Appendix E

Geotechnical Evaluation

Lawson & Associates Geotechnical Consulting, Inc.

March 26, 2010 Project No. 091069-01

Mr. Bob Woodings
City of Lake Forest
25550 Commercentre Dr., Ste. 100
Lake Forest, CA 92630

Subject: ***Preliminary Geotechnical Evaluation for the Proposed Lake Forest Sports Park, City of Lake Forest, California***

In accordance with your request and authorization, Lawson & Associates Geotechnical Consulting, Inc. (LGC) has performed a preliminary geotechnical evaluation for the proposed Lake Forest Sports Park to be located southwest of the intersection of Portola Parkway and Rancho Parkway in the City of Lake Forest, California.

The purpose of our study was to evaluate the existing onsite geotechnical conditions at the site and to provide preliminary geotechnical recommendations relative to the proposed development. This report presents the results of our field evaluation and geotechnical analysis and provides a summary of our preliminary conclusions and recommendations relative to the proposed development of the proposed sports park.

If you should have any questions regarding this report, please do not hesitate to contact our office. We appreciate this opportunity to be of service.

Respectfully Submitted,

LAWSON & ASSOCIATES GEOTECHNICAL CONSULTING, INC.

Dennis Boratynec, GE 2770
Vice President

Kevin B. Colson, CEG 2210
Vice President

JRT/DJB/KBC/

Distribution: (10) Addressee (three wet-signed copies)

1319 Calle Avanzado • San Clemente • CA 92673-6351 • (949) 369-6141 • Fax (949) 369-6142

TABLE OF CONTENTS

Section ***Page***

***TABLE OF CONTENTS* (Cont'd)**

Section ***Page***

LIST OF ILLUSTRATIONS, TABLES, AND APPENDICES

Figures

Sheets

Tables

Appendices

1.0 INTRODUCTION

1.1 Purpose and Scope of Services

This report presents the results of our limited geotechnical evaluation for the proposed Lake Forest Sports Park. The referenced in progress drainage plans (Psomas, 2010) were utilized as a base map for our Geotechnical Map (Sheet 1), Geotechnical Cross-Sections (Sheet 2), and Preliminary Removals Map (Sheet 3).

The purpose of our study was to evaluate the existing onsite geotechnical conditions at the site and to provide preliminary geotechnical recommendations relative to the development of the proposed Sports Park. As part of this study, we have: 1) reviewed readily available geotechnical reports and in-house geologic maps pertinent to the site and nearby adjacent sites (Appendix A); 2) performed a limited subsurface geotechnical evaluation of the site; 3) prepared a geotechnical map of the site incorporating available geotechnical information to date; 4) prepared geotechnical cross-sections depicting the interpreted subsurface conditions of the site relative to the proposed design; 5) performed geotechnical analysis utilizing the reviewed and acquired data; and 6) prepared this report presenting our preliminary findings, conclusions, and geotechnical recommendations for development of the proposed Sport Park.

The findings, conclusions, and recommendations presented herein should be considered preliminary and will need to be confirmed once site grading plans have been prepared. Additionally, LGC must provide observation and testing services during site grading in order to confirm our preliminary findings.

1.2 Project Description

The proposed Sports Park encompasses an area of approximately 45 acres located southeast of the intersection of Portola Parkway and Rancho Parkway in the City of Lake Forest (Figure 1). The 45-acre sports park will be developed within 3 parcels of land; the County Open Space Parcel (Glass Creek) approximately 58 acres and two private properties owned by Rados (approximately 13 acres) and Baker Ranch (approximately 18 acres). The overall property is surrounded by the future alignment of Rancho Parkway to the north, industrial development to the west and northwest, commercial development to the east, and residential development to the south.

We understand that future amenities at the Sport Park may include: a tot lot, soccer fields, basketball courts, a community center, baseball diamonds, restrooms, concession area, parking lots, interior streets, a connection to Portola Parkway, and associated utilities and improvements.

1.3 Subsurface Geotechnical Evaluation

LGC conducted a limited subsurface geotechnical evaluation of the site including excavation of three 24-inch diameter bucket auger borings, fifteen shallow backhoe excavated trenches, twelve 8-inch diameter hollow-stem auger borings, and two percolation test pits to evaluate onsite conditions within the area of the proposed Sports Park. The approximate locations of our borings, trenches and test pits are shown on our Geotechnical Map (Sheet 1). An additional four, 8-inch diameter hollow-stem auger borings (LGC-HS-6, 8, 11, and 12) and a backhoe trench (T-14) were conducted within the limits of the proposed Rancho Parkway extension. For convenience, the locations of the additional excavations as well as the associated boring and trench logs have been included herein. The borings and backhoe trenches were excavated to evaluate the general engineering characteristics of the onsite soils and the geologic structure of the materials in the area of the proposed grading. During excavation, the excavations were sampled and logged from the surface under the supervision of a geologist from our firm. In addition, the three bucket-auger borings were down-hole logged by an experienced geologist from our firm. The percolation test pits were utilized to measure the approximate infiltration rates of the site materials in the area of the test pits.

Prior to conducting our onsite subsurface evaluation, encroachment and drilling permits were obtained. Encroachment permits from the County of Orange – OC Parks Division, El Toro Materials (for the Baker Parcel) and from Steve P. Rados, Inc., were obtained for access to each of the three parcels. An additional encroachment permit was obtained from the Irvine Ranch Water District to access the ridgeline area in the western portion of the site through their property. After our fieldwork was completed, access routes were restored and/or repaired to near original conditions in general accordance with the aforementioned encroachment permits.

Additionally, drilling permits were obtained from the Orange County Health Care Agency for hollow stem and bucket auger excavations. In accordance with the permit requirements hollow stem borings were backfilled with hydrated bentonite chips to the surface. Also in accordance with the permit requirements, our bucket auger borings were backfilled with layers of hydrated bentonite chips placed at regular intervals between layers of the excavated materials. The backfill was tamped at regular intervals during the backfilling of the bucket auger excavations. All excavations were backfilled in general accordance with the Orange County Health Care requirements. Backfill of the borings will settle over time and will require occasional "topping off" by the sites maintenance personnel.

1.4 __Laboratory Testing__

Representative bulk and driven (relatively undisturbed) samples were retained for laboratory testing during our field evaluation. Laboratory testing included in-situ moisture content and in-situ dry density (depicted on boring logs), grain size analysis, corrosion potential, consolidation potential, direct shear, collapse (hydro-consolidation) potential, expansion index, maximum dry density and optimum moisture content (laboratory compaction) and R-Value tests.

The following is a summary of the laboratory test results.

- Dry density of the samples collected ranged from approximately 87 pounds per cubic foot (pcf) to 133 pcf, with an average of 111 pcf. Field moisture contents ranged from approximately 4 percent to 30 percent, with an average of 10 percent.
- Six gradation tests were performed and indicated a fines content (passing No. 200 sieve) ranging from approximately 14 to 40 percent. According to the Unified Soils Classification (USCS) these samples are considered to be coarse-grained soil.
- Corrosion testing indicated a chloride content between 52 and 119 ppm, a minimum resistivity between 888 and 2,732 ohm-cm, soluble sulfate content between 34 and 58 ppm and pH

between 6.6 and 7.8.

- Expansion potential testing on 3 representative samples of the onsite soils indicated an expansion index of between zero and 40, which indicates the onsite soils have “very low’ to “low” expansion potential (ASTM D4829).
- Compaction testing of 8 bulk samples indicates a maximum dry density between 106 and 22 pcf with an optimum moisture content of 12 and 11.5 percent, respectively.
- R-Value testing on two bulk samples indicates an R-Value of 67 and 69.
- Consolidation testing was performed on 4 samples of the onsite colluvium ranging from depth of 10 to 30 feet below grade. The results indicate a compression index (Cc) between 0.04 and 0.06 which indicates the soils are slightly compressible.
- Hydro-consolidation (collapse) testing was performed on 6 samples of the onsite colluvium ranging from depth of 10 to 30 feet below grade. The soils that were tested collapsed between 0.03 and 1.09 percent which is considered “negligible”.
- Direct shear testing was performed on seven samples. The results indicate peak friction angles between 30 degrees and 40 degrees with cohesion of 750 and 5 psf, respectfully. See Section 3.1 for design shear strength parameters.

A discussion of the tests performed and a summary of the results are presented in Appendix C. The moisture and dry density results are presented on the boring and trench logs in Appendix B.

1.5 __Infiltration Testing__

Infiltration testing consisted of the excavation of two hollow-stem auger borings (P-1 and P-2) to depths of approximately 5 and 4 feet below existing grade, respectively. The borings were excavated into the existing undocumented fill materials which were previously placed by others within the Rados Parcel (see Sheet 1). After drilling the two 8-inch-diameter borings to be utilized for infiltration testing, 2 inches of gravel was placed on the bottom of each test hole, a 4-inch-diameter perforated PVC pipe was then placed in each hole, and the annulus between the outside of the pipe and the soil was filled with gravel. Prior to conducting the infiltration test, each infiltration boring was filled with water and topped-off periodically during the previous day in order to presoak the surrounding soils. Approximately 6 gallons of water was placed in each boring during the presoaking phase.

The following morning, each infiltration boring was filled with approximately 3 feet of water and the water level was monitored for a period of 30 minutes using a hand-held Solinst electronic sounder. After 30 minutes the level of the water surface was recorded and infiltration boring was refilled with water. This was repeated 12 times for each boring for a total infiltration duration of 6 hours. In general, the infiltration rate was highest during the first 30 minute test and decreased thereafter.

The results were analyzed to estimate the in-situ infiltration rate of the subsurface soils as it relates to the proposed infiltration basins.

Our infiltration test results indicate average infiltration rates as shown in Table 1.

TABLE 1

Summary of Infiltration Testing

Test Location	Observed Infiltration Rate* (Inches/Hr)
P-1	1.0
P-2	1.1

*Infiltration rate based on average of last four, 30 minute tests.

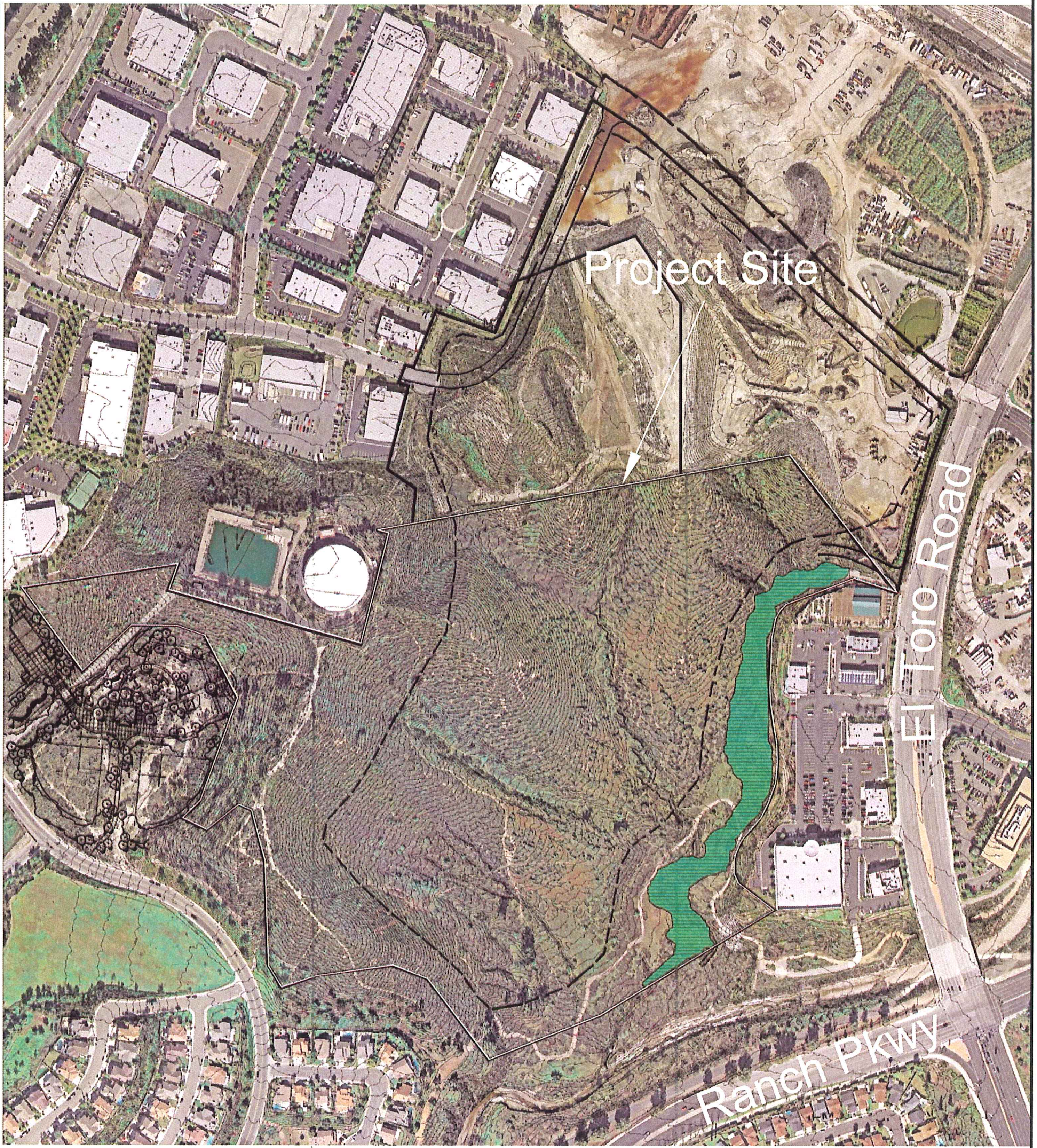
In general, infiltration rates are expected to vary based on the horizontal and vertical variability of site soils and amount of hydraulic head.

In accordance with the U.S. Department of Agriculture (USDA) textural classification system, our laboratory testing of representative samples obtained from the excavated soils take from similar onsite soils to those in the infiltration test, would be classified as “loamy sand”. This corresponds to Hydrologic Soil Type “A”, which correlates to a typical infiltration rate on the order of 2.4-inches per hour (Rawls, et al 1982).

Based on our analysis of the gradation characteristics of the onsite soils and the results of our in-situ infiltration test, the average infiltration rate of the near surface soils is lower than the rate estimated from the hydrologic soil properties classified by texture as “loamy sand” (Rawls, et al 1982).

We recommend a preliminary infiltration rate of 0.5-inches per hour for design purposes.

Note, our infiltration tests were conducted in artificial fill as it was our understanding that the infiltration basins would be located in areas of fill. However, we now understand that the infiltration basins will be located beyond the toe of slope located in the southeastern portion of the site and therefore the basins will be located an area of colluvium and not fill. Since the onsite fill where the infiltration test was conducted has similar gradation to the onsite colluvium, we anticipate that the infiltration rates will be similar. Additional infiltration testing should be conducted within the actual infiltration basin, once their location has been finalized.



LGC	FIGURE 1 Site Location Map	PROJECT NAME	City of Lake Forest Sports Park
		PROJECT NO.	091069-01
		ENG. / GEOL.	DJB / KBC
		SCALE	Not to Scale
		DATE	March 2010

2.0 GEOTECHNICAL CONDITIONS

2.1 Regional Geology

The site is located within the foothills of the Santa Ana Mountains, part of the Peninsular Ranges Geomorphic Province. The region consists of dissected foothills bordering the Los Angeles Basin to the northwest and the granitic-cored Santa Ana Mountains to the east. The Southern California Batholith forms the core of the Santa Ana Mountains, which is overlain by a thick sequence of sedimentary units, which comprise the foothills. The foothills have been tilted, folded, and faulted since deposition as a result of uplift of the Southern California Batholith. Bedrock materials on the site are primarily composed of sandstone and silty sandstone.

2.2 Site-Specific Geology

The bedrock geologic unit mapped on the site is Oso Member of the Tertiary-aged Capistrano Formation. Surficial units consisting of stockpiled materials, documented and undocumented fill, and topsoil/colluvium overlie the bedrock material. A brief description of these geologic units is presented in the following sections (from youngest to oldest) and their approximate lateral extents are depicted on the site Geotechnical Map (Sheet 1).

Based on our review of the State of California Seismic Hazard Zones El Toro 7.5 Minute Quadrangle (CDMG, 2001), a zone of potential earthquake induced landslides has been depicted in the southern portion of the site. Zones of potential liquefaction are not depicted within the limits of the proposed grading.

2.2.1 Artificial Fill – Stockpile (Map Symbol – Afs)

As a result of the ongoing mining operations in the northern portion of the project, many areas of stockpiled materials are present on the Baker property. As observed during our field evaluation the materials comprising these stockpiles include separate piles of concrete rubble, crushed aggregate base, various graded sands, and dozer pushed mixtures of gravel to cobble, sand, and silt. In general, the stockpiled artificial fill materials are loose and are considered potentially compressible and unsuitable to receive additional fill placement and/or for support of proposed improvements. These stockpiles should be completely removed to suitable material and may be considered suitable for reuse as fill, provided they are free of organic material and debris. The larger stockpiles are depicted on the Geotechnical Map. It should be noted that the mining operations are ongoing. As such, the location and extent of some of the stockpiled materials depicted on our Geotechnical Map is dynamic and will continue to change over time as the operations continue. The location of the stockpiles should be remapped by LGC once mining operations have ceased.

2.2.2 Artificial Fill – Undocumented (Map Symbol - Afu)

Areas of undocumented artificial fill soils were observed at various locations on the site, concentrated primarily in the northern portion of the overall site. The three largest areas of undocumented fill materials appeared to be associated with in-filled drainage channels (see Geotechnical Map). The thickest area of undocumented fill identified is located in the approximately central portion of the Rados property. These materials were encountered to depths of up to approximately 35 feet below the ground surface and contain clayey materials; however, deeper areas may be encountered during site grading. Undocumented fill associated with backfill of the non-potable waterline crosses the central portion of the site in a roughly east-west direction (ASL Consulting Engineers, 1998).

In general, the undocumented fill materials are considered potentially compressible and unsuitable to receive additional fill placement and/or for support of proposed structures. These materials should be completely removed to suitable material and may be considered suitable for reuse as fill, provided they are free of organic material and debris. The clayey (potentially expansive) material should be mixed with the onsite sandy soils and not be placed near finish grade. The larger areas of undocumented fill are depicted on the Geotechnical Map. Other smaller areas of undocumented fill may be encountered during grading.

2.2.3 Artificial Fill - Older (Map Symbol – Afo)

Older fill materials were identified on the site associated with grading for the reservoir water tank on the western side of the site. Based on our review of the as-built plans for the Zone II Reservoir (Boyle Engineering Corporation, 1978), these materials are believed to have been placed during grading for the construction of the reservoir site circa 1978. These materials are only expected to be minimally impacted during the proposed grading. In general these materials should be considered suitable to receive additional fill placement and/or for support of the proposed improvements, with the exception of the near surface material which is anticipated to be desiccated and likely includes animal boroughs and plant roots (approximately the upper 5 feet). Additionally, where exposed in cut slopes, additional evaluation should be performed by the geotechnical consultant to determine if replacement with a stability fill slope is appropriate or if the material will be suitable to be left in place.

2.2.4 Topsoil/Colluvium (Map Symbol - Qcol)

A relatively thin veneer of topsoil/colluvium mantles the bedrock materials on the site. Generally, topsoil develops as a result of weathering of the underlying materials; whereas colluvium is a general term referring to loose and incoherent deposits that accumulate, typically in the lower portions of slopes, chiefly as a result of gravity. As these lithologies develop concurrently and are typically intermixed they are grouped together herein for both mapping and discussion purposes. It should also be noted that while alluvial deposits, materials deposited by stream or running water, are present on the site, for the purposes of this report they have also been grouped in with colluvium.

In general, topsoil and colluvium were not mapped across much of the site due to their relatively thin nature and variable lateral extents; however, known thicker areas of colluvium have been depicted on the Geotechnical Map. These soils are typically massive, porous, and contain roots and organics. The upper portion of these materials (up to approximately 7.5 feet below existing grades) is considered to be potentially compressible and should be removed to suitable material in areas of proposed development.

2.2.5 Capistrano Formation – Oso Member (Map Symbol - Tco)

The Oso Member of the Tertiary Capistrano Formation is exposed across much of the site and underlies the entire site at depth. The Oso Member was deposited in a submarine fan complex environment. As encountered these materials generally consist of medium to coarse, weakly cemented, very dense sandstone. The material is generally light gray to off white in color. In general, the Oso Member material was found to be moderately bedded, consistently dipping approximately 10 degrees to the west.

2.3 Geologic Structure

The site bedrock consists of a series of layered sedimentary lithologies that have been tilted through regional tectonism. Bedding within the site bedrock materials indicates a gentle westerly dip, generally less than 10 degrees). Bedding within colluvial deposits on the site should generally be expected to dip gently southeast, roughly parallel to the surface topography, however, localized cross-bedding should be expected. No regional foliation and/or fracturing and jointing trend have been observed on the site. No indication of on site faulting was observed during our evaluation.

2.4 Ground Water

During our subsurface evaluation, groundwater was encountered in boring HS-5 at a depth of 24 feet below existing grade. During site grading, it should be expected that ground water may be locally encountered in perched conditions within the bedrock, colluvium and undocumented fill during grading. Groundwater may also be encountered at the geologic contact between bedrock and overlying materials during site removals. However, ground water is not anticipated to be a major constraint for the proposed grading or site development.

Seasonal fluctuations of ground water elevations should be expected over time. In general, ground water levels fluctuate with the seasons and local zones of perched ground water may be present within the near-surface deposits due to local seepage or during rainy seasons. Local perched ground water conditions or surface seepage may develop once site development is completed and landscape irrigation commences.

2.5 ***Landslides***

Review of topographic maps, aerial photographs, and published geologic maps do not indicate the presence of landslides in the area of proposed development or in the immediate vicinity. Review of the Seismic Hazards Zone Map (CDMG, 2001) and the Seismic Hazard Zone Report 2000-013 (CDMG, 2000b) for the El Toro Quadrangle indicates that a portion of the site is located within a mapped area considered potentially susceptible to seismically induced slope instability. Accordingly, we have performed slope stability analyses that consider seismic forces as summarized in Appendix D.

2.6 ***Faulting***

California is located on the boundary between the Pacific and North American Lithospheric Plates. The average motion along this boundary is on the order of 50-mm/yr in a right-lateral sense. The majority of the motion is expressed at the surface along the northwest trending San Andreas Fault Zone with lesser amounts of motion accommodated by sub-parallel faults located predominantly west of the San Andreas including the Elsinore, Newport-Inglewood, Rose Canyon, and Coronado Bank Faults. Within Southern California, a large bend in the San Andreas Fault north of the San Gabriel Mountains has resulted in a transfer of a portion of the right-lateral motion between the plates into left-lateral displacement and vertical uplift. Compression south and west of the bend has resulted in folding, left-lateral reverse thrust faulting, and regional uplift creating the east-west trending Transverse Ranges and several east-west trending faults. Further south within the Los Angeles Basin, "blind thrust" faults are believed to have developed below the surface also as a result of this compression, which have resulted in earthquakes such as the 1994 Northridge event along faults with little to no surface expression.

Prompted by damaging earthquakes in Northern and Southern California, State legislation and policies concerning the classification and land-use criteria associated with faults have been developed. Their purpose was to prevent the construction of urban developments across the trace of active faults. The result is the Alquist-Priolo Earthquake Fault Zoning Act, which was most recently revised in 1997 (Hart, 1997). According to the State Geologist, an active fault is defined as one, which has had surface displacement within the Holocene Epoch (roughly the last 11,000 years). A potentially active fault is defined as any fault, which has had surface displacement during Quaternary time (last 1,600,000 years), but not within the Holocene. Earthquake Fault Zones have been delineated along the traces of active faults within California. Where developments for human occupation are proposed within these zones, the state requires detailed fault evaluations be performed so that engineering geologists can mitigate the hazards associated with active faulting by identifying the location of active faults and allowing for a setback from the zone of previous ground rupture.

The subject site is not located within an Alquist-Priolo Earthquake Fault Zone and no faults were identified on the site during our site evaluation. The site is located approximately 16.1 kilometers (10 miles) from the Elsinore Fault. The possibility of damage due to ground rupture is considered low since active faults are not known to transect the site.

Secondary effects of seismic shaking resulting from large earthquakes on the major faults in the Southern California region, which may affect the site, include ground lurching and shallow ground rupture, soil liquefaction, dynamic settlement, seiches, and tsunamis. These secondary effects of seismic shaking are a possibility throughout the Southern California region and are dependant on the distance between the site and causative fault and the onsite geology. The closest major active faults that could produce these secondary effects include the Elsinore and Whittier Faults. A discussion of these secondary effects is provided in the following sections.

The possibility of damage due to ground rupture is considered low since active faults are not known to cross the site.

2.6.1 ***Lurching and Shallow Ground Rupture***

Soil lurching refers to the rolling motion on the ground surface by the passage of seismic surface waves. Effects of this nature are not likely to be significant where the thickness of soft sediments does not vary appreciably under structures. Minor cracking of near-surface soils, due to shaking from distant seismic events, is not considered a significant hazard, although it is a possibility at any site.

2.6.2 ***Liquefaction and Dynamic Settlement***

Liquefaction and liquefaction-induced dynamic settlement of soils can be caused by strong vibratory motion due to earthquakes. Liquefaction is typified by a build-up of pore-water pressure in the affected soil layer to a point where a total loss of shear strength occurs, causing the soil to behave as a liquid. Liquefaction primarily occurs in loose, saturated, granular soils while cohesive soils such as silty clays and clays are generally not considered susceptible to soil liquefaction. The effect of liquefaction may be manifested at the ground surface by rapid settlement and/or sand boils. Based on our review of the State of California Seismic Hazard Zones El Toro 7.5 Minute Quadrangle (CDMG, 2001), no zones having a potential for liquefaction have been depicted within the proposed limits of grading. Based on the proposed finish grades, depth of compacted fill, and lack of a shallow ground-water table, the potential for post construction liquefaction and liquefaction-induced settlement is considered very low.

2.6.3 ***Lateral Spreading***

Lateral spreading is a type of liquefaction induced ground failure associated with the lateral displacement of surficial blocks of sediment resulting from liquefaction in a subsurface layer. Once liquefaction transforms the subsurface layer into a fluid mass, gravity plus the earthquake inertial forces may cause the mass to move downslope towards a free face (such as a river channel or an embankment). Lateral spreading may cause large horizontal displacements and such movement typically damages pipelines, utilities, bridges, and structures.

Due to the low potential for liquefaction, the potential for lateral spreading is also considered very low.

2.6.4 Earthquake Induced Landslide

Based on our review of the State of California Seismic Hazard Zones El Toro 7.5 Minute Quadrangle (CDMG, 2001), a portion of the southern half of the Glass Creek Parcel is located within a zone having a potential for earthquake induced landslide. This zone generally extends from the slope located below the offsite IRWD tank located to the northwest to the natural canyon located northwest of El Toro Road. The proposed grading plan includes a large design cut on the slope below the IRWD tank and placement of up to 45 feet of fill near the existing canyon. Therefore, the net effect is to reduce the driving force by the design cut near the top of slope and add resisting force at the toe of slope as result of the fill placement. Thus, the proposed grading "naturally" increases the factor of the safety against the potential for earthquake induced landslides. The results of our slope stability analysis for the site slopes, including pseudostatic analysis, are discussed in the sections below and the results presented in Appendix D.

2.7 Rippability

Based on the excavation characteristics encountered during our subsurface evaluation, rippability is not anticipated to be an issue during site grading and construction. It is anticipated that the onsite soils may be excavated with conventional heavy-duty construction equipment in good working condition.

2.8 Oversized Material

With the exception of the large stockpile of concrete rubble observed in the area of the El Toro Materials mining/crushing operations, no significant amount of oversized material (material larger than 8 inches in maximum dimension) was encountered during our subsurface field work. However, there is the potential for some additional oversize material to be encountered during site grading. For any oversized material encountered that can not be broken down to workable size, recommendations are provided for appropriate handling of oversized materials in Appendix F.

2.9 Expansive Soil Characteristics

Laboratory testing of representative samples of the onsite materials indicated expansion potentials ranging from very low to low, see Appendix C. Generally, it is anticipated that the less prevalent highly expansive soils can be diluted by mixing with the less expansive soils, which comprise the majority of the site. In general, we recommend that expansive soils (EI>20) be not placed within 10 feet of finished grade. The expansion potential shall be confirmed at the completion of grading.

2.10 Corrosion Potential

Corrosion suites (pH, minimum resistivity, soluble sulfate, and chloride content) were performed to assess the corrosion potential of onsite soils. The results for resistivity tests ranged from a minimum resistivity value of 888 ohm-centimeters to 2,732 ohm-centimeters, pH values ranged from 6.6 to 7.8 and chloride content ranged from 52 to 119 parts-per-million (ppm). The result of the soluble sulfate content tests ranged from 34 ppm to 58 ppm. Caltrans defines a corrosive area where any of the following conditions exist: the soil contains more than 500 ppm of chlorides, more than 2,000 ppm (0.2 percent) of sulfates, or a pH of 5.5 or less. Based on the Caltrans definition, the onsite soils are considered non-corrosive. Refer to Appendix C for laboratory test results.

Based on the laboratory sulfate test results, concrete in direct contact with on the onsite soils can be designed according negligible sulfate exposure condition. These preliminary findings shall be confirmed at the end of grading based on the materials which are placed at or near design grade.

3.0 ANALYSIS

3.1 Slope Stability Analyses

The soil shear strength parameters utilized in our slope stability analysis are based upon our laboratory testing of the onsite materials and published shear strength data (CDMG, 2000b). Where supported by laboratory test data, soil shear strength parameters were increased by 20 percent (less than composite peak strength values) for seismic (pseudo-static) loading conditions. Laboratory test results are provided in Appendix C.

TABLE 1

Static Soil Shear Strength Parameters for Slope Stability Analysis

	ϕ (Degrees)	**Cohesion (psf)**
Capistrano Formation – Oso Member Bedrock (Tso)	32	100
Compacted Fill	32	50
Colluvium (Qcol)	32	0

3.2 Global Slope Stability Analysis

Global slope stability analysis was performed on critical cross-sections positioned throughout the site. Slope stability analysis was performed using the computer program GSTABL7 with STEDwin version 2.002 for both static and pseudo-static (seismic) loading conditions. For seismic analysis, a coefficient of 0.15 was used to model potential seismic loading conditions. Potential rotational failure modes were analyzed using Bishop's Modified Method.

Although not currently depicted on the project plans, our global slope stability analyses includes terrace drains on the cut and fill slopes, as they are a code requirement and will be added later to the civil plans. One 6 foot wide bench (terrace drain) was added at the midpoint for slopes up to 60 feet in height. For slopes up to 90 feet in height, a 6 foot wide and 12 foot wide bench (terrace drains) were evenly spaced along the slope face.

Our slope stability analysis of the proposed cut and fill slopes, indicate static and pseudostatic factors of safety greater than 1.5 and 1.1, respectively. Since the factors of safety for static and pseudo-static exceed the code minimums, the proposed cut and fill slopes are considered geotechnically acceptable.

Slope stability analysis is included in Appendix D.

3.3 Surficial Stability

Surficial slope stability analysis was performed for the proposed 2:1 cut and fill slopes under dry and saturated conditions. Our analysis indicates that under dry conditions (no major rainfall) the proposed cut and fill slopes have very large factors of safety, which are well in excess of the minimum of 1.5. However, due to the granular nature of the onsite soils, during periods of heavy rainfall our analysis indicates that the factor of safety against surficial instability decreases rapidly. Once the depth of saturation is greater than 1-foot (parallel to the slope surface), the factor of safety decreases below 1.5. Using a depth of saturation of 4 feet, as is typically done in the industry, the factor of safety is approximately 0.90 for fill slopes and approximately 1.1 for cut slopes. Thus, our surficial slope stability analysis indicates that the cut slopes and compacted fill slopes are subject to surficial instabilities when the depth of water saturation is approximately 4 feet below finished grade.

This same risk of surficial instability during periods of heavy rainfall is present for all other nearby cut and fill slopes which contain either Capistrano Formation - Oso Member bedrock or fill derived from the Oso Member as these material have a very low cohesion value (50 to 100 psf). Our experience with slopes made up of similar sandy materials with low cohesion, indicates that our analysis is likely conservative except during periods of heavy rain within 1 to 2 years after construction and prior to the establishment of deep rooted vegetation cover. Therefore, we recommend that the cut and fill slopes be immediately planted and irrigated once constructed, as vegetation has a positive effect on surficial stability (although there is no present method to include in our analysis). See section 5.2 for discussion on treatment of cut slopes to increase vegetation growth. Additionally, we recommend that grading be completed after the rainy season to further reduce the potential for the surficial instabilities. If the slopes are constructed prior to the rainy season, additional recommendations include the use of the jute netting or other spray-on type applications to reduce the potential for the surficial instabilities.

It should be noted that the fill slopes are surficially stable and have a factor of safety of 1.5, provided the depth of saturation is less than 1-foot and have a factor of safety of 1.0 up to a saturation depth of 3 feet. Within approximately of the slope being constructed, our experience indicates that if surficial slope failures occur, they will be limited in depth to up approximately 5 feet, but can be very large in width and length. Numerous surficial instabilities occurred in the winter of 2005 on recently constructed fill slopes which contained sandy soils. These surficial instabilities were observed to be approximately 5 feet deep, by 30 feet long and 100+ feet wide. Once the vegetation has been established and properly maintained, we would expect the risk for potential surficial slope instabilities to decrease significantly. After a period of 1 to 2 years we expect only minor failures may occur in isolated areas during periods of intense rainfall.

If the risk of surficial instability is not acceptable to the project team, the site can be selectively graded and cohesive material placed on the outer 15 feet of all slopes to increase the surficial stability. Based on our review of the site, this is anticipated to be extremely costly, if not impossible, due to the lack of onsite cohesive material.

See Appendix D for surficial slope stability analysis.

3.4 Settlement Analysis

The larger site fill slopes will be constructed along the eastern edge of the site to heights of up to approximately 45 feet. As a result of the increase in the stress due to the placement of the fill, the underlying colluvial materials will be subject to consolidation settlement. Based on the results of our laboratory testing and geotechnical analysis we calculate on the order of 6 to 8 inches of settlement will be induced in the underlying approximately 30 feet of left in place colluvium, when it is surcharged with 45 feet of fill. Given the sandy nature of the onsite colluvium and a general lack of groundwater, the rate of settlement will be relatively quick and the settlement would during grading. Therefore, we do not foresee a need for settlement monitoring after the site has been graded. The effects of the settlement (subsidence), as it relates to the earthwork balance, have been included in Section 5.1.9.

3.5 Seismic Design Criteria

The site seismic characteristics were evaluated per the guidelines set forth in Chapter 16, Section 1613 of the 2007 C.B.C. Site coordinates of latitude 33.664295 degrees north and longitude -117.657773 degrees west, which are representative of where future buildings will be constructed on the site, were utilized in our analyses. The initial results of our analyses for the maximum considered earthquake (MCE) spectral response accelerations (S_S and S_1) are presented on the Table 2A.

TABLE 2A

Seismic Design Parameters

Selected Parameters from the 2007 C.B.C. Section 1613 - Earthquake Loads	**Seismic Design Values**
Site Class per Table 1613.5.2	D
Spectral Acceleration for Short Periods (S_S)*	1.383 g
Spectral Accelerations for 1-Second Periods (S_1)*	0.495 g
Site Coefficient F_a per Table 1613.5.3(1)	1.0
Site Coefficient F_v per Table 1613.5.3(2)	1.505

* Calculated from the USGS computer program “Seismic Hazard Curves, Response Parameters and Design Parameters” v5.0.9a (10/21/09)

The spectral response accelerations (S_{MS} and S_{M1}) and design spectral response acceleration parameters (S_{DS} and S_{D1}), adjusted for Site Class D, were evaluated for the site in general accordance with section 1613 of the 2007 C.B.C. These site class adjusted parameters are listed on Table 2B.

TABLE 2B

<u>Seismic Design Parameters Modified for Site Class D</u>

Selected Parameters from the 2007 C.B.C. Section 1613 - Earthquake Loads	**Seismic Design Values Modified for Site Class D**
Site Modified Spectral Acceleration for Short Periods (S_{MS}) for Site Class D [Note: $S_{MS} = F_a S_S$]	1.383 g
Site Modified Spectral Acceleration for 1-Second Periods (S_{M1}) for Site Class D [Note: $S_{M1} = F_v S_1$]	0.745 g
Design Spectral Acceleration for Short Periods (S_{DS}) for Site Class D [Note: $S_{DS} = (^2/_3)S_{MS}$]	0.992 g
Design Spectral Acceleration for 1-Second Periods (S_{D1}) for Site Class D [Note: $S_{D1} = (^2/_3)S_{M1}$]	0.497 g

In accordance with Table 1613.5.6 (1, 2), the seismic design category for the subject site is Category D, where $S_{DS} \geq 0.5$ and $S_{D1} \geq 0.2$.

Section 1802.2.7 of the 2007 C.B.C. states that the PGA for a site may be defined as $S_{DS}/2.5$. The S_{DS} for the subject site has been calculated as 0.992 g.

Therefore, PGA = 0.992/2.5 = **0.40 g.** See Appendix E for additional information.

4.0 CONCLUSIONS

Based on the results of our subsurface geotechnical evaluation and geotechnical review of the proposed drainage plans, it is our opinion that the proposed development is feasible from a geotechnical standpoint, provided that the recommendations contained in the following sections are incorporated during site grading and development. A summary of our geotechnical conclusions are as follows:

- The bedrock geologic unit mapped on the site is Oso Member of the Tertiary-aged Capistrano Formation. Surficial units consisting of stockpiled materials, documented and undocumented fill, and topsoil/colluvium overlie the bedrock material.
- Groundwater was encountered in one boring, LGC-HS-5 at a depth of 24 feet below existing grade. Groundwater is not anticipated to be a major constraint to the proposed grading and development. However, isolated areas of perched ground-water should be anticipated during grading.
- Based on our review of the State of California Seismic Hazard Zones El Toro 7.5 Minute Quadrangle, approximately half of the Glass Creek Parcel is located within a zone having a potential for earthquake induced landslide. This potential will be mitigated due the natural buttresses effect of the design cuts along the western side and placement of design fill along the eastern portion of the site.
- Active or potentially active faults are not known to exist on or in the immediate vicinity of the site.
- The main seismic hazard that may affect the site is from ground shaking from one of the active regional faults. The subject site will likely experience strong seismic ground shaking during its design life. The estimated peak horizontal ground acceleration is 0.40 g.
- Based on the proposed finish grades, depth of compacted fill, and lack of a shallow ground-water table, the potential for post construction liquefaction and liquefaction-induced settlement is considered very low.
- Based on the results of our evaluation, it is anticipated that the onsite materials may be excavated with conventional heavy-duty construction equipment in good working condition.
- Although no significant amounts of oversized material (material larger than 8 inches in maximum dimension) was encountered during our evaluation (other than the stockpile of concrete rubble discussed herein), there is the potential for oversize material to be encountered during site grading.
- The upper portion the onsite colluvium is considered unsuitable for placement of new fill or for support of proposed improvements and should be removed and replaced with compacted fill. See Sheet 3 for recommended depth of removal and lateral limits.
- Global slope stability analysis of the proposed cut and fill slopes, indicate static and pseudostatic factors of safety greater than 1.5 and 1.1, respectively. Since the factors of safety for static and pseudo-static exceed the code minimums, the proposed cut and fill slopes are considered geotechnically acceptable as long as they are constructed in accordance with these recommendations and our General Earthwork and Grading Specifications (Appendix F).
- Surficial slope stability analysis indicates that 2:1 cut and fill slopes have a factor of safety less than 1.5 once the depth of saturation exceeds 1 foot. Using a depth of saturation of 4 feet, as is typically done in the industry, the factor of safety is approximately 0.90 for fill slopes and approximately 1.1 for cut slopes. Therefore, there is a long term and short term risk for surficial slope stability issues associated with the proposed cut and fill slopes. Therefore, we recommend that the completed cut and fill slopes be immediately planted and irrigated, as vegetation has a positive effect on surficial stability.
- For design purposes, preliminary infiltration rate of 0.5 inches per hour may be used. This value shall be confirmed by additional infiltration testing once the location of the infiltration basin has been finalized.

