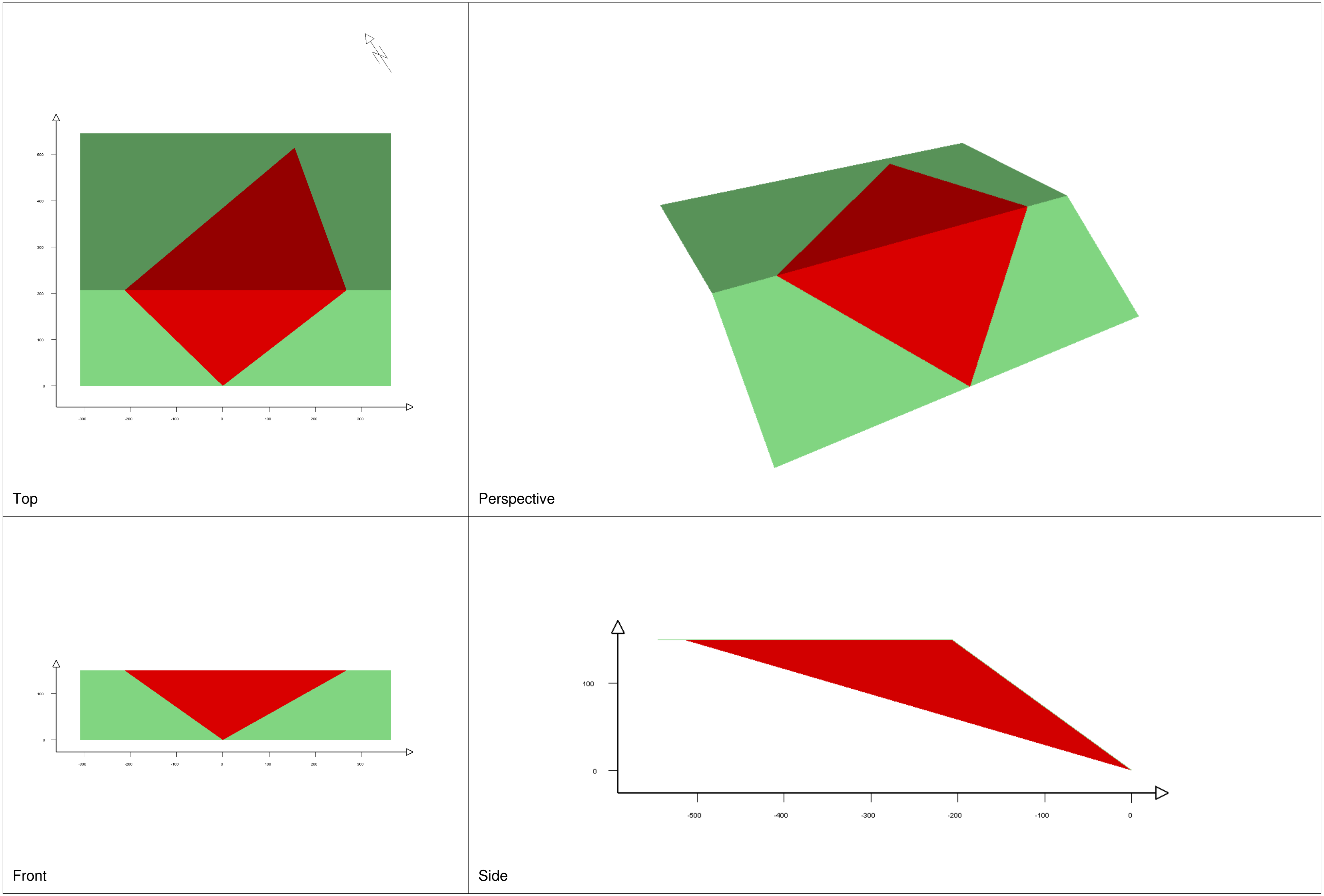
- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: NO
- Overhanging slope face: NO
- Externally applied force: NO

- Tension crack: NO

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	336.949	21.758	150.000
234	-60.262	289.679	150.000
123	416.236	339.761	150.000



Phi-C slope 36-214 planes 8-9.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 27-147 planes 3-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 9.1725
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 616.71
- Wedge volume [ft^3]: 7329501.860
- Wedge weight [tons]: 549712.640
- Wedge area (joint1) [ft^2]: 73849.94
- Wedge area (joint2) [ft^2]: 224413.03
- Wedge area (slope) [ft^2]: 78535.97
- Wedge area (upper face) [ft^2]: 146590.04

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	192255.43	372296.24
Effective Normal stress [t/ft^2]	2.60	1.66
Shear Strength [t/ft^2]	2.28	1.55
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 56215.78
  - Resisting force [tons]: 515641.84

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	57628.80
Joint 2	N/A	175120.71
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
5.87	95.64	1466.79

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	522.46	959.43
Joint 2	337.88	1358.42

Persistence:

- Joint 1 [ft]: 1466.79
- Joint 2 [ft]: 1466.79

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	62.85	13.00
Joint 1 & Crest	39.23	140.00
Joint 2 & Crest	77.93	27.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	77.00	7.00
Joint Set 2	27.00	174.00
Slope	27.00	147.00
Upper Face	0.00	147.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

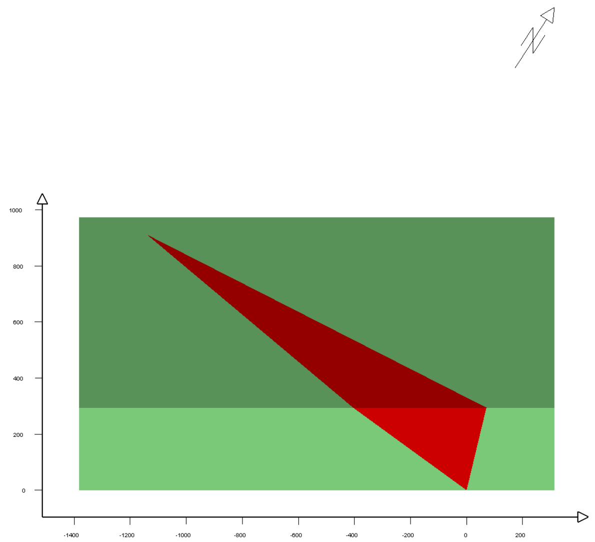
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-499.762	26.473	150.000
234	-101.062	285.391	150.000
123	-1452.039	143.398	150.000



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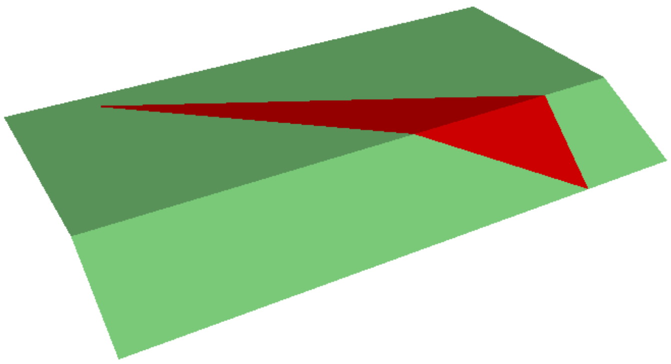

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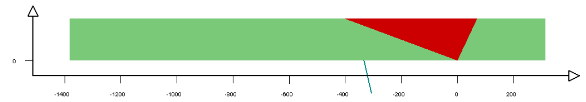

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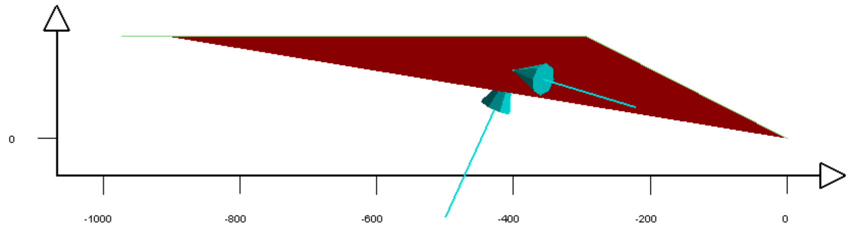


Side

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 27-147 planes 5-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9
- Company: Geo-Logic Associates

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 3.4072
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 196.74
- Wedge volume [ft^3]: 1246413.192
- Wedge weight [tons]: 93480.989
- Wedge area (joint1) [ft^2]: 17866.06
- Wedge area (joint2) [ft^2]: 71590.21
- Wedge area (slope) [ft^2]: 41864.96
- Wedge area (upper face) [ft^2]: 24928.26

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	26348.05	46492.48
Effective Normal stress [t/ft^2]	1.47	0.65
Shear Strength [t/ft^2]	1.40	0.76
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 23266.74
  - Resisting force [tons]: 79273.32

Water Pressures/Forces:

	Average pressure [t/ft^2]	Water force [tons]
Joint 1	N/A	13941.78
Joint 2	N/A	55865.42
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
14.41	114.29	602.67

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	377.57	237.31
Joint 2	337.88	433.35

Persistence:

- Joint 1 [ft]: 602.67
- Joint 2 [ft]: 602.67

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	41.02	29.00
Joint 1 & Crest	61.05	124.00
Joint 2 & Crest	77.93	27.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	203.00
Joint Set 2	27.00	174.00
Slope	27.00	147.00
Upper Face	0.00	147.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

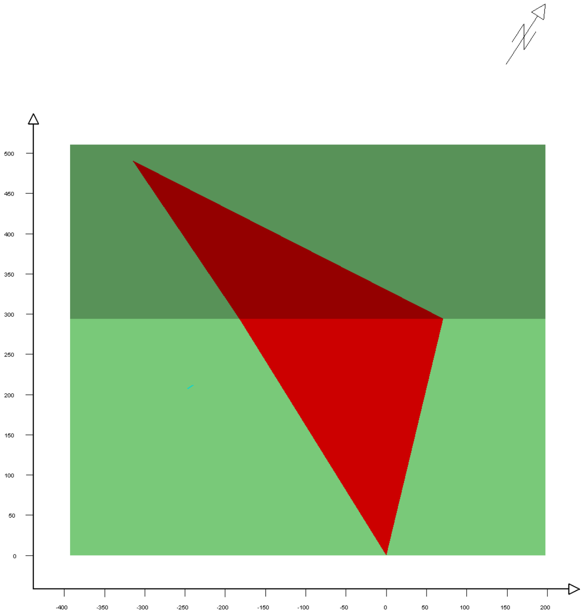
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-313.596	147.370	150.000
234	-101.062	285.391	150.000
123	-532.039	240.094	150.000



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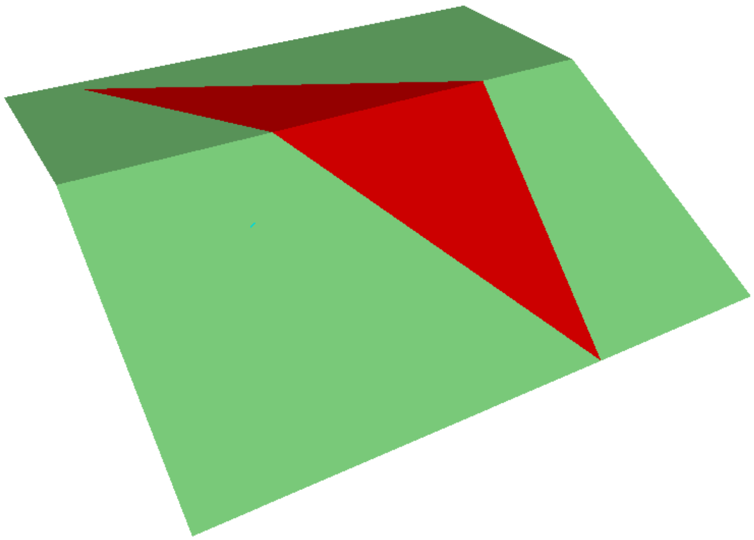

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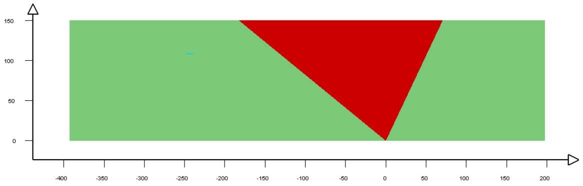

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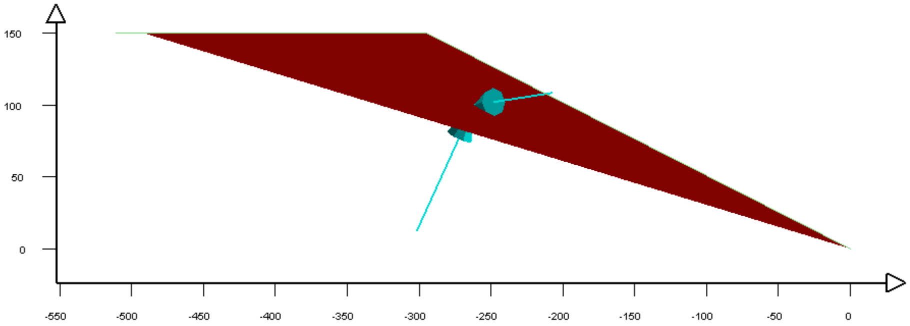


Side

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 27-147 planes 6-8.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 2.3341
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 307.97
- Wedge volume [ft^3]: 3688923.526
- Wedge weight [tons]: 276669.264
- Wedge area (joint1) [ft^2]: 58162.19
- Wedge area (joint2) [ft^2]: 79151.76
- Wedge area (slope) [ft^2]: 61134.82
- Wedge area (upper face) [ft^2]: 73778.47

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	105549.38	72767.75
Effective Normal stress [t/ft^2]	1.81	0.92
Shear Strength [t/ft^2]	1.67	0.97
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 74394.26
  - Resisting force [tons]: 173645.10

Water Pressures/Forces:

	Average pressure [t/ft^2]	Water force [tons]
Joint 1	N/A	45386.87
Joint 2	N/A	61766.08
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
15.60	230.78	557.84

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	369.47	327.74
Joint 2	331.73	479.12

Persistence:

- Joint 1 [ft]: 557.84
- Joint 2 [ft]: 557.84

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	86.02	70.00
Joint 1 & Crest	43.69	70.00
Joint 2 & Crest	50.29	40.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	25.00	284.00
Joint Set 2	27.00	174.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

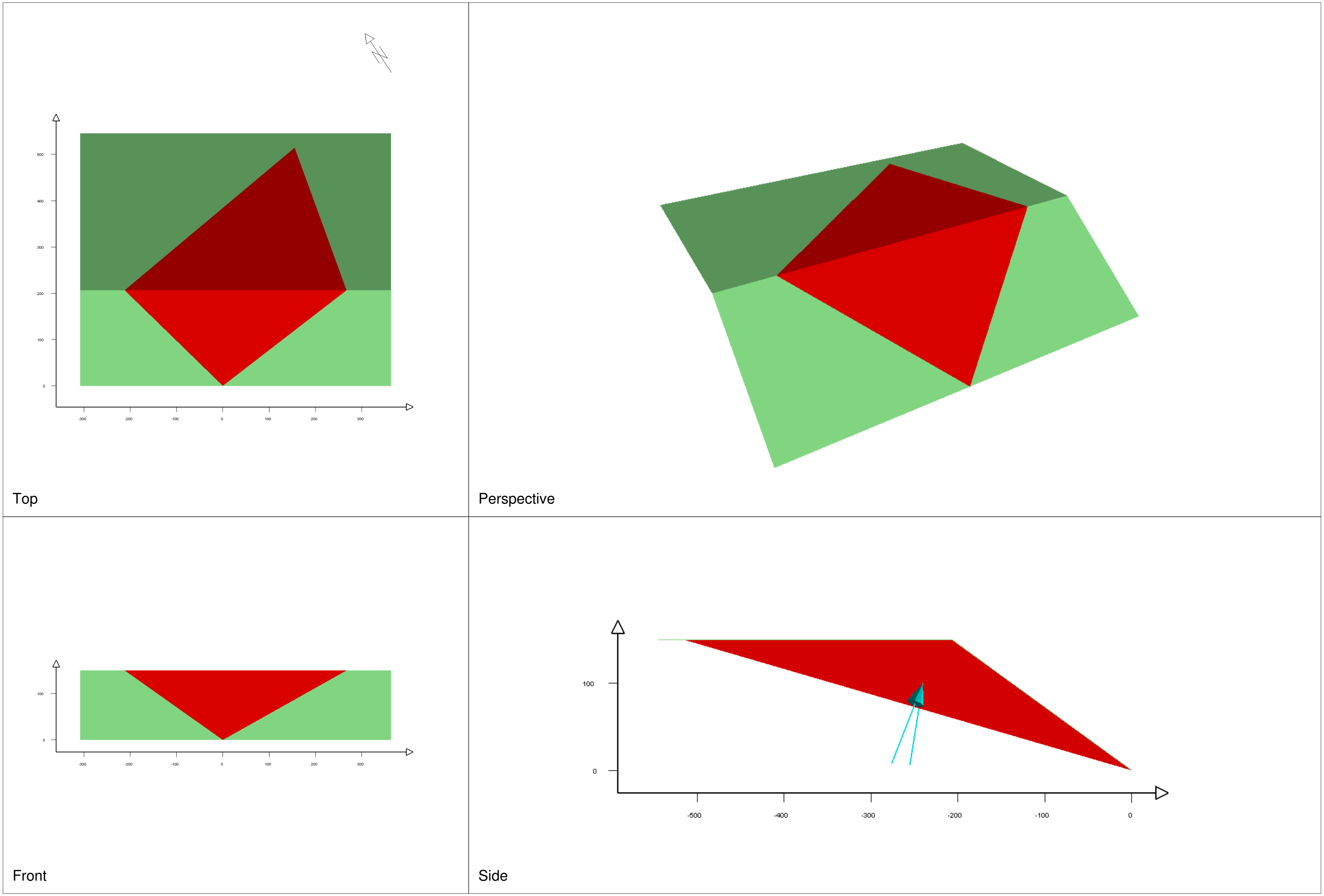
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	336.949	21.758	150.000
234	-60.262	289.679	150.000
123	416.236	339.761	150.000



Phi-C-Water slope 27-147 planes 6-8.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 27-147 planes 5-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9
- Company: Geo-Logic Associates

Comments:

  - Wedge analysis with fully filled fractures.