- As a result of the increase in the stress due to the placement of up to approximately 45 feet of fill, the underlying colluvial materials will be subject to consolidation settlement. Based on the results of our laboratory testing and geotechnical analysis we calculate up to 6 to 8 inches of settlement will be induced in the underlying approximately 30 feet of colluvium which is left in place. Given the sandy nature of the onsite colluvium materials and a general lack of groundwater, the rate of settlement will be relatively quick and settlement should occur during construction.
- Based on the results of limited laboratory testing, site soils are anticipated to have a very low to low expansion potential. This should be confirmed at the completion of grading.
- Based on the results of limited laboratory testing, site soils have a negligible sulfate exposure condition to concrete in direct contact with the onsite soils. This should be confirmed at the completion of grading.
- From a geotechnical perspective, the existing onsite soils are suitable material for use as fill, provided that they are relatively free from rocks (larger than 8 inches in maximum dimension), construction debris, and significant organic material.

5.0 <u>PRELIMINARY RECOMMENDATIONS</u>

The following recommendations are to be considered preliminary, and should be confirmed upon completion of grading and earthwork operations. In addition, they should be considered minimal from a geotechnical viewpoint, as there may be more restrictive requirements from the architect, structural engineer, building codes, governing agencies, or the City.

It should be noted that the following geotechnical recommendations are intended to provide the City with sufficient information to develop the site in general accordance with the 2007 C.B.C. requirements. With regard to the potential occurrence of potentially catastrophic geotechnical hazards such as fault rupture, earthquake-induced landslides, liquefaction, etc. the following geotechnical recommendations should provide adequate protection for the proposed development to the extent required to reduce seismic risk to an “acceptable level”. The “acceptable level” of risk is defined by the California Code of Regulations as “that level that provides reasonable protection of the public safety, though it does not necessarily ensure continued structural integrity and functionality of the project” [Section 3721(a)]. Therefore, repair and remedial work of the proposed improvement may be required after a significant seismic event. With regards to the potential for less significant geologic hazards to the proposed development, the recommendations contained herein are intended as a reasonable mitigation against the potential damaging effects of these phenomena such as expansive soils, fill settlement, ground-water seepage, etc. It should be understood, however, that our recommendations are intended to maintain the structural integrity of the proposed development and structures given the site geotechnical conditions, but cannot preclude the potential for some cosmetic distress or nuisance issues to develop as a result of the site geotechnical conditions.

The recommendations contained within are based specifically on development of a park site which contains one community center and large open areas (sports fields). Our recommendations are based on the fact that with the exception of the proposed building, the remainder of the improvements are not sensitive to post-construction settlements.

All geotechnical recommendations contained herein must be confirmed to be suitable or modified based on the actual as-graded conditions.

5.1 <u>Site Earthwork</u>

We anticipate that earthwork at the site will consist of removal of existing improvements associated with the mining operation, clearing and grubbing, rough grading, precise grading and construction of the proposed new improvements, including the community center, tot lots, subsurface utilities, interior streets, parking lots, etc. We recommend that earthwork onsite be performed in accordance with the following recommendations, the City of Lake Forest grading requirements, and the General Earthwork and Grading Specifications for Rough Grading included in Appendix F. In case of conflict, the following recommendations shall supersede those included in Appendix F. The following recommendations should be considered preliminary and may be revised based on the actual conditions encountered during site grading.

5.1.1 Site Preparation

Prior to grading of areas to receive structural fill or engineered structures, the areas should be cleared of surface obstructions and potentially compressible material (such as stockpiled materials, undocumented fill, colluvium, desiccated older fill weathered bedrock, and vegetation). Vegetation and debris should be removed and properly disposed of offsite. Holes resulting from the removal of buried obstructions, which extend below proposed finish grades, should be replaced with suitable compacted fill material.

5.1.2 Removal and Recompaction

All potentially compressible/collapsible materials not removed by the planned design cuts should be excavated to competent material and replaced with compacted fill soils. From a geotechnical perspective, material that is removed (stockpiles, undocumented fill, colluvium, etc.) may be placed as fill provided that the material is relatively free of organic material and/or deleterious debris, is moisture-conditioned or dried (as needed) to obtain near-optimum moisture content is mixed with sandy soils if clayey in nature, and then recompacted. Removal bottoms should be observed and accepted by LGC prior to fill placement. Areas to receive fill and/or other surface improvements should be scarified, brought to a near-optimum moisture condition, and recompacted to at least 90 percent relative compaction (based on American Society for Testing and Materials [ASTM] Test Method D1557).

5.1.2.1 Existing Stockpile Removals

We recommend the complete removal of all onsite stockpiles, followed by replacement with compacted fill as required to reach design grades. The approximate lateral limits and depth below existing grade of the undocumented fill removals is shown on Sheet 3.

5.1.2.2 Undocumented Fill Removals

Due to its undocumented nature and based on the findings of our subsurface evaluation, we recommend complete removal of all onsite undocumented fill, followed by replacement with compacted fill as required to reach design grades. The approximate lateral limits and depth below existing grade of the undocumented fill removals is shown on Sheet 3.

5.1.2.3 Colluvial Removals

Given that the upper portion of the onsite colluvium is weathered and compressible, we recommend the upper portion of the onsite colluvium/alluvium be removed and replaced with compacted fill as required to reach design grades. The approximate lateral limits and depth below existing grade of the colluvial removals is shown on Sheet 3.

5.1.3 Temporary Stability of Removal Excavations

Due to the recommended depth of remedial grading, temporary slopes will exist around the perimeter of the site grading limits. We do not expect these slopes to be grossly unstable; however, all excavations should be made in accordance with California Occupational Safety and Health Administration (Cal/OSHA) requirements. Site safety is the responsibility of the contractor.

5.1.4 Subdrains

For planning purposes, the anticipated locations of recommended canyon subdrains to be constructed during site rough grading are depicted on Sheet 3 Remedial Removals Map. The locations of the recommended subdrains are generally controlled by the natural site topography within the alluvial canyons/swales. Canyon subdrains are typically placed following remedial grading and before fill placement in order to collect future ground water that may accumulate/migrate in these areas. In areas where remedial grading will be deeper than available subdrain outlet elevations, some fill placement will be necessary to achieve suitable subdrain flow elevations (minimum two percent flow towards the outlet location). The primary purpose of the subdrains will be to reduce the potential for ground water to rise above the subdrain elevations into the compacted fill. The canyon subdrains should be constructed in accordance with the recommendations provided in Appendix F**.**

If unanticipated ground water or areas of potential future ground-water seepage and/or accumulation are encountered during grading, additional subdrains may be recommended by LGC during site grading and/or development.

A representative of the project civil engineer should survey the installed subdrains for alignment and grade prior to fill placement above the subdrains.

5.1.5 Fill Placement

From a geotechnical perspective, the onsite soils are generally suitable for use as compacted fill, provided they are screened of significant organic materials and construction debris. Areas prepared to receive structural fill and/or other surface improvements should be scarified, brought to at least optimum-moisture content, and recompacted to at least 90 percent relative compaction (based on ASTM Test Method D1557). Material to be placed as fill should be brought to above optimum moisture content and recompacted to at least 90 percent relative compaction (based on ASTM Test Method D1557). The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, granular fill should be placed in uniform lifts not exceeding 8 inches in compacted thickness. Generally, placement and compaction of fill should be performed in accordance with local grading ordinances and with observation and testing by the geotechnical consultant. Oversized material (material larger than 8 inches in maximum dimension) should be placed in accordance with the recommendations provided in Appendix F.

From a geotechnical viewpoint, import soils (if necessary) should consist of clean, granular soils of very low-to-low expansion potential (expansion index 50 or less based on U.B.C. 18-2). Source samples should be provided to the geotechnical consultant for laboratory testing a minimum of 48 hours prior to any planned importation.

5.1.6 ***Overexcavation of Cut/Fill Transitions***

To reduce the potential for differential settlement below the proposed buildings, we recommend the cut portion of cut/fill transitions be overexcavated a minimum of 5 feet vertically and to at least one half the maximum fill thickness under the building envelope, not exceeding 15 feet vertically, and extending at least 5 horizontal feet outside of the proposed building footprints. The bottom of the overexcavation should be graded to flow towards deeper fill areas. The overexcavated material should then be replaced by compacted fill material to design grade.

5.1.7 ***Overexcavation of Design Cut Pads and Streets***

To facilitate growth of the future plants throughout the Sports Park, we recommend all design cut pads be undercut a minimum of 2 feet below ultimate finish pad grade. The overexcavation bottom should be graded with a minimum two percent tilt towards deeper fill areas to reduce the potential for ponding water (this will necessitate some areas being over excavated more than 2 feet). Undercuts must be confirmed and mapped by the geotechnical consultant prior to backfill. Where adverse geologic conditions are identified in pad overexcavations, deeper undercut recommendations may be provided.

We recommend the future streets and parking lot areas be undercut a minimum of 2 feet below finished asphalt elevation. All overexcavated material should be replaced with compacted fill materials free of oversize material (material lager than 8 inches in maximum dimension).

5.1.8 ***Trench Backfill and Compaction***

The onsite materials may generally be considered suitable for use as trench backfill, provided that they are screened of rocks and other material greater than 6 inches in diameter and organic matter. If trenches are shallow or the use of conventional equipment may result in damage to the utilities, a clean sand having a SE > 30 may be used to bed and shade the pipes. Sand backfill may be densified by jetting or flooding and then tamping to ensure adequate compaction. Otherwise, trench backfill should be compacted in thin uniform lifts by mechanical means to at least 90 percent relative compaction (per ASTM Test Method D1557). A representative from LGC should observe, probe, and test the backfill to verify compliance with the project specifications.

5.1.9 Shrinkage and Bulking

Volumetric changes in earth quantities will occur when excavated onsite earth materials are replaced as properly compacted fill. Table 3 is an estimate of shrinkage and bulking factors for the various geologic units found on the site. These estimates are based on in-place densities of the various materials and on the estimated average degree of relative compaction achieved during grading.

It should be stressed that these values are only estimates and that an actual shrinkage factor is extremely difficult to predetermine. The effective shrinkage of on site materials will depend primarily on the type of compaction equipment and method of compaction used by the contractor. Additionally, the site geology varies across the site and with depth.

TABLE 3

Shrinkage and Bulking Factor

Geologic Unit*	**Shrinkage**	**Bulking**
Tco – outer 2 feet	5 to 15 %	-
Tco – below 2 feet	-	5 to 10 %
Afs	15 to 20 %	-
Afu	5 to 10 %	-
Afo	Zero	Zero
Qcol	5 to 15 %	-

* see removals map for vertical and lateral limits.

As previously mentioned, as a result of the increase in the stress due to the placement of the fill, the underlying colluvial materials will be subject to consolidation settlement. To account for this in the earthwork balance, we recommend an average subsidence of 0.2 feet be included over the entire fill area.

The above shrinkage, bulking and subsidence estimates are intended as an aid for project civil engineer in determining preliminary earthwork quantities. However, these estimates should be used with some caution since they are not absolute values. Contingencies should be made for balancing earthwork quantities based on actual shrinkage and subsidence that occurs during grading. Shrinkage and bulking are also expected to vary with variations in survey accuracy during rough grading.

5.1.10 Balance Area for Grading

We strongly recommend that the project civil engineer incorporate balance areas in the grading plan to ensure that each phase of the development has an earthwork balance. A balance area is open area (park, field, etc.) in which the grade can either be raised or lowered based on the amount of material which is present at the end of grading. Since either exporting or import soil could be very expensive depending on the market conditions which are present during grading, paying to export or import soils should be avoided. It is our experience that due to the variability of assessing the current density of the onsite materials, future density of the fill, and the effect of vegetation differences can have on the accuracy of the topographic survey, devoting additional time and resources to better estimate the shrinkage/bulking factors of the site materials is generally not worth the time and expense. A balance area is a much better solution to mitigate the potential of being long or short on material.

5.2 Slope Stability

5.2.1 Cut Slopes

Based on our slope stability analysis, the proposed cuts slopes are globally stable as the factor of safety exceeds 1.5 and 1.1 under static and pseudo-static loading conditions.

Since the presence of vegetation will increase the long term surficial factor of safety, from a plant growth perspective, it may be desirable to overexcavate the face of the proposed cut slopes and replace it with compacted fill. The idea being that since the vegetation would be planted in fill instead of bedrock, the growth rate of the plants will be better. However, from a geotechnical perspective, in the short term the factor of safety against surficial failure decreases as the fill is slightly weaker than the bedrock. The decision regarding the whether or not to overexcavate the cut slopes should be made by the owner based on information provided by the project landscape architect.

If the cuts slopes are to be overexcavated and replaced with fill, they should be constructed as replacement fill slopes in accordance with the recommendations provided on our Stabilization Fill detail provided in Appendix F. Properly outletted back drains should be constructed along stabilization fill backcuts.

In general, to reduce the potential for backcut failures, we recommend the keyway backcuts be planned to minimize the time the backcut is left exposed. The backcuts should not be initiated prior to forecasted rain or where they will be left open for extended periods.

Backcuts and key excavations should be geologically mapped by the geotechnical consultant during excavation to confirm the anticipated conditions. If adverse joints, fractures, and/or bedding are exposed, additional analysis and/or remediation measure may be required. The grading contractor must trim the backcuts with a slope board to remove loose material to allow for confirmational mapping.

5.2.2 Fill Slopes

Based on our slope stability analysis, the proposed fill slopes are globally stable as the factor of safety exceeds 1.5 and 1.1 under static and pseudo-static loading conditions.

Fill slope faces should also be compacted to minimum project specifications. This may require overbuilding of the slope face and trimming back to design grades. To improve surficial stability, vegetation specified by the landscape architect should be established on the slope face as soon as it is practical.

5.3 Provisional Foundation Recommendations

Based on the site geotechnical conditions and if the remedial recommendations provided herein are implemented, the site may be considered suitable for the support of the proposed structures using conventional or post-tensioned slab-on-grade foundation system.

The following section summarizes our recommendations for each alternative type of foundation component.

5.3.1 Preliminary Conventional Footings

Conventional footings may be used to support the proposed structures where the expansion index is less than 20 (very low). Minimum footing depths should be 18 inches for two-story buildings. Slab subgrade should be presoaked to optimum moisture content to a minimum depth of 12 inches. Structural steel reinforcement should be designed by the structural engineer based on the geotechnical parameters contained herein. See Section 5.6 for bearing values.

5.3.2 Preliminary Post-Tensioned Foundation Design Parameters

Post-tensioned slabs should be designed using the minimum geotechnical parameters provided in Table 4 and the as-graded expansion potential of the near-surface soils. The parameters in Table 4 have determined in general accordance with the guidelines set forth in the Third Edition of 'Design of Post-Tensioned Slabs-on-Ground (Addendum #2)'. In utilizing these parameters, the foundation engineer should design the foundation system in accordance with the allowable deflection criteria of applicable codes and the requirements of the structural engineer/architect. These provisional recommendations must be confirmed or modified by LGC at the completion of grading based on actual as-graded conditions.

The post-tensioned design methodology is in part based on the assumption that soil-moisture changes around and beneath the post-tensioned slabs are influenced only by climatological conditions. Soil-moisture change below slabs is the major factor in foundation damage relating to expansive soil. The design methodology has no consideration for presoaking, irrigation, or other non-climate related influences on the moisture content of subgrade soils. In recognition of these factors, and our previous experience and work on the geotechnical PTI subcommittee, we have modified the geotechnical parameters obtained from this methodology to account for man-made conditions, influence of irrigation, and climate. Our design parameters are based on our experience with structures and the anticipated nature of the soil (with respect to expansion potential). Please note that implementation of our recommendations will not eliminate foundation movement (and related distress) should the moisture content of the subgrade soils fluctuate. It is the intent of these recommendations to help maintain the integrity of the proposed structures and reduce (not eliminate) movement, based upon the anticipated site soil conditions.

TABLE 4

Preliminary Geotechnical Parameters for Post-Tensioned Foundation Slab Design

Parameter	Value
Center Lift Edge moisture variation distance, e_m Center lift, y_m	 9.0 feet 0.35 inches
Edge Lift Edge moisture variation distance, e_m Edge lift, y_m	 5.2 feet 0.4 inches
Modulus of Subgrade Reaction, k (assuming presoaking as indicated below)	200 pci
Perimeter foundation embedment below finish grade (for a conventional PT foundation)	12 inches
Presoak	Optimum moisture content to a minimum depth of 12 inches
Under slab moisture retarder and sand layers	15 mil polyolefin or equivalent overlain by 1 inch of dry sand; Refer to Text[2]
1. Assumed for preliminary design purposes. Further evaluation is needed at the completion of grading. 2. Recommendations for sand below slabs are traditionally included with geotechnical foundation recommendations, although they are not the purview of the geotechnical consultant. The sand layer requirements are the purview of the foundation engineer/structural engineer, and should be provided in accordance with ACI Publication 302 "Guide for Concrete Floor and Slab Construction".	

5.3.3 Post-Tensioned Foundation Subgrade Preparation and Maintenance

Presoaking of the subgrade soils to optimum moisture content is recommended prior to trenching the foundation. This subgrade moisture condition should be maintained up to the time of concrete placement. Furthermore, the moisture content of the soil around the immediate perimeter of the slab should be maintained at near optimum-moisture content (or slightly above) during construction and up to occupancy of the building.

The geotechnical parameters provided in Table 4 assumes that if the areas adjacent to the foundation are planted and irrigated, these areas will be designed with proper drainage and adequately maintained so that ponding, which causes significant moisture changes below the foundation, does not occur. Our recommendations do not account for excessive irrigation and/or incorrect landscape design. Sunken planters placed adjacent to the foundation, should either be designed with an efficient drainage system or liners to prevent moisture infiltration below the foundation. Some lifting of the perimeter foundation beam should be expected even with properly constructed planters.

5.4 Soil Bearing

An allowable soil bearing pressure of 2,000 pounds per square foot (psf) may be used for the design of footings having a minimum width of 12 inches and minimum embedment of 18 inches below lowest adjacent ground surface. This value may be increased by 300 psf for each additional foot of embedment of 100 psf for each additional foot of foundation width to a maximum value of 2,500 psf. These allowable bearing pressures are applicable for level (ground slope equal to or flatter than 5H:1V) conditions only.

In utilizing the above-mentioned allowable bearing capacity, foundation settlement due to structural loads is anticipated to be less than ½-inch over a horizontal span of 40 feet.

Resistance to lateral loads can be provided by friction acting at the base of foundations and by passive earth pressure. A coefficient of friction of 0.25 may be assumed with dead-load forces. A passive lateral earth pressure of 300 psf per foot of depth (or pcf) may be used for the sides of footings poured against properly compacted fill. This passive pressure is applicable for level (ground slope equal to or flatter than 5H:1V) conditions only.

Bearing values indicated above are for total dead loads and frequently applied live loads. The above vertical bearing may be increased by one-third for short durations of loading which will include the effect of wind or seismic forces. The passive pressure may be increased by one-third due to wind or seismic forces.

5.5 Lateral Earth Pressures for Preliminary Retaining Wall Design

The following parameters are applicable for conventional retaining walls that as less than 6 feet in height.

Lateral earth pressures for select material or approved native soils, meeting indicated project specifications, are provided below. Lateral earth pressures are provided as equivalent fluid unit weights, in psf/ft of depth or pcf. These values do not contain an appreciable factor of safety, so the civil and/or structural engineer should apply the applicable factors of safety and/or load factors during design. A soil unit weight of 125 pcf may be assumed for calculating the actual weight of soil over the wall footing. The retaining wall designer should clearly indicate on the retaining wall plans the type of backfill (select or native) used in the retaining wall design.

The following lateral pressures for approved free-draining granular soils (sand equivalent (SE) of 30 or greater per CTM 217 and Expansion Index (EI) not greater than 20 per test method U.B.C. 18-2) for level or sloping backfill are presented on Table 5.

TABLE 5

<u>Lateral Earth Pressures – Approved Select Material</u>

Conditions	**Equivalent Fluid Unit Weight (pcf)**	
	Level Backfill	**2:1 Backfill Sloping Upwards**
	Approved Soils	**Approved Soils**
Active	35	50
At-Rest	60	85
Passive	300	-

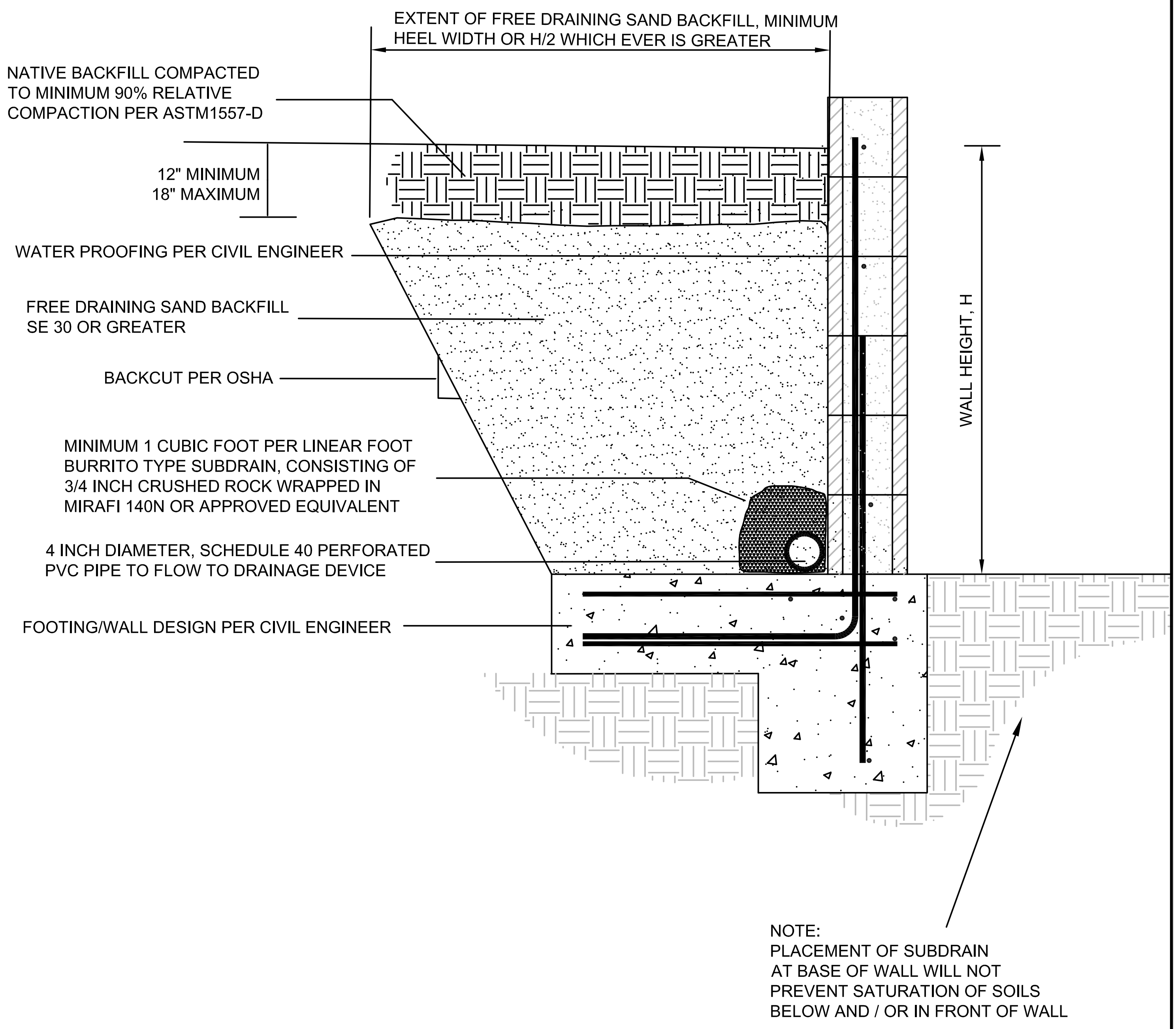
If the wall can yield enough to mobilize the full shear strength of the soil, it can be designed for "active" pressure. If the wall cannot yield under the applied load, the shear strength of the soil cannot be mobilized and the earth pressure will be higher. Such walls should be designed for "at-rest" conditions. If a structure moves toward the soils, the resulting resistance developed by the soil is the "passive" resistance. The passive earth pressure values assume sufficient slope setback criteria.

The equivalent fluid pressure values assume free-draining conditions. If conditions other than those assumed above are anticipated, the equivalent fluid pressure values should be provided on an individual-case basis by the geotechnical engineer. Surcharge loading effects from the adjacent structures should be evaluated by the geotechnical and structural engineer. Retaining wall structures should be provided with appropriate drainage and appropriately waterproofed. The outlet pipe should be sloped to drain to a suitable outlet. Typical wall drainage design is illustrated in Figure 2 (Sand Backfill).

For sliding resistance, the friction coefficient of 0.25 may be used at the concrete and soil interface. Wall footings should be designed in accordance with structural considerations. The passive resistance value may be increased by one-third when considering loads of short duration such as wind or seismic loads.

Excavations should be made in accordance with Cal/OSHA, as a general guideline. The backfill soils should be compacted to at least 90 percent relative compaction (based on ASTM Test Methods D2922 and D3017). Prolonged exposure of back-cut slopes during construction may result in some localized slope instability. Excavation safety is the sole responsibility of the contractor.

Soil bearing values for shallow footings are provided in Section 5.4.



LGC

FIGURE 2
Retaining Wall
Sand Backfill

PROJECT NAME	Lake Forest Sports Park
PROJECT NO.	091069-01
ENG. / GEOL.	DJB / TJL
SCALE	Not to Scale
DATE	March 2010

5.6 Control of Surface Water and Drainage Control

Positive drainage of surface water away from structures is very important. Water should not be allowed to pond adjacent to buildings or to flow freely down a graded slope. Positive drainage may be accomplished by providing drainage away from buildings at a gradient of at least 2 percent for earthen surfaces for a distance of at least 5 feet, and further maintained by a swale or drainage path at a gradient of at least 1 percent. Where necessary, drainage paths may be shortened by use of area drains and collector pipes. Eave gutters are recommended and should reduce water infiltration into the subgrade soils if the downspouts are properly connected to appropriate outlets.

5.7 Preliminary Pavement Recommendations

Laboratory testing of samples of the onsite materials collected during our filed work indicate R-values ranging from 67 to 69. We recommend the following provisional minimum street sections for Traffic Indices of 6.0 or less. These recommendations must be confirmed with R-value testing of representative near-surface soils at the completion of grading and after underground utilities have been installed and backfilled. Final street sections should be confirmed by the project civil engineer based upon the projected Traffic Index.

Assumed Traffic Index	< = 6.0
R-Value Subgrade	50
AC Thickness	4.0 inches
Base Thickness	4.0 inches

The thicknesses shown are for minimum thicknesses. Increasing the thickness of any or all of the above layers will reduce the likelihood of the pavement experiencing distress during its service life. The above recommendations are based on the assumption that proper maintenance and irrigation of the areas adjacent to the roadway will occur through the design life of the pavement. Failure to maintain a proper maintenance and/or irrigation program may jeopardize the integrity of the pavement.

Aggregate base should conform to the requirements of the latest edition of the Standard Specifications for Public Works Construction (“Greenbook”). Aggregate base should be compacted to a minimum of 95 percent relative compaction over subgrade compacted to a minimum of 90 percent relative compaction per ASTM- D1557.

5.8 Corrosivity to Concrete and Metal

Although not corrosion engineers (LGC is not a corrosion consultant), several governing agencies in Southern California require the geotechnical consultant to determine the corrosion potential of soils to buried concrete and metal facilities. We therefore present the results of our testing with regard to corrosion for the use of the client and other consultants as they determine necessary. It should be noted that chloride ranging from approximately 52 to 119 parts per million (ppm), sulfate contents ranged from approximately 34 ppm to 58 ppm (less than 0.10 percent) and pH ranged from 6.6 to 7.8. Caltrans defines a corrosive area as where any of the following exist: 1) the soil contains more than 500 ppm of chloride; 2) more than 2,000 (0.2 percent) of sulfate; or 3) a pH less than 5.5. Therefore, preliminary tests results indicate the onsite soils are non-corrosive.

Based on preliminary sulfate testing performed at the site, concrete should be designed in accordance with the negligible category (2007 C.B.C). These findings will be confirmed at the end of grading.

5.9 Nonstructural Concrete Flatwork

Concrete flatwork (such as sideways, bicycle trails, etc.) has the potential for cracking due to changes in soil volume related to soil-moisture fluctuations. To reduce the potential for excessive cracking and lifting, concrete should be designed in accordance with the minimum guidelines outlined in Table 6. These guidelines will reduce the potential for irregular cracking and promote cracking along construction joints, but will not eliminate all cracking or lifting.

TABLE 6

Nonstructural Concrete Flatwork for Low Expansion Potential

	Sidewalks	**City Sidewalk Curb and Gutters**
Minimum Thickness (in.)	4 (nominal)	Per City of Lake Forest
Presaturation	Wet down prior to placing	Per City of Lake Forest
Reinforcement	2 No. 3 Rebar longitudinal	Per City of Lake Forest
Thickened Edge (in.)	—	Per City of Lake Forest
Crack Control Joints	Saw cut or deep open tool joint to a minimum of $^{1}/_{3}$ the concrete thickness	Per City of Lake Forest
Maximum Joint Spacing	5 feet	Per City of Lake Forest
Aggregate Base Thickness (in.)	—	Per City of Lake Forest

5.10 ***Slope Creep***

Based on the proposed grading plan, pads areas will be located adjacent to descending slopes up to approximately 45 feet in height. Therefore, recommendations are provided to minimize the potential impacts of slope creep and lot stretching for proposed improvements.

As with most natural and manmade slopes and pad areas, some degree of slope creep should be expected for this site. The amount of slope creep is usually influenced by such factors as the slope geometry, slope exposure, aspect, height, composition, as well as plant type, precipitation, irrigation and landscaping programs. Since the depth of the creep zone is somewhat unknown and analytically is in its infancy, our estimates of the extent and magnitude of slope creep are, therefore, based on our observations at previous sites with similar soil conditions. In general, the effects of slope creep are not observed further than 10 to 20 feet into the lot. When the effects of slope creep are observed more than 20 feet into the lot, it usually occurs on lots with descending slopes greater than 60 feet composed of highly expansive soils and subject to a great deal of irrigation. The most active zone of creep is usually within the outer 6 to 10 feet of the slope face where moisture fluctuations commonly occur.

Although top-of-slope improvements including fences, walls, sidewalks, etc. are generally not considered structural, we recommend that these improvements, other landscaping features be constructed with flexibility to accommodate the effects of slope creep. Typical remediation methods include construction joints, separation joints, flexible pavers, flexible structures, or additional reinforcement to limit cracking (Refer to the Nonstructural Concrete Flatwork, Section 5.9). The exact amount of movement due to slope creep cannot be determined at this time; it is dependent to some extent upon irrigation practices. Lateral and vertical deflections on the order of 2 inches have been observed on projects with similar geotechnical conditions.

5.11 ***Construction Observation and Testing***

The recommendations provided in this report are based on limited subsurface observations and geotechnical analysis. The interpolated subsurface conditions should be checked in the field during construction by a representative of LGC.

Construction observation and testing should also be performed by LGC during future grading, excavations, backfill of utility trenches, preparation of pavement subgrade and placement of aggregate base, foundation or retaining wall construction, or when any unusual soil conditions are encountered at the site. Foundation plans and final project drawings should be reviewed by this office prior to construction.

5.12 Preconstruction Documentation

As with any infill grading project of this size and duration, unfortunately there is a potential for claims to be levied against the City as a result of the proposed construction activities. The most common claims that we have seen on similar projects include; wall cracks, flatwork cracks, effect of vibrations, dust, noise and perceived slope instability. In general, the majority of the claims made by adjacent land owners are for pre-existing conditions which are not associated with adjacent construction activity. We recommend that the city consider performing thorough preconstruction documentation of the existing adjacent improvements, installation of vibration monitors and/or slope inclinometers at critical locations. LGC has extensive experience in the installation and monitoring of the perimeter of hillside grading projects, which help to reduce the potential for future claims.

6.0 LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

This report is based on data obtained from limited observations of the site, which have been extrapolated to characterize the site. While the scope of services performed is considered suitable to adequately characterize the site geotechnical conditions relative to the proposed development, no practical evaluation can completely eliminate uncertainty regarding the anticipated geotechnical conditions in connection with a subject site. Variations may exist and conditions not observed or described in this report may be encountered during construction.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the other consultants (at a minimum the civil engineer, structural engineer, landscape architect) and incorporated into their plans. The contractor should properly implement the recommendations during construction and notify the owner if they consider any of the recommendations presented herein to be unsafe, or unsuitable.

The findings of this report are valid as of the present date. However, changes in the conditions of a site can and do occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. The findings, conclusions, and recommendations presented in this report can be relied upon only if LGC has the opportunity to observe the subsurface conditions during grading and construction of the project, in order to confirm that our preliminary findings are representative for the site. This report is intended exclusively for use by the client, any use of or reliance on this report by a third party shall be at such party's sole risk.

In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and modification.

APPENDIX A

References

ASL Consulting Engineers, 1998, Construction Plans for LAWD Zone C Non-Potable Water Pump Station and Pipeline, Los Alisos Water District, Dated June 1998.

Boyle Engineering Corporation, 1978, Construction Plans for the Zone II, Phase IV, 7.5 MG Reservoir, Los Alisos Water District, Orange County, California, Dated August 1978.

California Department of Conservation, Division of Mines and Geology (CDMG), 2000a, Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones of California, Southern Region, CDMG CD 2000-03.

_______, 2000b, Seismic Hazard Zone Evaluation of the El Toro 7.5-Minute Quadrangle, Orange County, California, Open-File Report 2000-013, dated 2000.

_______, 2001, State of California Seismic Hazard Zones, El Toro Quadrangle, Official Map, scale: 1:24,000, Release Date: January 17, 2001.

Cao, T., Bryant, W.A., Rowshandel, B., Branum, D., and Wills, C.J., 2003, The Revised 2002 California Probabilistic Seismic Hazard Maps, dated June; California Geological Survey, website address: http://www.consrv.ca.gov/CGS/rghm/psha/fault_parameters/pdf/2002_CA_Hazard_Maps.pd

Hart, 1997, Fault Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning with Index to Earthquake Fault Zone Maps, Department of Conservation, Division of Mines and Geology, Special Publication 42.

_______, 2007, California Building Code, Volume 2.

Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas: California Department of Conservation, Division of Mines and Geology, Geologic Data Map No. 6, Scale 1:750,000.

Morton, P.K., and Miller, R.V., 1981, Geologic Map of Orange County California, Showing Mines and Mineral Deposits, scale 1:48000.

Psomas, 2010a, Baker Parcel, 35% Submittal, “C-Grad.dwg”, Dated February 2, 2010.

______, 2010b, Glass Creek, Glass Creek Balanced Site Grading Plan, “C-Grad-Glass-Creek-Balanced”, Dated March 1, 2010.

______, 2010c, Rados Parcel, “C-Grad-Rados-20100312.dwg”, Dated March 12, 2010.

Rawls, Brakensiek and Saxton, 1982. Table of Hydrologic Soil Properties Classified by Soil Texture.