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 3.4072
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 196.74
- Wedge volume [ft^3]: 1246413.192
- Wedge weight [tons]: 93480.989
- Wedge area (joint1) [ft^2]: 17866.06
- Wedge area (joint2) [ft^2]: 71590.21
- Wedge area (slope) [ft^2]: 41864.96
- Wedge area (upper face) [ft^2]: 24928.26

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	26348.05	46492.48
Effective Normal stress [t/ft^2]	1.47	0.65
Shear Strength [t/ft^2]	1.40	0.76
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 23266.74
  - Resisting force [tons]: 79273.32

Water Pressures/Forces:

	Average pressure [t/ft^2]	Water force [tons]
Joint 1	N/A	13941.78
Joint 2	N/A	55865.42
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
14.41	114.29	602.67

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	377.57	237.31
Joint 2	337.88	433.35

Persistence:

- Joint 1 [ft]: 602.67
- Joint 2 [ft]: 602.67

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	41.02	29.00
Joint 1 & Crest	61.05	124.00
Joint 2 & Crest	77.93	27.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	203.00
Joint Set 2	27.00	174.00
Slope	27.00	147.00
Upper Face	0.00	147.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

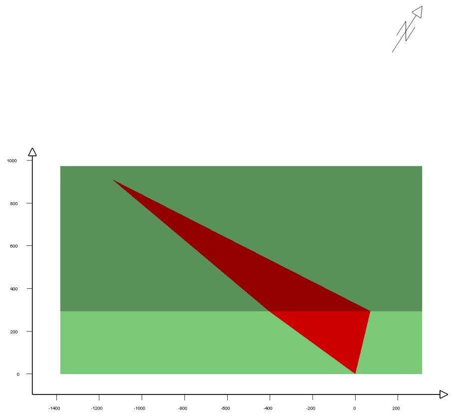
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-313.596	147.370	150.000
234	-101.062	285.391	150.000
123	-532.039	240.094	150.000



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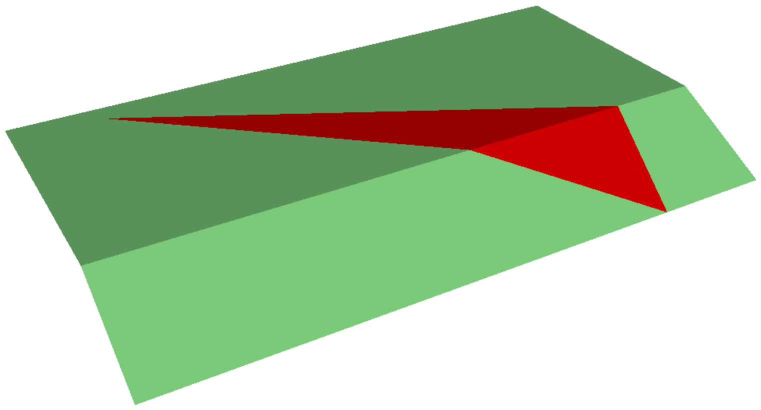
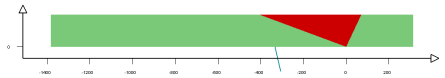


Perspective



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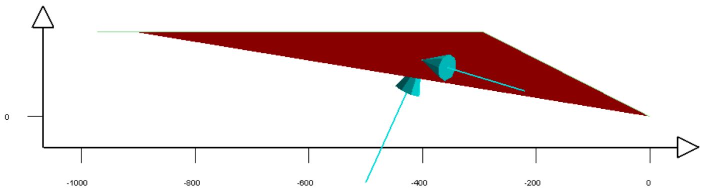


Side

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 27-150 planes 2-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 4.1061
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 0.00
- Wedge volume [ft^3]: 20068.649
- Wedge weight [tons]: 1505.149
- Wedge area (joint1) [ft^2]: 1355.58
- Wedge area (joint2) [ft^2]: 7273.17
- Wedge area (slope) [ft^2]: 7405.77
- Wedge area (upper face) [ft^2]: 0.00
- Wedge area (tension crack) [ft^2]: 204.51

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	84.08	655.80
Effective Normal stress [t/ft^2]	0.06	0.09
Shear Strength [t/ft^2]	0.30	0.32
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 666.14
  - Resisting force [tons]: 2735.24

Water Pressures/Forces:

	Average pressure [t/ft^2]	Water force [tons]
Joint 1	N/A	128.69
Joint 2	N/A	690.46
Fissures	0.09	N/A
Tension Crack	0.09	19.41

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
25.53	153.61	326.89

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	330.88	0.00
Joint 2	336.28	0.00
Tension Crack	N/A	44.83

Persistence:

- Joint 1 [ft]: 330.88
- Joint 2 [ft]: 336.28

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	7.65	7.65
Joint 1 & Crest	93.07	93.07
Joint 2 & Crest	79.28	79.28
Joint 1 & Tension Crack	N/A	96.00
Joint 2 & Tension Crack	N/A	156.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	66.00
Joint Set 2	27.00	174.00
Slope	27.00	150.00
Upper Face	0.00	150.00
Tension Crack	90.00	150.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: YES

Tension Crack Data:

- Location: Minimizes factor of safety
- Trace length [ft]: 0.00

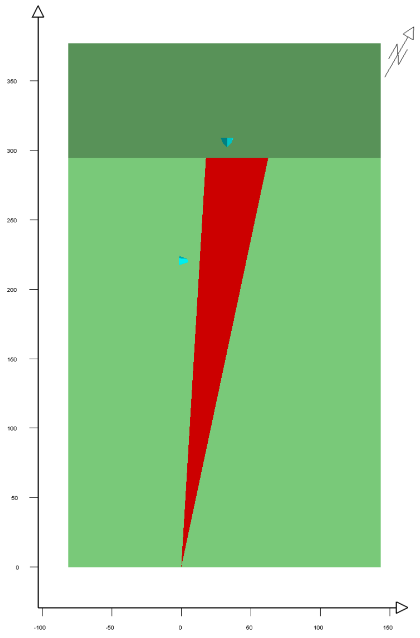
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope, 5=Tension Crack

Point	x	y	z
124	0.000	0.000	0.000
134	-131.827	263.824	150.000
234	-93.004	286.238	150.000
135	-131.827	263.824	150.000
125	-131.132	264.225	140.876
235	-93.004	286.238	150.000



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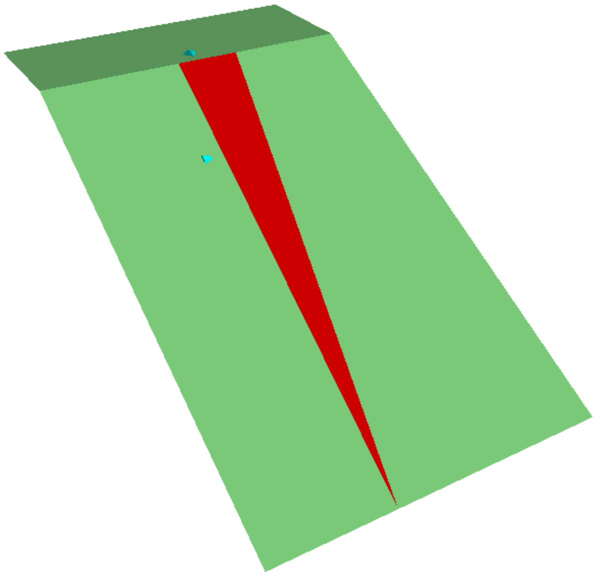

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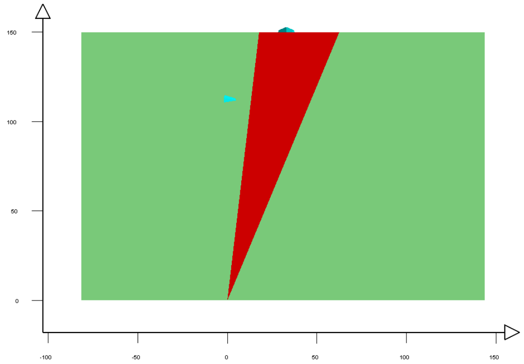

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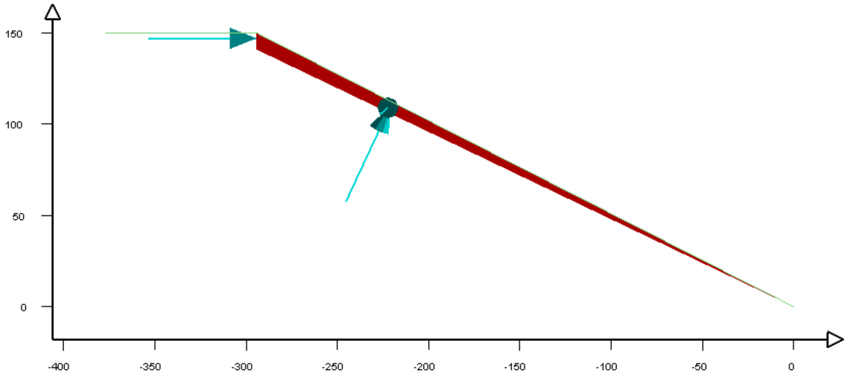


Side

Phi-C-Water slope 27-150 planes 2-9.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 27-150 planes 3-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 9.1196
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 555.81
- Wedge volume [ft^3]: 7097588.011
- Wedge weight [tons]: 532319.101
- Wedge area (joint1) [ft^2]: 71089.23
- Wedge area (joint2) [ft^2]: 225751.55
- Wedge area (slope) [ft^2]: 84383.15
- Wedge area (upper face) [ft^2]: 141951.76

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	186503.12	353930.83
Effective Normal stress [t/ft^2]	2.62	1.57
Shear Strength [t/ft^2]	2.30	1.47
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 54437.05
  - Resisting force [tons]: 496443.47

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	55474.48
Joint 2	N/A	176165.22
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
5.87	95.64	1466.79

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	556.83	923.56
Joint 2	336.28	1366.52

Persistence:

- Joint 1 [ft]: 1466.79
- Joint 2 [ft]: 1466.79

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	64.33	13.00
Joint 1 & Crest	36.40	143.00
Joint 2 & Crest	79.28	24.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	77.00	7.00
Joint Set 2	27.00	174.00
Slope	27.00	150.00
Upper Face	0.00	150.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

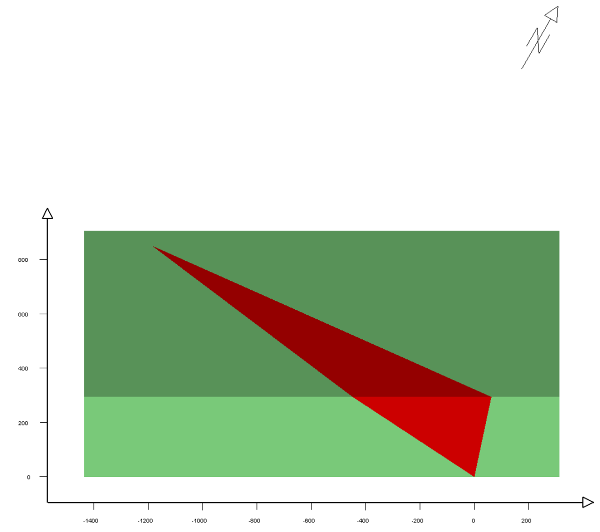
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-535.360	30.844	150.000
234	-93.004	286.238	150.000
123	-1452.039	143.398	150.000



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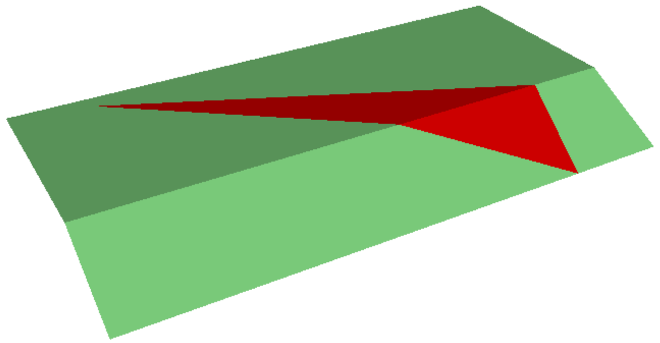

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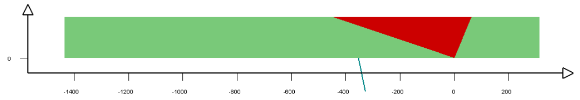

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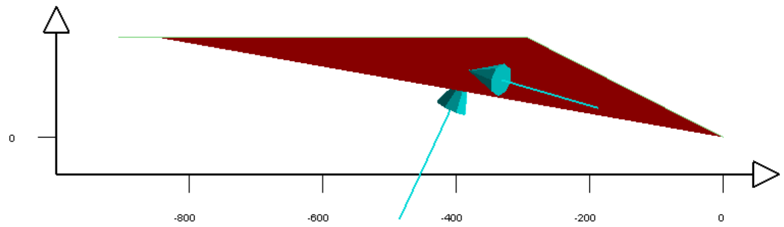


Side

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 27-150 planes 5-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 3.3508
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 179.55
- Wedge volume [ft^3]: 1202940.451
- Wedge weight [tons]: 90220.534
- Wedge area (joint1) [ft^2]: 16926.45
- Wedge area (joint2) [ft^2]: 72928.72
- Wedge area (slope) [ft^2]: 44271.19
- Wedge area (upper face) [ft^2]: 24058.81

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	25676.03	41877.90
Effective Normal stress [t/ft^2]	1.52	0.57
Shear Strength [t/ft^2]	1.44	0.70
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 22455.24
  - Resisting force [tons]: 75242.71

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	13208.55
Joint 2	N/A	56909.93
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
14.41	114.29	602.67

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	389.05	224.83
Joint 2	336.28	441.45

Persistence:

- Joint 1 [ft]: 602.67
- Joint 2 [ft]: 602.67

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	42.59	29.00
Joint 1 & Crest	58.13	127.00
Joint 2 & Crest	79.28	24.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	203.00
Joint Set 2	27.00	174.00
Slope	27.00	150.00
Upper Face	0.00	150.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

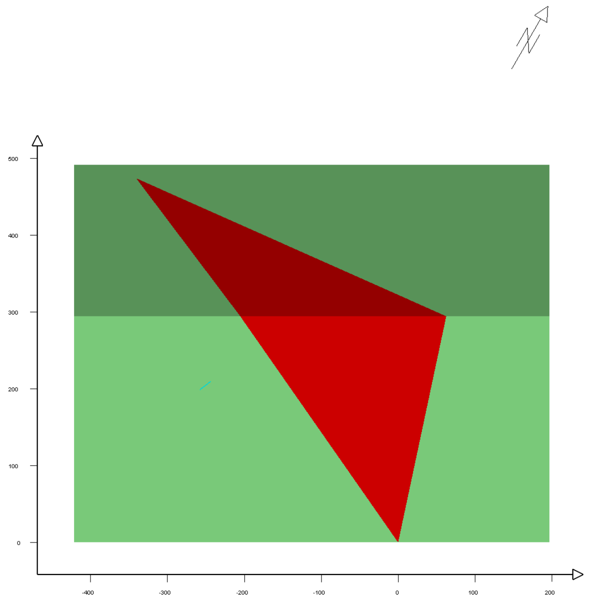
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-325.084	152.247	150.000
234	-93.004	286.238	150.000
123	-532.039	240.094	150.000



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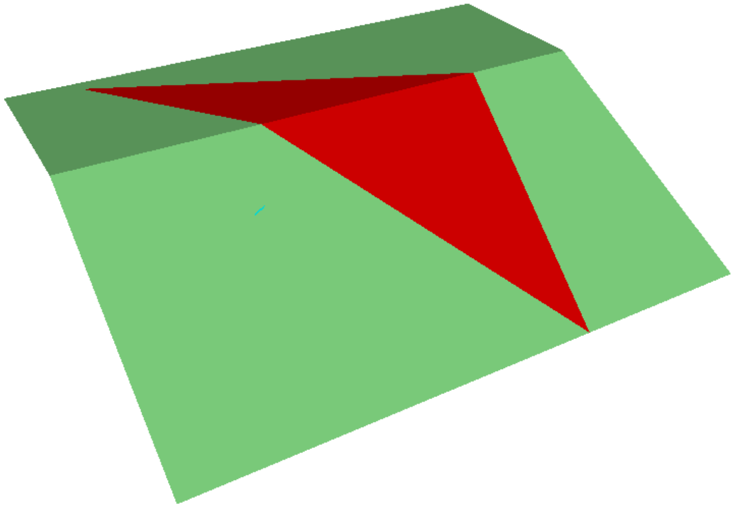