Geotechnical Boring Log LGC-B-1

Date : 1/25/2010	Page 1 of 4	**Drilling Company :**	Al Roy Drilling Services
Project Name :	Lake Forest Sports Park	**Type of Rig :**	EZ Bore
Project Number :	091069-01	**Drop :** 30"	**Hole Diameter :** 28"
Elevation of Top of Hole :	~ 838 ' MSL	**Drive Weight :**	Kelly Bar
Hole Location :	See Geotechnical Map		

Logged by BG/KBC

Sampled by BG

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							SM	**<u>Tertiary Capistrano Formation - Oso Member (Tco)</u>**	
									@ 0-1.5' Silty SANDSTONE: medium grained, brown to red orange, moist, many roots	
835				B-1					@ 1.5' Silty SANDSTONE: medium grained, olive green to light brown with red orange staining, moist	MD
									@ 4' Coarser grained, less staining	
	5									
			B: N6E, 9W						@ 6.5' Dark gray to green undulating fine grained bedding	
830									@8.5' Alternating layers of light tan medium grained sandstone and medium gray coarse grained sandstone	
	10			R-1	7	114.1	12.2		@ 10' Silty SANDSTONE: medium grained, light brown to olive green, moist; heavy red-orange staining	
825										
	15									
820										
			B: N2W, 7W						@ 19.5' Orange brown and black bedding	
	20			R-2	8	117.3	11.9		@ 20' Silty SANDSTONE: medium grained; tan to olive green, moist; red-orange and gray staining/streaking	SA
815									@ 23.5' Oblong sandstone inclusion of west side of boring; medium gray to brown and red-orange sandstone approximately 1 ft. in diameter; red-orange halo around inclusion	
									@ 24' Circular sedimentary structure approximately 0.25 ft. diameter; red-orange halo with dark gray brown interior sand	
	25									
810										
									@ 29' Fine grained Silty SAND	

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE
G GRAB SAMPLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE

Last Edited: 3/15/2010

Geotechnical Boring Log LGC-B-1

Date :	1/25/2010 Page 2 of 4	**Drilling Company :**	Al Roy Drilling Services
Project Name :	Lake Forest Sports Park	**Type of Rig :**	EZ Bore
Project Number :	091069-01	**Drop :** 30"	**Hole Diameter :** 28"
Elevation of Top of Hole :	~ 838 ' MSL	**Drive Weight :**	Kelly Bar
Hole Location :	See Geotechnical Map		

Logged by BG/KBC
Sampled by BG

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		B: N16E, 4W	R-3	7,8	121.4	11.6	SM	**Tertiary Capistrano Formation - Oso Member (continued)** @ 30' Silty SANDSTONE: medium grained, light brown to olive green, moist; red-orange staining	
									@ 30.5' Orange and black bed approximately 0.5" thick	
805										
									@ 34'-34.5' Becomes more coarse grained	
	35								@ 35' Alternating coarse and fine grained sandstone beds	
800										
	40			R-4	6, 6	116.0	12.9		@ 40' Silty SANDSTONE: medium grained, light brown to olive green, moist; red-orange staining	DS
795										
	45									
790										
	50			R-5	10, 10/4"	126.2	6.0		@ 50' Silty SANDSTONE: medium to coarse grained, light brown to olive green, moist; some dark gray mottling and red-orange staining	
									@ 52.5' - 53.5' Red-orange to olive-green layer	
785			B: N28E, 6W						@ 53.5' Relatively thick gray bed with yellow brown coloration along upper contact	
	55									
									@ 57' Finer grained; olive-green and red-orange; hard	
780			B: N10W, 2W							

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE
G GRAB SAMPLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE

Geotechnical Boring Log LGC-B-1

Date : 1/25/2010		**Drilling Company :**	Al Roy Drilling Services
Project Name :	Lake Forest Sports Park	**Type of Rig :**	EZ Bore
Project Number :	091069-01	**Drop :** 30"	**Hole Diameter :** 28"
Elevation of Top of Hole :	~ 838 ' MSL	**Drive Weight :**	Kelly Bar
Hole Location :	See Geotechnical Map		

Logged by BG/KBC
Sampled by BG

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	60			R-6	12,13	111.5	4.4	SM	**Tertiary Capistrano Formation - Oso Member (continued)** @ 60' Silty SANDSTONE: medium grained, light brown to white, moist	DS
775										
	65									
770									@ 68' Much more coarse; off-white to light brown, hard; no alternating beds	
	70			R-7	12,14	112.8	4.1		@ 70' Silty SANDSTONE: medium grained, light brown to white, moist	
765										
	75									
760										
	80			R-8	13,16	112.3	8.8		@ 80' Silty SANDSTONE: medium to coarse grained; white to tan; moist	
755										
	85								@ 86' Undulating contact of upper uniform sand with lower finer olive-green sand	
750										

LAWSON AND ASSOCIATES
GEOTECHNICAL CONSULTING, INC.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE
G GRAB SAMPLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE

Geotechnical Boring Log LGC-B-1

Date : 1/25/2010	Page 4 of 4	**Drilling Company :**	Al Roy Drilling Services
Project Name :	Lake Forest Sports Park	**Type of Rig :**	EZ Bore
Project Number :	091069-01	**Drop :** 30"	**Hole Diameter :** 28"
Elevation of Top of Hole :	~ 838 ' MSL	**Drive Weight :**	Kelly Bar
Hole Location :	See Geotechnical Map		

Logged by BG/KBC
Sampled by BG

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	90			R-9	25, 20/1"	109.6	6.1	SM	**Tertiary Capistrano Formation - Oso Member (continued)** @ 90' Silty SANDSTONE: medium grained, off-white to light brown, moist	
745									@ 93' Circular sedimentary structure on west side of boring; brown to orange-red; approximately 6" diameter	
	95								@ 95.5' Contact of upper coarse sand with lower fine olive-green sand; end visual log	
740									@ 100' Silty SANDSTONE: medium grained, off-white to light brown; moist	
	100			R-10	28, 22/2"	115.9	10.2			
735									**Total Depth = 100'** **No Ground Water Encountered** **Backfilled with Cuttings and Bentonite on 1/25/2010**	
	105									
730										
	110									
725										
	115									
720										

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE
G GRAB SAMPLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE

Geotechnical Boring Log LGC-B-2

Date : 1/28/2010	Page 1 of 4	**Drilling Company :**	Al Roy Drilling Services
Project Name :	Lake Forest Sports Park	**Type of Rig :**	EZ Bore
Project Number :	091069-01	**Drop :** 30"	**Hole Diameter :** 28"
Elevation of Top of Hole :	~ 864 ' MSL	**Drive Weight :**	Kelly Bar
Hole Location :	See Geotechnical Map		

Logged by BG/KBC
Sampled by BG

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							SM	**Tertiary Capistrano Formation - Oso Member (Tco)**	
									@ 0'-.5' Weathered bedrock with roots; off-white to light brown sand	
860										
	5									
855									@ 9.5' Coarse gravel layer; discontinuous around boring	
	10			R-1	6/6"	109.3	10.3		@ 10' SAND: medium grained, off-white to light gray, damp, friable	
			B: N16W, 7W						@ 10.5' Laminated sand; medium grained	
			B: N14W, 7W						@ 12' Gray fine sand	
850										
	15									
									@ 17' Undulatory bed	
845										
	20			R-2	6/6"	118.8	5.6		@ 20' SAND: medium grained, off-white to light gray, damp	
			B: N10W, 4W						@ 20.5' - 21.5' multiple orange bands within dark gray fine sand; hard	
840									@ 24' Coarser sand; light yellow brown to white to gray	
	25								@ 25.5' Medium grained	
									@ 26.5' Bedding	
835										

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE
G GRAB SAMPLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE

Last Edited: 3/15/2010

Geotechnical Boring Log LGC-B-2

Date : 1/28/2010	Page 2 of 4	**Drilling Company :**	Al Roy Drilling Services
Project Name :	Lake Forest Sports Park	**Type of Rig :**	EZ Bore
Project Number :	091069-01	**Drop :** 30"	**Hole Diameter :** 28"
Elevation of Top of Hole :	~ 864 ' MSL	**Drive Weight :**	Kelly Bar
Hole Location :	See Geotechnical Map		

Logged by BG/KBC

Sampled by BG

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		B: N15E, 2W	R-3	5,10	116.2	7.3	SM	**Tertiary Capistrano Formation - Oso Member (continued)**	
									@ 30' SAND: medium grained, off-white to gray with orange staining, slightly moist	
									@ 30.5' Orange and gray alternating beds with light yellow brown to white sands between	
830										
	35									
									@ 35.5' Black discontinuous sand lens on north side of boring	
			B: N13E, 7W							
825										
	40			R-4	5, 10/5"	123.9	10.0		@ 40' SAND: medium grained, light yellow brown to gray with heavy orange staining, slightly moist to moist	
			B: N10E, 5W							
									@ 42.5' Bedding, fine sand with hard black inclusions approximately 4"-5" diameter; light green to gray fine sand	
820										
	45									
815										
	50			R-5	4,7	117.0	11.5		@ 50' SAND: fine to medium grained, light green to gray, moist	DS
			B: N35W, 4N						@ 50' Undulating bedding; bands of orange, gray and tan	
									@ 53.5' Coarse sand layer	
810										
	55									
805										

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE
G	GRAB SAMPLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE

Geotechnical Boring Log LGC-B-2

Date : 1/28/2010	Page 3 of 4	**Drilling Company :** Al Roy Drilling Services	
Project Name : Lake Forest Sports Park		**Type of Rig :** EZ Bore	
Project Number : 091069-01		**Drop :** 30"	**Hole Diameter :** 28"
Elevation of Top of Hole : ~ 864 ' MSL		**Drive Weight :** Kelly Bar	
Hole Location : See Geotechnical Map			

Logged by BG/KBC

Sampled by BG

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	60			R-6	8,20	118.2	12.5	SM	**Tertiary Capistrano Formation - Oso Member (continued)** @ 60' SAND: fine to medium grained, green to light yellow brown, damp to moist	
800									@ 63.5' Minor cross bedding	
	65		GB: N35E, 10N							
795										
	70			R-7	8,20	114.2	12.8		@ 70' SAND: fine to medium grained, green to light brown, damp to moist	
790										
	75									
785									@ 79.5' Wavy undulatory bedding	
	80			R-8	24/6"	116.2	8.7		@ 80' SAND: medium grained, light yellow brownish green to light gray, damp to moist; some red-orange staining	
780										
	85									
775			B: ~Horizontal						@ 89' Wavy bedding; gray, orange and yellow brown banded beds	

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE
G	GRAB SAMPLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE

Geotechnical Boring Log LGC-B-2

Date : 1/28/2010	Page 4 of 4	**Drilling Company :**	Al Roy Drilling Services
Project Name :	Lake Forest Sports Park	**Type of Rig :**	EZ Bore
Project Number :	091069-01	**Drop :** 30"	**Hole Diameter :** 28"
Elevation of Top of Hole :	~ 864 ' MSL	**Drive Weight :**	Kelly Bar
Hole Location :	See Geotechnical Map		

Logged by BG/KBC

Sampled by BG

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	90			R-9	25/6"	107.8	12.5	SM	**Tertiary Capistrano Formation - Oso Member (continued)** @ 90' SAND: fine to medium grained, light green to gray with red-orange staining, damp to moist	
770										
	95		B: N12W, 8E						@ 95' Fine to medium grained green to gray hard sandstone; dark gray band @ 95.5' End visual log	
765										
	100			R-10	20, 15/1"	102.3	11.7		@ 100' SAND: fine to medium grained, light green to gray with red-orange staining, damp to moist	
									Total Depth = 100' **No Ground Water Encountered** **Backfilled with Cuttings and Bentonite on 1/28/2010**	
760										
	105									
755										
	110									
750										
	115									
745										

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE
- G GRAB SAMPLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE

Geotechnical Boring Log LGC-B-3

Date : 1/28/2010	Page 1 of 4	**Drilling Company :** Roy Brothers
Project Name : Lake Forest Sports Park		**Type of Rig :** Low Drill
Project Number : 091069-01		**Drop :** 30" **Hole Diameter :** 28"
Elevation of Top of Hole : ~ 858 ' MSL		**Drive Weight :** Kelly Bar
Hole Location : See Geotechnical Map		

Logged by BG/KBC
Sampled by BG

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							SM	**Artificial Fill (Afo)** @ 0'-11' silty fine to medium sand light gray to brown, damp to moist, dense; few rootlets; several 4"-6" discernable lifts; few dark brown clayey lifts	
855										
	5									
850										
	10							SM	**Tertiary Capistrano Formation - Oso Member (Tco)** @ 11' Irregular contact with silty fractured sandstone: light gray, damp, very dense; yellow brown staining; few medium grained sandstone lenses	
845									@ 12.5'-13.5' Slightly friable @ 14'-17.5' "Salt and pepper" yellow brown sand	
	15									
840									@ 17.5' silty fine to medium grained sandstone: "salt and pepper" light gray, damp, very dense; common yellow brown staining @ 18' claystone clast; approximately 5" diameter	
			B: N42E, 5N						@ 19' yellow brown 1/8" thick layer truncated by approximately 8" diameter concretion; below fine to medium sand stone: light gray, damp, very dense; medium to coarse at base	
	20		B: N85E, 9N	R-1	27/18"	111.4	5.2		@ 20' SAND: medium to coarse, light brown to off-white, damp @ 21' Fine to very fine sandstone bed approximately 1/4" to 1/2" thick truncated by ~8" scour structure @ 21.5' Coarser sand	SA
835									@ 22' Undulatory contact; below silty fine sandstone: gray, damp, very dense	
			B: N8W, 4W						@ 24' Silty fine to medium grained sandstone bed; very dense	
	25									
									@ 27' Similar material to that at 24' depth	
830			B: N45E, 4N						@ 28' Below very dense and difficult to pick	

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE
G GRAB SAMPLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE

Last Edited: 3/15/2010

Geotechnical Boring Log LGC-B-3

Date : 1/28/2010	Page 2 of 4	**Drilling Company :** Roy Brothers	
Project Name : Lake Forest Sports Park		**Type of Rig :** Low Drill	
Project Number : 091069-01		**Drop :** 30"	**Hole Diameter :** 28"
Elevation of Top of Hole : ~ 858 ' MSL		**Drive Weight :** Kelly Bar	
Hole Location : See Geotechnical Map			

Logged by BG/KBC

Sampled by BG

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30							SM	<u>**Tertiary Capistrano Formation - Oso Member (Tco)**</u>	
825										
	35			B-1					@ 35'-37' Medium to coarse sandstone bed; very dense but easy to pick	
			B: N18E, 9W B: N14E, 12W						@ 37' Lamina @ 37.5' Lamina	MD
820										
	40			R-2	41/18"	96.1	14.1		@ 40' SAND: medium to coarse grained, medium brown to light brown, damp	DS
815										
	45									
810										
	50		B: N35E, 5N							
805										
	55									
800										

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE
- G GRAB SAMPLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE

Geotechnical Boring Log LGC-B-3

Date : 1/28/2010 Page 3 of 4	**Drilling Company :** Roy Brothers
Project Name : Lake Forest Sports Park	**Type of Rig :** Low Drill
Project Number : 091069-01	**Drop :** 30" **Hole Diameter :** 28"
Elevation of Top of Hole : ~ 858 ' MSL	**Drive Weight :** Kelly Bar
Hole Location : See Geotechnical Map	

Logged by BG/KBC

Sampled by BG

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	60			R-3	37/18"	112.3	8.8	SM	**Tertiary Capistrano Formation - Oso Member (Tco)** @ 60' SAND: medium grained, light tan, damp	
795										
	65			B-1					@ 64'-65' Scoured irregular contact; below silty fine sandstone: light gray, damp, very dense; difficult to pick; medium grained sandstone interbeds; common gradational transitions to silty fine to medium grained sandstone	MD
790										
	70									
785										
	75									
780			B: N60E, 11N						@ 77.5' Discontinuous, hard to pick	
	80			R-4	17/18"	112.9	11.8		@ 80' SAND: fine to medium grained, light tan to light green, damp @ 82' Weakly cemented light brown concretion approximately 8" diameter @ 83' Sandstone grades to silty medium to coarse sandstone: off-white, dry, very dense; slightly friable	
775										
	85									
770										

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE
- G GRAB SAMPLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE

Geotechnical Boring Log LGC-B-3

Date : 1/28/2010	Page 4 of 4	**Drilling Company :**	Roy Brothers
Project Name : Lake Forest Sports Park		**Type of Rig :**	Low Drill
Project Number : 091069-01		**Drop :** 30"	**Hole Diameter :** 28"
Elevation of Top of Hole : ~ 858 ' MSL		**Drive Weight :**	Kelly Bar
Hole Location : See Geotechnical Map			

Logged by BG/KBC
Sampled by BG

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	90							SM	**Tertiary Capistrano Formation - Oso Member (Tco)**	
765										
	95								@ 96' End Visual Log	
760										
	100			R-5	9	109.0	9.7		@ 100' SAND: fine to medium grained, light brown to light green, damp	
755									**Total Depth = 100'** **No Ground Water Encountered** **Backfilled with Cuttings and Bentonite on 1/28/2010**	
	105									
750										
	110									
745										
	115									
740										

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE
G GRAB SAMPLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE

Geotechnical Boring Log Borehole LGC-HS-1

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~772' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							Quaternary Colluvium (Qcol):	
770			R-1	2 2 3	98.0	11.1	SP-SM	@ 2.5' - SAND with Silt, brown, medium grained, moist loose; with rootlets and some minor black mottling	
	5		SPT-1	5 7 7	-	4.1	SP	@ 5' - SAND, brown to tan, moist, dense; medium grained, with rootlets	
765			R-2	13 15 21	98.3	5.7		@ 7.5' - SAND, light brown to tan, moist, dense; medium grained, with rootlets and pockets of coarse tan sand	
	10		SPT-2	13 14 13	-	5.8		@ 10' - same as above	
760								@ 12' - water added to facilitate drilling	
	15		R-3	35 50/3"	110.9	7.7	SP	@ 15' - Tertiary Capistrano - Oso Member (Tco): SANDSTONE, light tan, moist, very dense; medium grained, medium to well cemented with dark gray stained veining	
755			R-4	50/4"	105.5	15.1		@ 17.5' SANDSTONE (disturbed), light tan, medium grained, dry to moist	
	20							Total Depth Drilled = 19' Total Depth Sampled = 17.8' Groundwater Not Encountered Backfilled with Grout on 2/1/2010	
750									
	25								
745									
	30								

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE (CA Modified Sampler)
G GRAB SAMPLE
SPT STANDARD PENETRATION TEST SAMPLE
GROUNDWATER TABLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE
-#200 % PASSING # 200 SIEVE

Last Edited: 3/11/2010

Geotechnical Boring Log Borehole LGC-HS-2

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~753' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1						Quaternary Colluvium (Qcol):	CR EI MD
750			R-1	3 3 3	101.6	8.8	SP	@ 2.5' - SAND, dark brown, moist, loose; medium grained, with rootlets	
	5		R-2	5 9 18	96.2	10.6		@ 5' - SAND, medium brown, moist; with rootlets	
745			R-3	7 6 6	101.7	4.6		@ 7.5' - SAND, medium brown to dark tan, moist, medium dense; with some rootlets	DS
	10		R-4	6 50/5"	108.4	10.5	SP-SM	@ 10' - Tertiary Capistrano - Oso Member (Tco): (At Shoe) SAND with Silt, brown, wet, very dense; medium grained, with rootlets	
			R-5	50/4"	91.8	7.1	SP	(At Tip) SAND, light tan to white with dark gray specks, dry, very dense; fine and medium grained	
740								@ 12' - SAND (disturbed), light tan to white with dark gray specks (mica), dry, very dense; fine and medium grained	
	15								
735								Total Depth Drilled = 12' Total Depth Sampled = 12.3' Groundwater Not Encountered Backfilled with Grout on 2/1/2010	
	20								
730									
	25								
725									
	30								

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE (CA Modified Sampler)
G GRAB SAMPLE
SPT STANDARD PENETRATION TEST SAMPLE
GROUNDWATER TABLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE
-#200 % PASSING # 200 SIEVE

Last Edited: 3/11/2010

Geotechnical Boring Log Borehole LGC-HS-3

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~743' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1						Quaternary Colluvium (Qcol):	
740			R-1	4 2 2	100.6	14.8	SM	@ 2.5' - silty SAND, dark brown to grey, moist, loose; medium grained, with rootlets	
	5		R-2	8 11 15	88.7	5.4	SP	@ 5' - SAND, gray to brown, moist, dense; medium grained, with rootlets	
735			R-3	12 15 22	104.2	4.6		@ 7.5' - SAND, tan to gray, dense, medium grained, moist @ 9' - water added to aid drilling	DS
	10		R-4	33 30 32	100.5	5.9		@ 10' - SAND with gravel, tan to gray, moist, very dense; medium grained, with roots/rootlets, rounded gravel	
730			R-5	38 50/4"	112.7	11.5	SM	@ 13' - silty SAND with gravel, brown to gray, moist, very dense	
	15		R-6	25 50/5"	104.8	7.8	SP	@ 15' - SAND with gravel, gray and brown with white flecks, moist, very dense; with few rootlets, rounded gravel	
725									
	20		R-7	19 39 45	108.0	6.9	SP	@ 20' - Tertiary Capistrano - Oso Member (Tco): SAND, light tan to light brown, moist, very dense; medium grained	
720			R-8	29 39 50	104.7	6.4		@ 22' - same as above, becoming whiter in color	
	25							Total Depth Drilled = 22' Total Depth Sampled = 23.5' Groundwater Not Encountered Backfilled with Grout on 2/1/2010	
715									
	30								

LAWSON AND ASSOCIATES
GEOTECHNICAL CONSULTING, INC.
LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- ▽ GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/11/2010

Geotechnical Boring Log Borehole LGC-HS-4

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~731' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1						Quaternary Colluvium (Qcol):	MD RV
730			R-1	10 10 12	110.2	11.6	SM	@ 2.5' - Silty SAND, brown, moist, dense, medium grained; with roots/rootlets	
	5		R-2	5 17 29	107.5	4.3		@ 5' - Silty SAND, tan to brown, moist, very dense; medium grained, with rootlets	
725			R-3	16 17 19	99.4	4.5		@ 7.5' - Silty SAND, tan to brown with some lighter tan streaking, moist, dense; medium grained	
	10		R-4	21 31 50	110.8	5.0		@ 10' - Silty SAND, tan and brown mottled/streaked, moist, very dense; medium grained, with rootlets	CN
720									
	15		R-5	10 11 40	-	-		@ 15' - no recovery	
715									
	20		R-6	50/5"	111.6	12.4	SM	@ 20' - Tertiary Capistrano - Oso Member (Tco): Silty SANDSTONE, tan to white, very dense, coarse grained, moist	
710			R-7	50/5"	102.2	17.1		@ 22' - same as above, becoming wet	
	25							Total Depth Drilled = 22' Total Depth Sampled = 22.4' Groundwater Not Encountered Backfilled with Grout on 2/1/2010	
705									
	30								

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- ▽ GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/11/2010

Geotechnical Boring Log Borehole LGC-HS-5

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~735' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							Quaternary Colluvium (Qcol):	
			R-1	4 6 12	112.2	16.3	SP-SC	@ 2.5' - SAND with Clay, brown to dark brown, moist, medium dense; fine and medium grained, with rootlets	
730	5		R-2	13 13 18	106.1	8.9	SM	@ 5' - Silty SAND, tan to brown, moist, dense; fine and medium grained, with few rootlets	
			R-3	6 7 9	101.4	10.6		@ 7.5' - same as above, medium dense	
725	10		R-4	10 15 16	103.7	6.6		@ 10' - Silty SAND, tan to brown, moist, medium dense; medium grained	
720	15		R-5	13 18 20	96.3	18.2		@ 15' - same as above	CO
715	20		R-6	15 20 23	107.6	9.4		@ 20' - Silty SAND, brown with lighter tan mottling, medium dense, medium grained, moist	CN
		▽	R-7	7 7 9	103.0	18.0		@ 24' - Silty SAND, brown, medium dense, medium grained, wet; disturbed sample	DS
710	25								
	30								

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- ▽ GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/11/2010

Geotechnical Boring Log Borehole LGC-HS-5

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~735' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		R-8	3 6 9	87.1	29.9	SC-SM	@ 30' - silty clayey SAND, brown with black and red mottling, wet, loose; fine grained, porous, with rootlets, disturbed sample	CN
705	35		R-9	50	122.0	14.7	SP	@ 35' - Tertiary Capistrano - Oso Member (Tco): SAND, light tan, wet, very dense; coarse grained	
			R-10	50/4"				@ 38' - no recovery	
700	40							Total Depth Drilled = 38' Total Depth Sampled = 38.3' Groundwater Encountered at Approximately 24' Backfilled with Grout on 2/1/2010	
695	45								
690	50								
685	55								
	60								

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole LGC-HS-6

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~765' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0						SP	Weathered Tertiary Capistrano: 0 to 2.5' - SAND, medium brown, moist	
			R-1	25 18 24	116.0	8.0	SP	@ 2.5' - Tertiary Capistrano - Oso Member (Tco): SAND, light tan to white, moist, very dense; medium grained	
760	5		R-2	50/5"	116.7	6.8		@ 5' - same as above	
								Total Depth Drilled = 5' Total Depth Sampled = 5.4' Groundwater Not Encountered Backfilled with Grout on 2/1/2010	
755	10								
750	15								
745	20								
740	25								
	30								

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/11/2010

Geotechnical Boring Log Borehole LGC-HS-7

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~755' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							Artificial Fill Undocumented (Afu):	
			R-1	23 20 21	118.9	10.1	SP-SC	@ 2.5' - SAND with clay and gravel, gray brown & tan with red orange mottling, moist, very dense; fine to coarse grained	
750	5		R-2	9 18 31	128.9	9.6		@ 5' - SAND with clay and gravel, medium brown with some white and tan mottling, moist, very dense; fine to coarse grained	
			R-3	13 15 15	133.2	6.1	SC-SM	@ 7.5' - silty clayey SAND with gravel, gray to dark gray and dark brown mottled, moist, dense; fine to coarse grained	
745	10		R-4	10 16 20	125.7	8.5	SP-SM	@ 10' - SAND with silt and gravel, medium to dark gray mottled, moist, dense; fine to coarse grained	
740	15		R-5	7 12 20	122.4	10.9	SP-SC	@ 15' - SAND with silty clay, brown gray with red orange mottling, moist, medium dense; fine to coarse grained	CN
735	20		R-6	9 12 14	119.1	11.7	SP	@ 20' - Tertiary Capistrano - Oso Member (Tco): SAND with clay, medium brown, moist, medium dense; medium grained	
730	25		R-7	12 25 50/3"	102.4	4.5		@ 25' - (At Shoe) SAND, gray, moist, very dense; medium grained (At Tip) SAND, light tan to gray, moist, very dense; medium grained, rock near tip	
	30								

DRAFT

LAWSON AND ASSOCIATES
GEOTECHNICAL CONSULTING, INC.
LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE (CA Modified Sampler)
G GRAB SAMPLE
SPT STANDARD PENETRATION TEST SAMPLE
GROUNDWATER TABLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE
-#200 % PASSING # 200 SIEVE

Last Edited: 3/11/2010

Geotechnical Boring Log Borehole LGC-HS-7

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~755' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	Logged By BG Sampled By BG Checked By DJB DESCRIPTION	Type of Test
	30							@ 30' - refusal due to rocks/cobbles	
								Total Depth Drilled = 30' Total Depth Sampled = 26.3' Groundwater Not Encountered Backfilled with Grout on 2/1/2010	
725	35								
720	40								
715	45								
710	50								
705	55								
	60								

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
⊻	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Geotechnical Boring Log Borehole LGC-HS-8

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~772' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							Artificial Fill Undocumented (Afu):	
770			R-1	12 23 29	113.0	18.6	SP	@ 2.5' - SAND, tan to brown, moist, very dense; medium grained	
	5		R-2	14 24 37	116.2	10.2		@ 5' - same as above	
765			R-3	9 18 25	118.9	11.0		@ 7.5' - same as above, with lighter tan banding, dense	
	10		R-4	11 16 50/5"	127.3	9.9		@ 10' - same as above, very dense; with few angular rocks, becoming coarse grained	
760									
	15		R-5	50/5"	114.2	5.5	SP	@ 15' - Tertiary Capistrano - Oso Member (Tco): SAND, light tan to white, moist, very dense; medium and coarse grained	
755									
	20							Total Depth Drilled = 15' Total Depth Sampled = 15.4' Groundwater Not Encountered Backfilled with Grout on 2/1/2010	
750									
	25								
745									
	30								

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/11/2010

Geotechnical Boring Log Borehole LGC-HS-9

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~797' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							Artificial Fill Undocumented (Afu):	
795			R-1	7 12 15	113.9	12.5	SP-SC	@ 2.5' - SAND with silty clay, mottled tan and brown, moist, dense; fine and medium grained	
	5		R-2	10 19 32	119.7	6.7		@ 5' - same as above, lighter tan toward tip, very dense	SA
790			R-3	15 34 50/5"	115.7	10.5	SP	@ 7.5' - Tertiary Capistrano - Oso Member (Tco): SAND, light brown to tan, very dense, medium grained, moist	
	10		R-4	15 37 50/5"	115.4	11.0		@ 10' - same as above, light tan to gray	
785								Total Depth Drilled = 10' Total Depth Sampled = 11.4' Groundwater Not Encountered Backfilled with Grout on 2/1/2010	
	15								
780									
	20								
775									
	25								
770									
	30								

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/11/2010

Geotechnical Boring Log Borehole LGC-HS-10

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~794' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							Artificial Fill (Af):	
			R-1	10 22 30	119.4	11.3	SP	@ 2.5' - SAND, gray to brown with light tan and red/brown mottling, moist, very dense; fine and medium grained, trace Clay with clasts of bedrock material	SA
790									
	5		R-2	16 32 50/5"	117.5	6.1		@ 5' - SAND, gray to brownish gray with some dark gray banding, moist, very dense; medium grained	
			R-3	10 14 15	119.9	10.8		@ 7.5' - SAND, medium brown to tan, moist, dense; medium grained, with clast of bedrock material	
785									
	10		R-4	9 22 35	118.6	10.4		@ 10' - same as above, light brown to tan, very dense	
780									
	15		R-5	9 24 25	117.3	9.8		@ 15' - SAND, medium brown to tan with dark gray and light tan mottling, moist, dense; medium grained	
775									
	20		SPT-1	8 8 12	-	9.1		@ 20' - same as above, medium dense	
770									
	25		R-6	16 25 42	121.1	9.8		@ 25' - SAND, dark gray & gray mottled, moist, dense; medium grained	
765									
	30								

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/11/2010

Geotechnical Boring Log Borehole LGC-HS-10

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~794' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		SPT-2	10 15 19	-	11.5	SP	@ 30' - same as above	
760	35		SPT-3	50/5"	-	7.1	SP	@ 35' - Tertiary Capistrano - Oso Member (Tco): SAND, light tan to white, moist, very dense; medium grained	
755	40							Total Depth Drilled = 35' Total Depth Sampled = 35.4' Groundwater Not Encountered Backfilled with Grout on 2/1/2010	
750	45								
745	50								
740	55								
735	60								

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole LGC-HS-11

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~783' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							Tertiary Capistrano - Oso Member (Tco):	
780			R-1	40 50/3"	114.2	13.5	SM-ML	@ 2.5' - silty SAND to sandy SILT, gray to dark gray, moist, very dense; fine grained	
	5		R-2	36 50/2"	108.9	13.7		@ 5' - same as above	
775								Total Depth Drilled = 5' Total Depth Sampled = 5.7' Groundwater Not Encountered Backfilled with Grout on 2/1/2010	
	10								
770									
	15								
765									
	20								
760									
	25								
755									
	30								

DRAFT

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/11/2010

Geotechnical Boring Log Borehole LGC-HS-12

Date: 2/1/2010	**Drilling Company:** Pacific Drilling
Project Name: Lake Forest Sports Park	**Type of Rig:** Mole
Project Number: 091069-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~770' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By BG
Sampled By BG
Checked By DJB

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							Tertiary Capistrano - Oso Member (Tco):	
			R-1	37 50/2"	110.8	6.9	SP	@ 2.5' - SAND, light tan to gray, moist, very dense; medium and coarse grained	
765	5		R-2	29 50/3"		5.4		@ 5' - same as above	
								Total Depth Drilled = 5' Total Depth Sampled = 5.8' Groundwater Not Encountered Backfilled with Grout on 2/1/2010	
760	10								
755	15								
750	20								
745	25								
	30								

LAWSON AND ASSOCIATES GEOTECHNICAL CONSULTING, INC.

LGC

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

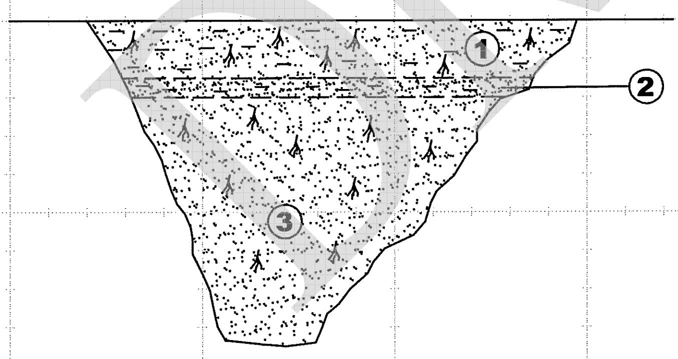
TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/11/2010

Project Name: Lake Forest Sports Park	Logged By: BG	Trench No: T-1	LGC
Project Number : 091069-01	Date : 2/3/2010	Engineering Properties:	
Equipment: Case Extend-a-Hoe	Location: See Geotechnical Map		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		Quaternary Colluvium					
	1	@ 0-3' Slightly Silty SAND: medium grained, dark brown, moist, very loose; many roots and rootlets	Qcol	SM			
	2	@ 3-4' Silty Fine SAND: medium brown, moist, dense; visibly porous; many white caliche stringers			B-1@ 3-4'		
	3	@ 4-17' Silty SAND: medium grained, light brown to yellow brown, moist; density decreases with depth; grain size increases with depth; rootlets					

GRAPHICAL REPRESENTATION BELOW: **Elevation : 766 ' MSL** **Trend: N20E**



Total Depth: 17'
Groundwater: None
Backfilled: 2/3/2010

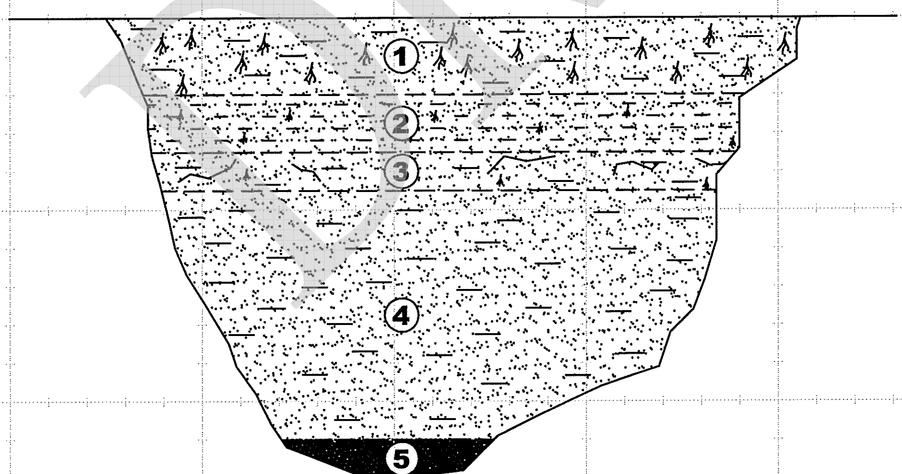
scale : 1 in = 10 ft

Project Name: Lake Forest Sports Park	**Logged By: BG**	**Trench No: T-2**
Project Number : 091069-01	**Date : 2/3/2010**	**Engineering Properties:**
Equipment: Case Extend-a-Hoe	**Location: See Geotechnical Map**	

LGC

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		Quaternary Colluvium					
	1	@ 0-2' Silty SAND: fine to medium grained, dark brown, moist, very loose; many roots and rootlets	Qcol	SM			
	2	@ 2-3.5' Clayey Slightly Silty SAND: fine to medium grained, dark brown, moist, loose to medium dense; some rootlets		SC	B-1 @2-3.5'		
	3	@ 3.5-4.5' Slightly Silty SAND: fine to medium grained, medium brown, moist, dense; many white caliche stringers; few rootlets		SM			
	4	@ 4.5'-11' Silty SAND: fine to medium grained, yellow brown to brown, moist, medium dense; grain size increases with depth					
	5	***Tertiary Capistrano Formation - Oso Member*** @ 11-12' SANDSTONE: medium to coarse grained, light yellow brown, dry to moist, dense; visible laminations of coarser sands and gravel; easy excavating	Tco				

GRAPHICAL REPRESENTATION BELOW: **Elevation : 757 ' MSL** **Trend: N20E**



Total Depth: 12'
Groundwater: None
Backfilled: 2/3/2010

scale : 1 in = 5 ft

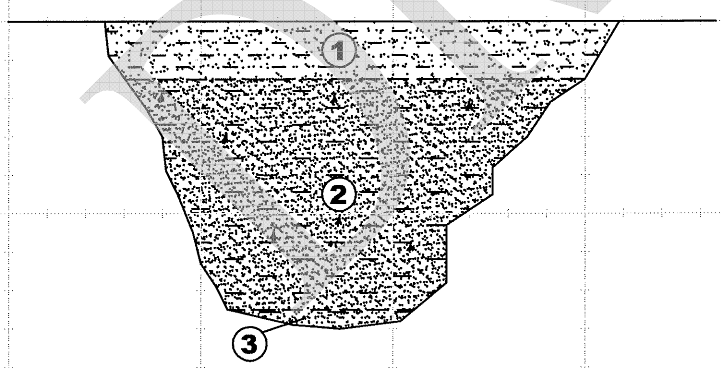
Last Edited: 3/1/2010

Project Name: Lake Forest Sports Park	**Logged By: BG**	**Trench No: T-3**
Project Number : 091069-01	**Date : 2/3/2010**	**Engineering Properties:**
Equipment: Case Extend-a-Hoe	**Location: See Geotechnical Map**	

LGC

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		Quaternary Colluvium					
	1	@ 0-1.5' Clayey Silty SAND: fine to coarse grained, dark brown to gray, wet	Qcol	SM-SC			
		Tertiary Capistrano Formation - Oso Member					
	2	@1.5-7.5' Slightly Clayey SAND: medium grained, dark brown, moist, dense; some rootlets	Tco				
	3	@ 7.5-8' Slightly Clayey SAND: coarse grained, medium brown, moist, dense; no roots/rootlets					
		@ 8' End of excavation due to backhoe access limitations					

GRAPHICAL REPRESENTATION BELOW: **Elevation : 748 ' MSL** **Trend: N40E**



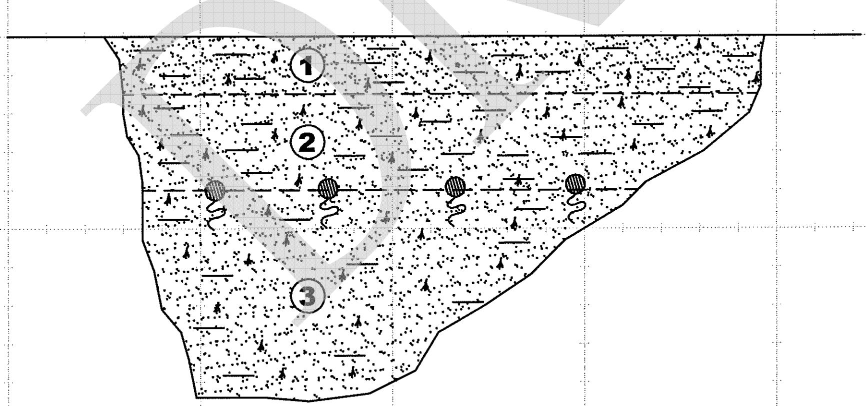
Total Depth: 8'
Groundwater: None
Backfilled: 2/3/2010

scale : 1 in = 5 ft

Project Name: Lake Forest Sports Park	Logged By: BG	Trench No: T-4	LGC
Project Number : 091069-01	Date : 2/3/2010	Engineering Properties:	
Equipment: Case Extend-a-Hoe	Location: See Geotechnical Map		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		Quaternary Colluvium					
	1	@ 0-1.5' Silty Fine SAND: dark brown with some black mottling, moist, medium dense; rootlets	Qcol	SM			
	2	@ 1.5-4' Silty SAND: medium grained, brown to yellow brown, moist; rootlets					
		@ 4' Seepage					
	3	@ 4-9.5' Slightly Silty SAND: fine to medium grained, brown, black, and gray mottled, moist, very dense; rootlets; porous; blocky and fractured			B-1 @4-9.5		
		@ 9.5' End of excavation due to backhoe access limitations					

GRAPHICAL REPRESENTATION BELOW: **Elevation : 735 ' MSL** **Trend: N20E**



Total Depth: 9.5'
Groundwater: None
Backfilled: 2/3/2010

scale : 1 in = 5 ft

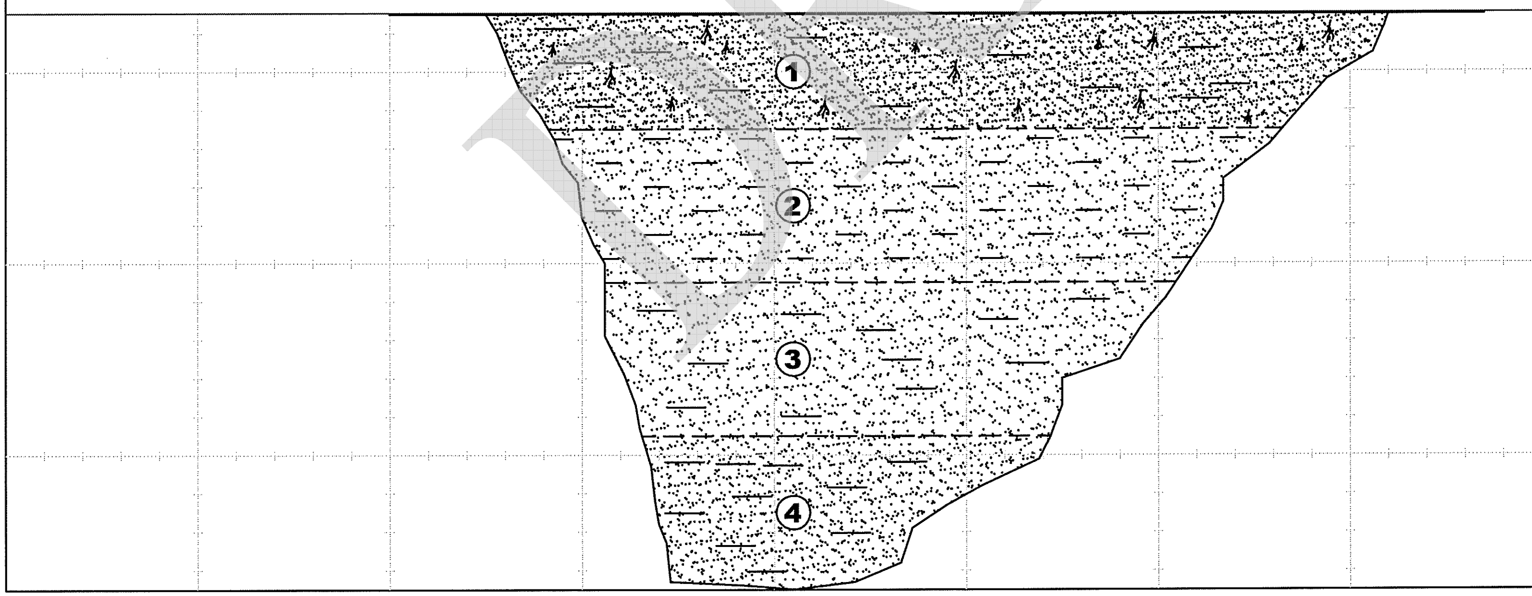
Last Edited: 3/1/2010

Project Name: Lake Forest Sports Park	**Logged By: BG**	**Trench No: T-5**
Project Number : 091069-01	**Date : 2/3/2010**	**Engineering Properties:**
Equipment: Case Extend-a-Hoe	**Location: See Geotechnical Map**	

LGC

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		Quaternary Colluvium					
	1	@ 0-3' Silty SAND: fine grained, dark gray to black, moist, loose; many roots and rootlets	Qcol	SM			
	2	@ 3-7' Slightly Clayey SAND: medium grained, medium brown, moist, loose; no roots/rootlets; porous		SC			
	3	@ 7-11' Silty SAND: medium grained, light brown to brown, moist, loose; porous		SM			
	4	@ 11-15' Silty SAND: fine to medium grained; light yellow brown to light brown, moist, medium dense; laminations of dark brown, finer silts and sands			B-1 @11-15'		

GRAPHICAL REPRESENTATION BELOW: **Elevation : 733 ' MSL** **Trend: N35W**



Total Depth: 15'
Groundwater: None
Backfilled: 2/3/2010

scale : 1 in = 5 ft

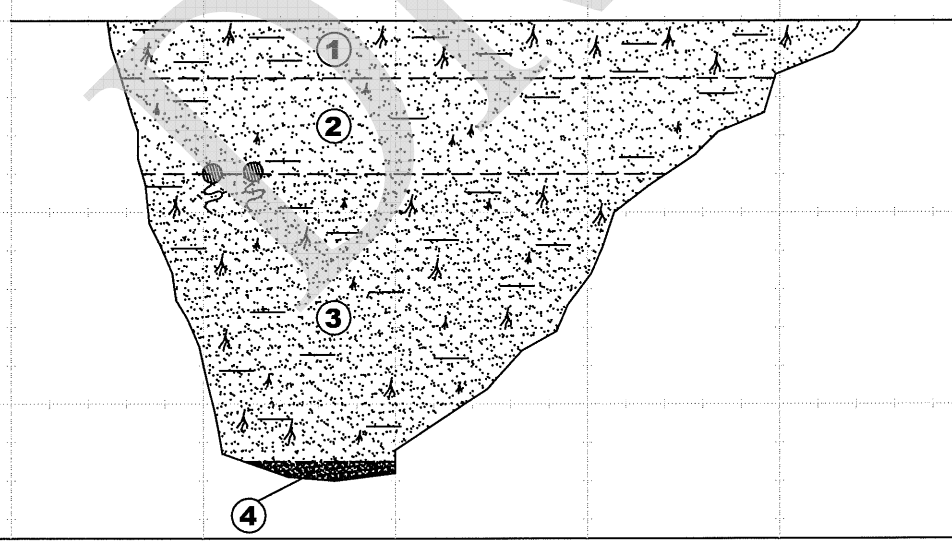
Last Edited: 3/1/2010

Project Name: Lake Forest Sports Park	**Logged By: BG**	**Trench No: T-6**
Project Number : 091069-01	**Date : 2/3/2010**	**Engineering Properties:**
Equipment: Case Extend-a-Hoe	**Location: See Geotechnical Map**	

LGC

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		Quaternary Colluvium					
	1	**@ 0-1.5' Silty SAND: medium grained, gray to brown, dry to moist, loose; many roots**	Qcol	SM			
	2	**@ 1.5-4' Slightly Silty SAND: medium grained, dark gray to brown, moist, loose; some rootlets**					
		@ 4' Seepage along southwest side of trench					
	3	**@ 4-11.5' Silty SAND: fine to medium grained, brown and gray mottled, moist, dense; blocky and fractured; many roots and rootlets; some polished surfaces; porous; moderately indurated**					
		Tertiary Capistrano Formation - Oso Member					
	4	**@ 11.5-12' SANDSTONE: medium to coarse grained, moist, light yellow brown; no roots/rootlets**	Tco				

GRAPHICAL REPRESENTATION BELOW: **Elevation : 743 ' MSL** **Trend: N30W**



Total Depth: 12'
Groundwater: None
Backfilled: 2/3/2010

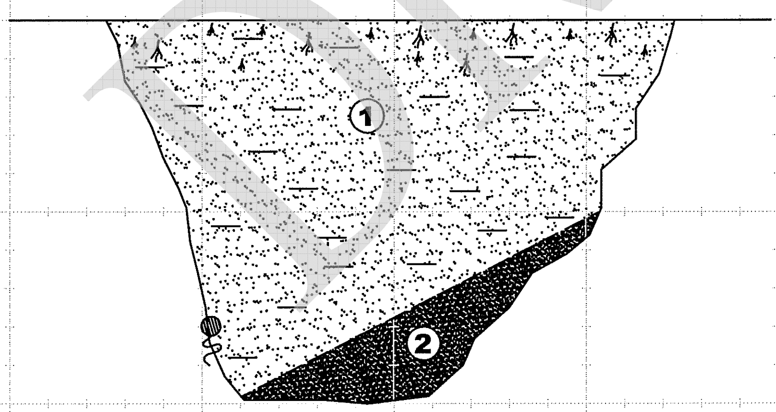
scale : 1 in = 5 ft

Last Edited: 3/1/2010

Project Name: Lake Forest Sports Park	Logged By: BG	Trench No: T-7	LGC
Project Number : 091069-01	Date : 2/4/2010	Engineering Properties:	
Equipment: Case Extend-a-Hoe	Location: See Geotechnical Map		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		Artificial Fill - Undocumented					
	1	**@ 0-5' Silty SAND: medium grained, medium brown to yellow brown, moist to wet, loose; roots/rootlets to 1.5'; abundant caving**	Afu	SM			
		Tertiary Capistrano Formation - Oso Member					
	2	**@ 5-10' SANDSTONE: medium grained, light brown to yellow brown, moist, medium dense to dense**	Tco				
		@ 8' Seepage					

GRAPHICAL REPRESENTATION BELOW: **Elevation : 789 ' MSL** **Trend: N75W**



Total Depth: 10'
Groundwater: None
Backfilled: 2/3/2010

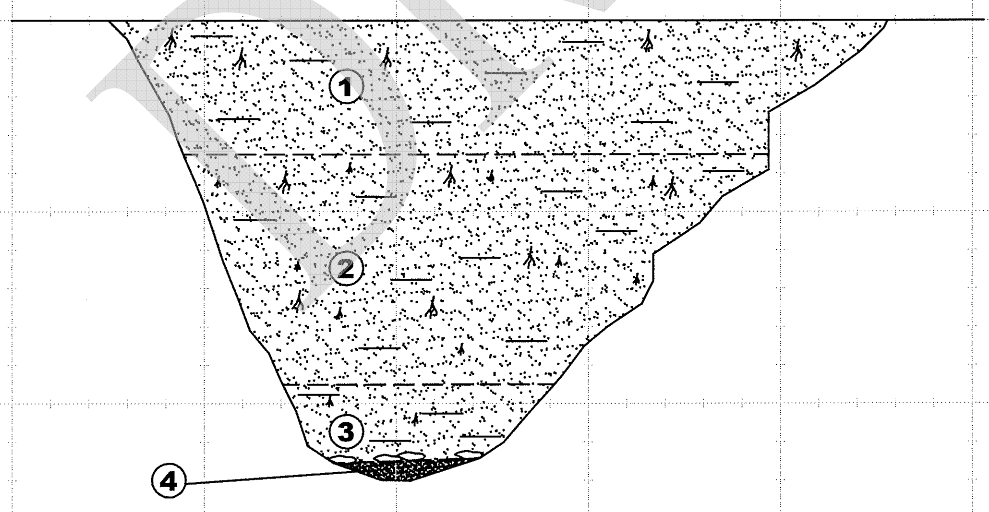
scale : 1 in = 5 ft

Last Edited: 3/1/2010

Project Name: Lake Forest Sports Park	Logged By: BG	Trench No: T-8	LGC
Project Number : 091069-01	Date : 2/3/2010	Engineering Properties:	
Equipment: Case Extend-a-Hoe	Location: See Geotechnical Map		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		Artificial Fill - Undocumented					
	1	@ 0-3.5' Silty SAND: medium grained, brown, moist, medium dense; some roots; discernable lifts	Afu	SM			
	2	@ 3.5-9.5' Silty SAND: medium grained, medium brown to yellow brown mottled, moist, medium dense; roots/rootlets; porous					
	3	@ 9.5-11.5' Silty SAND: medium grained, medium brown to yellow brown, moist, medium dense; few rootlets; porous; cobbles at bottom of unit					
		Tertiary Capistrano Formation - Oso Member					
	4	@ 11.5-12' SANDSTONE: medium grained, light yellow brown to light brown, moist, very dense; no roots	Tco				

GRAPHICAL REPRESENTATION BELOW: **Elevation : 802 ' MSL** **Trend: N85E**



Total Depth: 12'
Groundwater: None
Backfilled: 2/3/2010

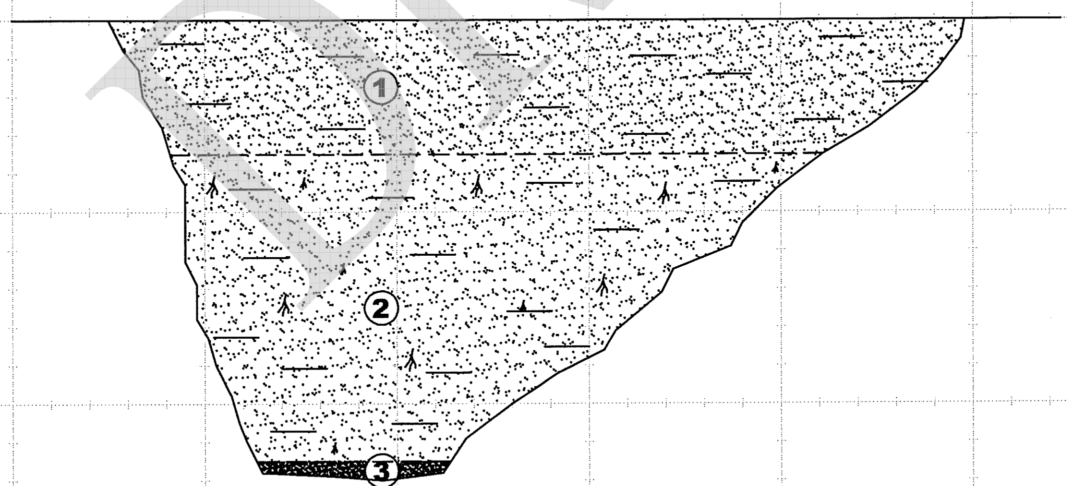
scale : 1 in = 5 ft

Last Edited: 3/1/2010

Project Name: Lake Forest Sports Park	**Logged By: BG**	**Trench No: T-9**
Project Number : 091069-01	**Date : 2/3/2010**	**Engineering Properties:**
Equipment: Case Extend-a-Hoe	**Location: See Geotechnical Map**	

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	1	***Artificial FIll - Undocumented*** **@ 0-8.5' Silty SAND to Clayey Silty SAND: fine to medium grained, brown to yellow brown mottled with clasts of sandstone, moist, medium dense; discernable lifts**	**Afu**	**SM-SC**	**B-1 @ 0-8.5'**		
	2	**@ 8.5-11.5' Silty SAND: medium grained, medium brown to yellow brown, moist, medium dense; porous; some roots and rootlets**		**SM**			
	3	***Tertiary Capistrano Formation - Oso Member*** **@ 11.5-12' SANDSTONE: medium grained, light yellow brown to light brown, moist, very dense**	**Tco**				

GRAPHICAL REPRESENTATION BELOW: **Elevation : 795 ' MSL** **Trend: N80E**



Total Depth: 12'
Groundwater: None
Backfilled: 2/3/2010

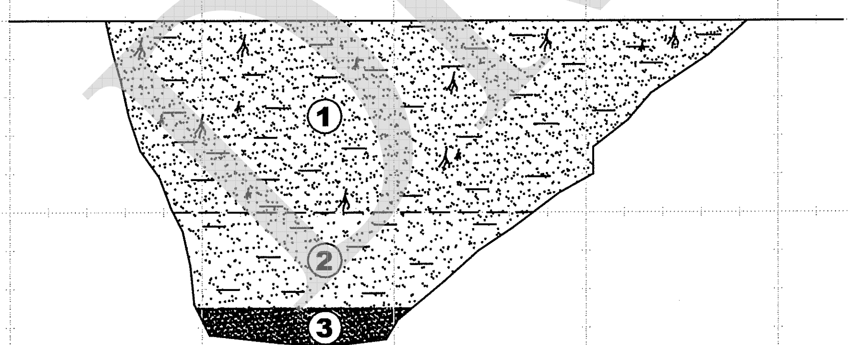
scale : 1 in = 5 ft

Last Edited: 3/1/2010

Project Name: Lake Forest Sports Park	Logged By: BG	Trench No: T-10	LGC
Project Number : 091069-01	Date : 2/4/2010	Engineering Properties:	
Equipment: Case Extend-a-Hoe	Location: See Geotechnical Map		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		Artificial Fill - Undocumented					
	1	@ 0-5' Slightly Silty SAND to Slightly Clayey Slightly Silty SAND: fine to medium grained, medium brown and yellow brown mottled, moist, medium dense; discernable lifts; roots and rootlets	Afu	SM			
	2	@ 5-7.5' Silty SAND: medium grained, medium brown to yellow brown, moist, loose					
		Tertiary Capistrano Formation - Oso Member					
	3	@ 7.5-8.5' SANDSTONE: medium grained, light brown to yellow brown, moist, dense	Tco				

GRAPHICAL REPRESENTATION BELOW: **Elevation : 797 ' MSL** **Trend: N20W**



Total Depth: 8.5'
Groundwater: None
Backfilled: 2/4/2010

scale : 1 in = 5 ft

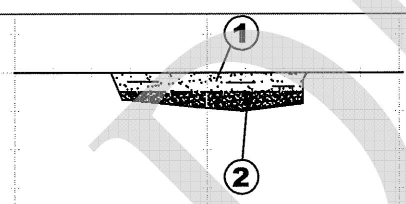
Last Edited: 3/1/2010

Project Name: Lake Forest Sports Park	**Logged By: BG**	**Trench No: T-11**
Project Number : 091069-01	**Date : 2/4/2010**	**Engineering Properties:**
Equipment: Case Extend-a-Hoe	**Location: See Geotechnical Map**	

LGC

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	1	***Artificial Fill - Undocumented*** **@ 0-0.5' Silty SAND: fine to medium grained, medium brown to yellow brown, moist, medium dense**	Afu	SM			
	2	***Tertiary Capistrano Formation - Oso Member*** **@ 0.5-1' SANDSTONE: medium to coarse grained, light yellow brown to light gray, damp, very dense**	Tco				

GRAPHICAL REPRESENTATION BELOW: **Elevation : 763 ' MSL** **Trend: N89E**



Total Depth: 1'
Groundwater: None
Backfilled: 2/4/2010

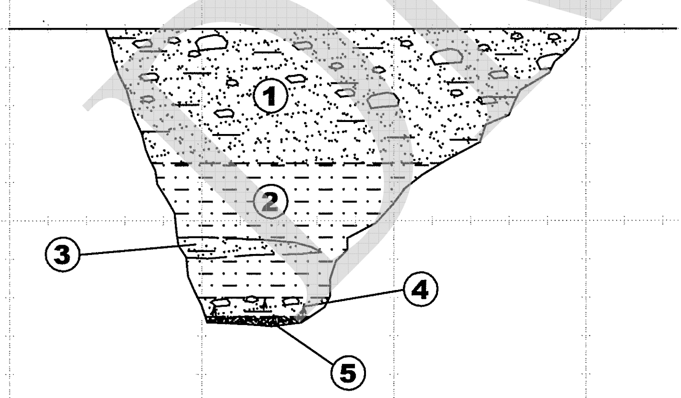
scale : 1 in = 5 ft

Last Edited: 3/1/2010

Project Name: Lake Forest Sports Park	Logged By: BG	Trench No: T-12	LGC
Project Number : 091069-01	Date : 2/4/2010	Engineering Properties:	
Equipment: Case Extend-a-Hoe	Location: See Geotechnical Map		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	1	***Artificial Fill - Undocumented*** @0-7' Silty SAND: alternating lifts of fine and coarse grained, dark brown to yellow brown mottled, moist, loose; many cobbles in upper 5' up to 18" diameter	Afu	SM			
	2	@ 7-14' Fat CLAY: gray brown, moist, soft; roots and rootlets		CL	B-1 @ 7-14'		
	3	@ 11' Slightly Silty SAND lense approximately 1' thick, coarse grained, yellow brown to light gray, moist, loose		SM			
	4	@ 14-15' Silty SAND: medium to coarse grained, dark brown and brown mottled, moist, medium dense; rootlets; cobbles in upper 6" of unit					
	5	***Tertiary Capistrano Formation - Oso Member*** @ 15-15.5' SANDSTONE: medium to coarse, light yellow brown to gray, moist, medium dense	Tco				

GRAPHICAL REPRESENTATION BELOW: **Elevation : 756 ' MSL** **Trend: N5W**



Total Depth: 15.5'
Groundwater: None
Backfilled: 2/4/2010

scale : 1 in = 10 ft

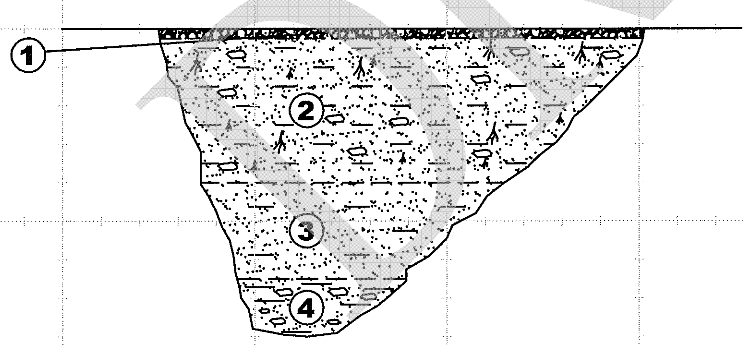
Last Edited: 3/1/2010

Project Name: Lake Forest Sports Park	Logged By: BG	Trench No: T-13
Project Number : 091069-01	Date : 2/4/2010	Engineering Properties:
Equipment: Case Extend-a-Hoe	Location: See Geotechnical Map	

LGC

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		Artificial Fill - Undocumented					
	1	@ 0-0.5' Gravel: 3/4" crushed rock mixed with some SAND, moist to wet	Afu	GM			
	2	@ 0.5-8' Clayey Slightly Silty SAND: medium grained, brown, yellow brown, and black mottled, clasts of light yellow brown to gray sandstone, moist, loose; cobbles up to 6" diameter; roots and rootlets; discernable lifts		SM			
	3	@ 8-13' Slightly Clayey SAND: fine to coarse grained, dark gray to dark brown, moist, loose		SC			
	4	@ 13-16' Slightly Silty SAND: medium to coarse grained, yellow brown to brown, moist, loose; some pockets of Clayey SAND; many cobbles up to 8" diameter		SM			

GRAPHICAL REPRESENTATION BELOW: **Elevation : 755 ' MSL** **Trend: N25E**



Total Depth: 16'
Groundwater: None
Backfilled: 2/4/2010

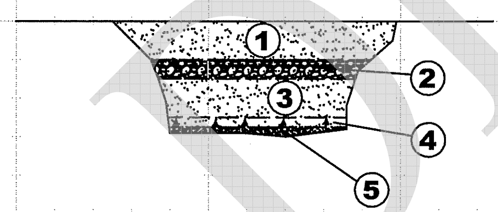
scale : 1 in = 10 ft

Last Edited: 3/1/2010

Project Name: Lake Forest Sports Park	Logged By: BG	Trench No: T-14	LGC
Project Number : 091069-01	Date : 2/4/2010	Engineering Properties:	
Equipment: Case Extend-a-Hoe	Location: See Geotechnical Map		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		Artificial Fill - Undocumented					
	1	@ 0-1' Silty SAND: fine to coarse grained, yellow brown to light yellow brown, moist, loose	Afu	SM			
	2	@ 1-1.5' GRAVEL with SAND, moist.		GM			
	3	@ 1.5-2.5' Slightly Silty SAND: fine to medium grained, medium brown to yellow brown, moist, loose		SM			
	4	@ 2.5-2.75' Silty Fine SAND: dark gray, moist, dense; rootlets					
		Tertiary Capistrano Formation - Oso Member					
	5	@ 2.75-3' SANDSTONE: medium to coarse grained, medium brown to yellow brown, moist, very dense	Tco				

GRAPHICAL REPRESENTATION BELOW: **Elevation : 771 ' MSL** **Trend: N15E**



Total Depth: 3'
Groundwater: None
Backfilled: 2/4/2010

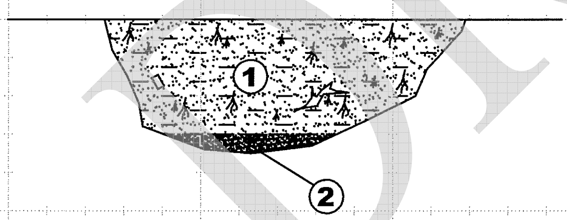
scale : 1 in = 5 ft

Last Edited: 3/1/2010

Project Name: Lake Forest Sports Park	**Logged By: BG**	**Trench No: T-15**	**LGC**
Project Number : 091069-01	**Date : 2/4/2010**	**Engineering Properties:**	
Equipment: Case Extend-a-Hoe	**Location: See Geotechnical Map**		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
		Artificial Fill - Undocumented					
	1	**@ 0-3' Clayey SAND: fine to medium grained, brown, moist, loose; many roots/rootlets; some trash**	**Afu**	**SC**			
		Tertiary Capistrano Formation - Oso Member					
	2	**@ 3-3.5' SANDSTONE: medium to coarse grained, light yellow brown to gray, moist, very dense**	**Tco**				

GRAPHICAL REPRESENTATION BELOW: **Elevation : 753 ' MSL** **Trend: N45E**



Total Depth: 3.5'
Groundwater: None
Backfilled: 2/4/2010

scale : 1 in = 5 ft

Last Edited: 3/1/2010

APPENDIX C

Laboratory Testing Procedures and Test Results

The laboratory testing program was directed towards providing quantitative data relating to the relevant engineering properties of the soils. Samples considered representative of site conditions were tested in general accordance with American Society for Testing and Materials (ASTM) procedure and/or California Test Methods (CTM), where applicable. The following summary is a brief outline of the test type and a table summarizing the test results.

Moisture and Density Determination Tests: Moisture content (ASTM D2216) and dry density determinations (ASTM D2937) were performed on relatively undisturbed samples obtained from the test borings and/or trenches. The results of these tests are presented in the boring and/or trench logs. Where applicable, only moisture content was determined from undisturbed or disturbed samples.

Grain Size Distribution: Representative samples were dried, weighed, and soaked in water until individual soil particles were separated (per ASTM D421) and then washed on a No. 200 sieve. The portion retained on the No. 200 sieve was dried and then sieved on a U.S. Standard brass sieve set in accordance with ASTM D422 (CTM 202). Where an appreciable amount of fines were encountered (greater than 20 percent passing the No. 200 sieve) a hydrometer analysis was done to determine the distribution of soil particles passing the No. 200 sieve.

Sample Location	Description	Passing #200(%)
LGC-B-1 (R-2) @ 20 ft	Tan Silty SANDSTONE	24
LGC-B-3 (R-1) @ 20 ft	Tan Sand with Silt	14
LGC-HS-9 (R-2) @ 5 ft	Light gray Silty SAND	17
LGC-HS-10 (R-1) @ 2.5 ft	Light gray to brown Silty SAND	18
T-9 (B-1) @ 0-8.5 ft	Brown Silty SAND	40

Chloride Content: Chloride content was tested in accordance with Caltrans Test Method (CTM) 422. The results are presented below:

Sample Location	Chloride Content (ppm)
LGC-HS-2 (B-1) @ 0-5 ft	52
T-1 (B-1) @ 3-4 ft	119

Minimum Resistivity and pH Tests: Minimum resistivity and pH tests were performed in general accordance with CTM 643 and standard geochemical methods. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. As a results of soil's resistivity decreases corrosivity increases. The results are presented in the table below:

Sample Location	pH	Minimum Resistivity (ohm-cm)
LGC-HS-2 (B-1) @ 0-5 ft	6.62	2,732
T-1 (B-1) @ 3-4 ft	7.75	888

Soluble Sulfates: The soluble sulfate contents of selected samples were determined by standard geochemical methods (CTM 417). The soluble sulfate content is used to determine the appropriate cement type and maximum water-cement ratios. The test results are presented in the table below:

Sample Location	Sulfate Content (ppm)	Sulfate Exposure*
LGC-HS-2 (B-1) @ 0-5 ft	34	Negligible
T-1 (B-1) @ 3-4 ft	58	Negligible

* Based on the 2007 edition of the California Building Code (C.B.C), Chapter 19, based on the International Conference of Building Officials (ICBO, 2006).

Expansion Index: The expansion potential of selected samples were evaluated by the Expansion Index Test, ASTM D4829. Specimens are molded under a given compactive energy to approximately the optimum moisture content and approximately 50 percent saturation or approximately 90 percent relative compaction. The prepared 1-inch-thick by 4-inch-diameter specimens are loaded to an equivalent 144 psf surcharge and are inundated with tap water until volumetric equilibrium is reached. The results of these tests are presented in the table below:

Sample Location	Compacted Dry Density (pcf)	Expansion Index	Expansion Potential
LGC-HS-2 (B-1) @ 0-5 ft	105.9	0	Very Low
T-1 (B-1) @ 3-4 ft	106.5	40	Low
T-1 (B-2) @ 4-17 ft	106.6	1	Very Low

* Per Chapter 18 of the 2007 C.B.C.; ASTM D 4829 Section 5.3.

Maximum Density Tests: The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM D1557. The results of these tests are presented in the table below:

Sample Location	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
LGC-B-1 (B-1) @ 0-5 ft	SAND	109.5	16.0
LGC-B-3 (B-1) @ 30-40 ft	Light tan SAND	112.5	15.0
LGC-B-3 (B-2) @ 60-70 ft	SAND	107.5	18.5
LGC-HS-2 (B-1) @ 0-5 ft	Dark gray Silty SAND	121.5	11.5

LGC-HS-4 (B-1) @ 0-5 ft	Silty SAND	118.0	11.5
T-1 (B-1) @ 3-4 ft	Silty SAND	117.0	14.5
T-2 (B-1) @ 2-3.5 ft	Gray to brown Silty SAND	117.0	14.5
T-5 (B-1) @ 11-15 ft	Light tan SAND	106.0	12.0

R-Value: The resistance R-value was determined by the ASTM D2844 for base, subbase, and basement soils. The samples were prepared and exudation pressure and R-value were determined. The graphically determined R-values at exudation pressure of 300 psi are reported in this appendix. These results were used for pavement design purposes.

Sample Location	R-Value
LGC-HS-4 (B-1) @ 0-5 ft	67
T-5 (B-1) @ 11-15 ft	69

Consolidation: Consolidation tests were performed on selected, relatively undisturbed ring samples (Modified ASTM Test Method D2435). Samples (2.42 inches in diameter and 1 inch in height) were placed in a consolidometer and increasing loads were applied. The samples were allowed to consolidate under "double drainage" and total deformation for each loading step was recorded. The percent consolidation for each load step was recorded as the ratio of the amount of vertical compression to the original sample height. The consolidation pressure curves are presented in this Appendix. Where applicable, time rates of consolidation were recorded and presented below:

Sample Location	Compression Index, Cc*
LGC-HS-4 (R-4) @ 10 ft	0.04
LGC-HS-5 (R-6) @ 20 ft	0.04
LGC-HS-5 (R-8) @ 30 ft	0.06
LGC-HS-7 (R-5) @ 15 ft	0.05

* In terms of strain

Hyrdo-consolidation: Hydro-consolidation tests (collapse) were performed on selected, relatively undisturbed ring samples (ASTM D4546). Samples were placed in a consolidometer and a load approximately equal to the in-situ overburden pressure was applied. Water was then added to the sample and the percent hydro-consolidation under the applied load was measured. The percent for the load was calculated as the ratio of the amount of vertical deformation to the original sample height. The percent hydroconsolidation is presented below:

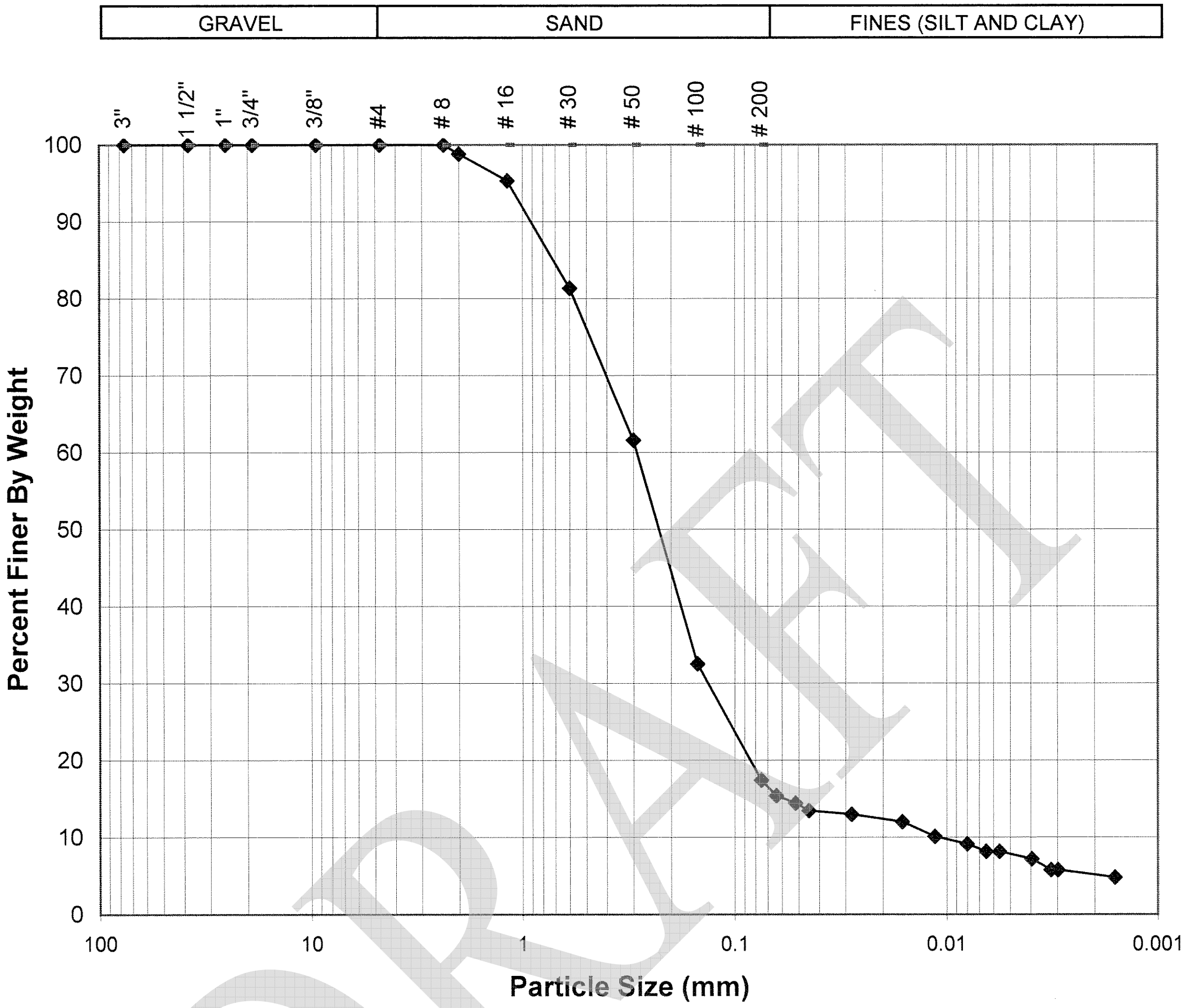
Sample Location	Applied Stress (psf)	Percent Hydroconsolidation
LGC-HS-4 (R-4) @ 10 ft	1000	0.74
LGC-HS-5 (R-5) @ 15 ft	2000	1.09

LGC-HS-4 (R-4) @ 10 ft	1000	0.82
LGC-HS-5 (R-6) @ 20 ft	2000	0.55
LGC-HS-5 (R-8) @ 30 ft	4000	0.03
LGC-HS-7 (R-5) @ 15 ft	2000	0.98

Note: Positive values of hydro-consolidation represent collapse of the soil structure, while negative values represent heave (or swelling) or the soil structure.

Direct Shear: Direct Shear tests were performed on selected driven and remolded samples, which were soaked for a minimum of 24 hours. The samples points were tested under normal loads equal to their approximate in-situ normal stress. The plots are presented in this appendix and summarized in the table below. See ASTM D 3080.

Sample Location	Description	Friction Angle Peak / At ¼" Def.	Cohesion (psf) Peak / At ¼" Def.
LGC-HS-2 (R-3) @ 7.5 ft	Silty SAND	32.7° / 30.1°	0 / 0
LGC-HS-3 (R-3) @ 7.5 ft	Tan to gray Silty SAND	34.7° / 30.6°	46 / 0
LGC-B-1 (R-4) @ 40 ft	Light tan SAND	35.7° / 50.3°	2481 / 0
LGC-B-1 (R-6) @ 60 ft	Light tan SAND	39.3° / 34.5°	0 / 0
LGC-B-2 (R-5) @ 50 ft	Light tan SAND	29.1° / 26.8°	767 / 370
LGC-B-3 (R-2) @ 40 ft	Light tan SAND	37.3° / 31.7°	123 / 355
LGC-HS-5 (R-7) @ 24 ft	Brown Silty SAND	39.9° / 35.8°	4 / 0



Location:	Sample No.:	Depth (ft.)	Soil Type	Gravel (%)	Sand (%)	Fines (%)
LGC-HS-9	**R-2**	**5**	**SM**	**0**	**83**	**17**

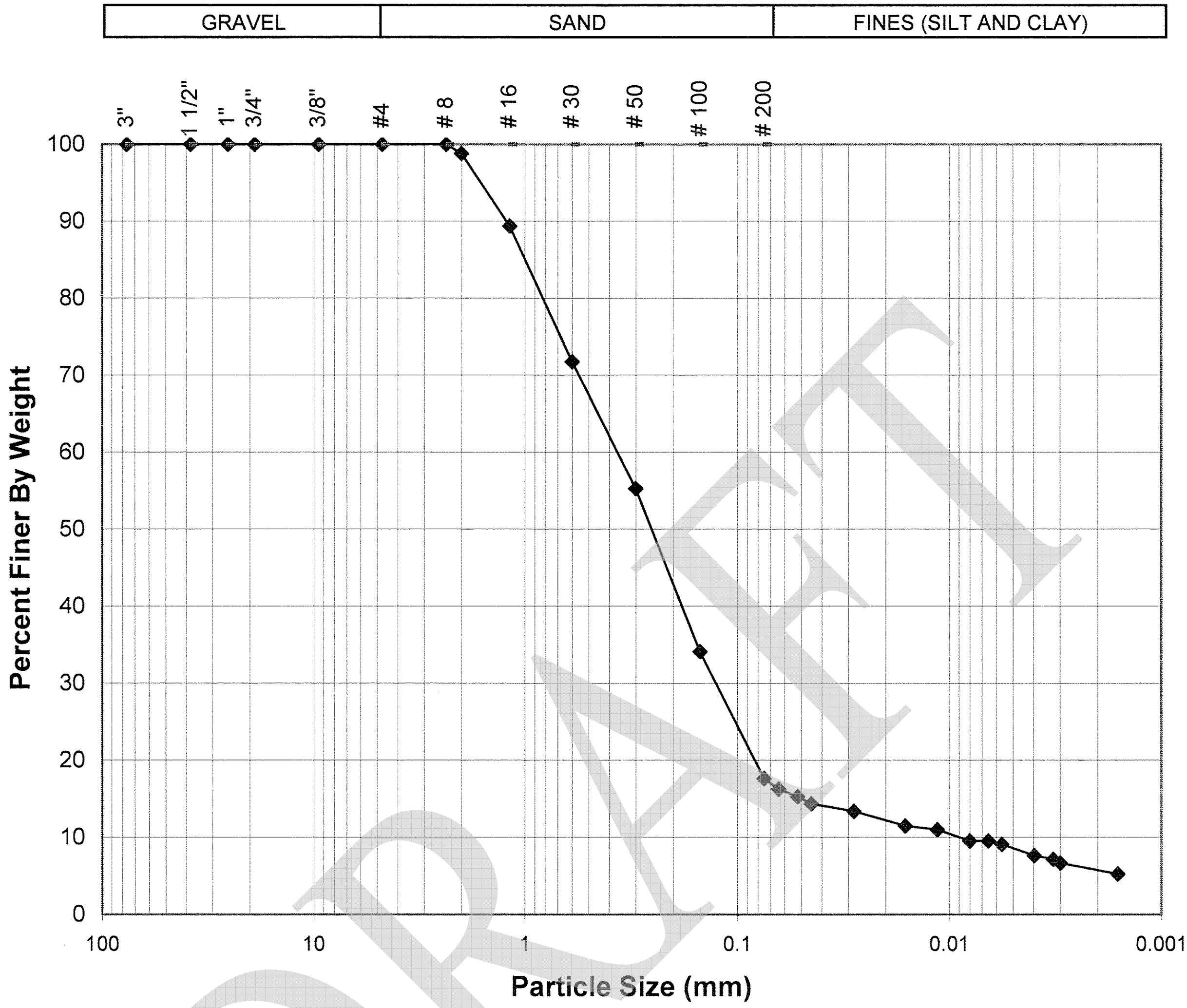
Sample Description: Light Gray Silty SAND

LGC

PARTICLE SIZE ANALYSIS
(ASTM D 422)

Project Number: 091069-01
Date: Mar-10

Lake Forest Sports Park



Location:	Sample No.:	Depth (ft.)	Soil Type	Gravel (%)	Sand (%)	Fines (%)
LGC-HS-10	**R-1**	**2.5**	**SM**	**0**	**82**	**18**

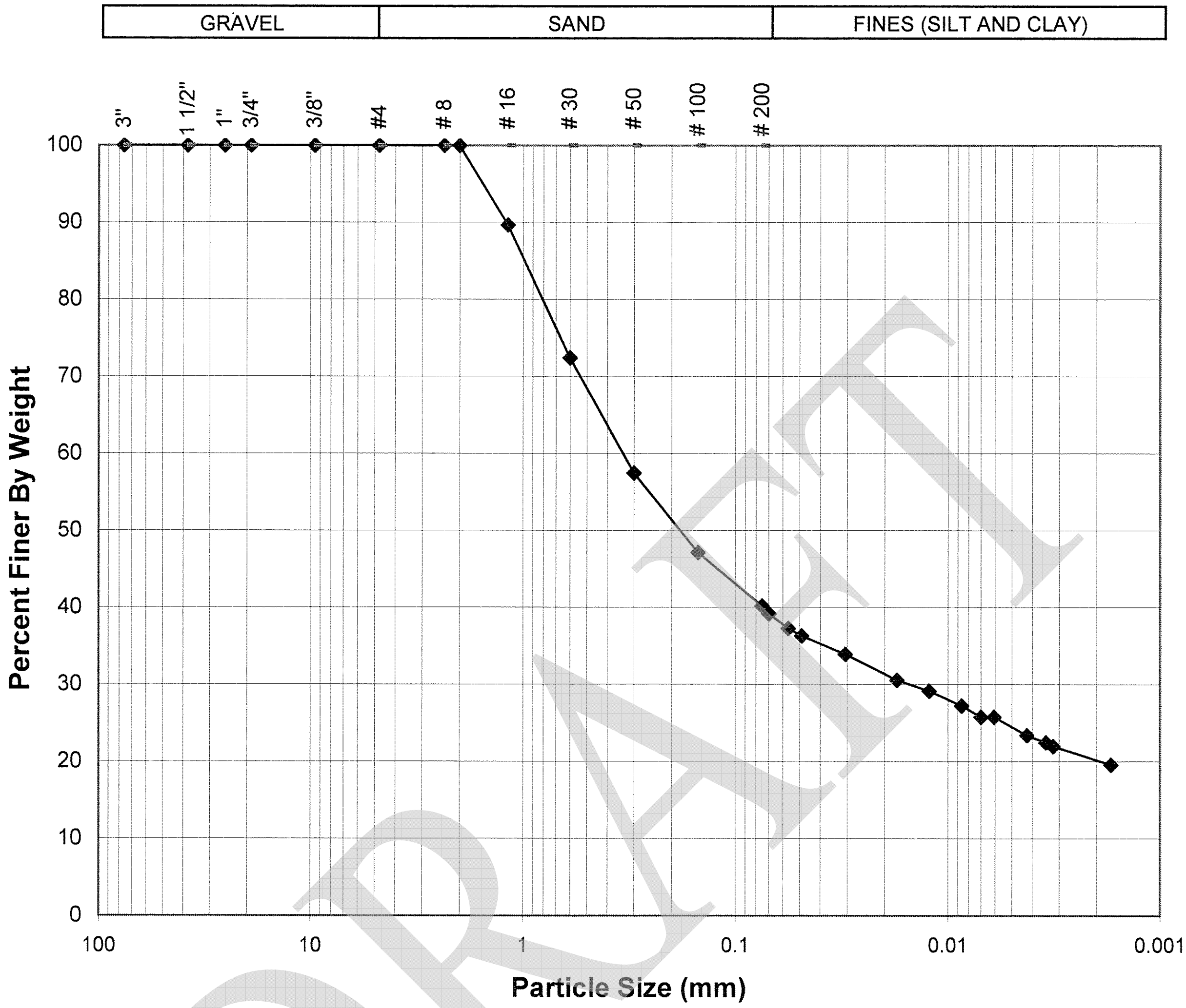
Sample Description: Light Gray to Brown Silty SAND

LGC

PARTICLE SIZE ANALYSIS
(ASTM D 422)

Project Number:	091069-01
Date:	Mar-10

Lake Forest Sports Park



Location:	Sample No.:	Depth (ft.)	Soil Type	Gravel (%)	Sand (%)	Fines (%)
T-9	**B-1**	**0-8.5**	**SM**	**0**	**60**	**40**

Sample Description: Brown Silty SAND

LGC

PARTICLE SIZE ANALYSIS
(ASTM D 422)

Project Number: 091069-01
Date: Mar-10

Lake Forest Sports Park

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: Lake Forest Sports Park | Tested By : V. Juliano | Date: 03/02/10