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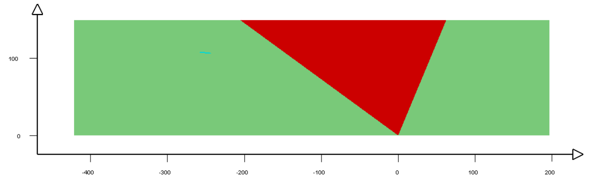

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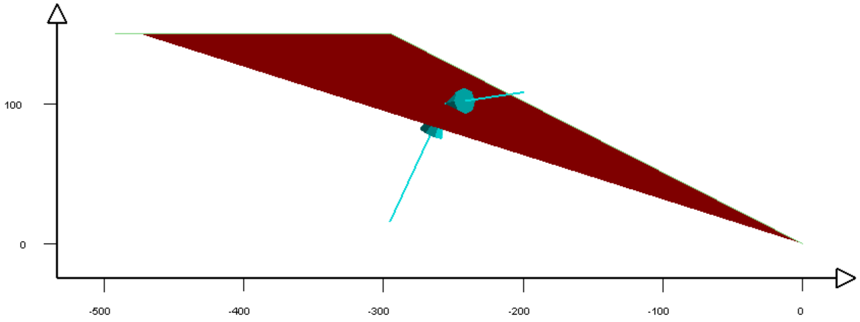


Side

Phi-C-Water slope 27-150 planes 5-9.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 34-097 planes 1-8.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 0.7766
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 51.14
- Wedge volume [ft^3]: 714952.017
- Wedge weight [tons]: 53621.401
- Wedge area (joint1) [ft^2]: 73830.17
- Wedge area (joint2) [ft^2]: 74463.26
- Wedge area (slope) [ft^2]: 75008.93
- Wedge area (upper face) [ft^2]: 14299.04

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	0.00	8234.73
Effective Normal stress [t/ft^2]	0.00	0.11
Shear Strength [t/ft^2]	0.00	0.34
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 32253.56
  - Resisting force [tons]: 25049.49

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	57613.38
Joint 2	N/A	58107.40
Fissures	0.78	N/A

Failure Mode:

- Sliding up joint2

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
1.76	10.22	4877.14

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	3900.66	977.06
Joint 2	4458.77	419.59

Persistence:

- Joint 1 [ft]: 4877.14
- Joint 2 [ft]: 4877.14

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	0.49	4.00
Joint 1 & Crest	176.06	3.00
Joint 2 & Crest	3.45	173.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	83.00	100.00
Joint Set 2	25.00	284.00
Slope	34.00	97.00
Upper Face	0.00	97.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

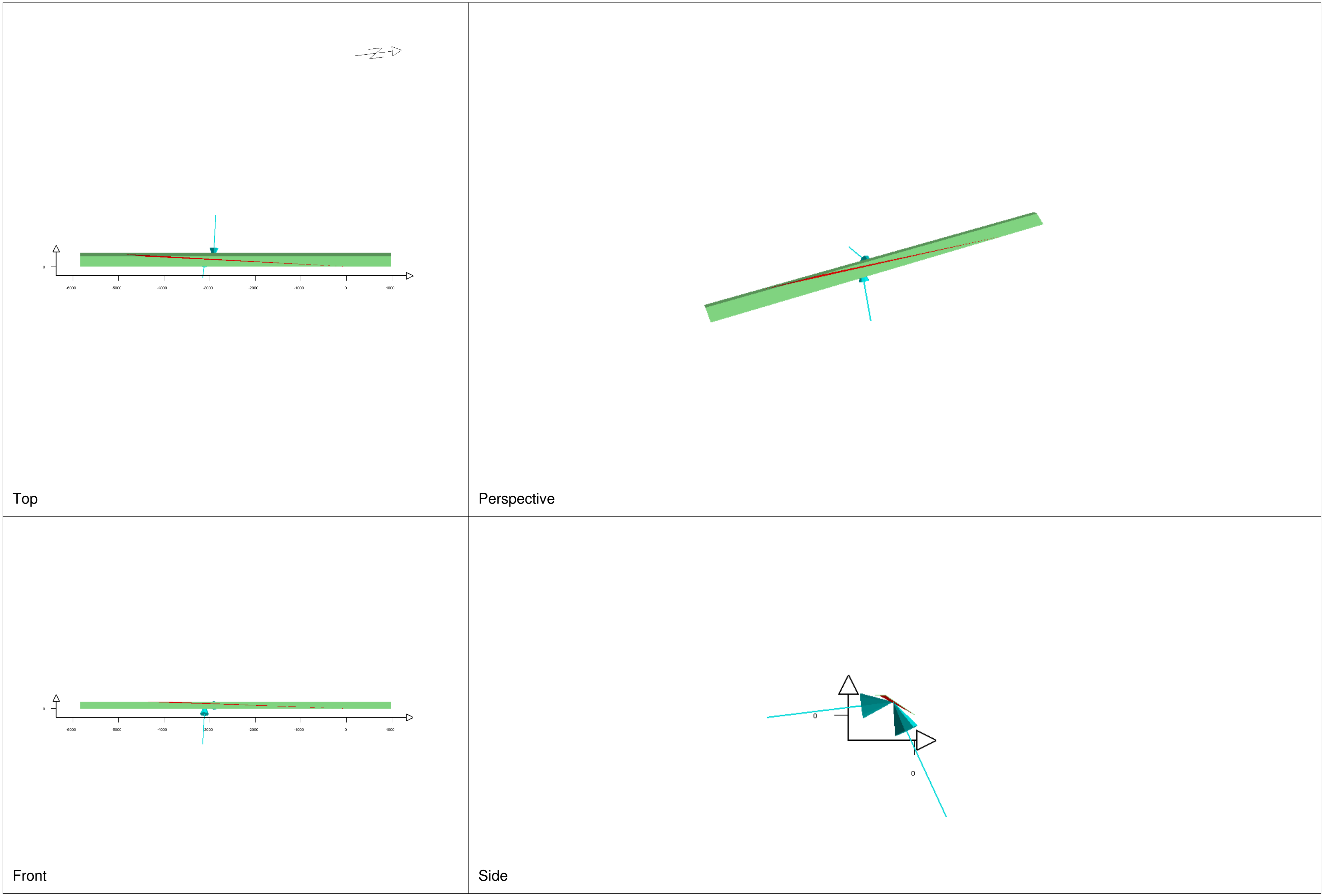
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-694.973	-3835.322	150.000
234	-763.129	-4390.413	150.000
123	-864.638	-4797.543	150.000



Phi-C-Water slope 34-097 planes 1-8.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 34-097 planes 3-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 9.4607
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 1236.31
- Wedge volume [ft^3]: 8821798.813
- Wedge weight [tons]: 661634.911
- Wedge area (joint1) [ft^2]: 95162.06
- Wedge area (joint2) [ft^2]: 209612.46
- Wedge area (slope) [ft^2]: 38281.61
- Wedge area (upper face) [ft^2]: 176435.98

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	226501.30	495300.73
Effective Normal stress [t/ft^2]	2.38	2.36
Shear Strength [t/ft^2]	2.11	2.10
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 67661.39
  - Resisting force [tons]: 640127.18

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	74259.72
Joint 2	N/A	163571.08
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
5.87	95.64	1466.79

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	270.47	1236.31
Joint 2	367.22	1268.83

Persistence:

- Joint 1 [ft]: 1466.79
- Joint 2 [ft]: 1466.79

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	50.43	13.00
Joint 1 & Crest	82.64	90.00
Joint 2 & Crest	46.93	77.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	77.00	7.00
Joint Set 2	27.00	174.00
Slope	34.00	97.00
Upper Face	0.00	97.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

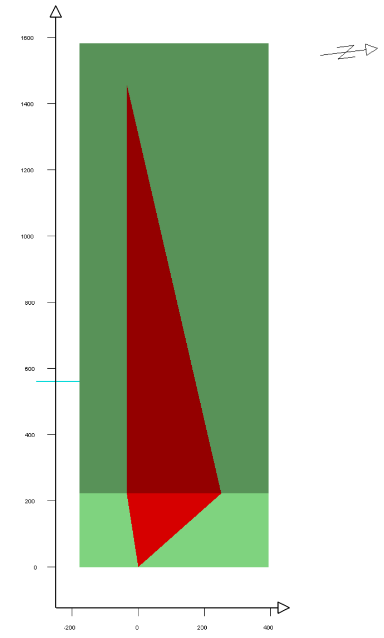
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-224.947	-7.270	150.000
234	-190.162	276.026	150.000
123	-1452.039	143.398	150.000



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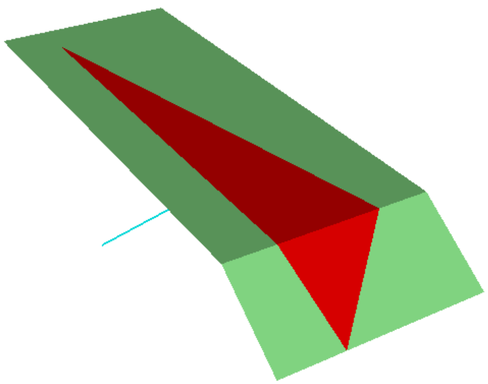

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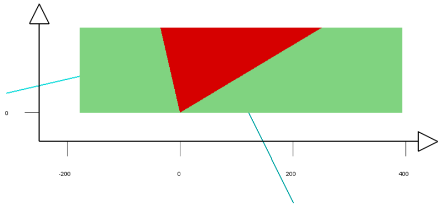

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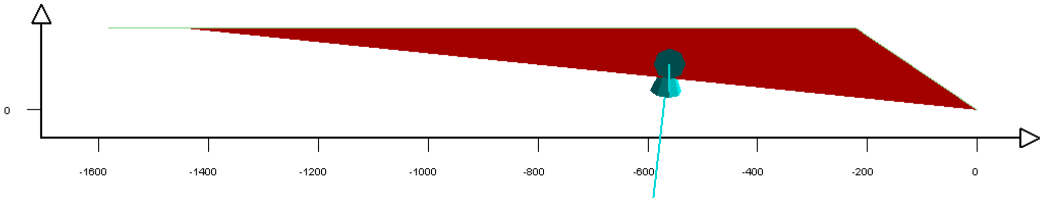


Side

Phi-C-Water slope 34-097 planes 3-9.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 34-097 planes 5-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 3.6882
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 334.95
- Wedge volume [ft^3]: 1451786.108
- Wedge weight [tons]: 108883.958
- Wedge area (joint1) [ft^2]: 26233.36
- Wedge area (joint2) [ft^2]: 56789.63
- Wedge area (slope) [ft^2]: 23253.26
- Wedge area (upper face) [ft^2]: 29035.72

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	26457.23	74907.74
Effective Normal stress [t/ft^2]	1.01	1.32
Shear Strength [t/ft^2]	1.04	1.28
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 27100.43
  - Resisting force [tons]: 99950.74

Water Pressures/Forces:

	Average pressure [t/ft^2]	Water force [tons]
Joint 1	N/A	20471.20
Joint 2	N/A	44315.79
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
14.41	114.29	602.67

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	279.19	348.45
Joint 2	367.22	343.76

Persistence:

- Joint 1 [ft]: 602.67
- Joint 2 [ft]: 602.67

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	26.98	29.00
Joint 1 & Crest	106.10	74.00
Joint 2 & Crest	46.93	77.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	203.00
Joint Set 2	27.00	174.00
Slope	34.00	97.00
Upper Face	0.00	97.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

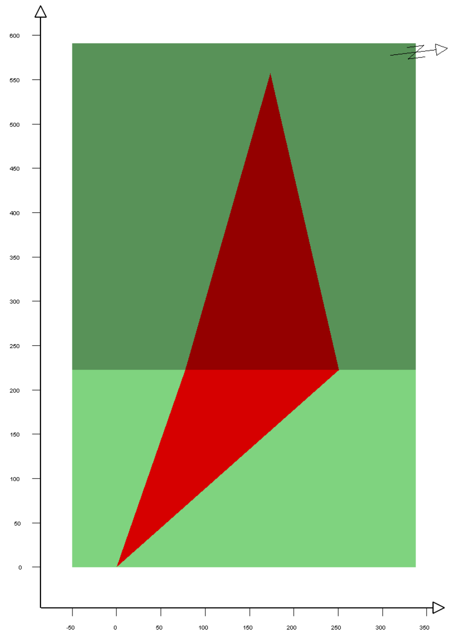
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-211.291	103.945	150.000
234	-190.162	276.026	150.000
123	-532.039	240.094	150.000



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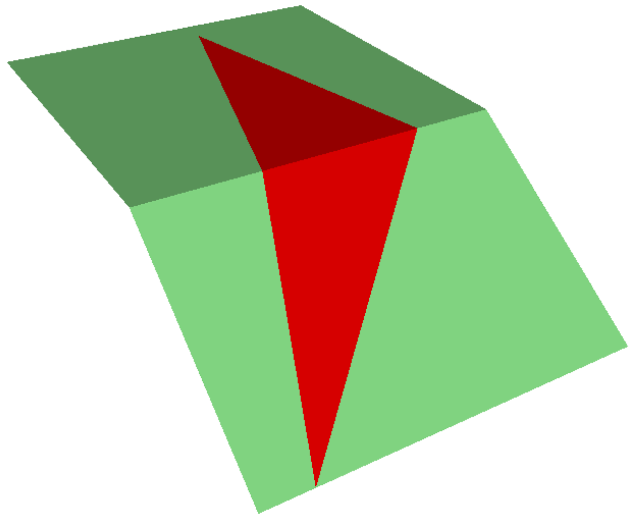

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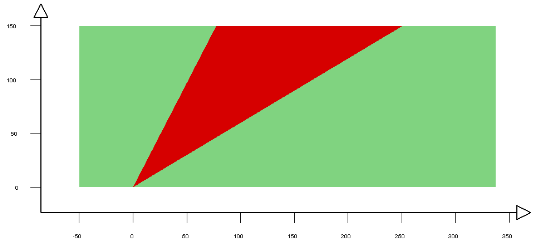

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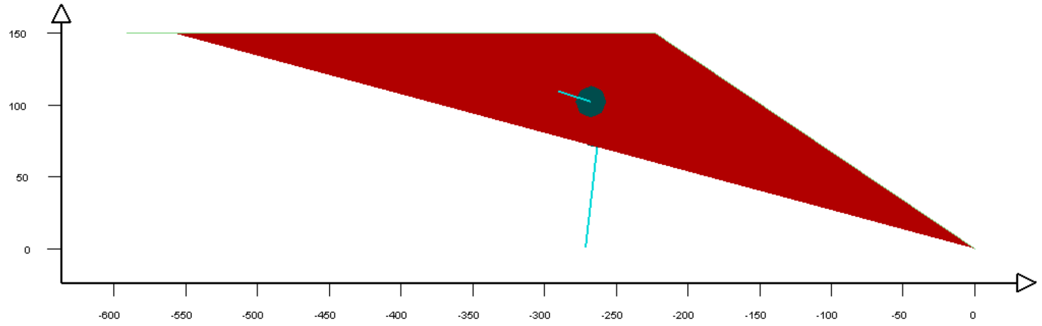


Side

Phi-C-Water slope 34-097 planes 5-9.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-140 planes 10-9 75%.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Fractures Filled 75%

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 1.5146
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 54.82
- Wedge volume [ft^3]: 148015.864
- Wedge weight [tons]: 11101.190
- Wedge area (joint1) [ft^2]: 4585.42
- Wedge area (joint2) [ft^2]: 16194.65
- Wedge area (slope) [ft^2]: 13781.36
- Wedge area (upper face) [ft^2]: 2960.32

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	0.00	4748.76
Effective Normal stress [t/ft^2]	0.00	0.29
Shear Strength [t/ft^2]	0.00	0.48
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 5122.76
  - Resisting force [tons]: 7758.80

Water Pressures/Forces:

	Average pressure [t/ft^2]	Water force [tons]
Joint 1	N/A	1509.57
Joint 2	N/A	5331.44
Fissures	0.33	N/A

Failure Mode:

- Sliding on joint2

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
26.87	168.03	331.83

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	278.84	60.99
Joint 2	337.18	98.03

Persistence:

- Joint 1 [ft]: 331.83
- Joint 2 [ft]: 337.18

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	17.05	82.00
Joint 1 & Crest	113.76	64.00
Joint 2 & Crest	49.19	34.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	86.00	256.00
Joint Set 2	27.00	174.00
Slope	36.00	140.00
Upper Face	0.00	140.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