Project No. : 091069-01 | Data Input By: J. Ward | Date: 03/04/10

Boring No.	LGC-HS-2	T-1		
Sample No.	B-1	B-1		
Sample Depth (ft)	0-5	3-4		
Soil Identification:	Dark olive (SM)	Olive (CL)s		
Wet Weight of Soil + Container (g)	209.40	158.40		
Dry Weight of Soil + Container (g)	205.40	151.50		
Weight of Container (g)	68.30	60.80		
Moisture Content (%)	2.92	7.61		
Weight of Soaked Soil (g)	100.40	100.50		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	9	10		
Crucible No.	21	23		
Furnace Temperature (°C)	830	830		
Time In / Time Out	7:25 / 8:10	7:25 / 8:10		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	18.8038	18.4172		
Wt. of Crucible (g)	18.8030	18.4159		
Wt. of Residue (g) (A)	0.0008	0.0013		
PPM of Sulfate (A) x 41150	32.92	53.50		
PPM of Sulfate, Dry Weight Basis	**34**	**58**		

CHLORIDE CONTENT, DOT California Test 422

ml of Chloride Soln. For Titration (B)	30	30		
ml of AgNO3 Soln. Used in Titration (C)	0.7	1.3		
PPM of Chloride (C -0.2) * 100 * 30 / B	50	110		
PPM of Chloride, Dry Wt. Basis	**52**	**119**		

pH TEST, DOT California Test 532/643

pH Value	**6.62**	**7.75**		
Temperature °C	20.6	20.5		

SOIL RESISTIVITY TEST
DOT CA TEST 532 / 643

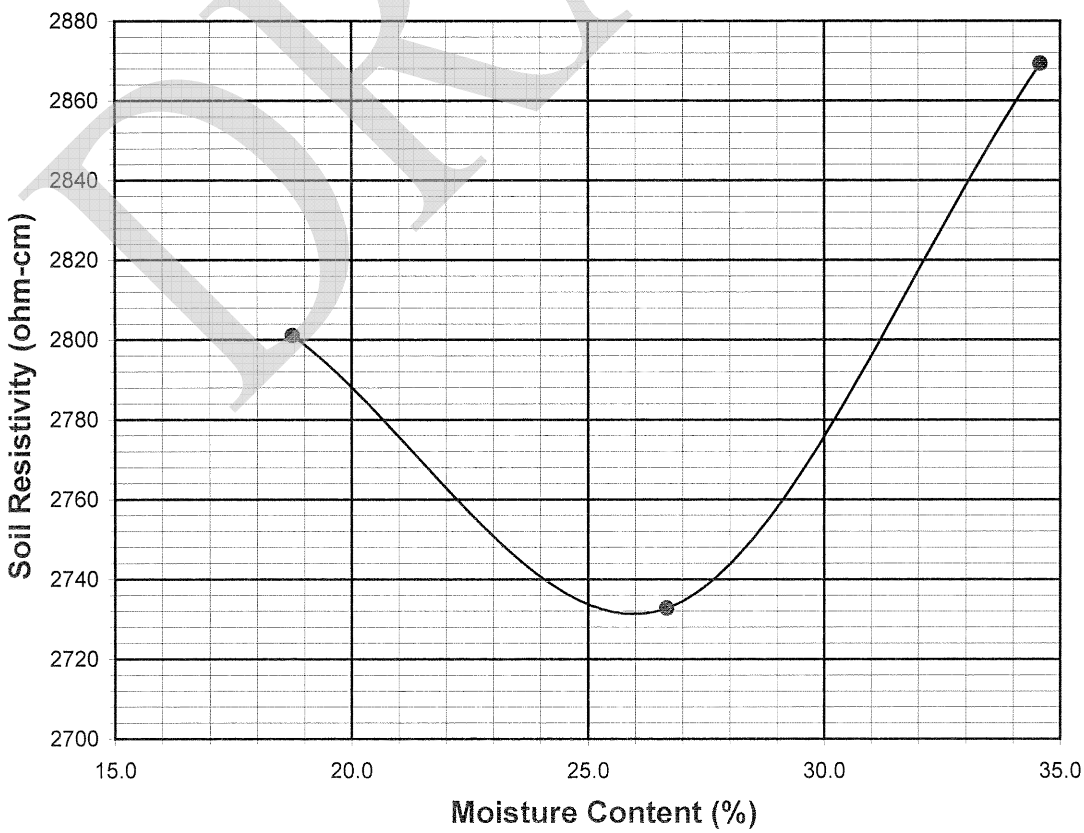
Project Name: Lake Forest Sports Park
Project No. : 091069-01
Boring No.: LGC-HS-2
Sample No. : B-1
Soil Identification: Dark olive (SM)

Tested By : V. Juliano Date: 03/04/10
Data Input By: J. Ward Date: 03/04/10
Depth (ft.) : 0-5

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	200	18.75	410	2801
2	300	26.67	400	2733
3	400	34.58	420	2869
4				
5				

Moisture Content (%) (MCi)	2.92
Wet Wt. of Soil + Cont. (g)	209.40
Dry Wt. of Soil + Cont. (g)	205.40
Wt. of Container (g)	68.30
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.832
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
2732	**26.0**	**34**	**52**	**6.62**	**20.6**



SOIL RESISTIVITY TEST

DOT CA TEST 532 / 643

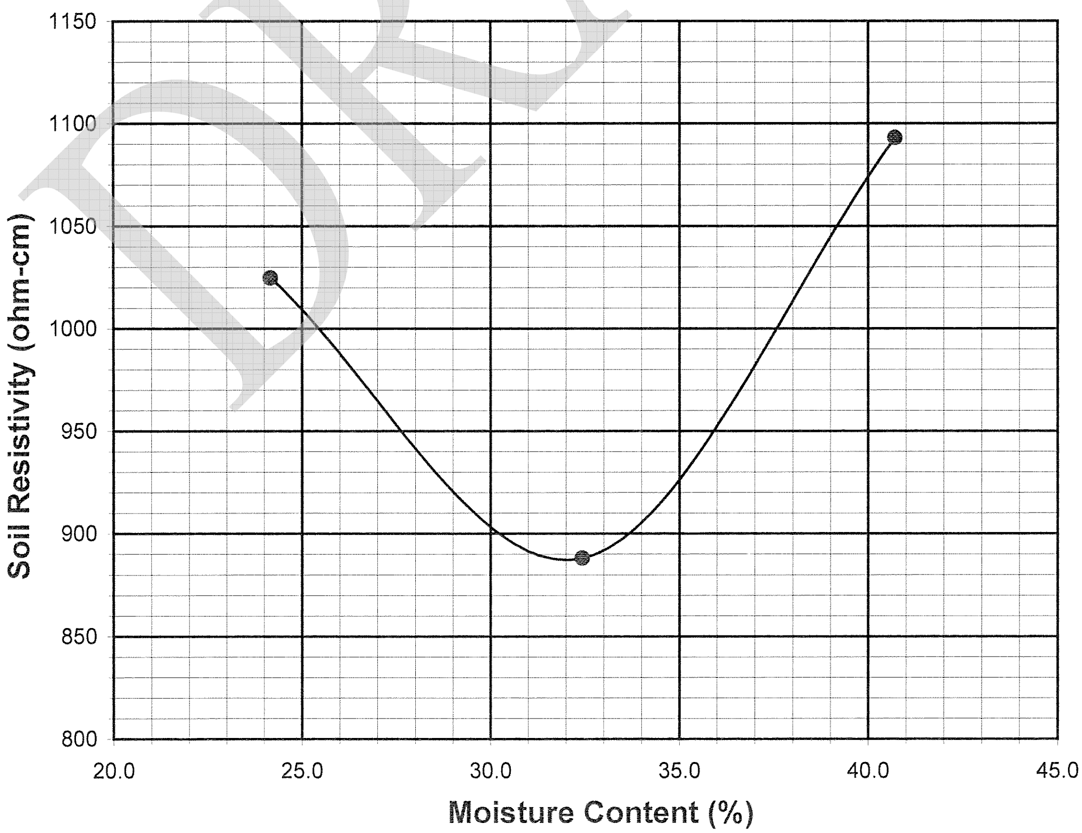
Project Name: Lake Forest Sports Park
Project No. : 091069-01
Boring No.: T-1
Sample No. : B-1
Soil Identification: Olive (CL)s

Tested By : V. Juliano Date: 03/04/10
Data Input By: J. Ward Date: 03/04/10
Depth (ft.) : 3-4

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	200	24.16	150	1025
2	300	32.44	130	888
3	400	40.72	160	1093
4				
5				

Moisture Content (%) (MCi)	7.61
Wet Wt. of Soil + Cont. (g)	158.40
Dry Wt. of Soil + Cont. (g)	151.50
Wt. of Container (g)	60.80
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.832
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
888	**32.0**	**58**	**119**	**7.75**	**20.5**



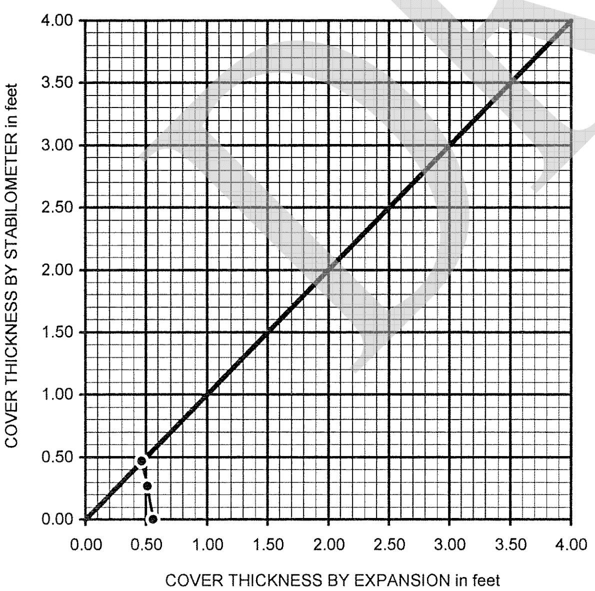
R-VALUE TEST RESULTS
DOT CA 301

PROJECT NAME:	Lake Forest Sports Park	PROJECT NUMBER:	091069-01
BORING NUMBER:	LGC-HS-4	DEPTH (FT.):	0-5
SAMPLE NUMBER:	B-1	TECHNICIAN:	S. Felter
SAMPLE DESCRIPTION:	Light brown silty sand (SM)	DATE COMPLETED:	3/2/2010

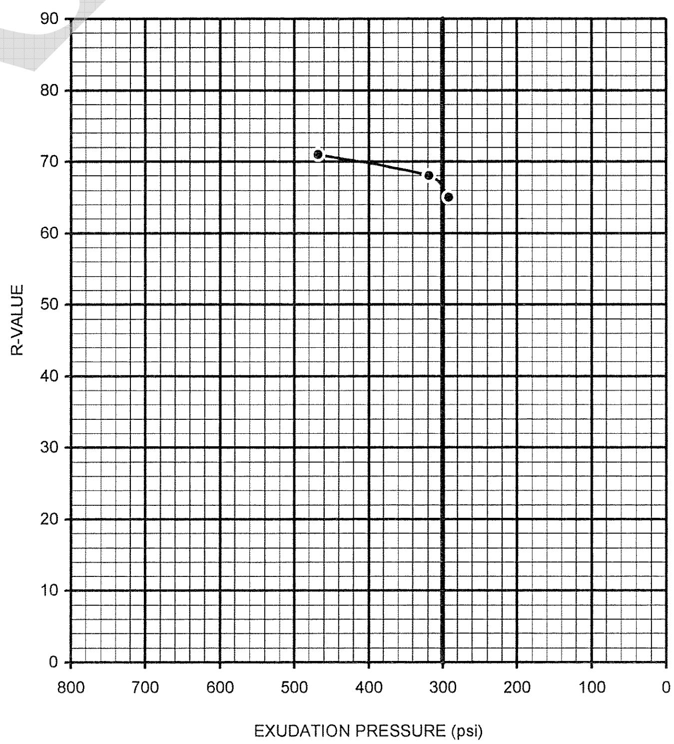
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	14.1	14.5	14.7
HEIGHT OF SAMPLE, Inches	2.48	2.55	2.47
DRY DENSITY, pcf	114.0	113.5	114.1
COMPACTOR PRESSURE, psi	250	200	170
EXUDATION PRESSURE, psi	467	318	291
EXPANSION, Inches x 10exp-4	14	8	0
STABILITY Ph 2,000 lbs (160 psi)	32	33	38
TURNS DISPLACEMENT	4.18	4.58	4.32
R-VALUE UNCORRECTED	71	68	65
R-VALUE CORRECTED	71	68	65

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.46	0.51	0.56
EXPANSION PRESSURE THICKNESS, ft.	0.47	0.27	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	71
R-VALUE BY EXUDATION:	67
EQUILIBRIUM R-VALUE:	67

R-VALUE TEST RESULTS

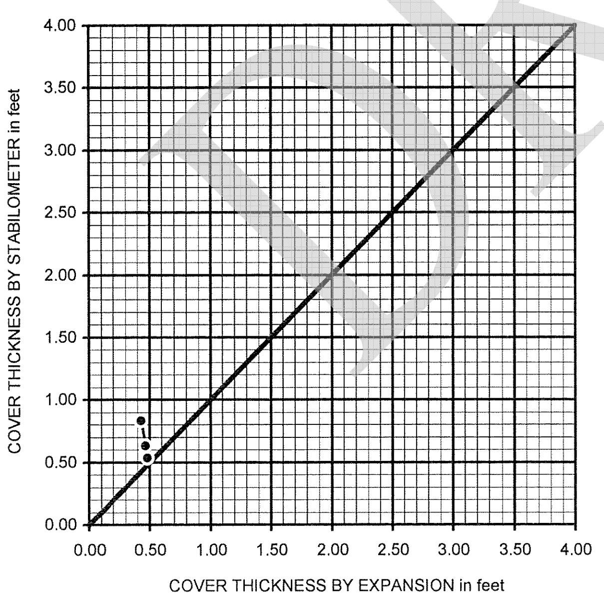
DOT CA 301

PROJECT NAME:	Lake Forest Sports Park	PROJECT NUMBER:	091069-01
BORING NUMBER:	T-5	DEPTH (FT.):	11-15
SAMPLE NUMBER:	B-1	TECHNICIAN:	S. Felter
SAMPLE DESCRIPTION:	Olive brown silty sand (SM)	DATE COMPLETED:	3/2/2010

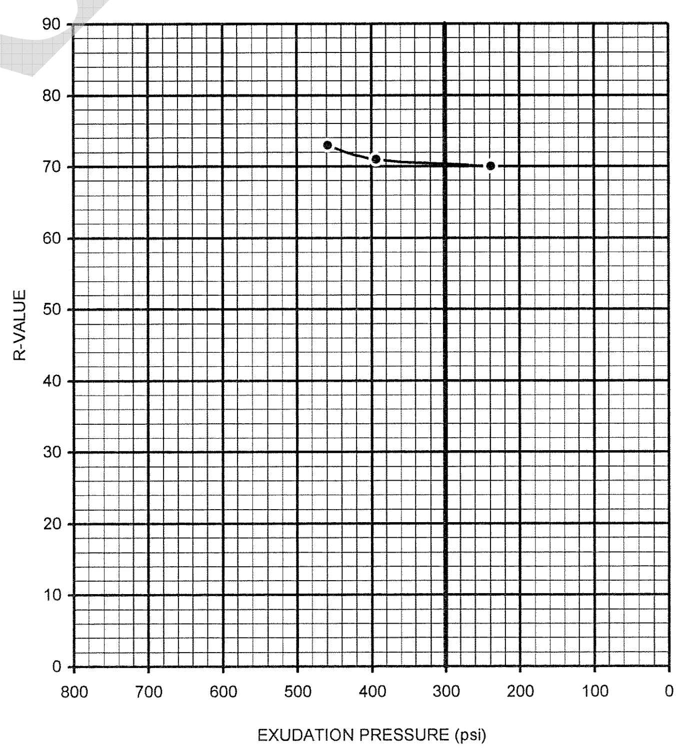
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	14.7	14.9	15.1
HEIGHT OF SAMPLE, Inches	2.49	2.45	2.54
DRY DENSITY, pcf	109.0	107.4	108.0
COMPACTOR PRESSURE, psi	325	300	275
EXUDATION PRESSURE, psi	458	393	238
EXPANSION, Inches x 10exp-4	25	19	16
STABILITY Ph 2,000 lbs (160 psi)	28	29	30
TURNS DISPLACEMENT	4.37	4.51	4.63
R-VALUE UNCORRECTED	73	71	70
R-VALUE CORRECTED	73	71	70

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.43	0.46	0.48
EXPANSION PRESSURE THICKNESS, ft.	0.83	0.63	0.53

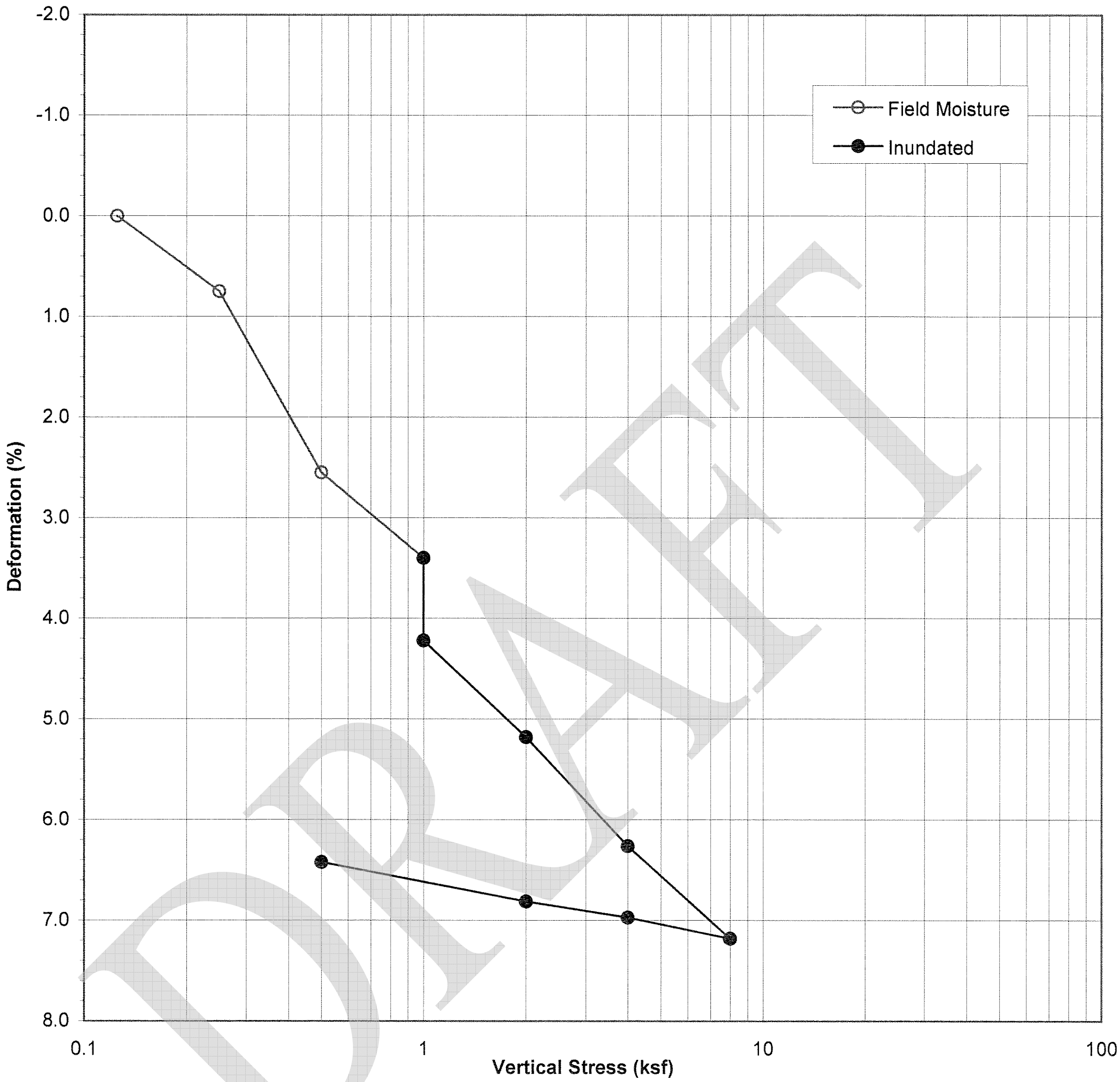
EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



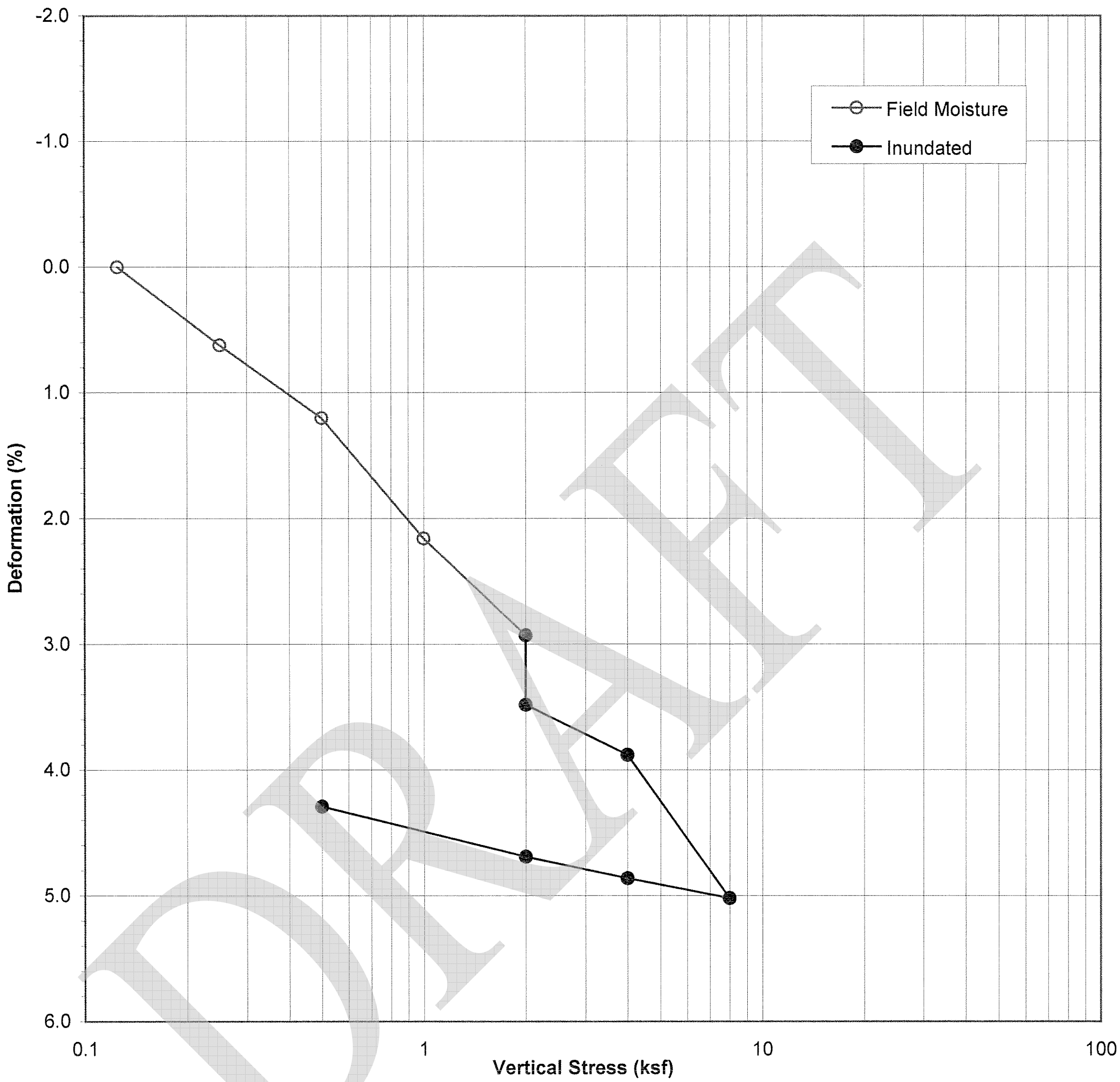
R-VALUE BY EXPANSION:	69
R-VALUE BY EXUDATION:	70
EQUILIBRIUM R-VALUE:	69



Location:	Sample No.:	Depth (ft)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-HS-4	**R-4**	**10**	**110.8**	**5.0**	**14.2**

Sample Description: Tan to Brown Silty SAND

LGC	ONE-DIMENSIONAL CONSOLIDATION	**Project Number:** 091069-01 **Date:** Feb-10 **Lake Forest Sports Park**



Location:	Sample No.:	Depth (ft)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-HS-5	**R-6**	**20**	**107.6**	**9.4**	**15.0**

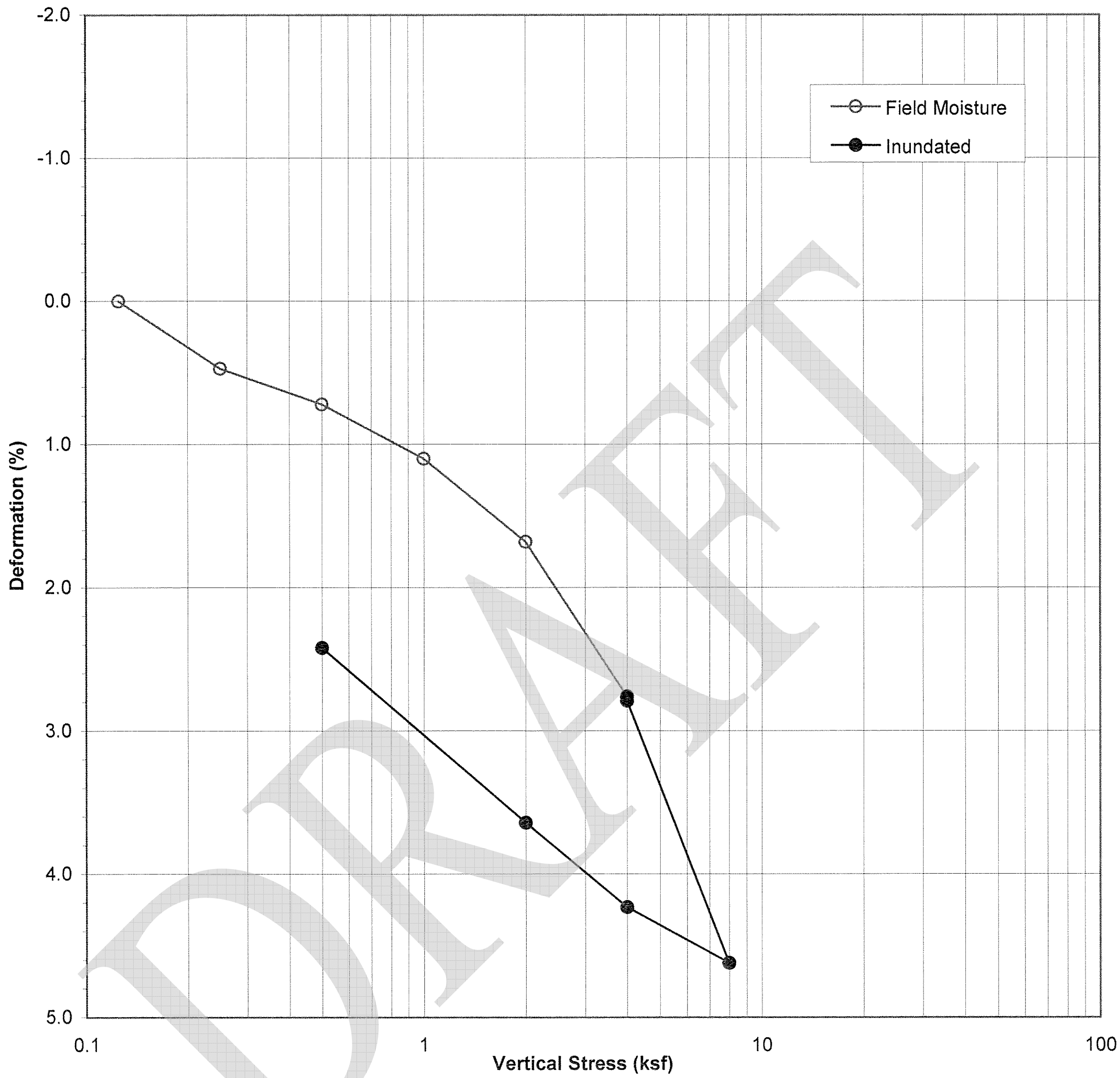
Sample Description: Tan to Brown Silty SAND

LGC

ONE-DIMENSIONAL CONSOLIDATION

Project Number: 091069-01
Date: Feb-10

Lake Forest Sports Park



Location:	Sample No.:	Depth (ft)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-HS-5	**R-8**	**30**	**87.1**	**29.9**	**40.4**

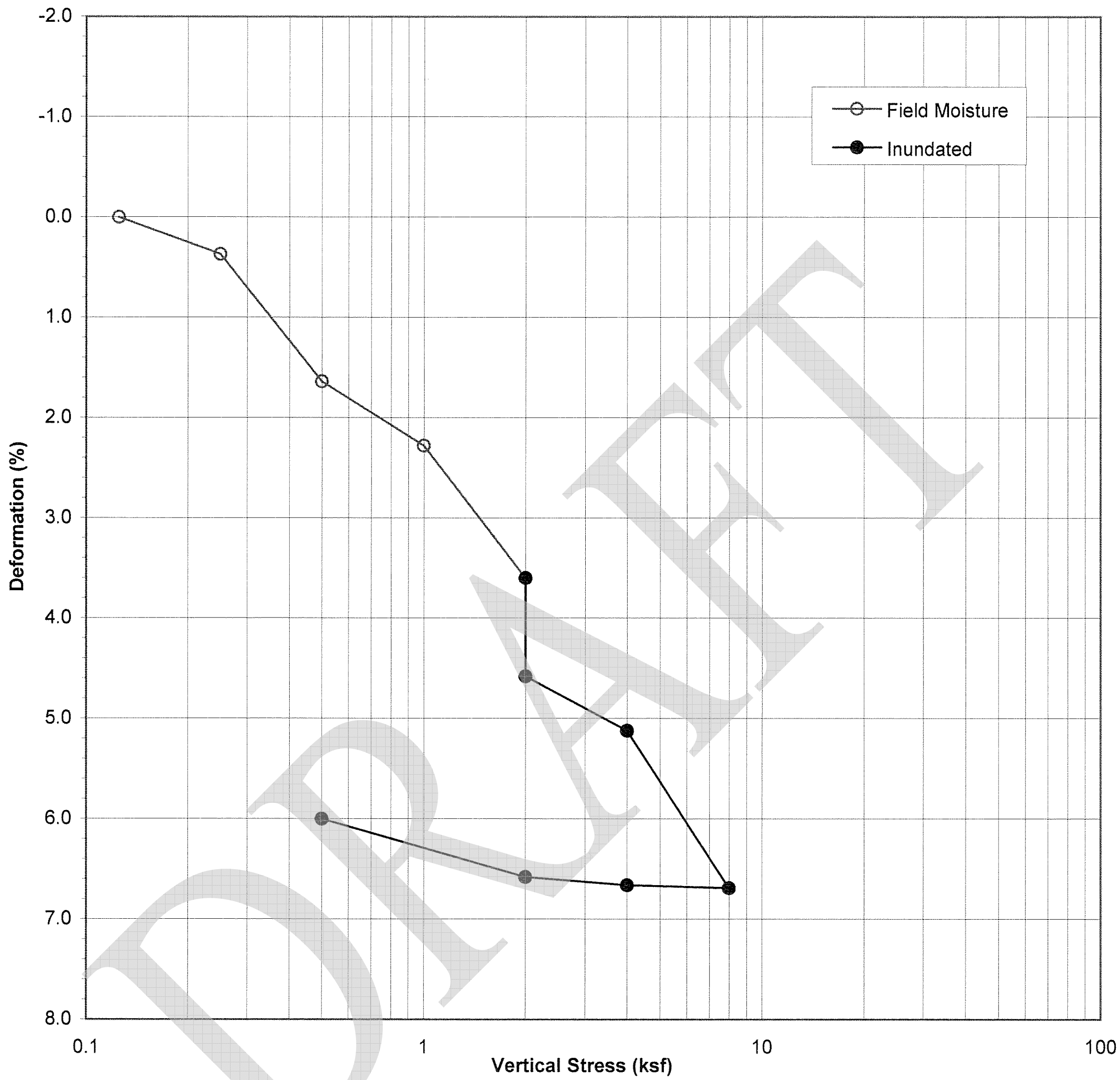
Sample Description: Brown Clayey Silty SAND

LGC

ONE-DIMENSIONAL CONSOLIDATION

Project Number: 091069-01
Date: Feb-10

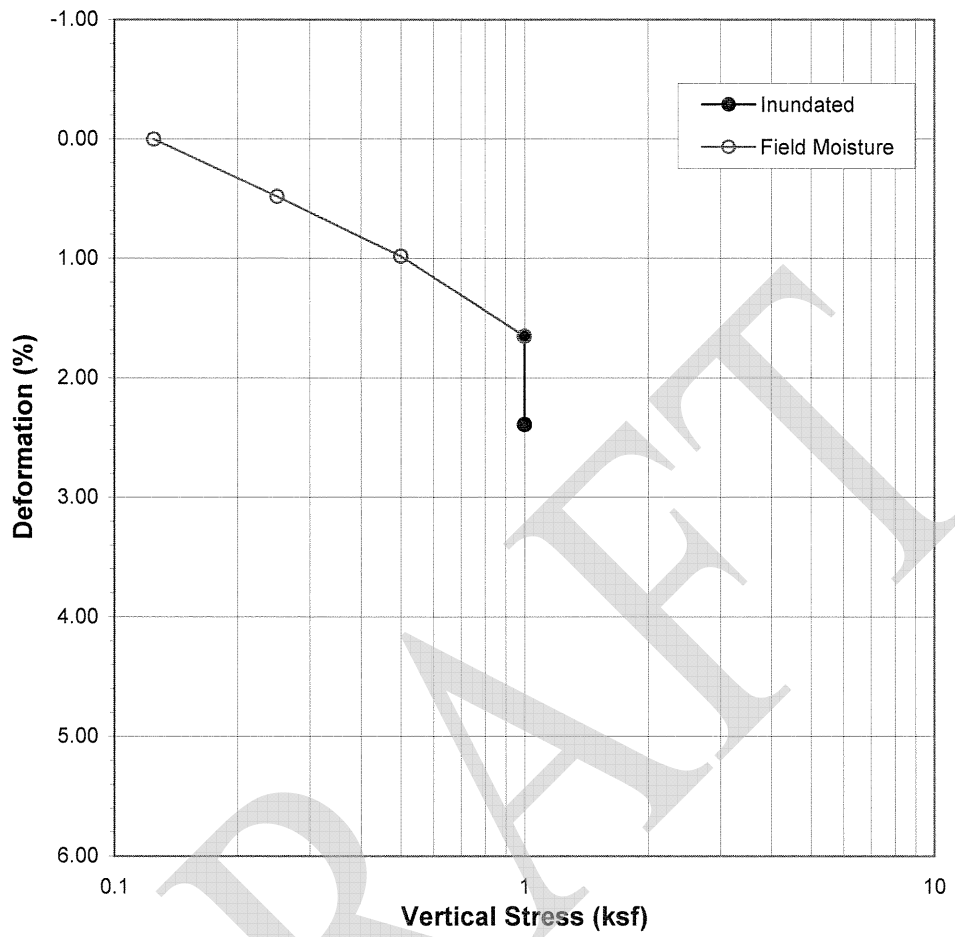
Lake Forest Sports Park



Location:	Sample No.:	Depth (ft)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-HS-7	**R-5**	**15**	**97.6**	**10.9**	**13.4**

Sample Description: Gray to Brown Slightly Clayey Silty SAND

LGC	ONE-DIMENSIONAL CONSOLIDATION	**Project Number:** 091069-01 **Date:** Feb-10 **Lake Forest Sports Park**

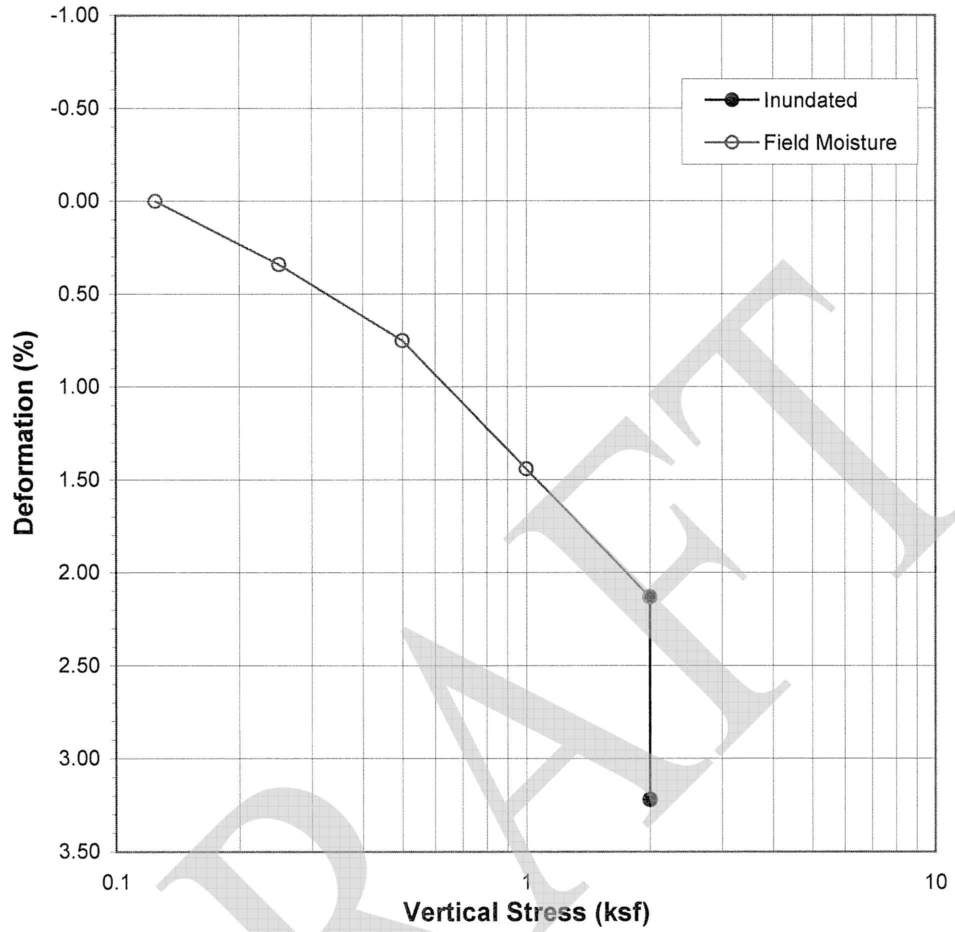


Percent Swell / Settlement After Inundation = 0.74

Location:	Sample No.:	Depth (ft)	Degree of Saturation (%)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-HS-4	**R-4**	**10**	**26**	**110.8**	**5.0**	**23.6**

Sample Description: Tan to Brown Silty Sand

LGC	ONE-DIMENSIONAL SETTLEMENT / SWELL	**Project Number:** 091069-01 **Date:** Feb-10 **Lake Forest Sports Park**

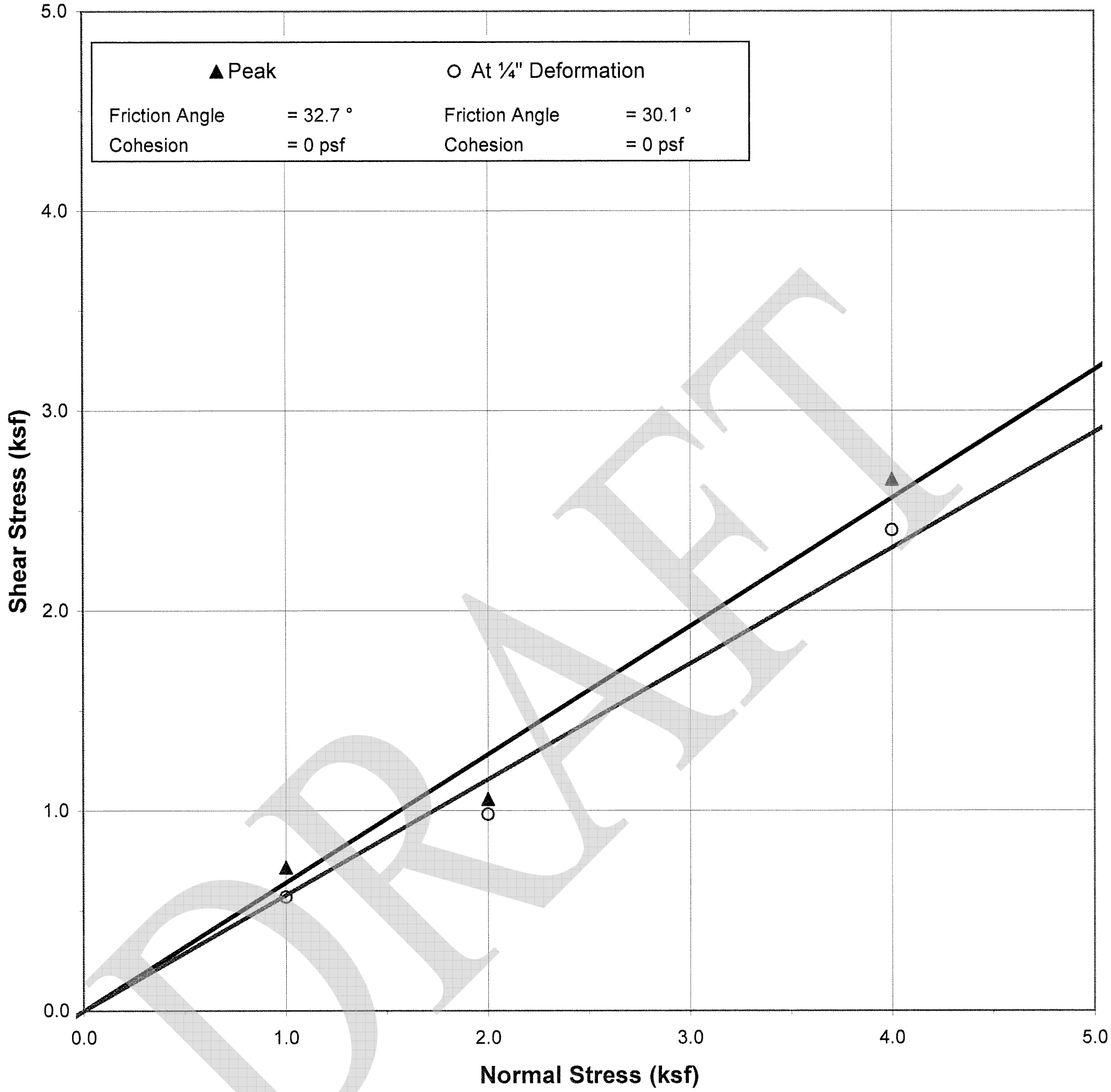


Percent Swell / Settlement After Inundation = 1.09

Location:	Sample No.:	Depth (ft)	Degree of Saturation (%)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-HS-5	**R-5**	**15**	**66**	**96.3**	**18.2**	**21.8**

Sample Description: Tan to Brown Silty Sand

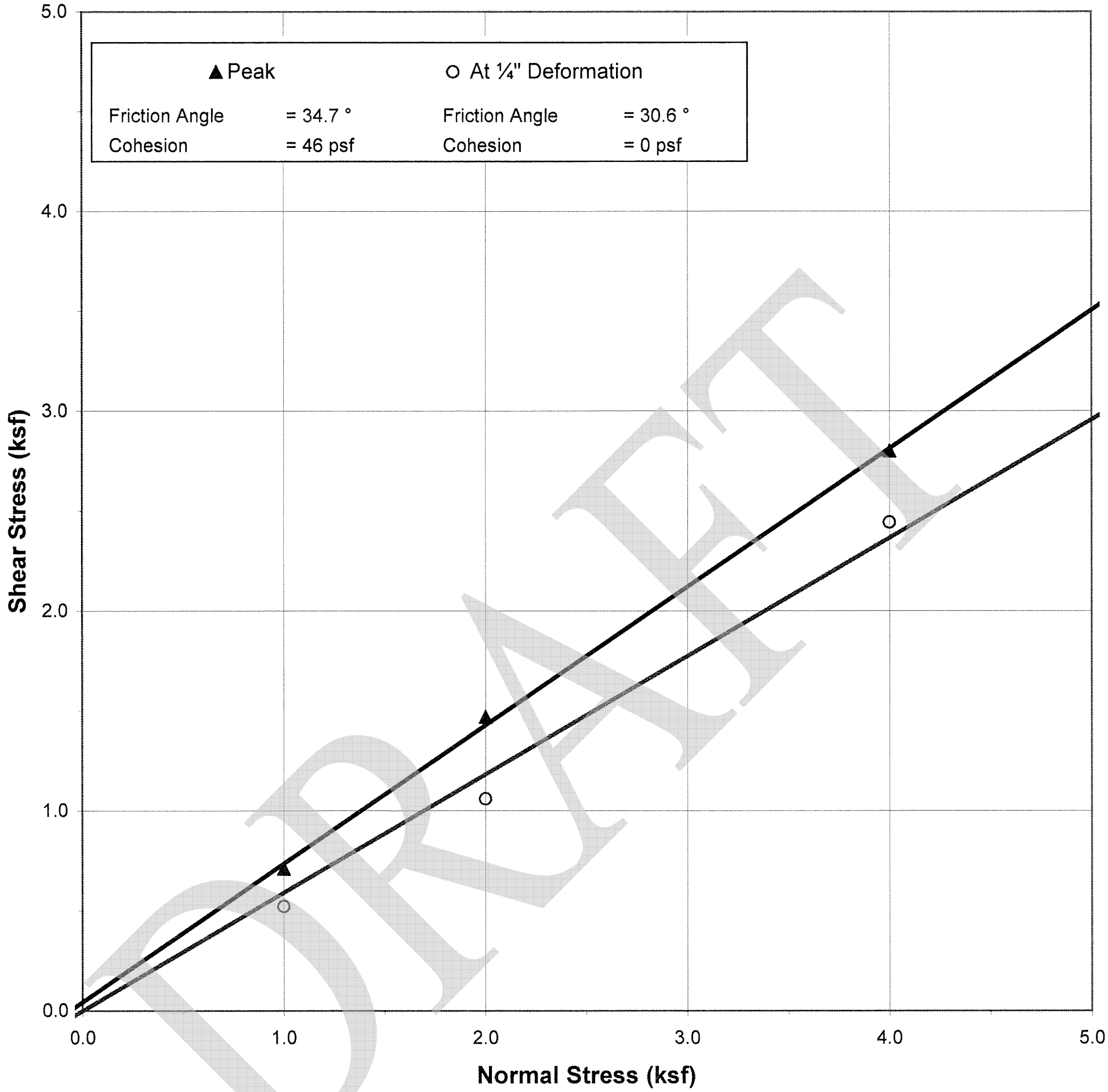
LGC	ONE-DIMENSIONAL SETTLEMENT / SWELL	**Project Number:** 091069-01 **Date:** Feb-10 **Lake Forest Sports Park**



Location:	Sample No.:	Depth (ft)	Sample Type	Shear Rate (inch/min)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-HS-2	**R-3**	**7.5'**	**Driven**	**0.004**	**101.7**	**4.6**	**25.1**

Sample Description: Silty Sand

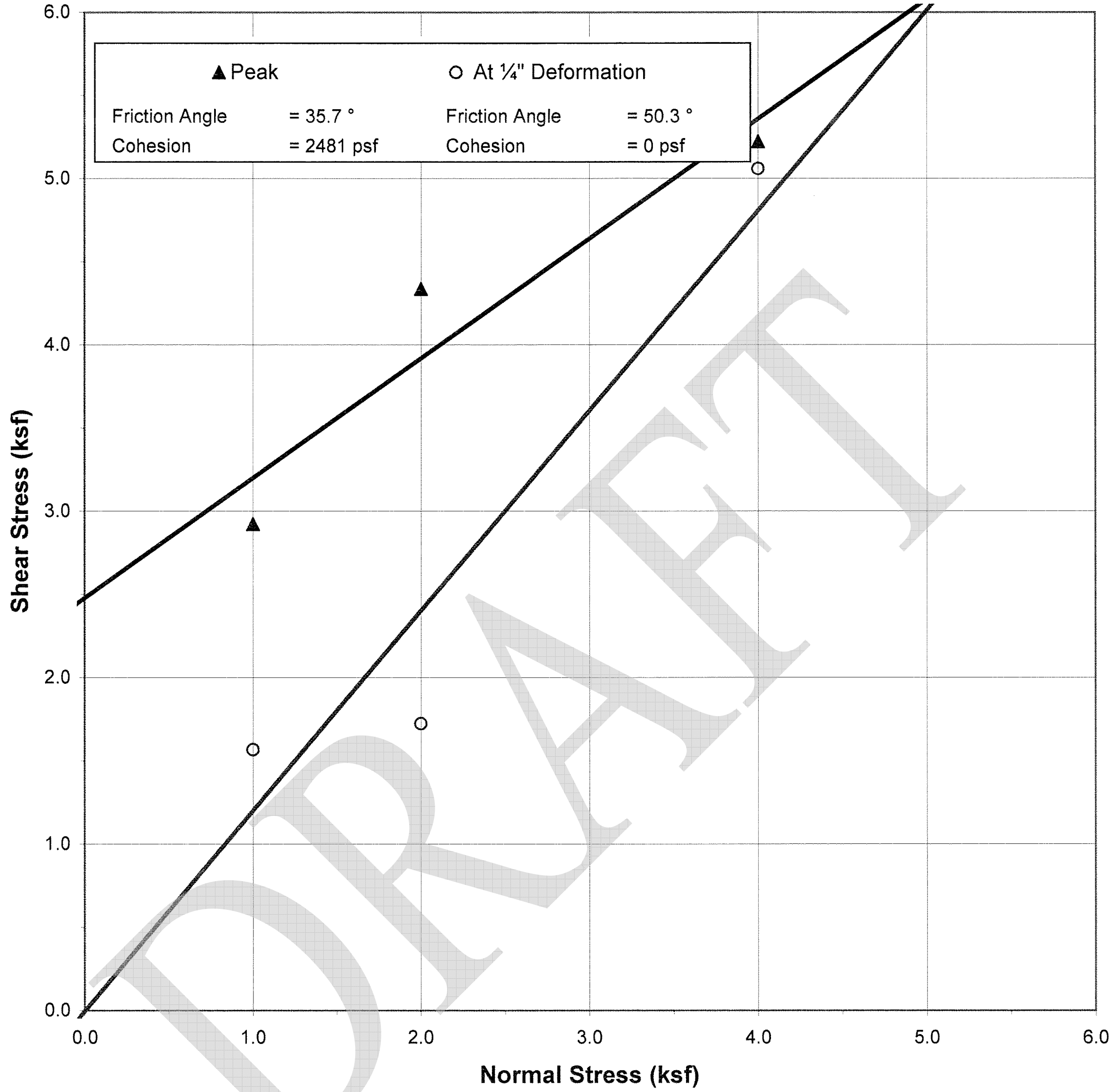
LGC	DIRECT SHEAR PLOT	**Project Number:** 091069-01 **Date:** Mar-10 **Lake Forest Sports Park**



Location:	Sample No.:	Depth (ft)	Sample Type	Shear Rate (inch/min)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-HS-3	**R-3**	**7.5'**	**Driven**	**0.004**	**104.2**	**4.6**	**24.2**

Sample Description: Tan to Gray Silty SAND

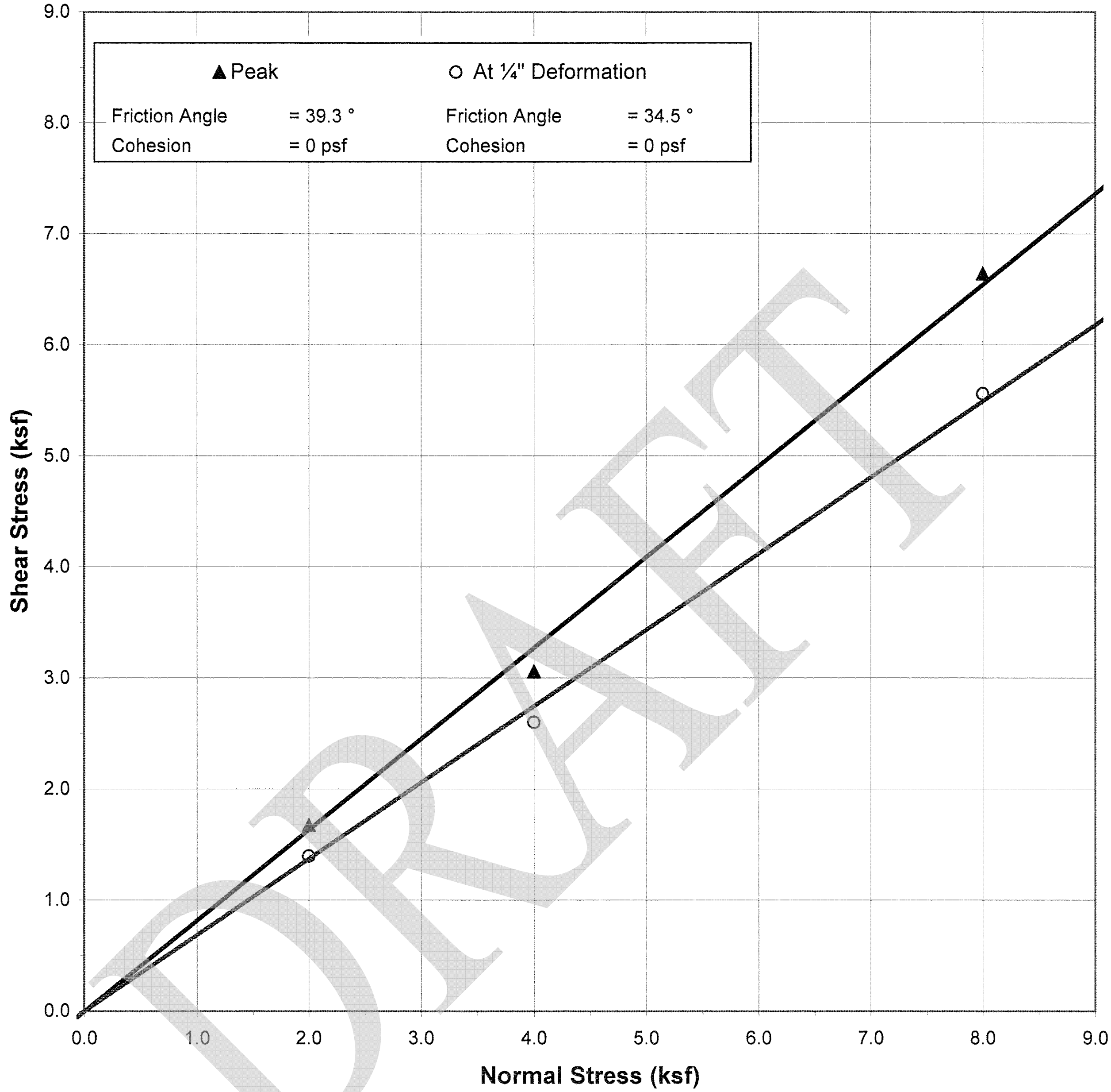
LGC	DIRECT SHEAR PLOT	Project Number: 091069-01 Date: Mar-10 **Lake Forest Sports Park**



Location:	Sample No.:	Depth (ft)	Sample Type	Shear Rate (inch/min)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-B-1	**R-4**	**40**	**Driven**	**0.004**	**116.0**	**12.9**	**20.8**

Sample Description: Light Tan Sand

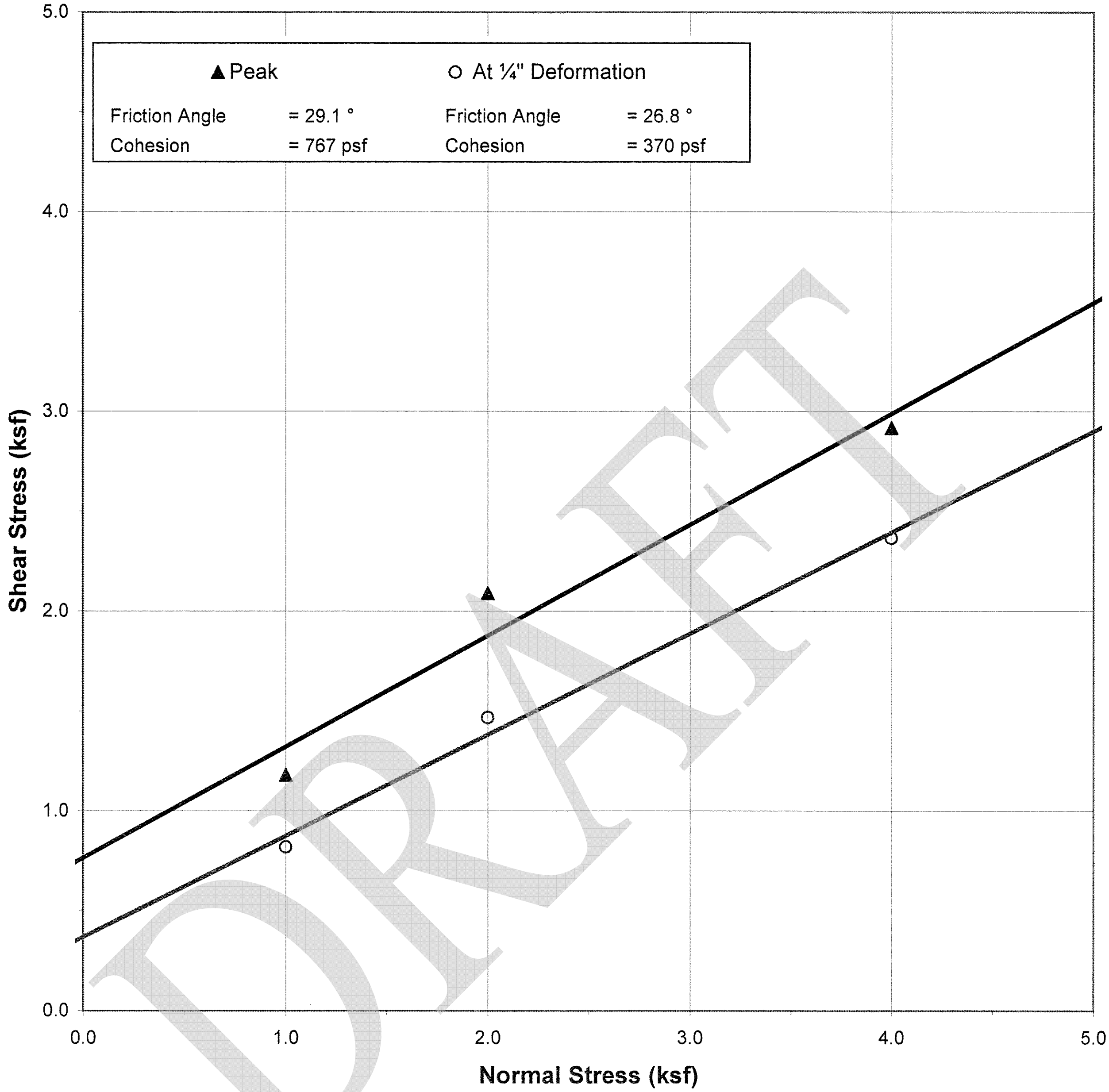
LGC	DIRECT SHEAR PLOT	Project Number: 091069-01 Date: Feb-10 **Lake Forest Sports Park**



Location:	Sample No.:	Depth (ft)	Sample Type	Shear Rate (inch/min)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-B-1	**R-6**	**60**	**Driven**	**0.004**	**111.5**	**4.4**	**21.5**

Sample Description: Light Tan Sand

LGC	DIRECT SHEAR PLOT	Project Number: 091069-01 Date: Feb-10 **Lake Forest Sports Park**



Location:	Sample No.:	Depth (ft)	Sample Type	Shear Rate (inch/min)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-B-2	**R-5**	**50**	**Driven**	**0.004**	**117.0**	**11.5**	**23.5**

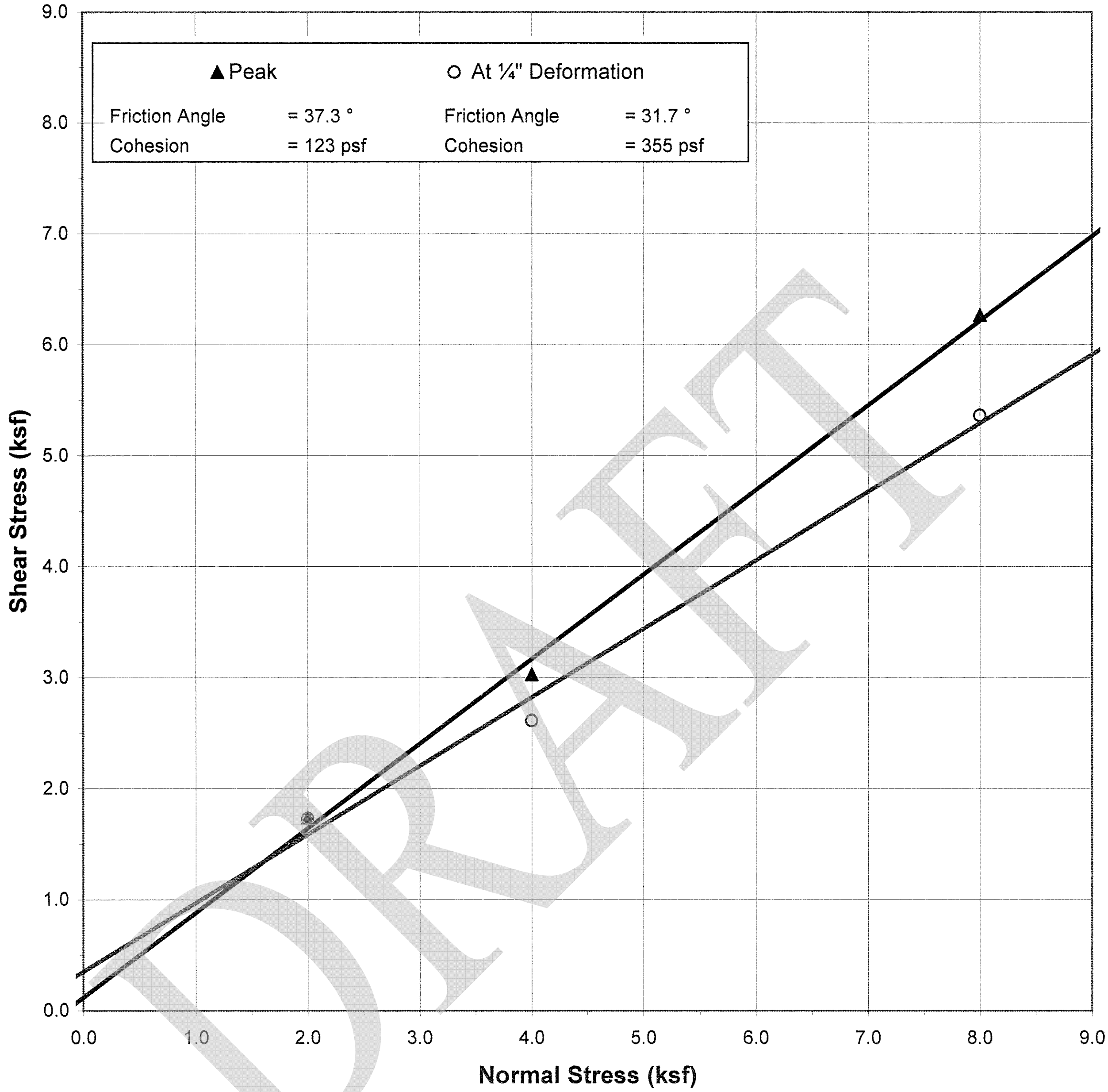
Sample Description: Light Tan Sand

LGC

DIRECT SHEAR PLOT

Project Number: 091069-01
Date: Feb-10

Lake Forest Sports Park



Location:	Sample No.:	Depth (ft)	Sample Type	Shear Rate (inch/min)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-B-3	**R-2**	**40**	**Driven**	**0.004**	**96.1**	**14.1**	**27.9**

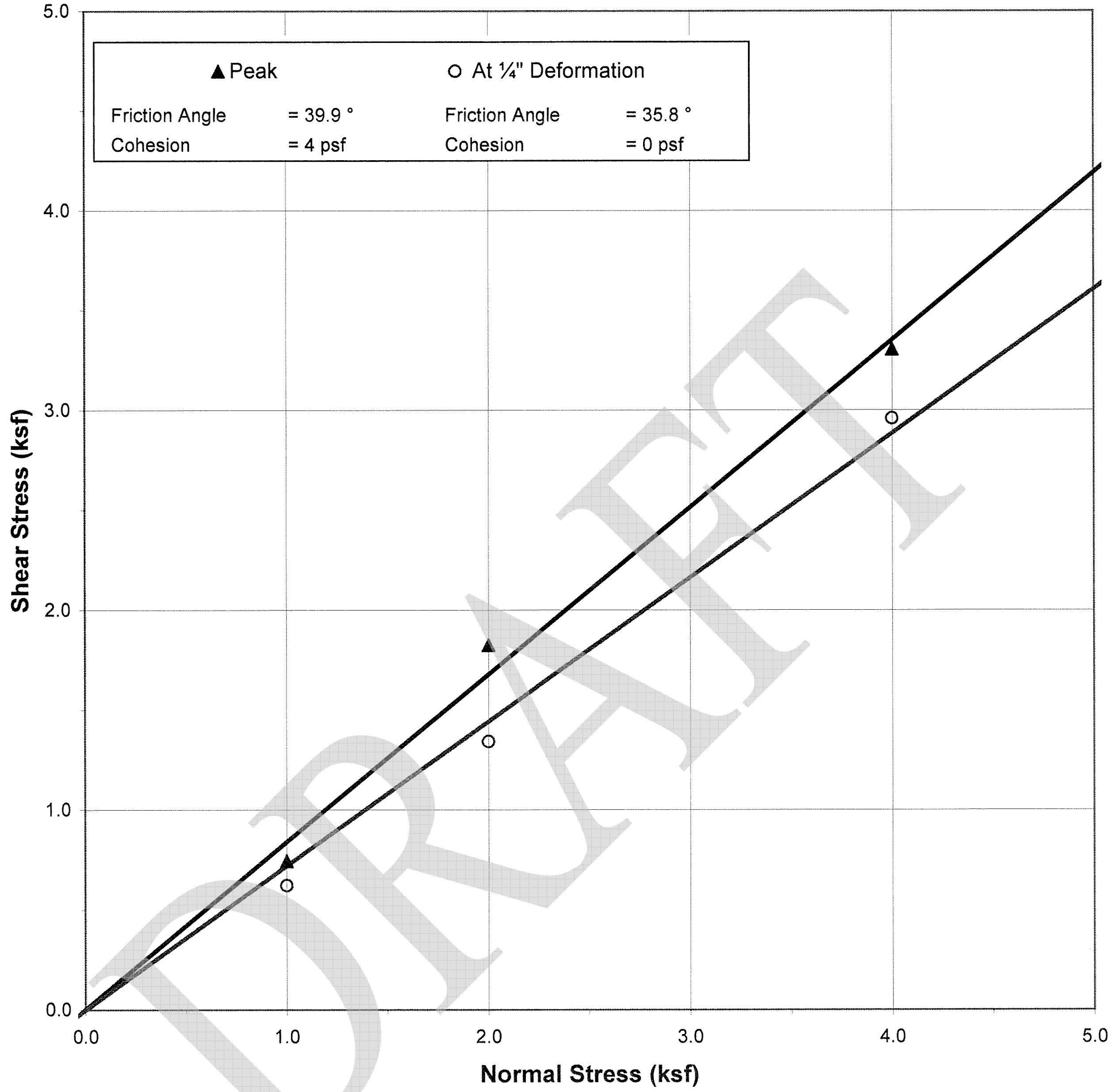
Sample Description: Light Tan Sand

LGC

DIRECT SHEAR PLOT

Project Number: 091069-01
Date: Feb-10

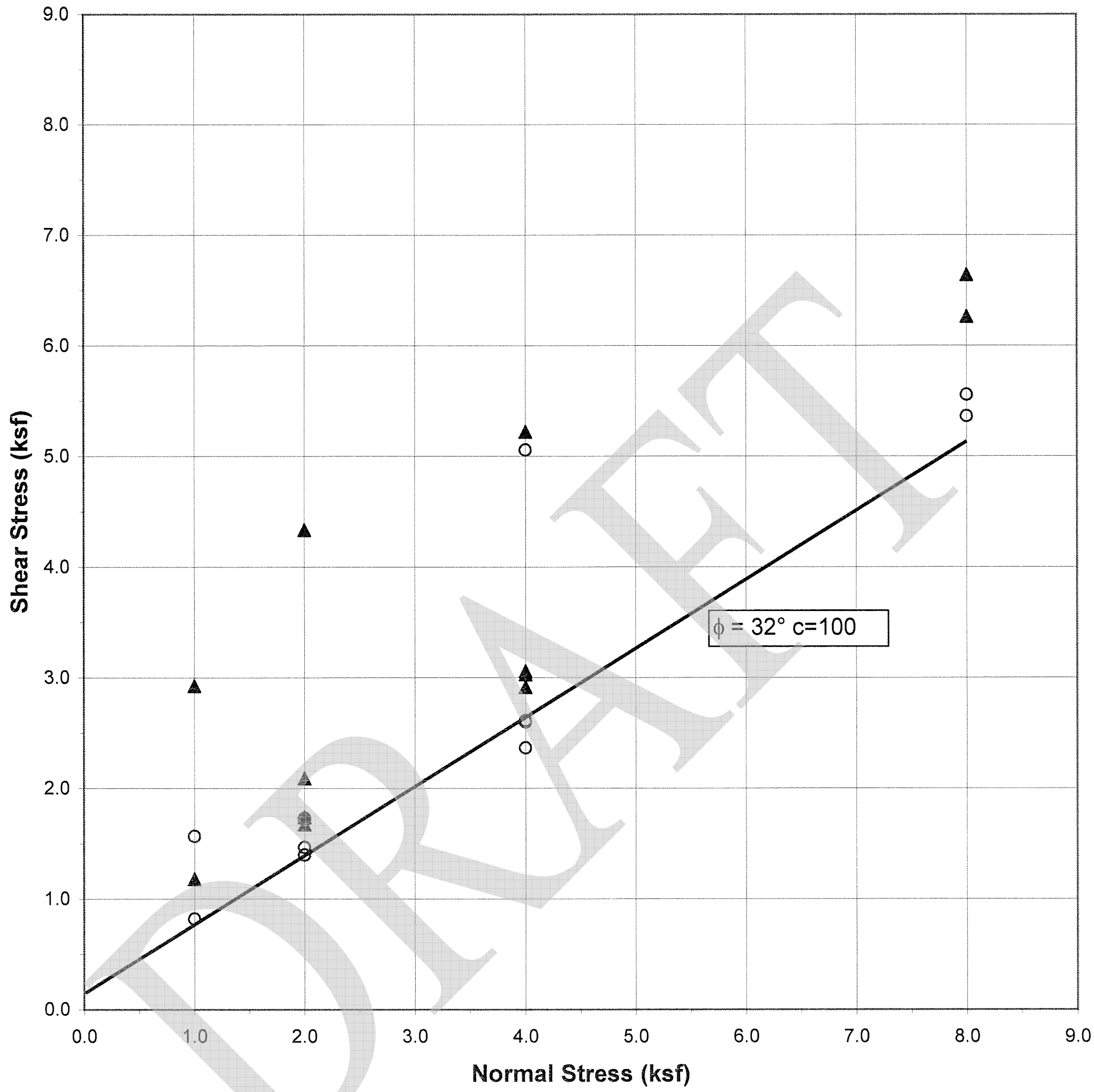
Lake Forest Sports Park



Location:	Sample No.:	Depth (ft)	Sample Type	Shear Rate (inch/min)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
LGC-HS-5	**R-7**	**24'**	**Driven**	**0.004**	**103.0**	**18.0**	**21.7**

Sample Description: Brown Silty SAND

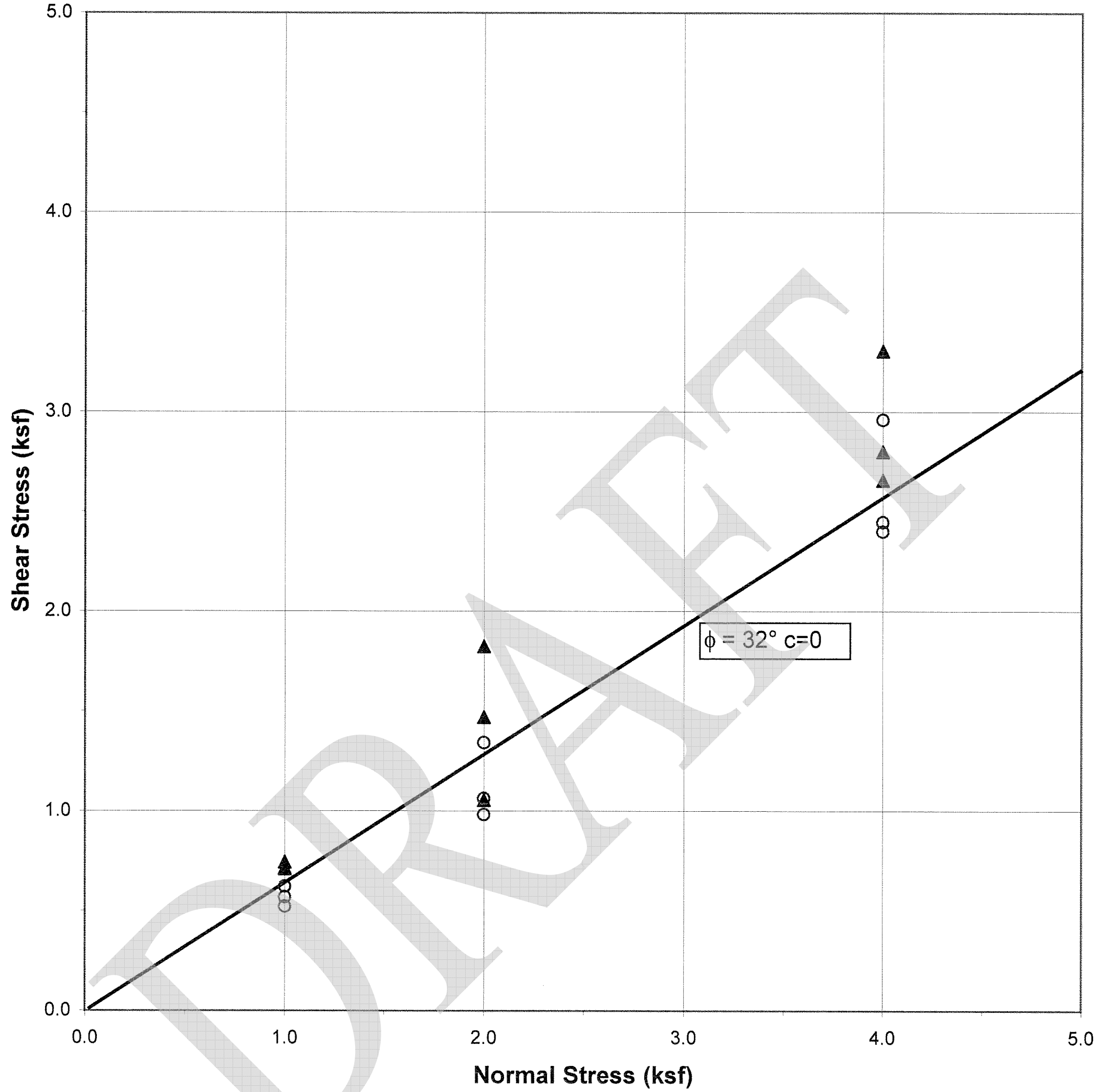
LGC	**DIRECT SHEAR PLOT**	**Project Number:** 091069-01 **Date:** Mar-10 **Lake Forest Sports Park**



Location:	Sample No.:	Depth (ft)	Sample Type	Shear Rate (inch/min)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
-	-	-	**Driven**	**0.004**	-	-	-

Sample Description: LGC-B-1, R-6; LGC-B-2, R-5; LGC-B-3, R-2; LGC-B-1, R-4

LGC	**DIRECT SHEAR COMPOSITE PLOT (Tco)**	**Project Number:** 091069-01 **Date:** Feb-10
		Lake Forest Sports Park



Location:	Sample No.:	Depth (ft)	Sample Type	Shear Rate (inch/min)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
-	-	-	**Driven**	**0.004**	-	-	-

Sample Description: LGC-HS-2, R-3; LGC-HS-3, R-3; LGC-HS-5, R-7

LGC	DIRECT SHEAR COMPOSITE PLOT (Qcol)	**Project Number:** 091069-01 **Date:** Feb-10
		Lake Forest Sports Park

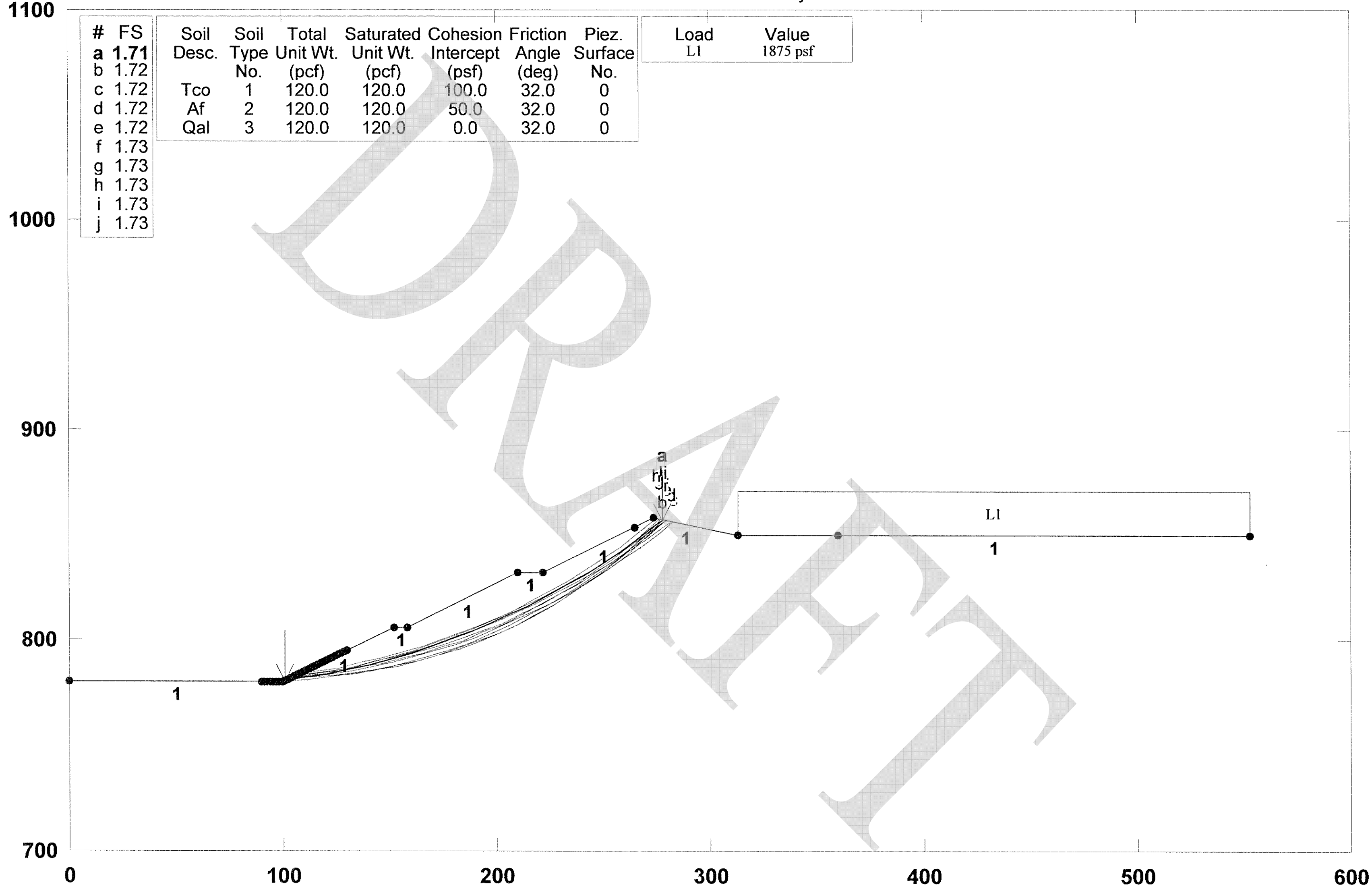
APPENDIX D

Summary of Slope Stability Analysis

Cross Section	Static FS	Pseudostatic FS	Remarks
A-A' Upper Slope	1.71	1.45	Cut Slope
A-A' Lower Slope	1.65	N/A	Fill Slope
B-B' Upper Slope	1.69	1.42	Cut Slope
B-B' Lower Slope	1.65	1.40	Fill Slope
C-C'	1.75	N/A	Cut Slope
D-D'	1.62	N/A	Fill Slope
E-E'	1.66	N/A	Cut Slope
Manufactured 2:1 Fill Slope Dry	10.3	N/A	Surficial Stability
Manufactured 2:1 Fill Slope Saturated	0.89	N/A	Surficial Stability
2:1 Cut Slope - Dry	19.9	N/A	Surficial Stability
2:1 Cut Slope - Saturated	1.13	N/A	Surficial Stability

Lake Forest Sport Park 100 Scale, Section A-A', Static, Upper Slope (Cut)

M:\2009PR~1\091069~1\ENGINE~1\AA'1S1.PL2 Run By: Username 3/25/2010 6:45PM



GSTABL7 v.2 FSmin=1.71

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static Earthquake, and Applied Force Options.