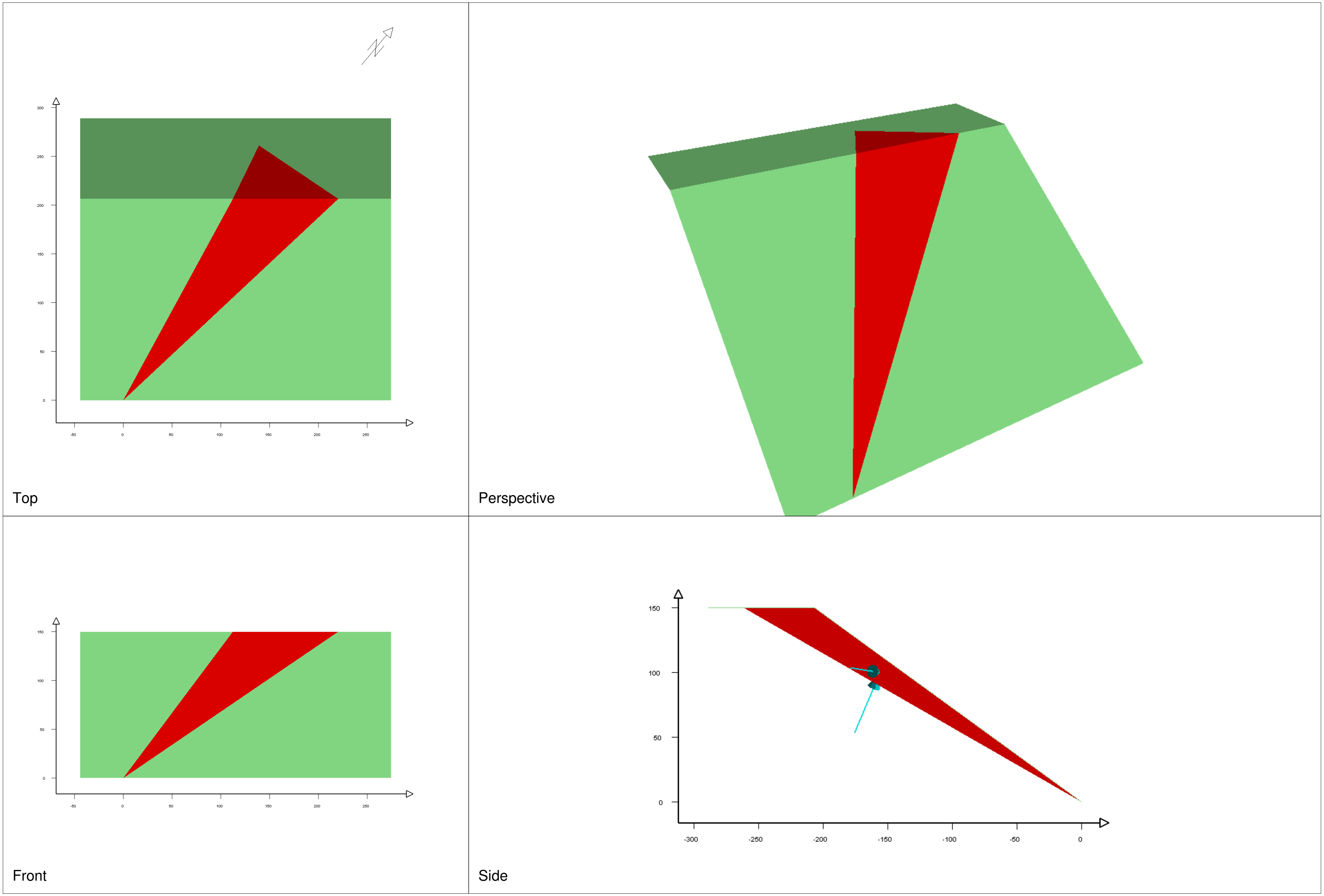
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Percent Filled Fissures
- Percent Filled: 75.000 %

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-46.631	230.383	150.000
234	36.107	299.808	150.000
123	-61.386	289.561	150.000



Phi-C-Water slope 36-140 planes 10-9 75%.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-140 planes 10-9 87%.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Fractures Filled 87%

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 1.0280
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 54.82
- Wedge volume [ft^3]: 148015.864
- Wedge weight [tons]: 11101.190
- Wedge area (joint1) [ft^2]: 4585.42
- Wedge area (joint2) [ft^2]: 16194.65
- Wedge area (slope) [ft^2]: 13781.36
- Wedge area (upper face) [ft^2]: 2960.32

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	0.00	1864.37
Effective Normal stress [t/ft^2]	0.00	0.12
Shear Strength [t/ft^2]	0.00	0.34
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 5355.29
  - Resisting force [tons]: 5505.27

Water Pressures/Forces:

	Average pressure [t/ft^2]	Water force [tons]
Joint 1	N/A	2356.28
Joint 2	N/A	8321.83
Fissures	0.51	N/A

Failure Mode:

- Sliding on joint2

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
26.87	168.03	331.83

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	278.84	60.99
Joint 2	337.18	98.03

Persistence:

- Joint 1 [ft]: 331.83
- Joint 2 [ft]: 337.18

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	17.05	82.00
Joint 1 & Crest	113.76	64.00
Joint 2 & Crest	49.19	34.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	86.00	256.00
Joint Set 2	27.00	174.00
Slope	36.00	140.00
Upper Face	0.00	140.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

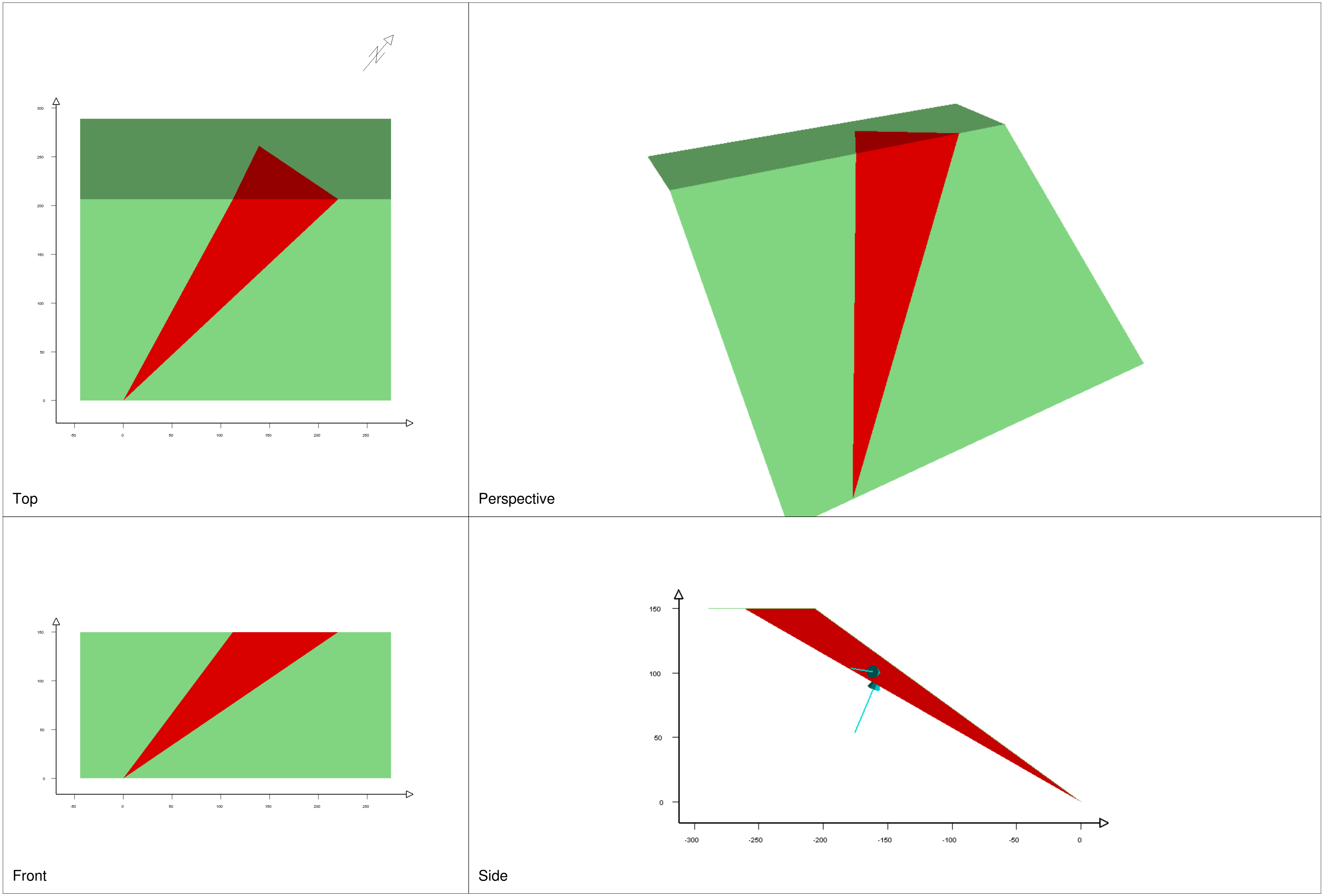
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Percent Filled Fissures
- Percent Filled: 87.000 %

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-46.631	230.383	150.000
234	36.107	299.808	150.000
123	-61.386	289.561	150.000



Phi-C-Water slope 36-140 planes 10-9 87%.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-140 planes 10-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 0.0000
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 54.82
- Wedge volume [ft^3]: 148015.864
- Wedge weight [tons]: 11101.190
- Wedge area (joint1) [ft^2]: 4585.42
- Wedge area (joint2) [ft^2]: 16194.65
- Wedge area (slope) [ft^2]: 13781.36
- Wedge area (upper face) [ft^2]: 2960.32

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	0.00	0.00
Effective Normal stress [t/ft^2]	0.00	0.00
Shear Strength [t/ft^2]	0.00	0.00
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 6321.86
  - Resisting force [tons]: 0.00

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	3578.23
Joint 2	N/A	12637.49
Fissures	0.78	N/A

Failure Mode:

- Contact lost on both joints

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
26.87	168.03	331.83

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	278.84	60.99
Joint 2	337.18	98.03

Persistence:

- Joint 1 [ft]: 331.83
- Joint 2 [ft]: 337.18

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	17.05	82.00
Joint 1 & Crest	113.76	64.00
Joint 2 & Crest	49.19	34.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	86.00	256.00
Joint Set 2	27.00	174.00
Slope	36.00	140.00
Upper Face	0.00	140.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

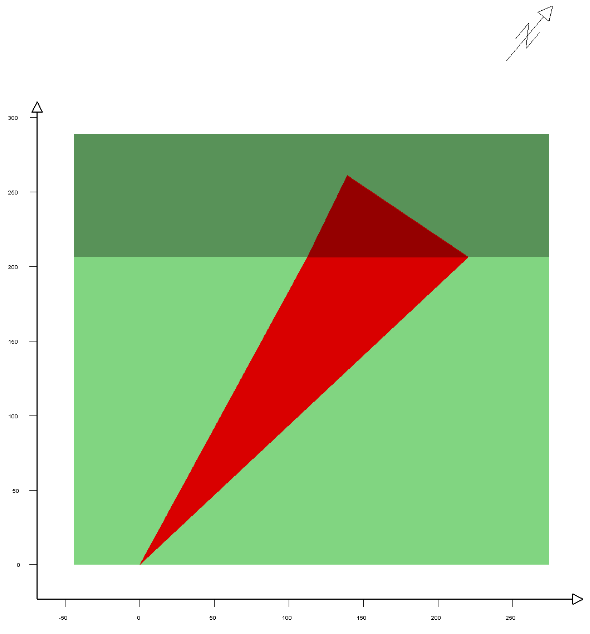
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	**x**	**y**	**z**
124	0.000	0.000	0.000
134	-46.631	230.383	150.000
234	36.107	299.808	150.000
123	-61.386	289.561	150.000



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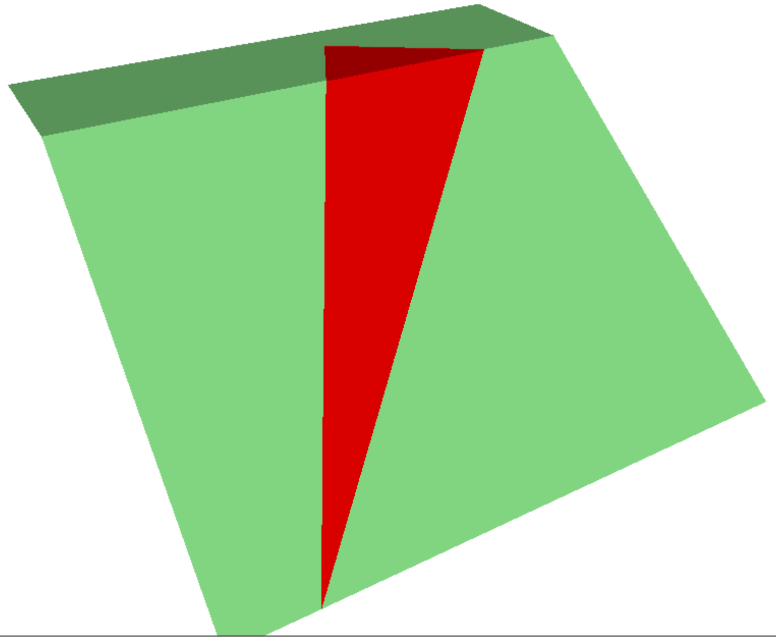

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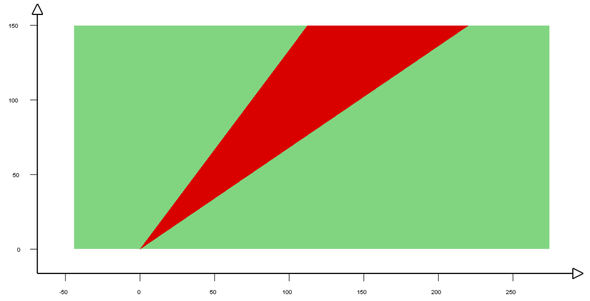

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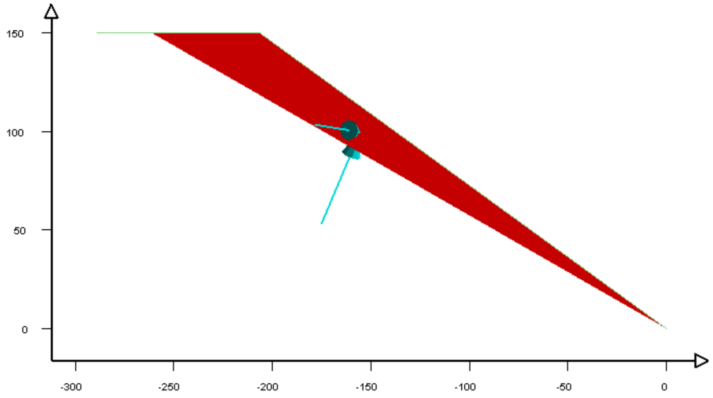


Side

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-140 planes 2-9 86%.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Fractures Filled 86%

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 1.5262
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 98.81
- Wedge volume [ft^3]: 431855.952
- Wedge weight [tons]: 32389.196
- Wedge area (joint1) [ft^2]: 7738.79
- Wedge area (joint2) [ft^2]: 29191.12
- Wedge area (slope) [ft^2]: 22307.12
- Wedge area (upper face) [ft^2]: 8637.12

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	791.81	14657.79
Effective Normal stress [t/ft^2]	0.10	0.50
Shear Strength [t/ft^2]	0.33	0.64
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 13958.43
  - Resisting force [tons]: 21303.03

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	3841.12
Joint 2	N/A	14488.91
Fissures	0.50	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
25.53	153.61	348.06

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	259.23	102.79
Joint 2	337.18	176.70

Persistence:

- Joint 1 [ft]: 348.06
- Joint 2 [ft]: 348.06

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	30.69	72.00
Joint 1 & Crest	100.12	74.00
Joint 2 & Crest	49.19	34.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	66.00
Joint Set 2	27.00	174.00
Slope	36.00	140.00
Upper Face	0.00	140.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

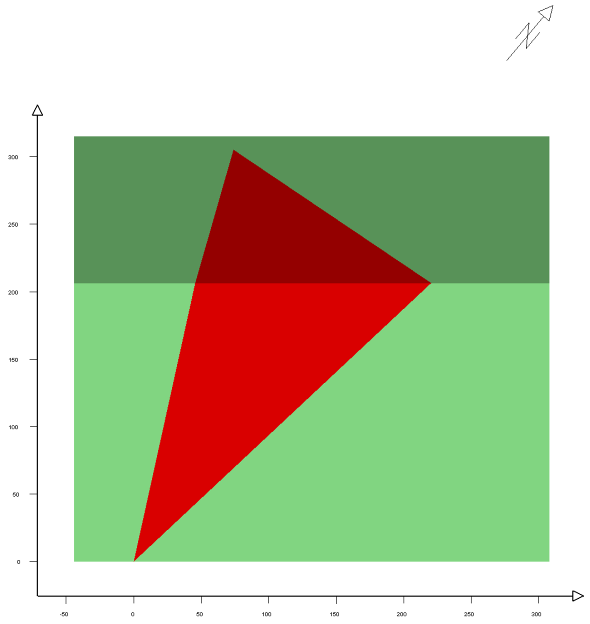
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Percent Filled Fissures
- Percent Filled: 86.000 %

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-97.816	187.433	150.000
234	36.107	299.808	150.000
123	-139.625	281.338	150.000