****

Analysis Run Date: 3/25/2010
Time of Run: 6:45PM
Run By: Username
Input Data Filename: M:aa'1s1.
Output Filename: M:aa'1s1.OUT
Unit System: English
Plotted Output Filename: M:aa'1s1.PLT
PROBLEM DESCRIPTION: Lake Forest Sport Park 100 Scale,
Section A-A', Static, Upper Slope (Cut)

BOUNDARY COORDINATES
8 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	780.00	100.00	780.00	1
2	100.00	780.00	152.00	806.00	1
3	152.00	806.00	158.00	806.00	1
4	158.00	806.00	210.00	832.00	1
5	210.00	832.00	222.00	832.00	1
6	222.00	832.00	274.00	858.00	1
7	274.00	858.00	313.00	850.00	1
8	313.00	850.00	553.00	850.00	1

User Specified Y-Origin = 700.00(ft)

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	100.0	32.0	0.00	0.0	0
2	120.0	120.0	50.0	32.0	0.00	0.0	0
3	120.0	120.0	0.0	32.0	0.00	0.0	0

BOUNDARY LOAD(S)
1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	313.00	553.00	1875.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
6000 Trial Surfaces Have Been Generated.
200 Surface(s) Initiate(s) From Each Of 30 Points Equally Spaced
Along The Ground Surface Between X = 90.00(ft)
and X = 130.00(ft)
Each Surface Terminates Between X = 265.00(ft)
and X = 360.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Evaluated = 6000

Number of Trial Failure Surfaces is Greater Than 5000.
Statistical Data on FS Values are Not Generated.
To Generate Stastical Data, Reduce Number of Trial
Failure Surfaces to 5000 or less.
Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	101.03	780.52
2	110.93	781.98
3	120.77	783.73
4	130.57	785.76
5	140.30	788.06
6	149.96	790.63
7	159.54	793.48
8	169.05	796.61
9	178.45	799.99
10	187.76	803.65
11	196.96	807.57
12	206.05	811.74
13	215.01	816.18
14	223.85	820.86
15	232.54	825.80
16	241.10	830.98
17	249.50	836.40
18	257.75	842.05
19	265.83	847.94
20	273.75	854.05
21	277.65	857.25

Circle Center At X = 54.31 ; Y = 1129.86 ; and Radius = 352.45
Factor of Safety
*** 1.714 ***
Individual data on the 25 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.9	2065.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	9.8	5988.2	0.0	0.0	0.	0.	0.0	0.0	0.0
3	9.8	9509.4	0.0	0.0	0.	0.	0.0	0.0	0.0
4	9.7	12623.3	0.0	0.0	0.	0.	0.0	0.0	0.0
5	9.7	15326.5	0.0	0.0	0.	0.	0.0	0.0	0.0
6	2.0	3562.9	0.0	0.0	0.	0.	0.0	0.0	0.0
7	6.0	9984.2	0.0	0.0	0.	0.	0.0	0.0	0.0
8	1.5	2434.4	0.0	0.0	0.	0.	0.0	0.0	0.0
9	9.5	16077.7	0.0	0.0	0.	0.	0.0	0.0	0.0
10	9.4	17583.3	0.0	0.0	0.	0.	0.0	0.0	0.0
11	9.3	18688.9	0.0	0.0	0.	0.	0.0	0.0	0.0
12	9.2	19401.8	0.0	0.0	0.	0.	0.0	0.0	0.0
13	9.1	19731.5	0.0	0.0	0.	0.	0.0	0.0	0.0
14	4.0	8673.6	0.0	0.0	0.	0.	0.0	0.0	0.0
15	5.0	10262.2	0.0	0.0	0.	0.	0.0	0.0	0.0
16	7.0	11714.5	0.0	0.0	0.	0.	0.0	0.0	0.0
17	1.8	2678.6	0.0	0.0	0.	0.	0.0	0.0	0.0
18	8.7	12283.0	0.0	0.0	0.	0.	0.0	0.0	0.0
19	8.6	11317.1	0.0	0.0	0.	0.	0.0	0.0	0.0
20	8.4	10049.5	0.0	0.0	0.	0.	0.0	0.0	0.0
21	8.2	8500.8	0.0	0.0	0.	0.	0.0	0.0	0.0
22	8.1	6693.6	0.0	0.0	0.	0.	0.0	0.0	0.0
23	7.9	4651.6	0.0	0.0	0.	0.	0.0	0.0	0.0
24	0.3	115.3	0.0	0.0	0.	0.	0.0	0.0	0.0
25	3.7	818.8	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	101.03	780.52
2	111.02	781.11
3	120.97	782.08

```
    4        130.88      783.41
    5        140.73      785.12
    6        150.52      787.19
    7        160.22      789.63
    8        169.82      792.43
    9        179.31      795.58
   10        188.67      799.09
   11        197.90      802.94
   12        206.98      807.14
   13        215.89      811.67
   14        224.63      816.53
   15        233.18      821.71
   16        241.53      827.22
   17        249.67      833.02
   18        257.59      839.13
   19        265.27      845.53
   20        272.71      852.21
   21        277.87      857.21
Circle Center At X =    90.15 ; Y =  1047.98 ; and Radius =   267.68
       Factor of Safety
      ***   1.715   ***
Failure Surface Specified By 21 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        102.41      781.21
    2        112.37      782.20
    3        122.28      783.50
    4        132.15      785.11
    5        141.96      787.02
    6        151.71      789.25
    7        161.39      791.78
    8        170.98      794.61
    9        180.48      797.74
   10        189.87      801.17
   11        199.15      804.89
   12        208.31      808.90
   13        217.35      813.19
   14        226.24      817.76
   15        234.98      822.61
   16        243.57      827.74
   17        251.99      833.13
   18        260.25      838.78
   19        268.31      844.68
   20        276.19      850.84
   21        282.66      856.22
Circle Center At X =    75.86 ; Y =  1099.15 ; and Radius =   319.05
       Factor of Safety
      ***   1.716   ***
Failure Surface Specified By 21 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        103.79      781.90
    2        113.68      783.43
    3        123.51      785.22
    4        133.30      787.27
    5        143.03      789.57
    6        152.70      792.13
    7        162.30      794.94
    8        171.82      798.00
    9        181.26      801.30
   10        190.60      804.86
   11        199.85      808.66
   12        209.00      812.69
   13        218.04      816.97
   14        226.96      821.48
   15        235.77      826.23
   16        244.44      831.20
```



```
   17        252.98      836.40
   18        261.39      841.82
   19        269.65      847.46
   20        277.75      853.32
   21        281.80      856.40
Circle Center At X =    50.27 ; Y =  1159.83 ; and Radius =   381.70
       Factor of Safety
      ***   1.722   ***
Failure Surface Specified By 21 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        106.55      783.28
    2        116.50      784.33
    3        126.40      785.71
    4        136.25      787.42
    5        146.05      789.44
    6        155.77      791.78
    7        165.41      794.44
    8        174.96      797.41
    9        184.41      800.69
   10        193.74      804.27
   11        202.96      808.16
   12        212.04      812.34
   13        220.98      816.82
   14        229.77      821.59
   15        238.40      826.64
   16        246.86      831.97
   17        255.14      837.57
   18        263.24      843.44
   19        271.14      849.57
   20        278.84      855.96
   21        279.80      856.81
Circle Center At X =    79.07 ; Y =  1088.95 ; and Radius =   306.91
       Factor of Safety
      ***   1.723   ***
Failure Surface Specified By 21 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        103.79      781.90
    2        113.79      782.29
    3        123.75      783.08
    4        133.68      784.26
    5        143.56      785.83
    6        153.37      787.79
    7        163.09      790.14
    8        172.71      792.86
    9        182.22      795.96
   10        191.60      799.43
   11        200.83      803.27
   12        209.90      807.47
   13        218.81      812.02
   14        227.53      816.92
   15        236.04      822.16
   16        244.35      827.73
   17        252.43      833.63
   18        260.27      839.83
   19        267.86      846.34
   20        275.19      853.15
   21        279.00      856.97
Circle Center At X =    98.72 ; Y =  1035.87 ; and Radius =   254.02
       Factor of Safety
      ***   1.727   ***
Failure Surface Specified By 20 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        106.55      783.28
    2        116.52      784.07
```

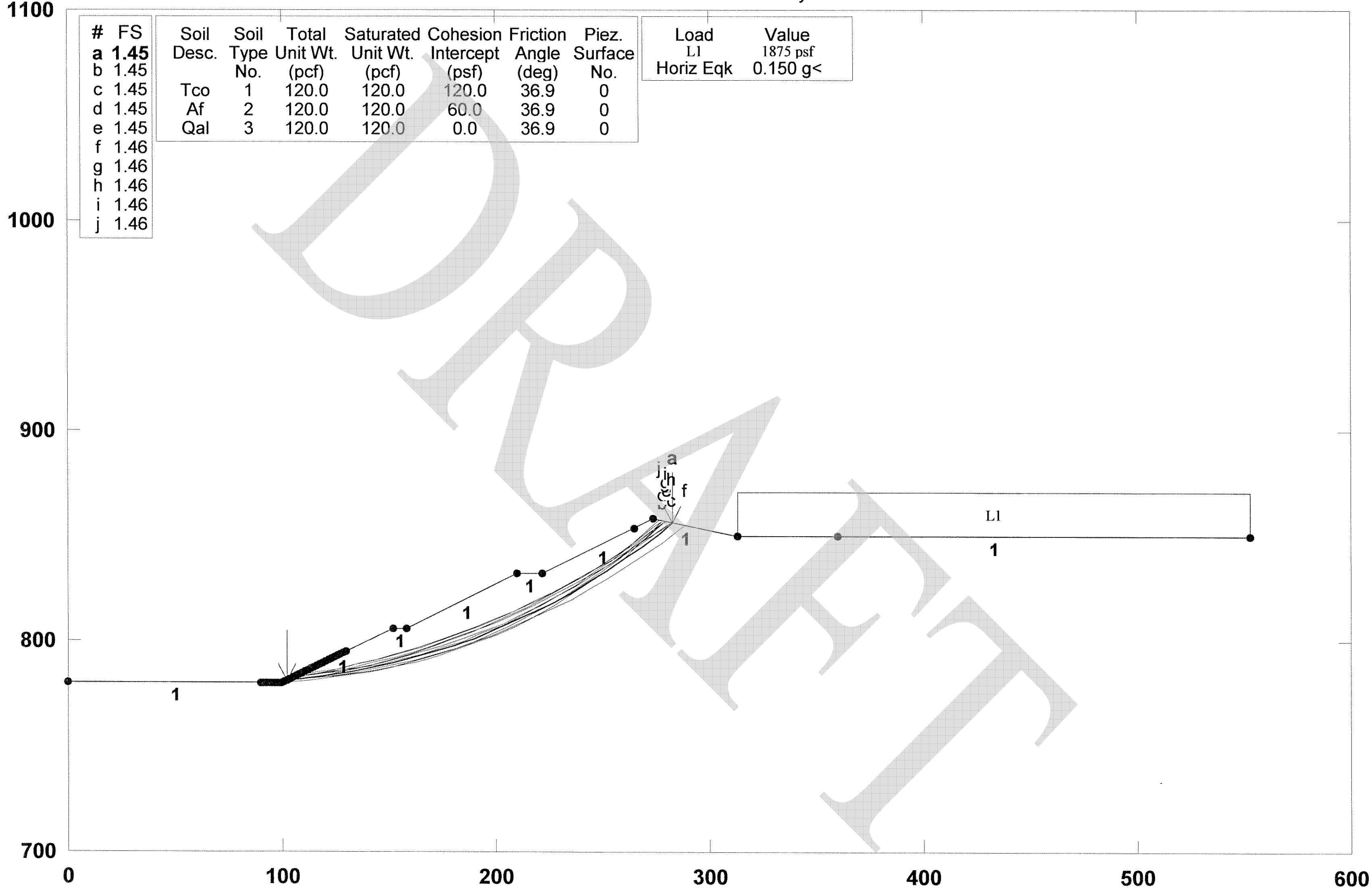
```
   3        126.45      785.23
   4        136.34      786.76
   5        146.16      788.65
   6        155.90      790.90
   7        165.55      793.51
   8        175.10      796.48
   9        184.53      799.80
  10        193.84      803.47
  11        203.00      807.47
  12        212.01      811.82
  13        220.85      816.49
  14        229.51      821.49
  15        237.98      826.80
  16        246.25      832.42
  17        254.31      838.35
  18        262.14      844.57
  19        269.73      851.07
  20        276.65      857.46
Circle Center At X =    90.14 ; Y =  1053.02 ; and Radius =   270.24
       Factor of Safety
      ***    1.729   ***
Failure Surface Specified By 21 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
   1        102.41      781.21
   2        112.30      782.74
   3        122.13      784.57
   4        131.90      786.67
   5        141.61      789.07
   6        151.25      791.74
   7        160.80      794.69
   8        170.27      797.91
   9        179.64      801.41
  10        188.90      805.18
  11        198.05      809.22
  12        207.08      813.52
  13        215.98      818.08
  14        224.74      822.90
  15        233.36      827.97
  16        241.83      833.29
  17        250.14      838.85
  18        258.28      844.65
  19        266.26      850.69
  20        274.05      856.95
  21        275.03      857.79
Circle Center At X =    54.43 ; Y =  1122.28 ; and Radius =   344.43
       Factor of Safety
      ***    1.730   ***
Failure Surface Specified By 20 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
   1        106.55      783.28
   2        116.42      784.88
   3        126.25      786.75
   4        136.02      788.88
   5        145.73      791.27
   6        155.37      793.93
   7        164.93      796.85
   8        174.42      800.02
   9        183.81      803.45
  10        193.11      807.13
  11        202.30      811.06
  12        211.39      815.23
  13        220.36      819.65
  14        229.21      824.31
  15        237.93      829.21
  16        246.51      834.34
```



```
  17        254.95      839.70
  18        263.25      845.29
  19        271.39      851.10
  20        279.13      856.95
Circle Center At X =    52.13 ; Y =  1149.74 ; and Radius =   370.48
       Factor of Safety
      ***    1.731   ***
Failure Surface Specified By 21 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
   1        103.79      781.90
   2        113.79      782.16
   3        123.77      782.85
   4        133.71      783.94
   5        143.59      785.45
   6        153.41      787.37
   7        163.13      789.69
   8        172.76      792.41
   9        182.26      795.53
  10        191.62      799.04
  11        200.83      802.94
  12        209.87      807.22
  13        218.72      811.86
  14        227.38      816.88
  15        235.82      822.24
  16        244.02      827.95
  17        251.99      834.00
  18        259.70      840.37
  19        267.13      847.06
  20        274.28      854.05
  21        277.36      857.31
Circle Center At X =   102.34 ; Y =  1022.85 ; and Radius =   240.96
       Factor of Safety
      ***    1.732   ***
          **** END OF GSTABL7 OUTPUT ****
```

Lake Forest Sport Park 100 Scale, Section A-A', Pseudo, Upper Slope (Cut)

M:\2009PR~1\091069~1\ENGINE~1\AA'1P1.PL2 Run By: Username 3/25/2010 6:43PM



#	FS
a	**1.45**
b	1.45
c	1.45
d	1.45
e	1.45
f	1.46
g	1.46
h	1.46
i	1.46
j	1.46

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Tco	1	120.0	120.0	120.0	36.9	0
Af	2	120.0	120.0	60.0	36.9	0
Qal	3	120.0	120.0	0.0	36.9	0

Load	Value
L1	1875 psf
Horiz Eqk	0.150 g<

GSTABL7 v.2 FSmin=1.45
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **
** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **

****
SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static Earthquake, and Applied Force Options.
****

Analysis Run Date: 3/25/2010
Time of Run: 6:43PM
Run By: Username
Input Data Filename: M:aa'1p1.
Output Filename: M:aa'1p1.OUT
Unit System: English
Plotted Output Filename: M:aa'1p1.PLT
PROBLEM DESCRIPTION: Lake Forest Sport Park 100 Scale,
Section A-A', Pseudo, Upper Slope (Cut)

BOUNDARY COORDINATES
8 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	780.00	100.00	780.00	1
2	100.00	780.00	152.00	806.00	1
3	152.00	806.00	158.00	806.00	1
4	158.00	806.00	210.00	832.00	1
5	210.00	832.00	222.00	832.00	1
6	222.00	832.00	274.00	858.00	1
7	274.00	858.00	313.00	850.00	1
8	313.00	850.00	553.00	850.00	1

User Specified Y-Origin = 700.00(ft)

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	120.0	36.9	0.00	0.0	0
2	120.0	120.0	60.0	36.9	0.00	0.0	0
3	120.0	120.0	0.0	36.9	0.00	0.0	0

BOUNDARY LOAD(S)
1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	313.00	553.00	1875.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.
A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned
A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned
Cavitation Pressure = 0.0(psf)
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
6000 Trial Surfaces Have Been Generated.
200 Surface(s) Initiate(s) From Each Of 30 Points Equally Spaced
Along The Ground Surface Between X = 90.00(ft)
and X = 130.00(ft)
Each Surface Terminates Between X = 265.00(ft)
and X = 360.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Evaluated = 6000
Number of Trial Failure Surfaces is Greater Than 5000.
Statistical Data on FS Values are Not Generated.
To Generate Stastical Data, Reduce Number of Trial
Failure Surfaces to 5000 or less.
Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	102.41	781.21
2	112.37	782.20
3	122.28	783.50
4	132.15	785.11
5	141.96	787.02
6	151.71	789.25
7	161.39	791.78
8	170.98	794.61
9	180.48	797.74
10	189.87	801.17
11	199.15	804.89
12	208.31	808.90
13	217.35	813.19
14	226.24	817.76
15	234.98	822.61
16	243.57	827.74
17	251.99	833.13
18	260.25	838.78
19	268.31	844.68
20	276.19	850.84
21	282.66	856.22

Circle Center At X = 75.86 ; Y = 1099.15 ; and Radius = 319.05
Factor of Safety
*** 1.445 ***
Individual data on the 25 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	2380.4	0.0	0.0	0.	0.	357.1	0.0	0.0
2	9.9	6919.8	0.0	0.0	0.	0.	1038.0	0.0	0.0
3	9.9	11022.9	0.0	0.0	0.	0.	1653.4	0.0	0.0
4	9.8	14678.9	0.0	0.0	0.	0.	2201.8	0.0	0.0
5	9.7	17879.9	0.0	0.0	0.	0.	2682.0	0.0	0.0
6	0.3	571.9	0.0	0.0	0.	0.	85.8	0.0	0.0
7	6.0	11442.1	0.0	0.0	0.	0.	1716.3	0.0	0.0
8	3.4	6307.1	0.0	0.0	0.	0.	946.1	0.0	0.0
9	9.6	19447.4	0.0	0.0	0.	0.	2917.1	0.0	0.0
10	9.5	21299.0	0.0	0.0	0.	0.	3194.8	0.0	0.0
11	9.4	22696.6	0.0	0.0	0.	0.	3404.5	0.0	0.0
12	9.3	23647.0	0.0	0.0	0.	0.	3547.0	0.0	0.0
13	9.2	24159.6	0.0	0.0	0.	0.	3623.9	0.0	0.0
14	1.7	4505.8	0.0	0.0	0.	0.	675.9	0.0	0.0
15	7.3	18121.8	0.0	0.0	0.	0.	2718.3	0.0	0.0
16	4.7	9836.5	0.0	0.0	0.	0.	1475.5	0.0	0.0
17	4.2	8334.1	0.0	0.0	0.	0.	1250.1	0.0	0.0
18	8.7	16911.1	0.0	0.0	0.	0.	2536.7	0.0	0.0
19	8.6	15935.1	0.0	0.0	0.	0.	2390.3	0.0	0.0
20	8.4	14615.4	0.0	0.0	0.	0.	2192.3	0.0	0.0
21	8.3	12977.0	0.0	0.0	0.	0.	1946.5	0.0	0.0
22	8.1	11047.2	0.0	0.0	0.	0.	1657.1	0.0	0.0
23	5.7	6599.8	0.0	0.0	0.	0.	990.0	0.0	0.0
24	2.2	2051.8	0.0	0.0	0.	0.	307.8	0.0	0.0
25	6.5	2601.3	0.0	0.0	0.	0.	390.2	0.0	0.0

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	101.03	780.52
2	110.93	781.98
3	120.77	783.73
4	130.57	785.76
5	140.30	788.06
6	149.96	790.63
7	159.54	793.48
8	169.05	796.61
9	178.45	799.99
10	187.76	803.65
11	196.96	807.57
12	206.05	811.74
13	215.01	816.18
14	223.85	820.86
15	232.54	825.80
16	241.10	830.98
17	249.50	836.40
18	257.75	842.05
19	265.83	847.94
20	273.75	854.05
21	277.65	857.25

Circle Center At X = 54.31 ; Y = 1129.86 ; and Radius = 352.45

Factor of Safety

*** 1.447 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	103.79	781.90
2	113.68	783.43
3	123.51	785.22
4	133.30	787.27
5	143.03	789.57
6	152.70	792.13
7	162.30	794.94
8	171.82	798.00
9	181.26	801.30
10	190.60	804.86
11	199.85	808.66
12	209.00	812.69
13	218.04	816.97
14	226.96	821.48
15	235.77	826.23
16	244.44	831.20
17	252.98	836.40
18	261.39	841.82
19	269.65	847.46
20	277.75	853.32
21	281.80	856.40

Circle Center At X = 50.27 ; Y = 1159.83 ; and Radius = 381.70

Factor of Safety

*** 1.450 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	101.03	780.52
2	111.02	781.11
3	120.97	782.08
4	130.88	783.41
5	140.73	785.12
6	150.52	787.19
7	160.22	789.63
8	169.82	792.43
9	179.31	795.58
10	188.67	799.09
11	197.90	802.94

12	206.98	807.14
13	215.89	811.67
14	224.63	816.53
15	233.18	821.71
16	241.53	827.22
17	249.67	833.02
18	257.59	839.13
19	265.27	845.53
20	272.71	852.21
21	277.87	857.21

Circle Center At X = 90.15 ; Y = 1047.98 ; and Radius = 267.68

Factor of Safety

*** 1.450 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	106.55	783.28
2	116.50	784.33
3	126.40	785.71
4	136.25	787.42
5	146.05	789.44
6	155.77	791.78
7	165.41	794.44
8	174.96	797.41
9	184.41	800.69
10	193.74	804.27
11	202.96	808.16
12	212.04	812.34
13	220.98	816.82
14	229.77	821.59
15	238.40	826.64
16	246.86	831.97
17	255.14	837.57
18	263.24	843.44
19	271.14	849.57
20	278.84	855.96
21	279.80	856.81

Circle Center At X = 79.07 ; Y = 1088.95 ; and Radius = 306.91

Factor of Safety

*** 1.453 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	102.41	781.21
2	112.38	782.06
3	122.31	783.21
4	132.21	784.66
5	142.05	786.42
6	151.84	788.47
7	161.56	790.81
8	171.20	793.45
9	180.76	796.38
10	190.23	799.60
11	199.60	803.11
12	208.85	806.90
13	217.99	810.96
14	227.00	815.30
15	235.87	819.92
16	244.60	824.80
17	253.18	829.94
18	261.59	835.34
19	269.84	840.99
20	277.92	846.89
21	285.81	853.03
22	288.27	855.07

Circle Center At X = 79.41 ; Y = 1109.86 ; and Radius = 329.45

Factor of Safety

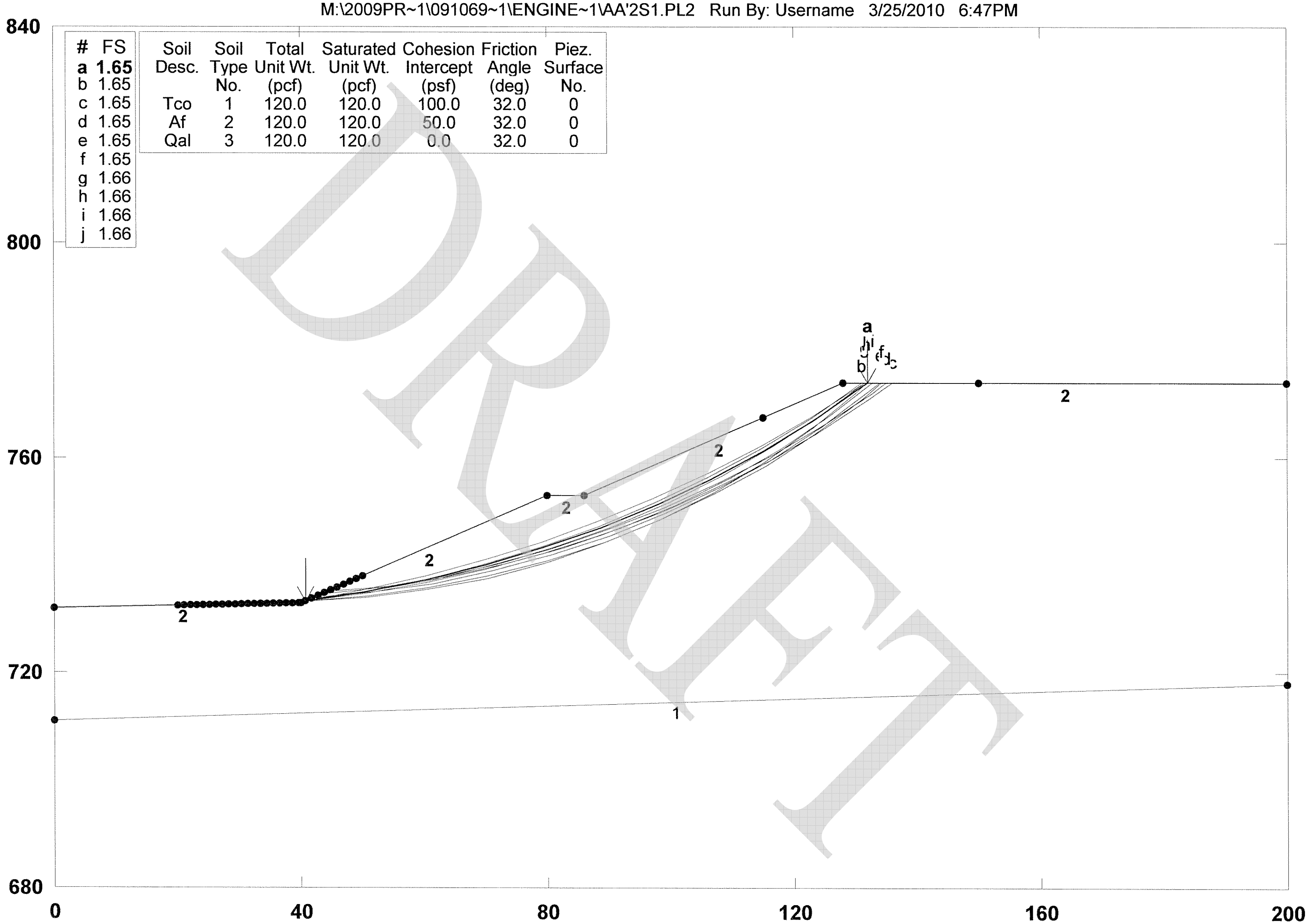
```
      ***     1.458    ***
 Failure Surface Specified By 21 Coordinate Points
   Point      X-Surf       Y-Surf
    No.        (ft)         (ft)
     1        103.79       781.90
     2        113.79       782.29
     3        123.75       783.08
     4        133.68       784.26
     5        143.56       785.83
     6        153.37       787.79
     7        163.09       790.14
     8        172.71       792.86
     9        182.22       795.96
    10        191.60       799.43
    11        200.83       803.27
    12        209.90       807.47
    13        218.81       812.02
    14        227.53       816.92
    15        236.04       822.16
    16        244.35       827.73
    17        252.43       833.63
    18        260.27       839.83
    19        267.86       846.34
    20        275.19       853.15
    21        279.00       856.97
 Circle Center At X =    98.72 ; Y =  1035.87 ; and Radius =   254.02
        Factor of Safety
      ***     1.459    ***
 Failure Surface Specified By 21 Coordinate Points
   Point      X-Surf       Y-Surf
    No.        (ft)         (ft)
     1        103.79       781.90
     2        113.62       783.77
     3        123.39       785.87
     4        133.12       788.18
     5        142.80       790.71
     6        152.41       793.46
     7        161.97       796.42
     8        171.45       799.59
     9        180.86       802.97
    10        190.19       806.56
    11        199.44       810.36
    12        208.61       814.37
    13        217.68       818.57
    14        226.65       822.98
    15        235.53       827.59
    16        244.30       832.40
    17        252.96       837.40
    18        261.50       842.59
    19        269.93       847.97
    20        278.24       853.54
    21        282.19       856.32
 Circle Center At X =    24.65 ; Y =  1222.78 ; and Radius =   447.93
        Factor of Safety
      ***     1.459    ***
 Failure Surface Specified By 20 Coordinate Points
   Point      X-Surf       Y-Surf
    No.        (ft)         (ft)
     1        106.55       783.28
     2        116.42       784.88
     3        126.25       786.75
     4        136.02       788.88
     5        145.73       791.27
     6        155.37       793.93
     7        164.93       796.85
     8        174.42       800.02
     9        183.81       803.45
```



```
    10        193.11       807.13
    11        202.30       811.06
    12        211.39       815.23
    13        220.36       819.65
    14        229.21       824.31
    15        237.93       829.21
    16        246.51       834.34
    17        254.95       839.70
    18        263.25       845.29
    19        271.39       851.10
    20        279.13       856.95
 Circle Center At X =    52.13 ; Y =  1149.74 ; and Radius =   370.48
        Factor of Safety
      ***     1.460    ***
 Failure Surface Specified By 20 Coordinate Points
   Point      X-Surf       Y-Surf
    No.        (ft)         (ft)
     1        106.55       783.28
     2        116.52       784.07
     3        126.45       785.23
     4        136.34       786.76
     5        146.16       788.65
     6        155.90       790.90
     7        165.55       793.51
     8        175.10       796.48
     9        184.53       799.80
    10        193.84       803.47
    11        203.00       807.47
    12        212.01       811.82
    13        220.85       816.49
    14        229.51       821.49
    15        237.98       826.80
    16        246.25       832.42
    17        254.31       838.35
    18        262.14       844.57
    19        269.73       851.07
    20        276.65       857.46
 Circle Center At X =    90.14 ; Y =  1053.02 ; and Radius =   270.24
        Factor of Safety
      ***     1.460    ***
           **** END OF GSTABL7 OUTPUT ****
```

Lake Forest Sport Park 100 Scale, Section A-A', Static, Lower Slope (Fill)

M:\2009PR~1\091069~1\ENGINE~1\AA'2S1.PL2 Run By: Username 3/25/2010 6:47PM



GSTABL7 v.2 FSmin=1.65

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

```
                      ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
  ** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **
           (All Rights Reserved-Unauthorized Use Prohibited)
*********************************************************************************
                  SLOPE STABILITY ANALYSIS SYSTEM
      Modified Bishop, Simplified Janbu, or GLE Method of Slices.
      (Includes Spencer & Morgenstern-Price Type Analysis)
      Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
      Nonlinear Undrained Shear Strength, Curved Phi Envelope,
      Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
      Surfaces, Pseudo-Static Earthquake, and Applied Force Options.
*********************************************************************************
Analysis Run Date:         3/25/2010
Time of Run:               6:47PM
Run By:                    Username
Input Data Filename:       M:aa'2s1.
Output Filename:           M:aa'2s1.OUT
Unit System:               English
Plotted Output Filename:   M:aa'2s1.PLT
PROBLEM DESCRIPTION:  Lake Forest Sport Park 100 Scale,
                      Section A-A', Static, Lower Slope (Fill)
BOUNDARY COORDINATES
    5 Top   Boundaries
    6 Total Boundaries
Boundary     X-Left     Y-Left     X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)      Below Bnd
    1         0.00      732.00      40.00     733.00        2
    2        40.00      733.00      80.00     753.00        2
    3        80.00      753.00      86.00     753.00        2
    4        86.00      753.00     128.00     774.00        2
    5       128.00      774.00     200.00     774.00        2
    6         0.00      711.00     200.00     718.00        1
User Specified Y-Origin =        680.00(ft)
ISOTROPIC SOIL PARAMETERS
 3 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore    Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)   Param.    (psf)     No.
  1   120.0    120.0     100.0      32.0    0.00      0.0       0
  2   120.0    120.0      50.0      32.0    0.00      0.0       0
  3   120.0    120.0       0.0      32.0    0.00      0.0       0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
6000 Trial Surfaces Have Been Generated.
 200 Surface(s) Initiate(s) From Each Of    30 Points Equally Spaced
Along The Ground Surface Between  X =  20.00(ft)
                             and  X =  50.00(ft)
Each Surface Terminates Between   X = 115.00(ft)
                             and  X = 150.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =      0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Evaluated. They Are
      Ordered - Most Critical First.
      * * Safety Factors Are Calculated By The Modified Bishop Method * *
      Total Number of Trial Surfaces Evaluated =  6000
      Number of Trial Failure Surfaces is Greater Than 5000.
      Statistical Data on FS Values are Not Generated.
      To Generate Stastical Data, Reduce Number of Trial
      Failure Surfaces to 5000 or less.
      Failure Surface Specified By 12 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1        40.69       733.35
          2        50.55       735.01
```



```
          3        60.30       737.22
          4        69.92       739.96
          5        79.37       743.22
          6        88.63       747.01
          7        97.66       751.29
          8       106.45       756.07
          9       114.96       761.33
         10       123.16       767.04
         11       131.04       773.20
         12       131.95       774.00
      Circle Center At X =    15.53 ; Y =   912.58 ; and Radius =   181.00
             Factor of Safety
            ***    1.648   ***
            Individual data on the    14  slices
                    Water  Water    Tie      Tie       Earthquake
                    Force  Force   Force    Force        Force    Surcharge
Slice  Width  Weight  Top    Bot    Norm     Tan      Hor     Ver     Load
 No.   (ft)   (lbs)  (lbs)  (lbs)   (lbs)   (lbs)    (lbs)   (lbs)   (lbs)
  1     9.9   1931.5   0.0    0.0     0.      0.      0.0     0.0      0.0
  2     9.8   5383.9   0.0    0.0     0.      0.      0.0     0.0      0.0
  3     9.6   8043.0   0.0    0.0     0.      0.      0.0     0.0      0.0
  4     9.5   9904.7   0.0    0.0     0.      0.      0.0     0.0      0.0
  5     0.6    714.5   0.0    0.0     0.      0.      0.0     0.0      0.0
  6     6.0   5971.8   0.0    0.0     0.      0.      0.0     0.0      0.0
  7     2.6   2268.5   0.0    0.0     0.      0.      0.0     0.0      0.0
  8     9.0   8048.8   0.0    0.0     0.      0.      0.0     0.0      0.0
  9     8.8   7744.1   0.0    0.0     0.      0.      0.0     0.0      0.0
 10     8.5   6792.0   0.0    0.0     0.      0.      0.0     0.0      0.0
 11     8.2   5263.2   0.0    0.0     0.      0.      0.0     0.0      0.0
 12     4.8   2239.1   0.0    0.0     0.      0.      0.0     0.0      0.0
 13     3.0    724.6   0.0    0.0     0.      0.      0.0     0.0      0.0
 14     0.9     43.7   0.0    0.0     0.      0.      0.0     0.0      0.0
      Failure Surface Specified By 12 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1        40.69       733.35
          2        50.54       735.08
          3        60.28       737.35
          4        69.88       740.15
          5        79.30       743.49
          6        88.54       747.33
          7        97.54       751.68
          8       106.29       756.52
          9       114.76       761.84
         10       122.93       767.61
         11       130.76       773.83
         12       130.95       774.00
      Circle Center At X =    14.28 ; Y =   912.51 ; and Radius =   181.10
             Factor of Safety
            ***    1.653   ***
      Failure Surface Specified By 12 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1        40.69       733.35
          2        50.59       734.75
          3        60.40       736.69
          4        70.09       739.18
          5        79.62       742.19
          6        88.98       745.72
          7        98.13       749.76
          8       107.04       754.30
          9       115.69       759.32
         10       124.05       764.81
         11       132.09       770.75
         12       136.03       774.00
      Circle Center At X =    20.33 ; Y =   913.19 ; and Radius =   181.00
             Factor of Safety
```

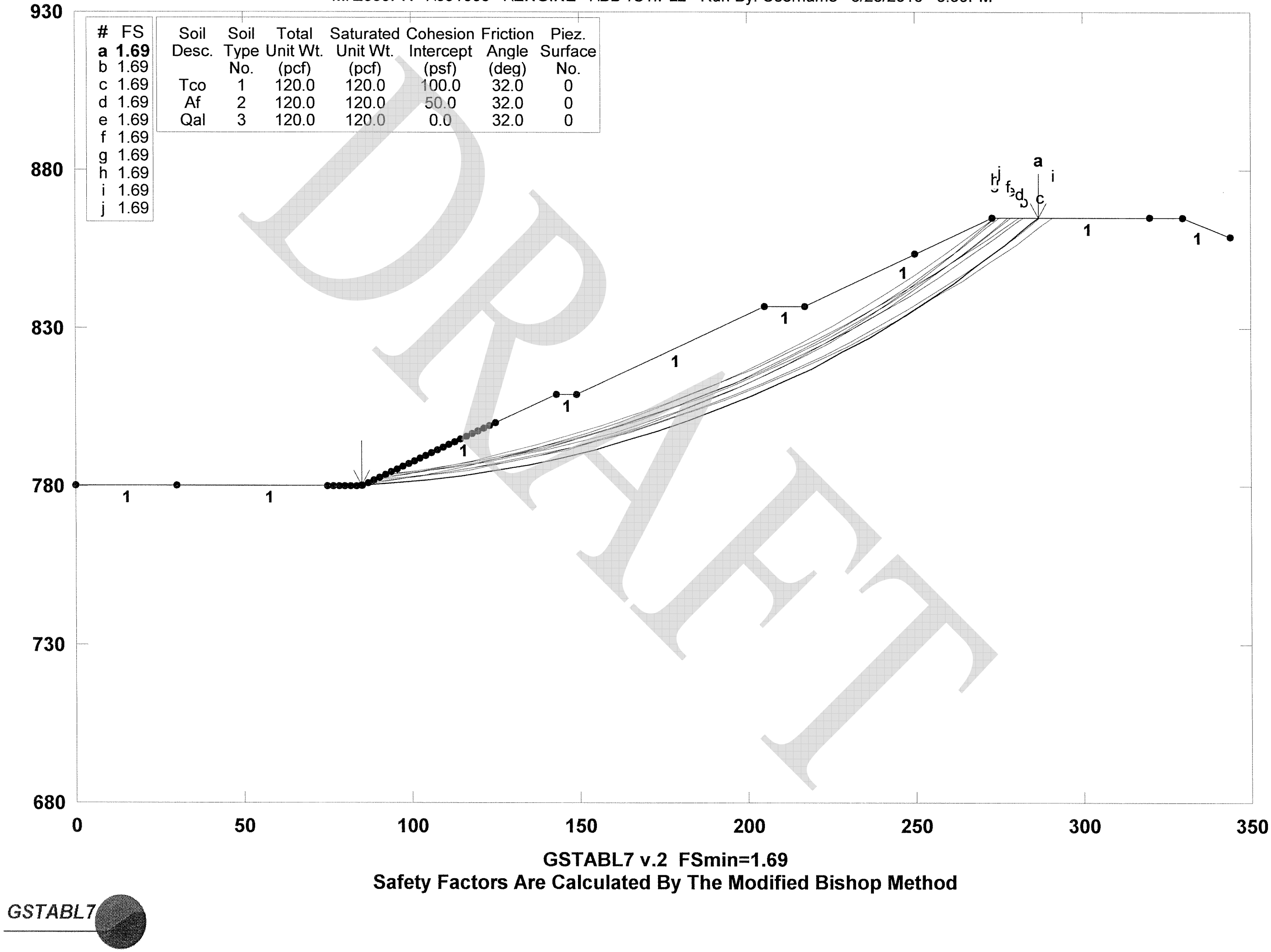
```
        ***    1.653   ***
 Failure Surface Specified By 12 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1         41.72      733.86
     2         51.61      735.34
     3         61.41      737.37
     4         71.07      739.93
     5         80.58      743.03
     6         89.90      746.64
     7         99.01      750.77
     8        107.88      755.40
     9        116.48      760.51
    10        124.78      766.08
    11        132.75      772.11
    12        134.99      774.00
 Circle Center At X =    20.13 ; Y =   912.44 ; and Radius =   179.88
          Factor of Safety
        ***    1.654   ***
 Failure Surface Specified By 12 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1         41.72      733.86
     2         51.67      734.89
     3         61.53      736.57
     4         71.25      738.90
     5         80.80      741.88
     6         90.13      745.48
     7         99.20      749.69
     8        107.97      754.50
     9        116.40      759.87
    10        124.46      765.80
    11        132.10      772.24
    12        133.93      774.00
 Circle Center At X =    31.40 ; Y =   883.56 ; and Radius =   150.05
          Factor of Safety
        ***    1.654   ***
 Failure Surface Specified By 12 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1         40.69      733.35
     2         50.65      734.19
     3         60.54      735.72
     4         70.29      737.92
     5         79.87      740.79
     6         89.23      744.31
     7         98.33      748.46
     8        107.12      753.23
     9        115.56      758.60
    10        123.61      764.53
    11        131.23      771.00
    12        134.32      774.00
 Circle Center At X =    33.54 ; Y =   877.94 ; and Radius =   144.77
          Factor of Safety
        ***    1.655   ***
 Failure Surface Specified By 11 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1         42.76      734.38
     2         52.67      735.70
     3         62.48      737.66
     4         72.14      740.25
     5         81.61      743.46
     6         90.85      747.27
     7         99.83      751.68
     8        108.50      756.66
     9        116.84      762.18
```



```
    10        124.79      768.24
    11        131.43      774.00
 Circle Center At X =    27.31 ; Y =   888.12 ; and Radius =   154.51
          Factor of Safety
        ***    1.656   ***
 Failure Surface Specified By 12 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1         40.69      733.35
     2         50.67      734.02
     3         60.57      735.45
     4         70.33      737.62
     5         79.89      740.54
     6         89.21      744.17
     7         98.22      748.50
     8        106.88      753.51
     9        115.13      759.16
    10        122.93      765.42
    11        130.23      772.25
    12        131.83      774.00
 Circle Center At X =    36.97 ; Y =   864.18 ; and Radius =   130.88
          Factor of Safety
        ***    1.657   ***
 Failure Surface Specified By 11 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1         43.79      734.90
     2         53.73      735.98
     3         63.58      737.74
     4         73.28      740.17
     5         82.79      743.26
     6         92.07      746.99
     7        101.07      751.35
     8        109.75      756.31
     9        118.07      761.86
    10        126.00      767.96
    11        132.83      774.00
 Circle Center At X =    32.93 ; Y =   880.64 ; and Radius =   146.15
          Factor of Safety
        ***    1.660   ***
 Failure Surface Specified By 12 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1         40.69      733.35
     2         50.48      735.40
     3         60.16      737.91
     4         69.70      740.88
     5         79.10      744.31
     6         88.33      748.17
     7         97.36      752.46
     8        106.17      757.18
     9        114.76      762.31
    10        123.09      767.84
    11        131.15      773.76
    12        131.44      774.00
 Circle Center At X =     2.33 ; Y =   940.60 ; and Radius =   210.77
          Factor of Safety
        ***    1.662   ***
              **** END OF GSTABL7 OUTPUT ****
```

Lake Forest Sport Park 100 Scale, Section B-B', Static, Upper Slope (Cut)

M:\2009PR~1\091069~1\ENGINE~1\BB'1S1.PL2   Run By: Username   3/25/2010   6:50PM



GSTABL7 v.2 FSmin=1.69

Safety Factors Are Calculated By The Modified Bishop Method

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **
** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static Earthquake, and Applied Force Options.