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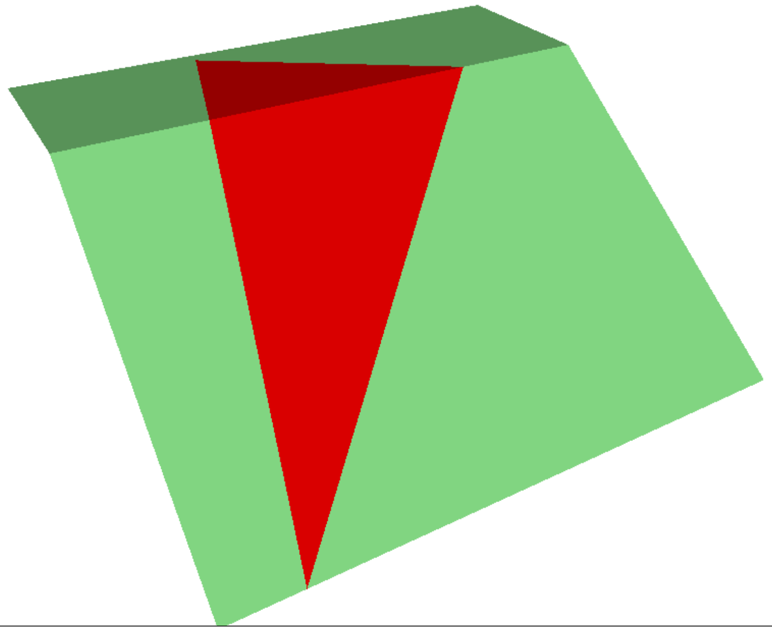

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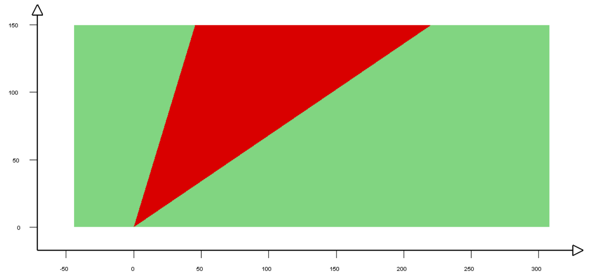

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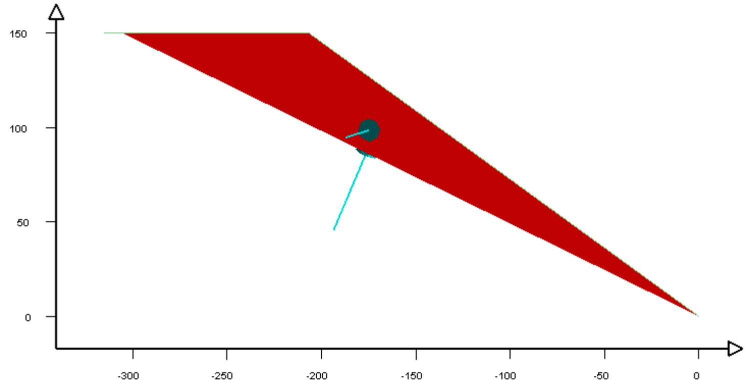


Side

Phi-C-Water slope 36-140 planes 2-9 86%.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-140 planes 2-9 96%.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Fractures Filled 96%

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 1.0273
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 98.81
- Wedge volume [ft^3]: 431855.952
- Wedge weight [tons]: 32389.196
- Wedge area (joint1) [ft^2]: 7738.79
- Wedge area (joint2) [ft^2]: 29191.12
- Wedge area (slope) [ft^2]: 22307.12
- Wedge area (upper face) [ft^2]: 8637.12

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	0.00	9037.12
Effective Normal stress [t/ft^2]	0.00	0.31
Shear Strength [t/ft^2]	0.00	0.49
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 13976.40
  - Resisting force [tons]: 14358.35

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	5342.89
Joint 2	N/A	20153.66
Fissures	0.69	N/A

Failure Mode:

- Sliding on joint2

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
25.53	153.61	348.06

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	259.23	102.79
Joint 2	337.18	176.70

Persistence:

- Joint 1 [ft]: 348.06
- Joint 2 [ft]: 348.06

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	30.69	72.00
Joint 1 & Crest	100.12	74.00
Joint 2 & Crest	49.19	34.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	66.00
Joint Set 2	27.00	174.00
Slope	36.00	140.00
Upper Face	0.00	140.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

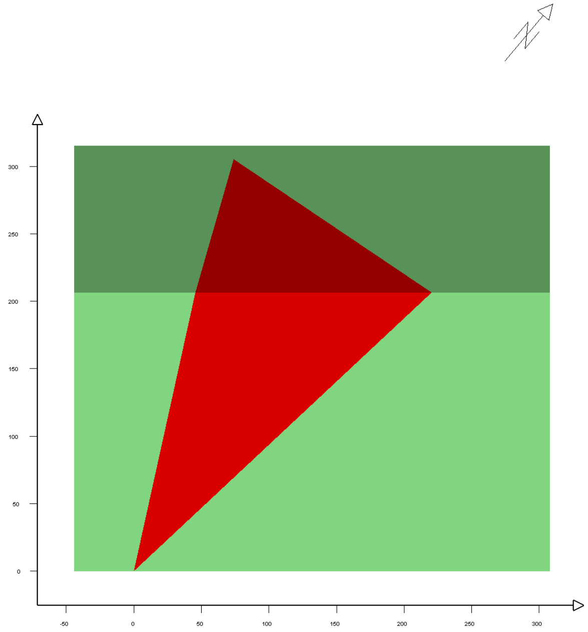
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Percent Filled Fissures
- Percent Filled: 96.000 %

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-97.816	187.433	150.000
234	36.107	299.808	150.000
123	-139.625	281.338	150.000



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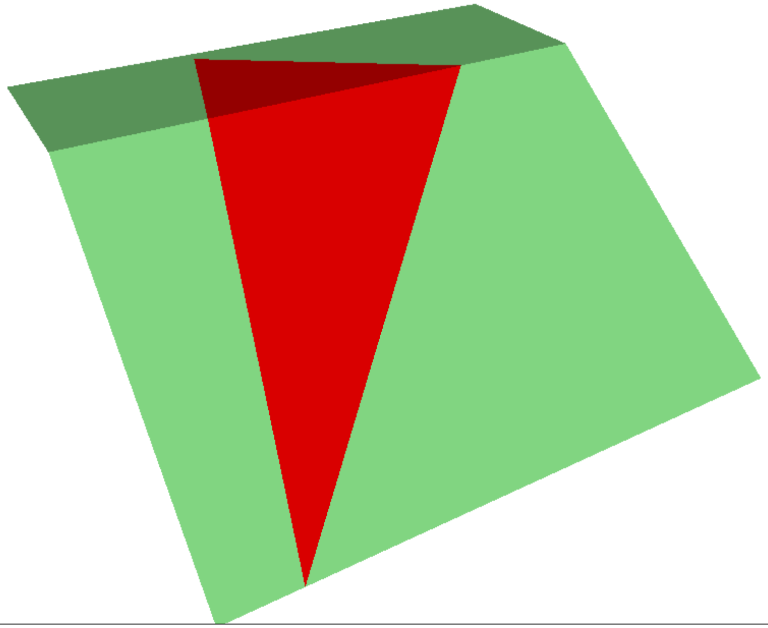
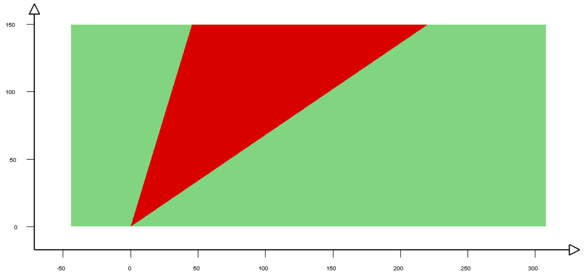


Perspective



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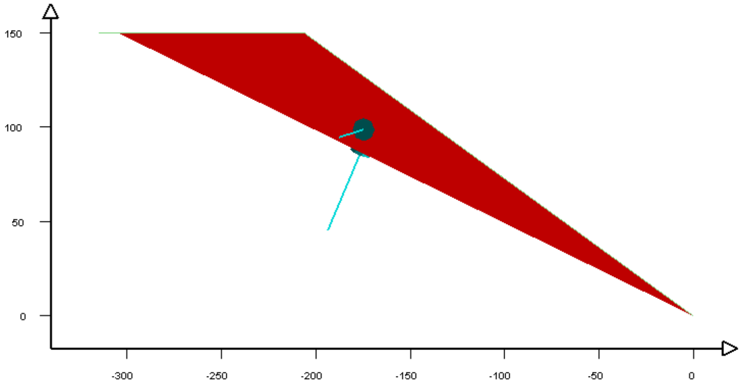


Side

Phi-C-Water slope 36-140 planes 2-9 96%.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-140 planes 2-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 0.8797
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 98.81
- Wedge volume [ft^3]: 431855.952
- Wedge weight [tons]: 32389.196
- Wedge area (joint1) [ft^2]: 7738.79
- Wedge area (joint2) [ft^2]: 29191.12
- Wedge area (slope) [ft^2]: 22307.12
- Wedge area (upper face) [ft^2]: 8637.12

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	0.00	6454.72
Effective Normal stress [t/ft^2]	0.00	0.22
Shear Strength [t/ft^2]	0.00	0.42
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 14028.79
  - Resisting force [tons]: 12340.76

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	6038.97
Joint 2	N/A	22779.29
Fissures	0.78	N/A

Failure Mode:

- Sliding on joint2

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
25.53	153.61	348.06

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	259.23	102.79
Joint 2	337.18	176.70

Persistence:

- Joint 1 [ft]: 348.06
- Joint 2 [ft]: 348.06

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	30.69	72.00
Joint 1 & Crest	100.12	74.00
Joint 2 & Crest	49.19	34.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	66.00
Joint Set 2	27.00	174.00
Slope	36.00	140.00
Upper Face	0.00	140.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

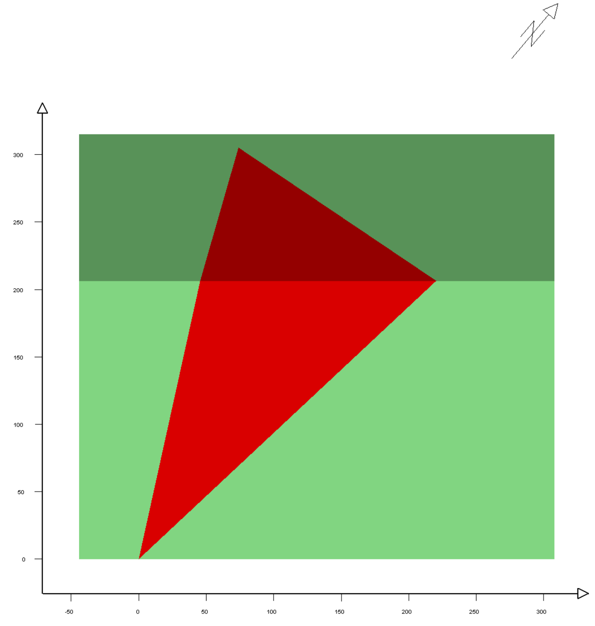
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-97.816	187.433	150.000
234	36.107	299.808	150.000
123	-139.625	281.338	150.000



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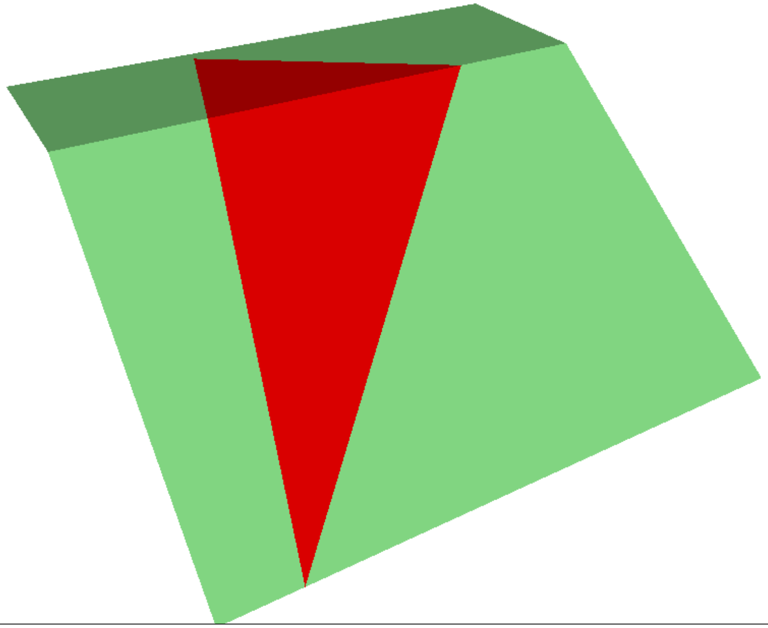

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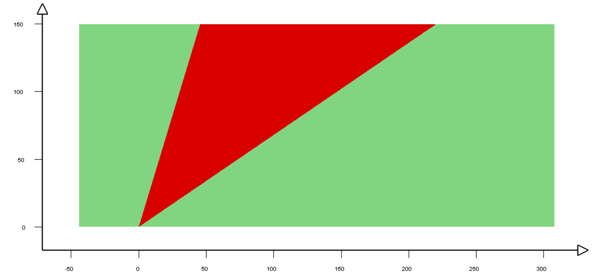

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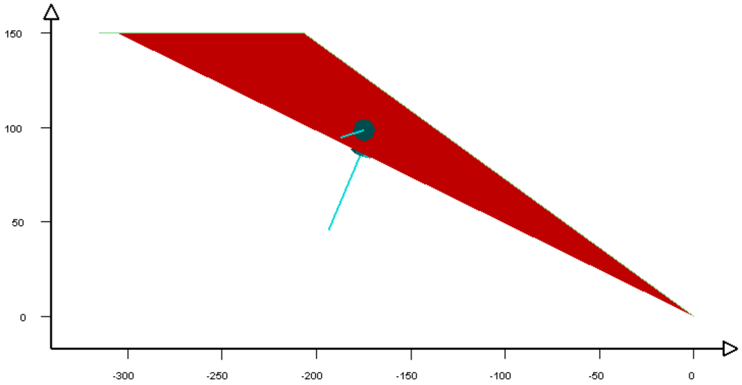


Side

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-140 planes 3-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 9.4479
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 836.74
- Wedge volume [ft^3]: 9627747.261
- Wedge weight [tons]: 722081.045
- Wedge area (joint1) [ft^2]: 88064.88
- Wedge area (joint2) [ft^2]: 247198.44
- Wedge area (slope) [ft^2]: 58726.53
- Wedge area (upper face) [ft^2]: 192554.95

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	259516.73	526164.21
Effective Normal stress [t/ft^2]	2.95	2.13
Shear Strength [t/ft^2]	2.55	1.91
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 73842.85
  - Resisting force [tons]: 697657.06

Water Pressures/Forces:

	Average pressure [t/ft^2]	Water force [tons]
Joint 1	N/A	68721.43
Joint 2	N/A	192901.30
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
5.87	95.64	1466.79

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	350.24	1144.10
Joint 2	337.18	1496.34

Persistence:

- Joint 1 [ft]: 1466.79
- Joint 2 [ft]: 1496.34

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	84.04	13.00
Joint 1 & Crest	46.77	133.00
Joint 2 & Crest	49.19	34.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	77.00	7.00
Joint Set 2	27.00	174.00
Slope	36.00	140.00
Upper Face	0.00	140.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

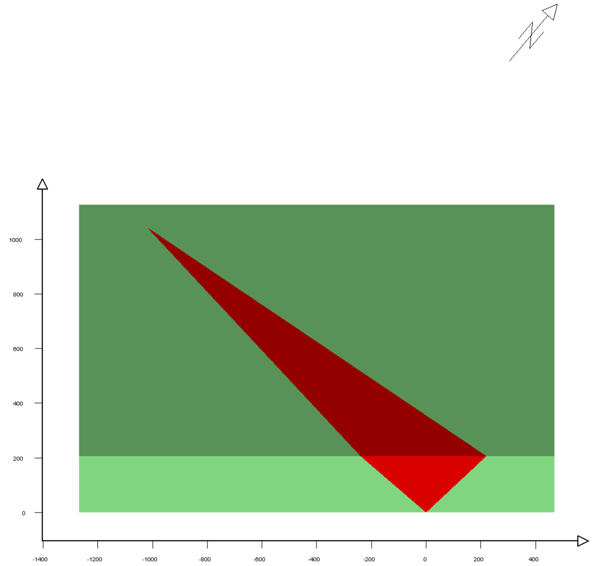
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-316.463	3.967	150.000
234	36.107	299.808	150.000
123	-1452.039	143.398	150.000



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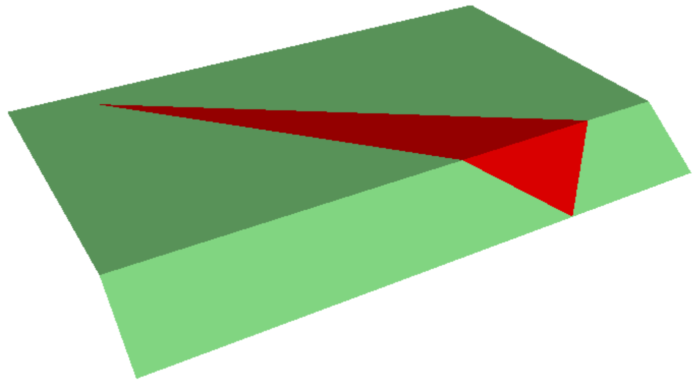

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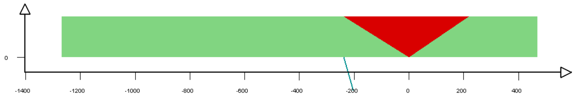

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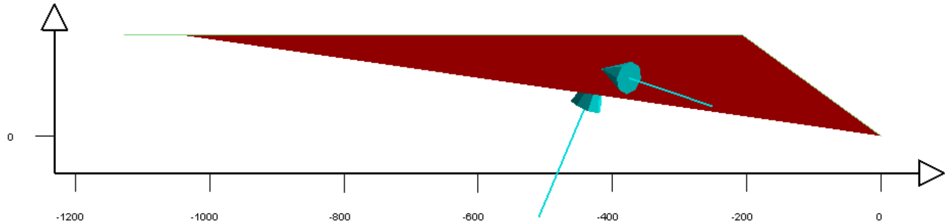


Side

Phi-C-Water slope 36-140 planes 3-9.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-140 planes 5-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 3.8480
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 319.45
- Wedge volume [ft^3]: 2482461.935
- Wedge weight [tons]: 186184.645
- Wedge area (joint1) [ft^2]: 26992.50
- Wedge area (joint2) [ft^2]: 94375.62
- Wedge area (slope) [ft^2]: 39662.33
- Wedge area (upper face) [ft^2]: 49649.24

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	59181.03	130218.64
Effective Normal stress [t/ft^2]	2.19	1.38
Shear Strength [t/ft^2]	1.96	1.33
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 46340.01
  - Resisting force [tons]: 178317.26

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	21063.60
Joint 2	N/A	73646.01
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
14.41	114.29	602.67

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	270.76	358.53
Joint 2	337.18	571.28

Persistence:

- Joint 1 [ft]: 602.67
- Joint 2 [ft]: 602.67

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	60.33	29.00
Joint 1 & Crest	70.48	117.00
Joint 2 & Crest	49.19	34.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	85.00	203.00
Joint Set 2	27.00	174.00
Slope	36.00	140.00
Upper Face	0.00	140.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

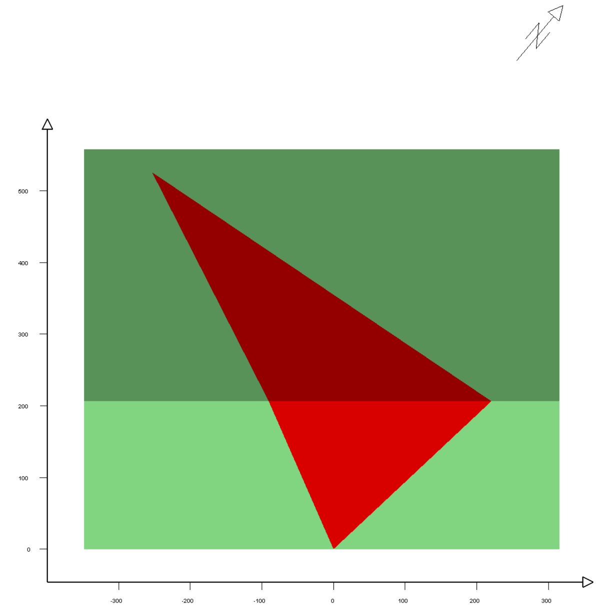
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-202.010	100.005	150.000
234	36.107	299.808	150.000
123	-532.039	240.094	150.000



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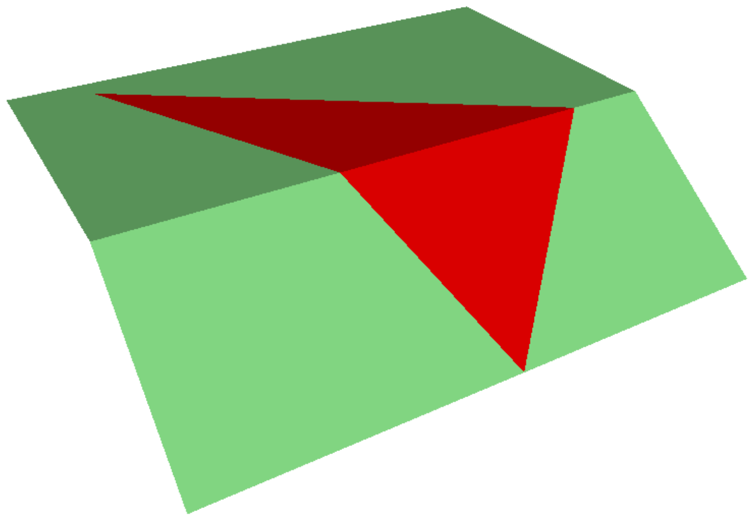

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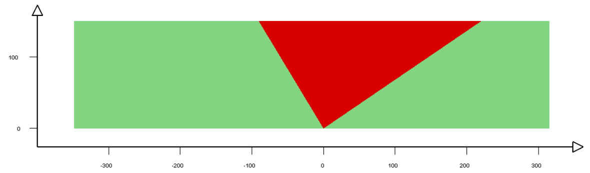

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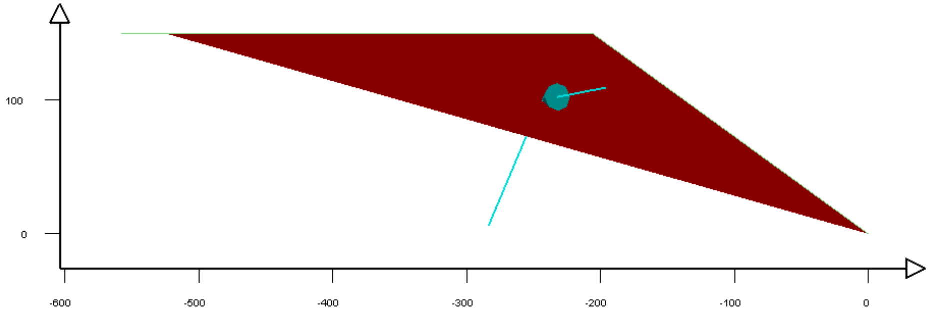


Side

Phi-C-Water slope 36-140 planes 5-9.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-214 planes 1-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 20.7610
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 1673.38
- Wedge volume [ft^3]: 15825660.438
- Wedge weight [tons]: 1186924.533
- Wedge area (joint1) [ft^2]: 176645.13
- Wedge area (joint2) [ft^2]: 430072.26
- Wedge area (slope) [ft^2]: 48269.19
- Wedge area (upper face) [ft^2]: 316513.21

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	521341.98	1107791.80
Effective Normal stress [t/ft^2]	2.95	2.58
Shear Strength [t/ft^2]	2.56	2.26
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 68614.01
  - Resisting force [tons]: 1424498.15

Water Pressures/Forces:

	Average pressure [t/ft^2]	Water force [tons]
Joint 1	N/A	137845.03
Joint 2	N/A	335606.89
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
3.31	257.47	2594.79

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	304.62	2326.27
Joint 2	331.73	2603.32

Persistence:

- Joint 1 [ft]: 2594.79
- Joint 2 [ft]: 2603.32

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	72.81	6.00
Joint 1 & Crest	56.90	134.00
Joint 2 & Crest	50.29	40.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	81.00	168.00
Joint Set 2	27.00	174.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

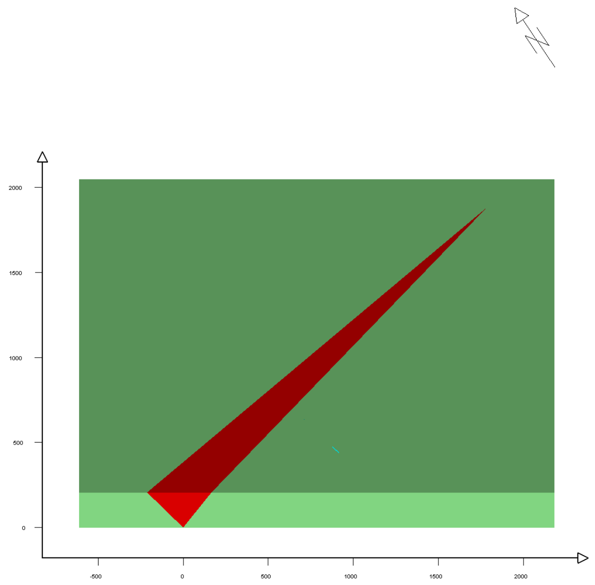
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	253.357	78.141	150.000
234	-60.262	289.679	150.000
123	2528.793	561.800	150.000



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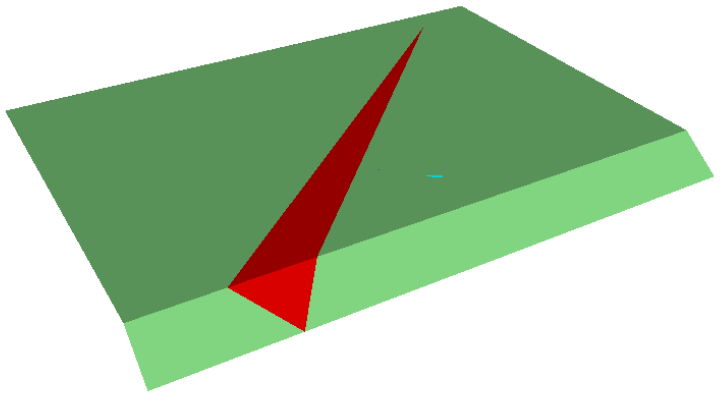

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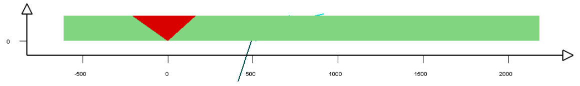

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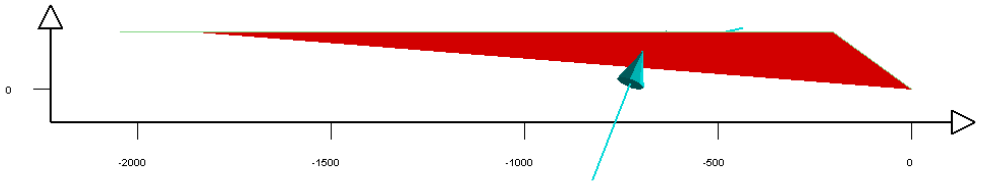


Side

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-214 planes 4-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 20.7610
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 1673.38
- Wedge volume [ft^3]: 15825660.438
- Wedge weight [tons]: 1186924.533
- Wedge area (joint1) [ft^2]: 176645.13
- Wedge area (joint2) [ft^2]: 430072.26
- Wedge area (slope) [ft^2]: 48269.19
- Wedge area (upper face) [ft^2]: 316513.21

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	521341.98	1107791.80
Effective Normal stress [t/ft^2]	2.95	2.58
Shear Strength [t/ft^2]	2.56	2.26
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 68614.01
  - Resisting force [tons]: 1424498.15

Water Pressures/Forces:

	Average pressure [t/ft^2]	Water force [tons]
Joint 1	N/A	137845.03
Joint 2	N/A	335606.89
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
3.31	257.47	2594.79

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	304.62	2326.27
Joint 2	331.73	2603.32

Persistence:

- Joint 1 [ft]: 2594.79
- Joint 2 [ft]: 2603.32

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	72.81	6.00
Joint 1 & Crest	56.90	134.00
Joint 2 & Crest	50.29	40.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	81.00	168.00
Joint Set 2	27.00	174.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

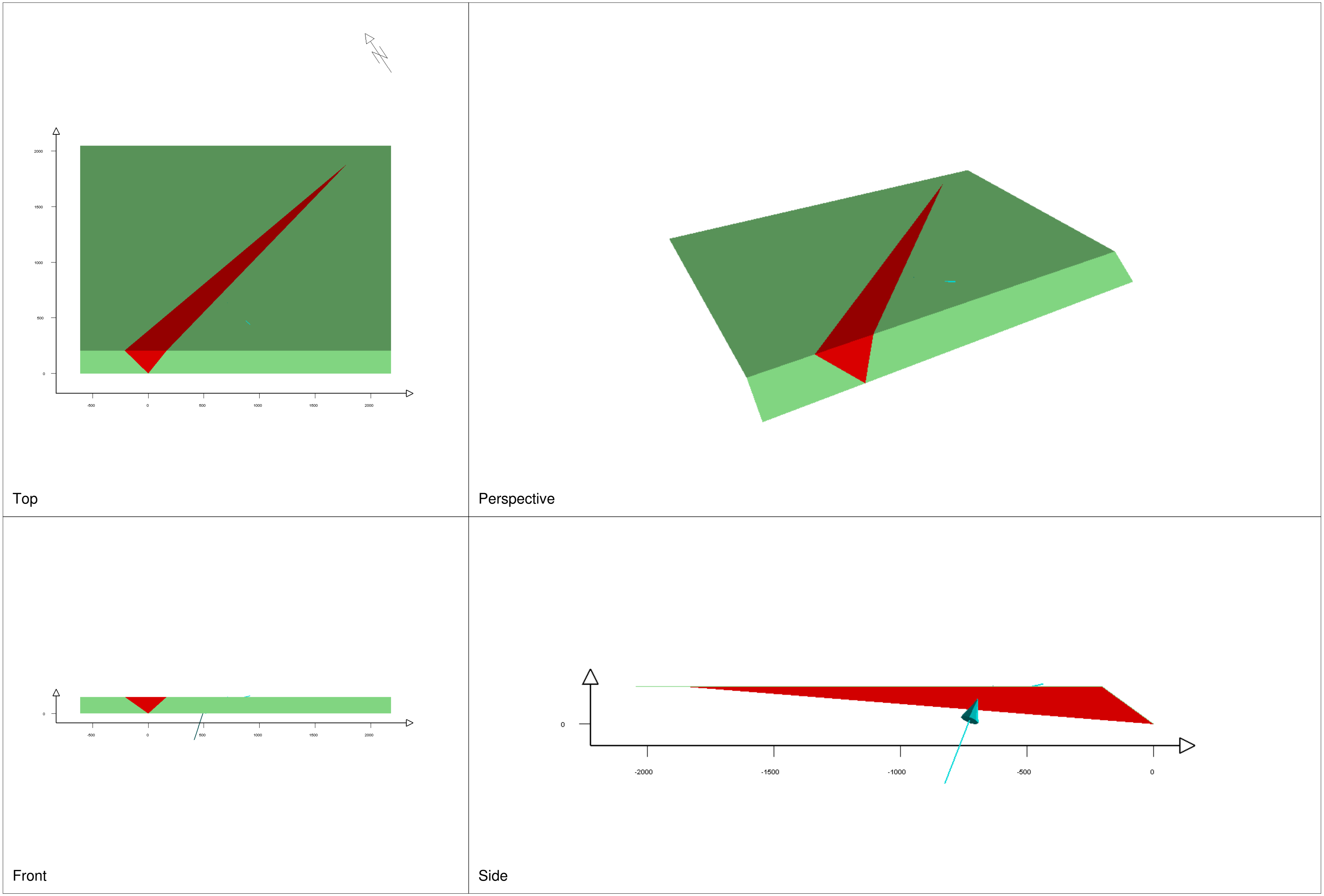
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	253.357	78.141	150.000
234	-60.262	289.679	150.000
123	2528.793	561.800	150.000



Phi-C-Water slope 36-214 planes 4-9.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-214 planes 6-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 2.3341
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 307.97
- Wedge volume [ft^3]: 3688923.526
- Wedge weight [tons]: 276669.264
- Wedge area (joint1) [ft^2]: 58162.19
- Wedge area (joint2) [ft^2]: 79151.76
- Wedge area (slope) [ft^2]: 61134.82
- Wedge area (upper face) [ft^2]: 73778.47

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	105549.38	72767.75
Effective Normal stress [t/ft^2]	1.81	0.92
Shear Strength [t/ft^2]	1.67	0.97
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 74394.26
  - Resisting force [tons]: 173645.10

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	45386.87
Joint 2	N/A	61766.08
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
15.60	230.78	557.84

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	369.47	327.74
Joint 2	331.73	479.12

Persistence:

- Joint 1 [ft]: 557.84
- Joint 2 [ft]: 557.84

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	86.02	70.00
Joint 1 & Crest	43.69	70.00
Joint 2 & Crest	50.29	40.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	25.00	284.00
Joint Set 2	27.00	174.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

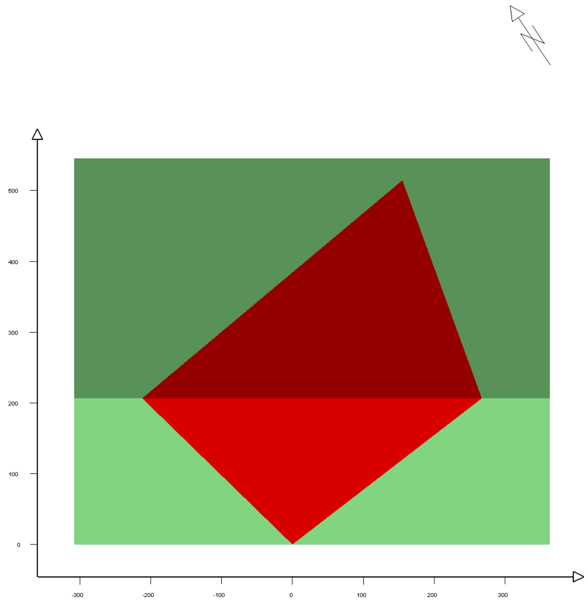
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	336.949	21.758	150.000
234	-60.262	289.679	150.000
123	416.236	339.761	150.000



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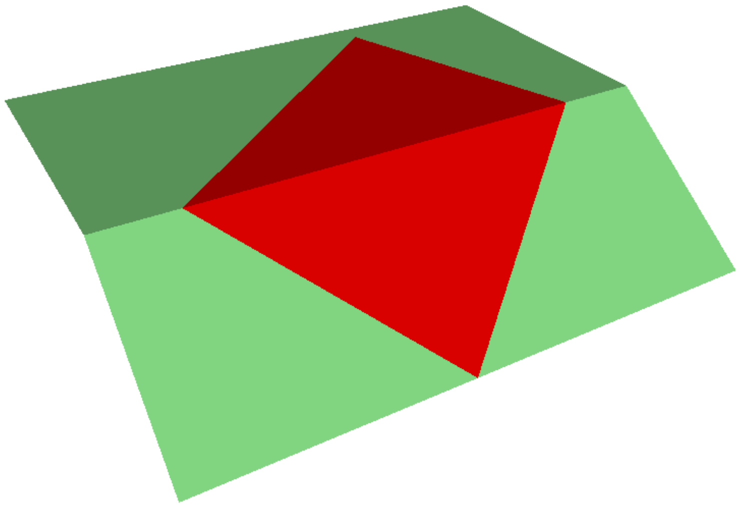

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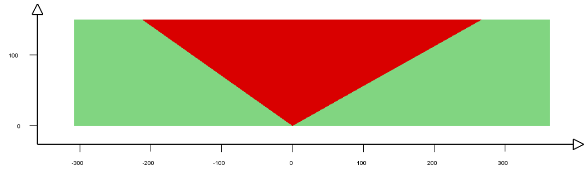

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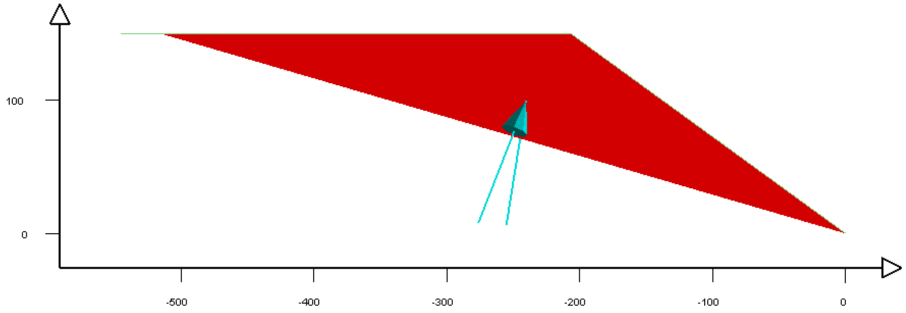


Side

Phi-C-Water slope 36-214 planes 6-9.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-214 planes 7-8.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

- Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 7.4277
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 541.99
- Wedge volume [ft^3]: 2288101.387
- Wedge weight [tons]: 171607.604
- Wedge area (joint1) [ft^2]: 102358.11
- Wedge area (joint2) [ft^2]: 50314.63
- Wedge area (slope) [ft^2]: 21546.80
- Wedge area (upper face) [ft^2]: 45762.03

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	183833.19	86573.36
Effective Normal stress [t/ft^2]	1.80	1.72
Shear Strength [t/ft^2]	1.65	1.59
Strength due to Waviness [t/ft^2]	0.00	0.00

- Driving force [tons]: 33581.41
- Resisting force [tons]: 249432.94

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	79875.15
Joint 2	N/A	39263.02
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
11.28	219.34	766.53

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	369.47	576.78
Joint 2	273.48	542.74

Persistence:

- Joint 1 [ft]: 766.53
- Joint 2 [ft]: 766.53

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	25.25	17.00
Joint 1 & Crest	43.69	70.00
Joint 2 & Crest	111.07	93.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	25.00	284.00
Joint Set 2	54.00	301.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

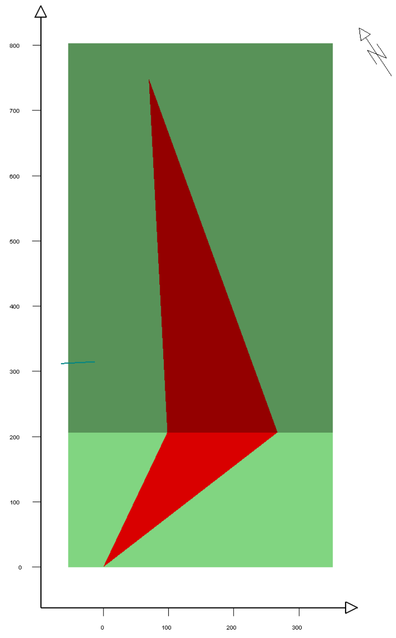
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	336.949	21.758	150.000
234	196.953	116.186	150.000
123	476.484	581.404	150.000



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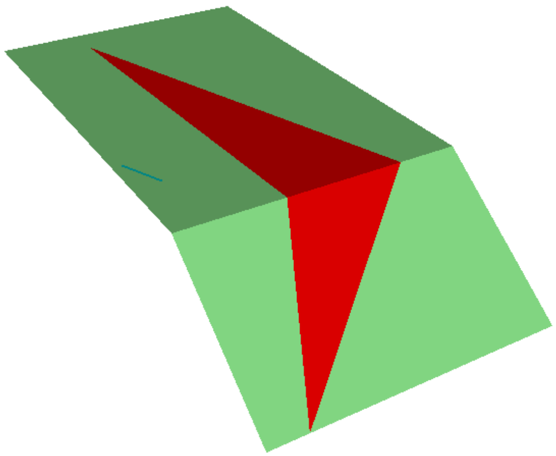
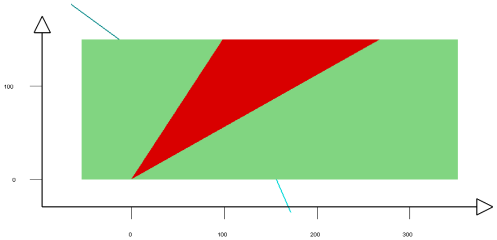


Perspective



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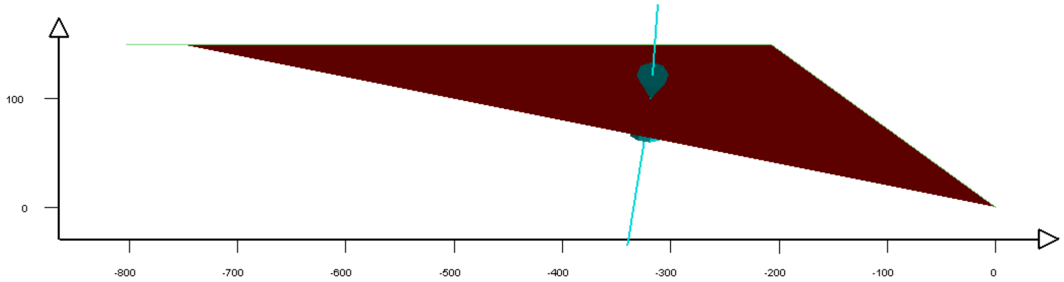


Side

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-214 planes 7-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 2.1790
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 249.37
- Wedge volume [ft^3]: 1934219.514
- Wedge weight [tons]: 145066.464
- Wedge area (joint1) [ft^2]: 64090.18
- Wedge area (joint2) [ft^2]: 23149.61
- Wedge area (slope) [ft^2]: 39588.02
- Wedge area (upper face) [ft^2]: 38684.39

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	63866.53	32733.88
Effective Normal stress [t/ft^2]	1.00	1.41
Shear Strength [t/ft^2]	1.03	1.35
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 44646.30
  - Resisting force [tons]: 97282.46

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	50012.78
Joint 2	N/A	18064.80
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
17.92	224.59	487.39

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	331.73	387.95
Joint 2	273.48	249.71

Persistence:

- Joint 1 [ft]: 487.39
- Joint 2 [ft]: 487.39

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	60.78	53.00
Joint 1 & Crest	50.29	40.00
Joint 2 & Crest	68.93	87.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	27.00	174.00
Joint Set 2	54.00	301.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

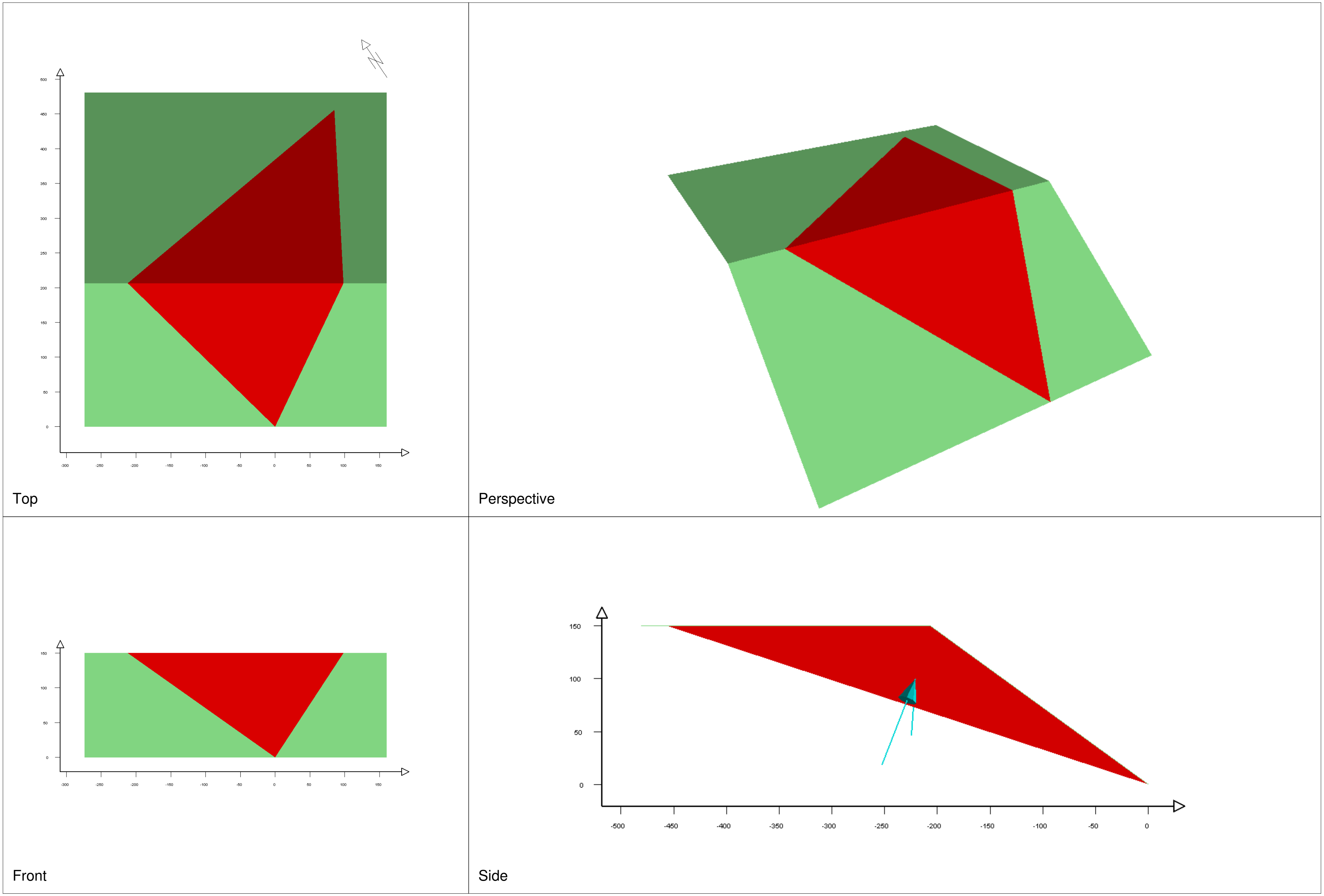
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	-60.262	289.679	150.000
234	196.953	116.186	150.000
123	325.564	330.231	150.000



Phi-C-Water slope 36-214 planes 7-9.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-214 planes 8-4 86%.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

- Fractures Filled 86%

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 1.5066
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 75.83
- Wedge volume [ft^3]: 191151.193
- Wedge weight [tons]: 14336.340
- Wedge area (joint1) [ft^2]: 14321.07
- Wedge area (joint2) [ft^2]: 8004.89
- Wedge area (slope) [ft^2]: 12865.63
- Wedge area (upper face) [ft^2]: 3823.02

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	6048.64	0.00
Effective Normal stress [t/ft^2]	0.42	0.00
Shear Strength [t/ft^2]	0.58	0.00
Strength due to Waviness [t/ft^2]	0.00	0.00

- Driving force [tons]: 5512.97
- Resisting force [tons]: 8305.98

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	7108.21
Joint 2	N/A	3973.20
Fissures	0.50	N/A

Failure Mode:

- Sliding on joint1

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
22.05	254.32	399.48

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	369.47	80.70
Joint 2	304.62	105.42

Persistence:

- Joint 1 [ft]: 399.48
- Joint 2 [ft]: 399.48

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	13.22	64.00
Joint 1 & Crest	43.69	70.00
Joint 2 & Crest	123.10	46.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	25.00	284.00
Joint Set 2	81.00	168.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

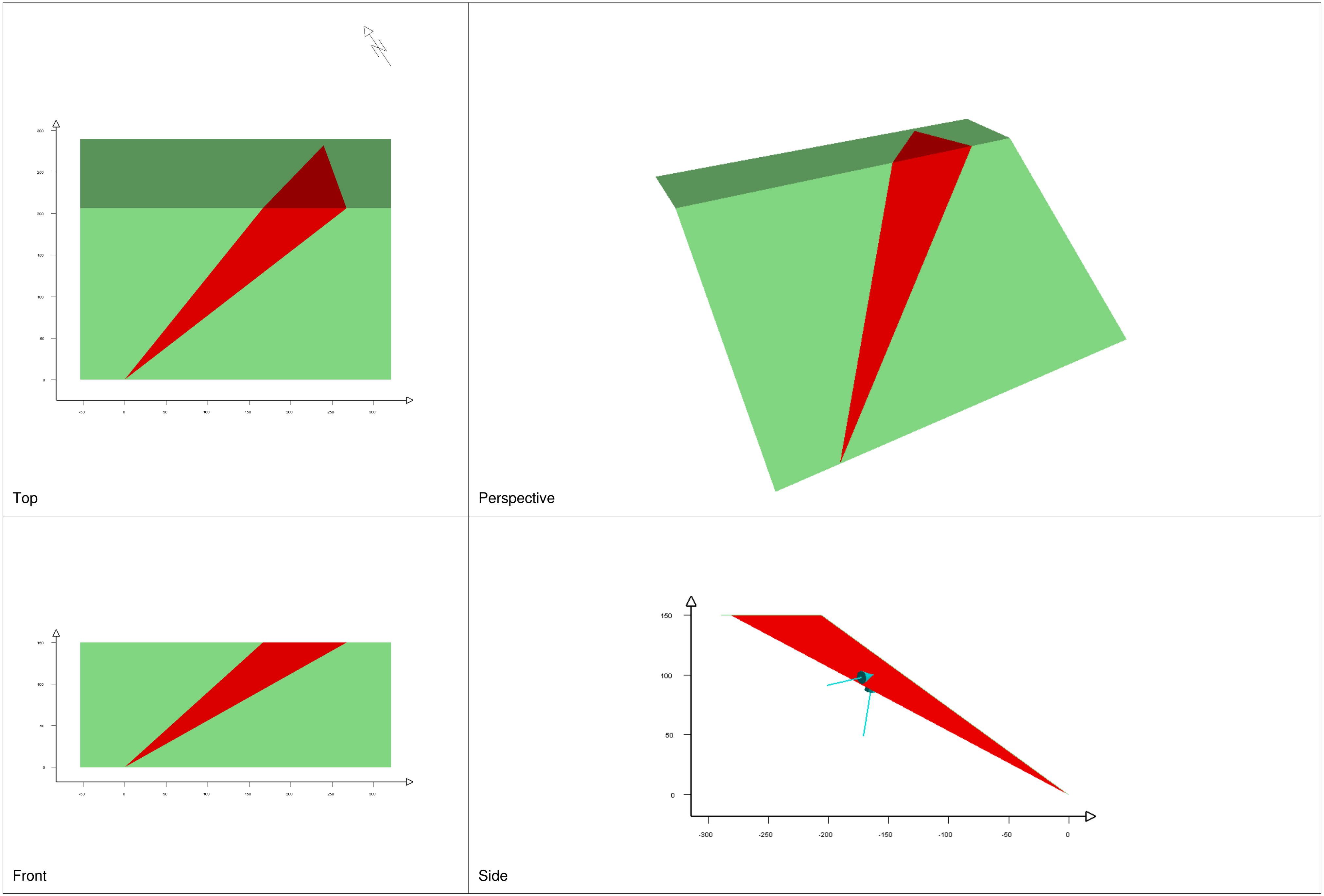
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Percent Filled Fissures
- Percent Filled: 86.000 %

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	336.949	21.758	150.000
234	253.357	78.141	150.000
123	356.471	100.059	150.000



Phi-C-Water slope 36-214 planes 8-4 86%.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-214 planes 8-4 96%.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Fractures Filled 96%

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 1.0238
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 75.83
- Wedge volume [ft^3]: 191151.193
- Wedge weight [tons]: 14336.340
- Wedge area (joint1) [ft^2]: 14321.07
- Wedge area (joint2) [ft^2]: 8004.89
- Wedge area (slope) [ft^2]: 12865.63
- Wedge area (upper face) [ft^2]: 3823.02

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	3333.54	0.00
Effective Normal stress [t/ft^2]	0.23	0.00
Shear Strength [t/ft^2]	0.43	0.00
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 6041.02
  - Resisting force [tons]: 6184.71

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	9887.32
Joint 2	N/A	5526.61
Fissures	0.69	N/A

Failure Mode:

- Sliding on joint1

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
22.05	254.32	399.48

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	369.47	80.70
Joint 2	304.62	105.42

Persistence:

- Joint 1 [ft]: 399.48
- Joint 2 [ft]: 399.48

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	13.22	64.00
Joint 1 & Crest	43.69	70.00
Joint 2 & Crest	123.10	46.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	25.00	284.00
Joint Set 2	81.00	168.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

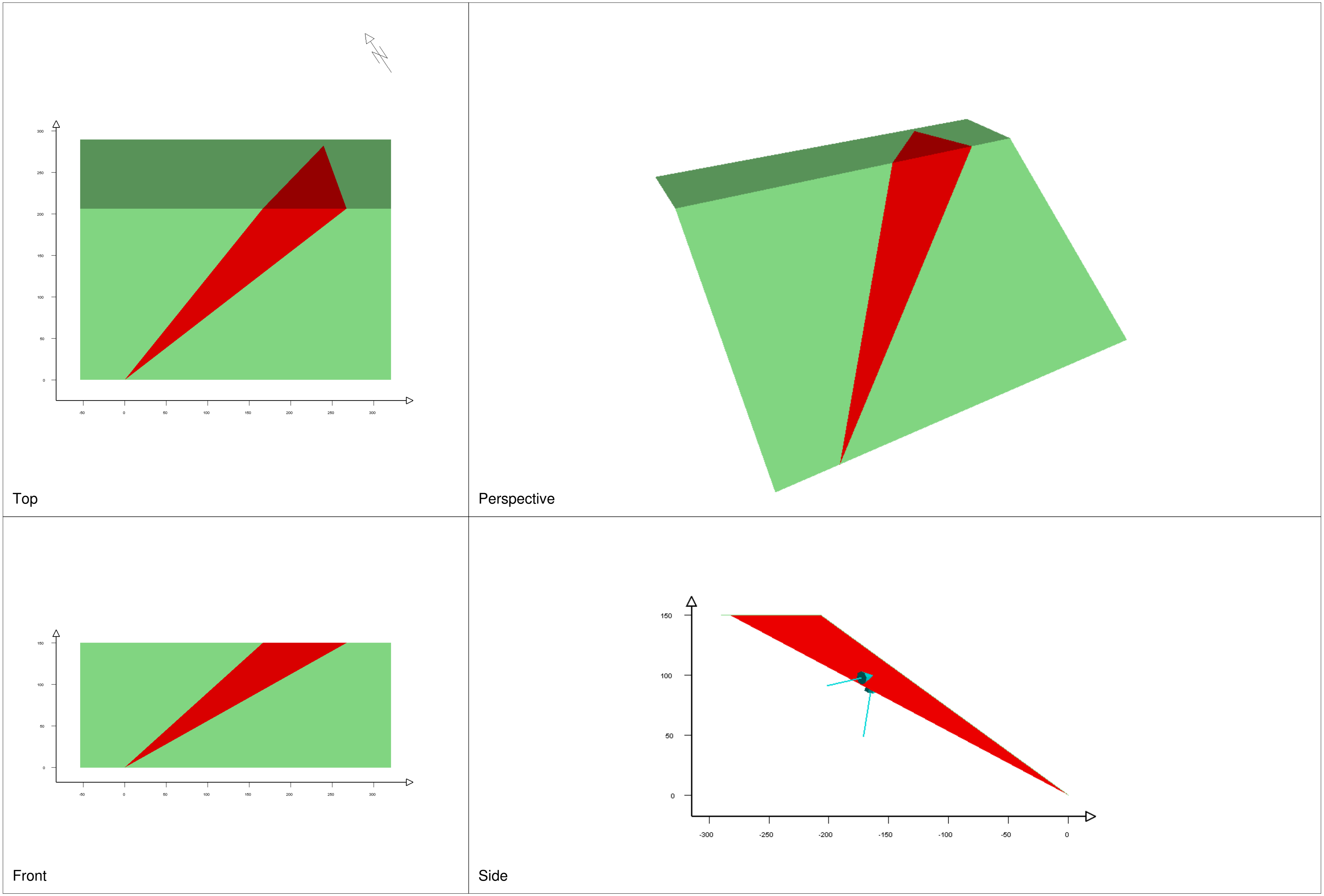
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Percent Filled Fissures
- Percent Filled: 96.000 %

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	336.949	21.758	150.000
234	253.357	78.141	150.000
123	356.471	100.059	150.000



Top

Perspective

Front

Side

Phi-C-Water slope 36-214 planes 8-4 96%.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-214 planes 8-4.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 0.8128
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 75.83
- Wedge volume [ft^3]: 191151.193
- Wedge weight [tons]: 14336.340
- Wedge area (joint1) [ft^2]: 14321.07
- Wedge area (joint2) [ft^2]: 8004.89
- Wedge area (slope) [ft^2]: 12865.63
- Wedge area (upper face) [ft^2]: 3823.02

Effective Normal and Strength Properties:

	Joint 1	**Joint 2**
Effective Normal force [tons]	2075.08	0.00
Effective Normal stress [t/ft^2]	0.14	0.00
Shear Strength [t/ft^2]	0.36	0.00
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 6399.67
  - Resisting force [tons]: 5201.50

Water Pressures/Forces:

	Average pressure [t/ft^2]	**Water force [tons]**
Joint 1	N/A	11175.45
Joint 2	N/A	6246.62
Fissures	0.78	N/A

Failure Mode:

- Sliding on joint1

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
22.05	254.32	399.48

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	369.47	80.70
Joint 2	304.62	105.42

Persistence:

- Joint 1 [ft]: 399.48
- Joint 2 [ft]: 399.48

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	13.22	64.00
Joint 1 & Crest	43.69	70.00
Joint 2 & Crest	123.10	46.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	25.00	284.00
Joint Set 2	81.00	168.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

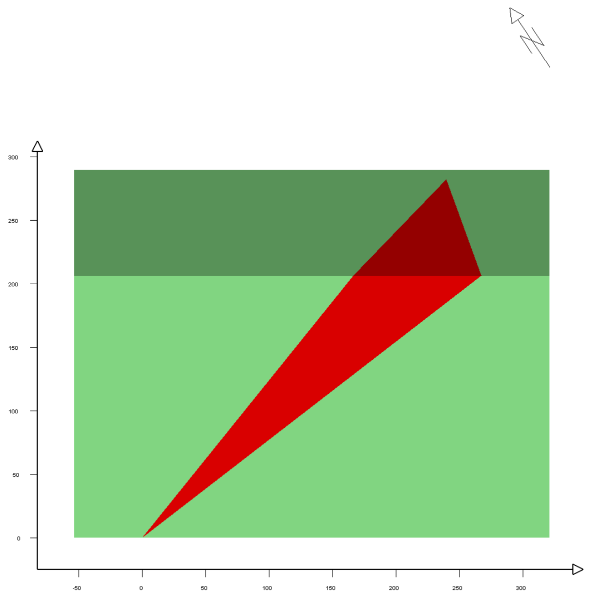
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	336.949	21.758	150.000
234	253.357	78.141	150.000
123	356.471	100.059	150.000



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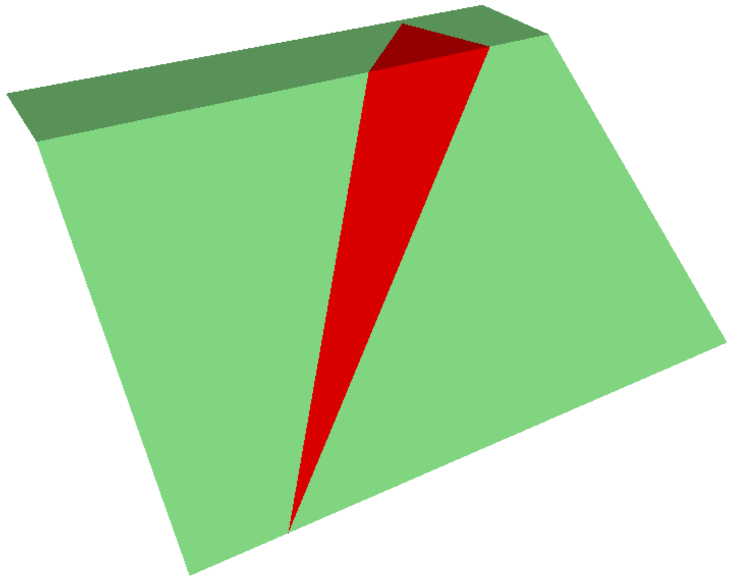

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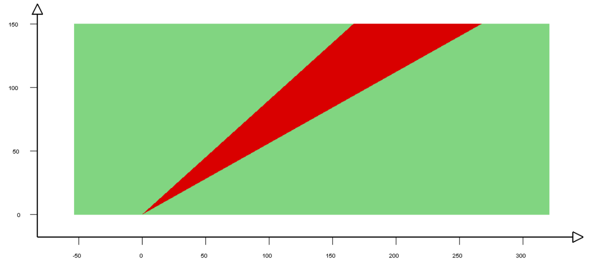

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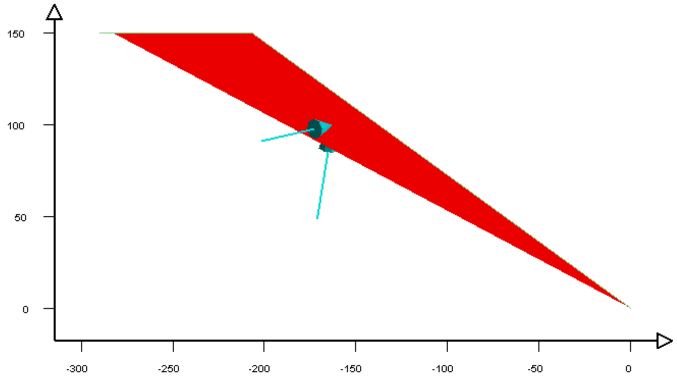


Side

Phi-C-Water slope 36-214 planes 8-4.swd

Swedge Analysis Information

Document Name:

- Phi-C-Water slope 36-214 planes 8-9.swd

Project Summary:

- Job Title: Scholl Canyon - Slope 36/214 Intersection Planes 4/9

Comments:

  - Saturated

Analysis Results:

- Analysis type: Deterministic
- Safety Factor: 2.3341
- Wedge height (on slope) [ft]: 150.00
- Bench width (on upper face) [ft]: 307.97
- Wedge volume [ft^3]: 3688923.526
- Wedge weight [tons]: 276669.264
- Wedge area (joint1) [ft^2]: 58162.19
- Wedge area (joint2) [ft^2]: 79151.76
- Wedge area (slope) [ft^2]: 61134.82
- Wedge area (upper face) [ft^2]: 73778.47

Effective Normal and Strength Properties:

	Joint 1	Joint 2
Effective Normal force [tons]	105549.38	72767.75
Effective Normal stress [t/ft^2]	1.81	0.92
Shear Strength [t/ft^2]	1.67	0.97
Strength due to Waviness [t/ft^2]	0.00	0.00

  - Driving force [tons]: 74394.26
  - Resisting force [tons]: 173645.10

Water Pressures/Forces:

	Average pressure [t/ft^2]	Water force [tons]
Joint 1	N/A	45386.87
Joint 2	N/A	61766.08
Fissures	0.78	N/A

Failure Mode:

- Sliding on intersection line (joints 1&2)

Joint Sets 1&2 line of Intersection:

Plunge [deg]	Trend [deg]	Length [ft]
15.60	230.78	557.84

Trace Lengths:

	Slope Face [ft]	Upper Face [ft]
Joint 1	369.47	327.74
Joint 2	331.73	479.12

Persistence:

- Joint 1 [ft]: 557.84
- Joint 2 [ft]: 557.84

Intersection Angles:

	Slope Face	Upper Face
Joint 1 & Joint 2	86.02	70.00
Joint 1 & Crest	43.69	70.00
Joint 2 & Crest	50.29	40.00

Dip and Dip Direction:

	Dip [deg]	Dip Direction [deg]
Joint Set 1	25.00	284.00
Joint Set 2	27.00	174.00
Slope	36.00	214.00
Upper Face	0.00	214.00

Joint Set 1 Data:

- Cohesion [t/ft^2]: 0.25
- Friction Angle [deg]: 38.00

Joint Set 2 Data:

- Cohesion [t/ft^2]: 0.25

- Friction Angle [deg]: 38.00

Slope Data:

- Slope height [ft]: 150.00
- Rock unit weight [t/ft^3]: 0.07
- Water pressures in the slope: YES
- Overhanging slope face: NO
- Externally applied force: NO
- Tension crack: NO

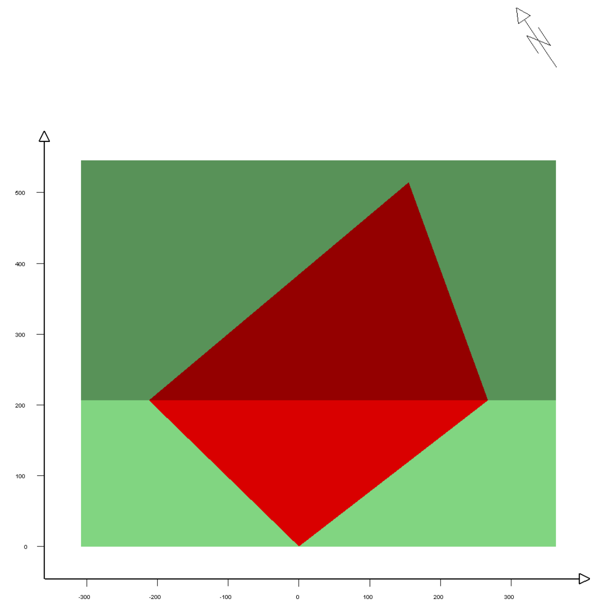
Water Pressure Data:

- Water unit weight [t/ft^3]: 0.031
- Pressure definition method: Filled Fissures

Wedge Vertices:

- Coordinates in Easting,Northing,Up Format
- 1=Joint1, 2=Joint2, 3=Upper Face, 4=Slope

Point	x	y	z
124	0.000	0.000	0.000
134	336.949	21.758	150.000
234	-60.262	289.679	150.000
123	416.236	339.761	150.000



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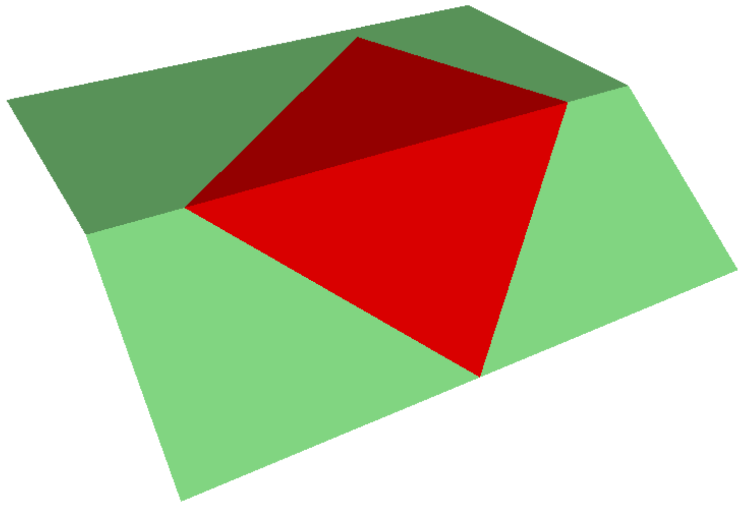

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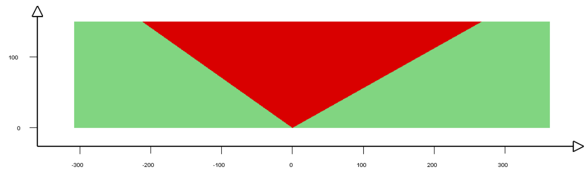

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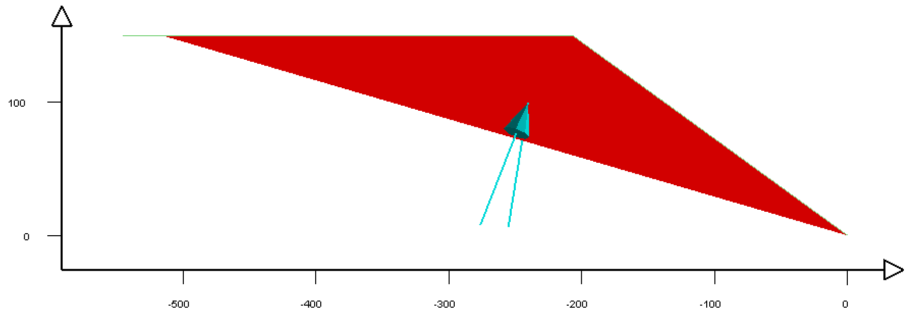

Side