Analysis Run Date:	3/25/2010
Time of Run:	6:50PM
Run By:	Username
Input Data Filename:	M:bb'1s1.
Output Filename:	M:bb'1s1.OUT
Unit System:	English
Plotted Output Filename:	M:bb'1s1.PLT
PROBLEM DESCRIPTION:	Lake Forest Sport Park 100 Scale, Section B-B', Static, Upper Slope (Cut)

BOUNDARY COORDINATES
9 Top Boundaries
9 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	780.00	30.00	780.00	1
2	30.00	780.00	85.00	780.00	1
3	85.00	780.00	143.00	809.00	1
4	143.00	809.00	149.00	809.00	1
5	149.00	809.00	205.00	837.00	1
6	205.00	837.00	217.00	837.00	1
7	217.00	837.00	273.00	865.00	1
8	273.00	865.00	330.00	865.00	1
9	330.00	865.00	344.00	859.00	1

User Specified Y-Origin = 680.00(ft)
ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	100.0	32.0	0.00	0.0	0
2	120.0	120.0	50.0	32.0	0.00	0.0	0
3	120.0	120.0	0.0	32.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
6000 Trial Surfaces Have Been Generated.
200 Surface(s) Initiate(s) From Each Of 30 Points Equally Spaced
Along The Ground Surface Between X = 75.00(ft)
and X = 125.00(ft)
Each Surface Terminates Between X = 250.00(ft)
and X = 320.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Evaluated = 6000
Number of Trial Failure Surfaces is Greater Than 5000.
Statistical Data on FS Values are Not Generated.
To Generate Stastical Data, Reduce Number of Trial
Failure Surfaces to 5000 or less.
Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	85.35	780.17
2	95.32	780.88
3	105.27	781.90
4	115.18	783.22
5	125.05	784.84
6	134.86	786.77
7	144.61	789.00
8	154.28	791.53
9	163.88	794.35
10	173.38	797.46
11	182.78	800.87
12	192.07	804.57
13	201.25	808.54
14	210.30	812.80
15	219.21	817.33
16	227.98	822.14
17	236.60	827.21
18	245.06	832.55
19	253.35	838.14
20	261.46	843.99
21	269.39	850.08
22	277.13	856.41
23	284.67	862.98
24	286.86	865.00

Circle Center At X = 67.31 ; Y = 1104.79 ; and Radius = 325.12
Factor of Safety
*** 1.686 ***
Individual data on the 28 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	2560.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	9.9	7469.5	0.0	0.0	0.	0.	0.0	0.0	0.0
3	9.9	11958.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	9.9	16015.0	0.0	0.0	0.	0.	0.0	0.0	0.0
5	9.8	19628.1	0.0	0.0	0.	0.	0.0	0.0	0.0
6	8.1	18815.7	0.0	0.0	0.	0.	0.0	0.0	0.0
7	1.6	3897.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	4.4	10236.6	0.0	0.0	0.	0.	0.0	0.0	0.0
9	5.3	12356.4	0.0	0.0	0.	0.	0.0	0.0	0.0
10	9.6	24294.1	0.0	0.0	0.	0.	0.0	0.0	0.0
11	9.5	26120.4	0.0	0.0	0.	0.	0.0	0.0	0.0
12	9.4	27497.3	0.0	0.0	0.	0.	0.0	0.0	0.0
13	9.3	28431.0	0.0	0.0	0.	0.	0.0	0.0	0.0
14	9.2	28930.1	0.0	0.0	0.	0.	0.0	0.0	0.0
15	3.8	11988.4	0.0	0.0	0.	0.	0.0	0.0	0.0
16	5.3	16176.4	0.0	0.0	0.	0.	0.0	0.0	0.0
17	6.7	18091.7	0.0	0.0	0.	0.	0.0	0.0	0.0
18	2.2	5513.1	0.0	0.0	0.	0.	0.0	0.0	0.0
19	8.8	21636.8	0.0	0.0	0.	0.	0.0	0.0	0.0
20	8.6	20649.7	0.0	0.0	0.	0.	0.0	0.0	0.0
21	8.5	19317.4	0.0	0.0	0.	0.	0.0	0.0	0.0
22	8.3	17663.5	0.0	0.0	0.	0.	0.0	0.0	0.0
23	8.1	15714.0	0.0	0.0	0.	0.	0.0	0.0	0.0
24	7.9	13496.6	0.0	0.0	0.	0.	0.0	0.0	0.0
25	3.6	5432.8	0.0	0.0	0.	0.	0.0	0.0	0.0
26	4.1	5096.3	0.0	0.0	0.	0.	0.0	0.0	0.0
27	7.5	4803.4	0.0	0.0	0.	0.	0.0	0.0	0.0
28	2.2	265.4	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.52	782.76
2	100.42	784.14
3	110.28	785.79

```
     4        120.10      787.70
     5        129.86      789.86
     6        139.57      792.28
     7        149.20      794.96
     8        158.76      797.89
     9        168.24      801.07
    10        177.64      804.50
    11        186.94      808.18
    12        196.14      812.10
    13        205.23      816.26
    14        214.21      820.66
    15        223.07      825.30
    16        231.80      830.17
    17        240.41      835.27
    18        248.87      840.59
    19        257.19      846.13
    20        265.37      851.89
    21        273.39      857.87
    22        281.25      864.05
    23        282.39      865.00
Circle Center At X =     42.95 ; Y =  1158.75 ; and Radius =   378.99
      Factor of Safety
     ***    1.686   ***
Failure Surface Specified By 23 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
     1         88.79      781.90
     2         98.74      782.94
     3        108.65      784.26
     4        118.52      785.86
     5        128.35      787.73
     6        138.11      789.87
     7        147.82      792.29
     8        157.45      794.98
     9        167.00      797.94
    10        176.47      801.16
    11        185.84      804.64
    12        195.11      808.39
    13        204.28      812.39
    14        213.33      816.65
    15        222.25      821.16
    16        231.05      825.92
    17        239.71      830.92
    18        248.22      836.16
    19        256.59      841.64
    20        264.80      847.34
    21        272.85      853.28
    22        280.73      859.44
    23        287.45      865.00
Circle Center At X =     56.46 ; Y =  1138.24 ; and Radius =   357.81
      Factor of Safety
     ***    1.689   ***
Failure Surface Specified By 23 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
     1         88.79      781.90
     2         98.63      783.70
     3        108.42      785.72
     4        118.17      787.96
     5        127.86      790.42
     6        137.50      793.09
     7        147.07      795.99
     8        156.58      799.09
     9        166.01      802.41
    10        175.36      805.94
    11        184.64      809.68
    12        193.83      813.63
```



```
    13        202.92      817.79
    14        211.92      822.14
    15        220.82      826.70
    16        229.62      831.46
    17        238.31      836.41
    18        246.88      841.56
    19        255.33      846.90
    20        263.67      852.43
    21        271.87      858.14
    22        279.95      864.04
    23        281.20      865.00
Circle Center At X =     13.65 ; Y =  1220.24 ; and Radius =   444.74
      Factor of Safety
     ***    1.691   ***
Failure Surface Specified By 22 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
     1         92.24      783.62
     2        102.15      784.94
     3        112.03      786.54
     4        121.85      788.43
     5        131.61      790.59
     6        141.31      793.02
     7        150.93      795.73
     8        160.48      798.72
     9        169.94      801.97
    10        179.29      805.49
    11        188.55      809.28
    12        197.70      813.32
    13        206.72      817.63
    14        215.62      822.19
    15        224.39      827.00
    16        233.02      832.05
    17        241.50      837.35
    18        249.82      842.89
    19        257.99      848.67
    20        265.98      854.67
    21        273.81      860.90
    22        278.67      865.00
Circle Center At X =     50.81 ; Y =  1132.77 ; and Radius =   351.60
      Factor of Safety
     ***    1.691   ***
Failure Surface Specified By 22 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
     1         92.24      783.62
     2        102.19      784.60
     3        112.11      785.91
     4        121.98      787.53
     5        131.79      789.46
     6        141.53      791.71
     7        151.20      794.27
     8        160.78      797.13
     9        170.26      800.30
    10        179.64      803.78
    11        188.90      807.55
    12        198.04      811.62
    13        207.04      815.98
    14        215.89      820.62
    15        224.59      825.55
    16        233.14      830.75
    17        241.50      836.22
    18        249.69      841.96
    19        257.70      847.96
    20        265.50      854.21
    21        273.10      860.71
    22        277.81      865.00
```

```
Circle Center At X =    66.61 ; Y =  1094.34 ; and Radius =   311.78
      Factor of Safety
     ***   1.692   ***
Failure Surface Specified By 22 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         88.79      781.90
    2         98.75      782.82
    3        108.67      784.07
    4        118.55      785.65
    5        128.36      787.56
    6        138.11      789.80
    7        147.78      792.36
    8        157.35      795.24
    9        166.82      798.44
   10        176.19      801.96
   11        185.42      805.79
   12        194.53      809.92
   13        203.49      814.35
   14        212.30      819.08
   15        220.95      824.11
   16        229.43      829.42
   17        237.72      835.00
   18        245.82      840.87
   19        253.72      847.00
   20        261.41      853.39
   21        268.89      860.03
   22        274.12      865.00
Circle Center At X =    66.30 ; Y =  1080.25 ; and Radius =   299.20
      Factor of Safety
     ***   1.693   ***
Failure Surface Specified By 22 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         85.35      780.17
    2         95.21      781.84
    3        105.02      783.76
    4        114.78      785.93
    5        124.48      788.35
    6        134.12      791.02
    7        143.69      793.93
    8        153.18      797.09
    9        162.58      800.49
   10        171.90      804.12
   11        181.12      808.00
   12        190.23      812.11
   13        199.24      816.45
   14        208.13      821.02
   15        216.91      825.82
   16        225.56      830.84
   17        234.08      836.08
   18        242.46      841.53
   19        250.69      847.20
   20        258.79      853.08
   21        266.72      859.16
   22        273.96      865.00
Circle Center At X =    25.12 ; Y =  1166.17 ; and Radius =   390.67
      Factor of Safety
     ***   1.693   ***
Failure Surface Specified By 24 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         87.07      781.03
    2         97.01      782.14
    3        106.91      783.51
    4        116.78      785.13
    5        126.60      787.02
```



```
    6        136.37      789.16
    7        146.08      791.55
    8        155.72      794.20
    9        165.29      797.09
   10        174.79      800.24
   11        184.19      803.64
   12        193.51      807.27
   13        202.72      811.16
   14        211.83      815.28
   15        220.83      819.64
   16        229.72      824.23
   17        238.48      829.05
   18        247.11      834.10
   19        255.60      839.38
   20        263.96      844.87
   21        272.17      850.58
   22        280.22      856.51
   23        288.12      862.64
   24        291.00      865.00
Circle Center At X =    49.80 ; Y =  1161.18 ; and Radius =   381.97
      Factor of Safety
     ***   1.694   ***
Failure Surface Specified By 22 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         90.52      782.76
    2        100.44      784.01
    3        110.32      785.57
    4        120.14      787.42
    5        129.91      789.56
    6        139.61      792.00
    7        149.23      794.72
    8        158.77      797.74
    9        168.21      801.04
   10        177.54      804.62
   11        186.77      808.48
   12        195.87      812.62
   13        204.85      817.02
   14        213.69      821.70
   15        222.38      826.64
   16        230.93      831.84
   17        239.31      837.29
   18        247.53      842.99
   19        255.57      848.93
   20        263.43      855.12
   21        271.09      861.54
   22        274.99      865.00
Circle Center At X =    53.78 ; Y =  1113.18 ; and Radius =   332.46
      Factor of Safety
     ***   1.694   ***
         **** END OF GSTABL7 OUTPUT ****
```

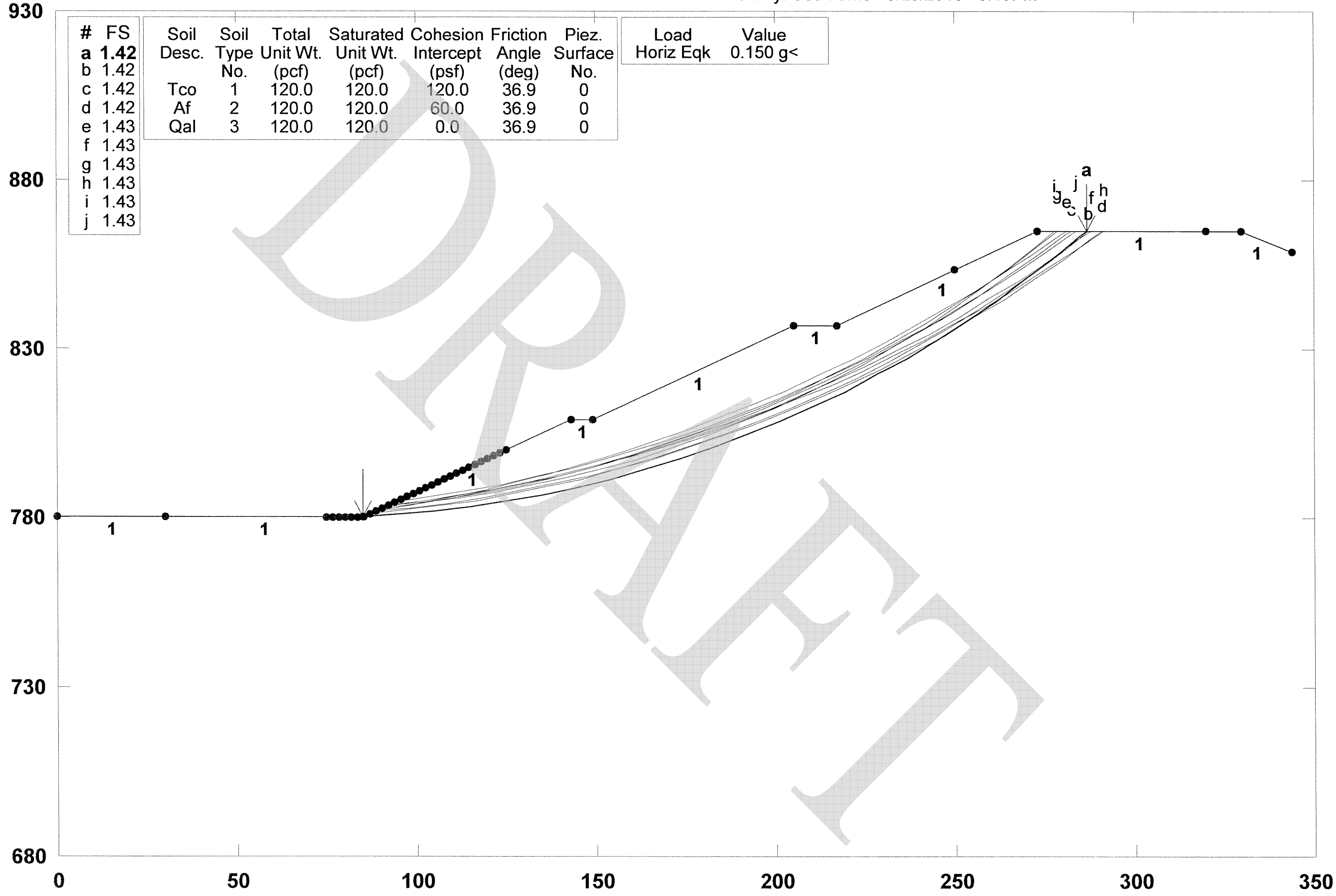
Lake Forest Sport Park 100 Scale, Section B-B', Pseudo, Upper Slope (Cut)

M:\2009PR~1\091069~1\ENGINE~1\BB'1P1.PL2 Run By: Username 3/25/2010 6:49PM

#	FS
a	**1.42**
b	1.42
c	1.42
d	1.42
e	1.43
f	1.43
g	1.43
h	1.43
i	1.43
j	1.43

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Tco	1	120.0	120.0	120.0	36.9	0
Af	2	120.0	120.0	60.0	36.9	0
Qal	3	120.0	120.0	0.0	36.9	0

Load	Value
Horiz Eqk	0.150 g<



GSTABL7 v.2 FSmin=1.42

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static Earthquake, and Applied Force Options.

****

Analysis Run Date: 3/25/2010
Time of Run: 6:49PM
Run By: Username
Input Data Filename: M:bb'1p1.
Output Filename: M:bb'1p1.OUT
Unit System: English
Plotted Output Filename: M:bb'1p1.PLT
PROBLEM DESCRIPTION: Lake Forest Sport Park 100 Scale,
Section B-B', Pseudo, Upper Slope (Cut)

BOUNDARY COORDINATES
9 Top Boundaries
9 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	780.00	30.00	780.00	1
2	30.00	780.00	85.00	780.00	1
3	85.00	780.00	143.00	809.00	1
4	143.00	809.00	149.00	809.00	1
5	149.00	809.00	205.00	837.00	1
6	205.00	837.00	217.00	837.00	1
7	217.00	837.00	273.00	865.00	1
8	273.00	865.00	330.00	865.00	1
9	330.00	865.00	344.00	859.00	1

User Specified Y-Origin = 680.00(ft)
ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	120.0	36.9	0.00	0.0	0
2	120.0	120.0	60.0	36.9	0.00	0.0	0
3	120.0	120.0	0.0	36.9	0.00	0.0	0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned
A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned
Cavitation Pressure = 0.0(psf)
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
6000 Trial Surfaces Have Been Generated.
200 Surface(s) Initiate(s) From Each Of 30 Points Equally Spaced
Along The Ground Surface Between X = 75.00(ft)
and X = 125.00(ft)
Each Surface Terminates Between X = 250.00(ft)
and X = 320.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Evaluated = 6000
Number of Trial Failure Surfaces is Greater Than 5000.

Statistical Data on FS Values are Not Generated.
To Generate Stastical Data, Reduce Number of Trial
Failure Surfaces to 5000 or less.
Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	85.35	780.17
2	95.32	780.88
3	105.27	781.90
4	115.18	783.22
5	125.05	784.84
6	134.86	786.77
7	144.61	789.00
8	154.28	791.53
9	163.88	794.35
10	173.38	797.46
11	182.78	800.87
12	192.07	804.57
13	201.25	808.54
14	210.30	812.80
15	219.21	817.33
16	227.98	822.14
17	236.60	827.21
18	245.06	832.55
19	253.35	838.14
20	261.46	843.99
21	269.39	850.08
22	277.13	856.41
23	284.67	862.98
24	286.86	865.00

Circle Center At X = 67.31 ; Y = 1104.79 ; and Radius = 325.12
Factor of Safety
*** 1.423 ***
Individual data on the 28 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	2560.2	0.0	0.0	0.	0.	384.0	0.0	0.0
2	9.9	7469.5	0.0	0.0	0.	0.	1120.4	0.0	0.0
3	9.9	11958.8	0.0	0.0	0.	0.	1793.8	0.0	0.0
4	9.9	16015.0	0.0	0.0	0.	0.	2402.2	0.0	0.0
5	9.8	19628.1	0.0	0.0	0.	0.	2944.2	0.0	0.0
6	8.1	18815.7	0.0	0.0	0.	0.	2822.4	0.0	0.0
7	1.6	3897.1	0.0	0.0	0.	0.	584.6	0.0	0.0
8	4.4	10236.6	0.0	0.0	0.	0.	1535.5	0.0	0.0
9	5.3	12356.4	0.0	0.0	0.	0.	1853.5	0.0	0.0
10	9.6	24294.1	0.0	0.0	0.	0.	3644.1	0.0	0.0
11	9.5	26120.4	0.0	0.0	0.	0.	3918.1	0.0	0.0
12	9.4	27497.3	0.0	0.0	0.	0.	4124.6	0.0	0.0
13	9.3	28431.0	0.0	0.0	0.	0.	4264.6	0.0	0.0
14	9.2	28930.1	0.0	0.0	0.	0.	4339.5	0.0	0.0
15	3.8	11988.4	0.0	0.0	0.	0.	1798.3	0.0	0.0
16	5.3	16176.4	0.0	0.0	0.	0.	2426.5	0.0	0.0
17	6.7	18091.7	0.0	0.0	0.	0.	2713.8	0.0	0.0
18	2.2	5513.1	0.0	0.0	0.	0.	827.0	0.0	0.0
19	8.8	21636.8	0.0	0.0	0.	0.	3245.5	0.0	0.0
20	8.6	20649.7	0.0	0.0	0.	0.	3097.5	0.0	0.0
21	8.5	19317.4	0.0	0.0	0.	0.	2897.6	0.0	0.0
22	8.3	17663.5	0.0	0.0	0.	0.	2649.5	0.0	0.0
23	8.1	15714.0	0.0	0.0	0.	0.	2357.1	0.0	0.0
24	7.9	13496.6	0.0	0.0	0.	0.	2024.5	0.0	0.0
25	3.6	5432.8	0.0	0.0	0.	0.	814.9	0.0	0.0
26	4.1	5096.3	0.0	0.0	0.	0.	764.5	0.0	0.0
27	7.5	4803.4	0.0	0.0	0.	0.	720.5	0.0	0.0
28	2.2	265.4	0.0	0.0	0.	0.	39.8	0.0	0.0

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	88.79	781.90
2	98.74	782.94
3	108.65	784.26
4	118.52	785.86
5	128.35	787.73
6	138.11	789.87
7	147.82	792.29
8	157.45	794.98
9	167.00	797.94
10	176.47	801.16
11	185.84	804.64
12	195.11	808.39
13	204.28	812.39
14	213.33	816.65
15	222.25	821.16
16	231.05	825.92
17	239.71	830.92
18	248.22	836.16
19	256.59	841.64
20	264.80	847.34
21	272.85	853.28
22	280.73	859.44
23	287.45	865.00

Circle Center At X = 56.46 ; Y = 1138.24 ; and Radius = 357.81
Factor of Safety
*** 1.424 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.52	782.76
2	100.42	784.14
3	110.28	785.79
4	120.10	787.70
5	129.86	789.86
6	139.57	792.28
7	149.20	794.96
8	158.76	797.89
9	168.24	801.07
10	177.64	804.50
11	186.94	808.18
12	196.14	812.10
13	205.23	816.26
14	214.21	820.66
15	223.07	825.30
16	231.80	830.17
17	240.41	835.27
18	248.87	840.59
19	257.19	846.13
20	265.37	851.89
21	273.39	857.87
22	281.25	864.05
23	282.39	865.00

Circle Center At X = 42.95 ; Y = 1158.75 ; and Radius = 378.99
Factor of Safety
*** 1.424 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	87.07	781.03
2	97.01	782.14
3	106.91	783.51
4	116.78	785.13
5	126.60	787.02
6	136.37	789.16
7	146.08	791.55

8	155.72	794.20
9	165.29	797.09
10	174.79	800.24
11	184.19	803.64
12	193.51	807.27
13	202.72	811.16
14	211.83	815.28
15	220.83	819.64
16	229.72	824.23
17	238.48	829.05
18	247.11	834.10
19	255.60	839.38
20	263.96	844.87
21	272.17	850.58
22	280.22	856.51
23	288.12	862.64
24	291.00	865.00

Circle Center At X = 49.80 ; Y = 1161.18 ; and Radius = 381.97
Factor of Safety
*** 1.425 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	88.79	781.90
2	98.63	783.70
3	108.42	785.72
4	118.17	787.96
5	127.86	790.42
6	137.50	793.09
7	147.07	795.99
8	156.58	799.09
9	166.01	802.41
10	175.36	805.94
11	184.64	809.68
12	193.83	813.63
13	202.92	817.79
14	211.92	822.14
15	220.82	826.70
16	229.62	831.46
17	238.31	836.41
18	246.88	841.56
19	255.33	846.90
20	263.67	852.43
21	271.87	858.14
22	279.95	864.04
23	281.20	865.00

Circle Center At X = 13.65 ; Y = 1220.24 ; and Radius = 444.74
Factor of Safety
*** 1.429 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	92.24	783.62
2	102.15	785.00
3	112.01	786.63
4	121.84	788.50
5	131.61	790.62
6	141.33	792.98
7	150.98	795.58
8	160.57	798.43
9	170.08	801.51
10	179.52	804.83
11	188.86	808.38
12	198.12	812.16
13	207.28	816.18
14	216.34	820.42
15	225.28	824.88

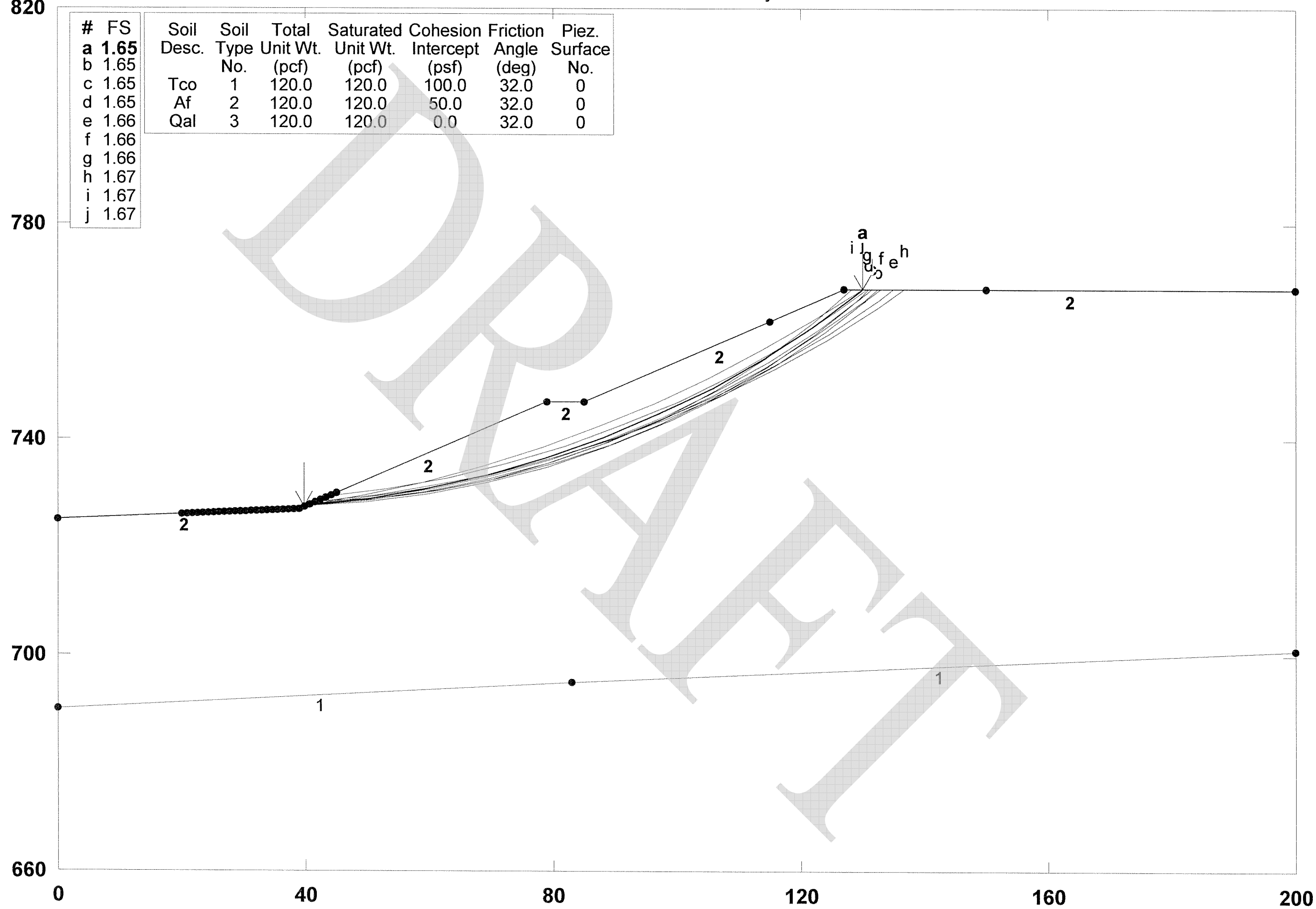
```
  16        234.12      829.57
  17        242.83      834.48
  18        251.42      839.60
  19        259.88      844.93
  20        268.20      850.48
  21        276.38      856.23
  22        284.42      862.18
  23        288.03      865.00
Circle Center At X =    41.85 ; Y =  1181.22 ; and Radius =   400.78
      Factor of Safety
     ***    1.429   ***
Failure Surface Specified By 22 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
   1          92.24      783.62
   2         102.15      784.94
   3         112.03      786.54
   4         121.85      788.43
   5         131.61      790.59
   6         141.31      793.02
   7         150.93      795.73
   8         160.48      798.72
   9         169.94      801.97
  10         179.29      805.49
  11         188.55      809.28
  12         197.70      813.32
  13         206.72      817.63
  14         215.62      822.19
  15         224.39      827.00
  16         233.02      832.05
  17         241.50      837.35
  18         249.82      842.89
  19         257.99      848.67
  20         265.98      854.67
  21         273.81      860.90
  22         278.67      865.00
Circle Center At X =    50.81 ; Y =  1132.77 ; and Radius =   351.60
      Factor of Safety
     ***    1.430   ***
Failure Surface Specified By 23 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
   1          90.52      782.76
   2         100.41      784.21
   3         110.27      785.88
   4         120.09      787.78
   5         129.86      789.91
   6         139.58      792.27
   7         149.24      794.85
   8         158.84      797.66
   9         168.37      800.68
  10         177.83      803.93
  11         187.21      807.40
  12         196.50      811.08
  13         205.71      814.97
  14         214.83      819.08
  15         223.85      823.40
  16         232.77      827.93
  17         241.57      832.66
  18         250.27      837.60
  19         258.85      842.74
  20         267.31      848.07
  21         275.64      853.60
  22         283.84      859.32
  23         291.60      865.00
Circle Center At X =    33.11 ; Y =  1210.08 ; and Radius =   431.16
      Factor of Safety
```



```
     ***    1.431   ***
Failure Surface Specified By 22 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
   1          92.24      783.62
   2         102.19      784.60
   3         112.11      785.91
   4         121.98      787.53
   5         131.79      789.46
   6         141.53      791.71
   7         151.20      794.27
   8         160.78      797.13
   9         170.26      800.30
  10         179.64      803.78
  11         188.90      807.55
  12         198.04      811.62
  13         207.04      815.98
  14         215.89      820.62
  15         224.59      825.55
  16         233.14      830.75
  17         241.50      836.22
  18         249.69      841.96
  19         257.70      847.96
  20         265.50      854.21
  21         273.10      860.71
  22         277.81      865.00
Circle Center At X =    66.61 ; Y =  1094.34 ; and Radius =   311.78
      Factor of Safety
     ***    1.431   ***
Failure Surface Specified By 22 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
   1          93.97      784.48
   2         103.85      786.00
   3         113.69      787.77
   4         123.49      789.79
   5         133.23      792.05
   6         142.91      794.55
   7         152.53      797.29
   8         162.07      800.27
   9         171.54      803.49
  10         180.92      806.95
  11         190.22      810.64
  12         199.42      814.56
  13         208.52      818.71
  14         217.51      823.08
  15         226.39      827.68
  16         235.15      832.50
  17         243.79      837.54
  18         252.30      842.79
  19         260.67      848.26
  20         268.91      853.93
  21         277.00      859.80
  22         283.79      865.00
Circle Center At X =    38.14 ; Y =  1180.13 ; and Radius =   399.57
      Factor of Safety
     ***    1.431   ***
         **** END OF GSTABL7 OUTPUT ****
```

Lake Forest Sport Park 100 Scale, Section B-B', Static, Lower Slope (Fill)

M:\2009PR~1\091069~1\ENGINE~1\BB'2S1.PL2   Run By: Username   3/25/2010   6:55PM



GSTABL7 v.2 FSmin=1.65

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

```
                         ***  GSTABL7  ***
               ** GSTABL7 by Garry H. Gregory, P.E. **
 ** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **
            (All Rights Reserved-Unauthorized Use Prohibited)
*********************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static Earthquake, and Applied Force Options.
*********************************************************************************
Analysis Run Date:         3/25/2010
Time of Run:               6:55PM
Run By:                    Username
Input Data Filename:       M:bb'2s1.
Output Filename:           M:bb'2s1.OUT
Unit System:               English
Plotted Output Filename:   M:bb'2s1.PLT
PROBLEM DESCRIPTION:   Lake Forest Sport Park 100 Scale,
                       Section B-B', Static, Lower Slope (Fill)
BOUNDARY COORDINATES
    5 Top   Boundaries
    7 Total Boundaries
Boundary     X-Left      Y-Left      X-Right     Y-Right     Soil Type
   No.        (ft)        (ft)        (ft)        (ft)       Below Bnd
    1          0.00      725.00       39.00      727.00          2
    2         39.00      727.00       79.00      747.00          2
    3         79.00      747.00       85.00      747.00          2
    4         85.00      747.00      127.00      768.00          2
    5        127.00      768.00      200.00      768.00          2
    6          0.00      690.00       83.00      695.00          1
    7         83.00      695.00      200.00      701.00          1
User Specified Y-Origin =       660.00(ft)
ISOTROPIC SOIL PARAMETERS
  3 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)    Param.    (psf)     No.
  1   120.0    120.0     100.0     32.0    0.00       0.0      0
  2   120.0    120.0      50.0     32.0    0.00       0.0      0
  3   120.0    120.0       0.0     32.0    0.00       0.0      0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
6000 Trial Surfaces Have Been Generated.
 200 Surface(s) Initiate(s) From Each Of    30 Points Equally Spaced
Along The Ground Surface Between  X =  20.00(ft)
                             and  X =  45.00(ft)
Each Surface Terminates Between   X = 115.00(ft)
                            and   X = 150.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =      0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Evaluated. They Are
      Ordered - Most Critical First.
      * * Safety Factors Are Calculated By The Modified Bishop Method * *
      Total Number of Trial Surfaces Evaluated =  6000
      Number of Trial Failure Surfaces is Greater Than 5000.
      Statistical Data on FS Values are Not Generated.
      To Generate Stastical Data, Reduce Number of Trial
      Failure Surfaces to 5000 or less.
      Failure Surface Specified By 12 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1         39.83      727.41
```



```
          2         49.74      728.76
          3         59.54      730.73
          4         69.20      733.32
          5         78.68      736.52
          6         87.93      740.31
          7         96.92      744.68
          8        105.63      749.60
          9        114.00      755.08
         10        122.00      761.07
         11        129.62      767.55
         12        130.08      768.00
      Circle Center At X =    23.59 ; Y =   884.15 ; and Radius =   157.58
             Factor of Safety
           ***    1.648   ***
           Individual data on the    14  slices
                     Water  Water     Tie      Tie       Earthquake
                     Force  Force    Force    Force        Force    Surcharge
Slice  Width  Weight   Top    Bot     Norm     Tan      Hor     Ver     Load
 No.   (ft)   (lbs)   (lbs)  (lbs)   (lbs)    (lbs)    (lbs)   (lbs)   (lbs)
  1    9.9   2144.8    0.0    0.0      0.       0.       0.0     0.0      0.0
  2    9.8   5967.6    0.0    0.0      0.       0.       0.0     0.0      0.0
  3    9.7   8876.1    0.0    0.0      0.       0.       0.0     0.0      0.0
  4    9.5  10858.1    0.0    0.0      0.       0.       0.0     0.0      0.0
  5    0.3    402.7    0.0    0.0      0.       0.       0.0     0.0      0.0
  6    6.0   6567.1    0.0    0.0      0.       0.       0.0     0.0      0.0
  7    2.9   2821.1    0.0    0.0      0.       0.       0.0     0.0      0.0
  8    9.0   8875.7    0.0    0.0      0.       0.       0.0     0.0      0.0
  9    8.7   8350.0    0.0    0.0      0.       0.       0.0     0.0      0.0
 10    8.4   7097.2    0.0    0.0      0.       0.       0.0     0.0      0.0
 11    8.0   5217.2    0.0    0.0      0.       0.       0.0     0.0      0.0
 12    5.0   2132.6    0.0    0.0      0.       0.       0.0     0.0      0.0
 13    2.6    490.8    0.0    0.0      0.       0.       0.0     0.0      0.0
 14    0.5     12.5    0.0    0.0      0.       0.       0.0     0.0      0.0
      Failure Surface Specified By 12 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1         39.83      727.41
          2         49.77      728.49
          3         59.62      730.22
          4         69.34      732.58
          5         78.88      735.57
          6         88.21      739.18
          7         97.28      743.38
          8        106.06      748.17
          9        114.51      753.51
         10        122.59      759.40
         11        130.28      765.80
         12        132.59      768.00
      Circle Center At X =    28.37 ; Y =   879.90 ; and Radius =   152.92
             Factor of Safety
           ***    1.649   ***
      Failure Surface Specified By 12 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1         40.69      727.85
          2         50.63      728.96
          3         60.47      730.74
          4         70.17      733.16
          5         79.69      736.23
          6         88.98      739.93
          7         98.00      744.24
          8        106.72      749.14
          9        115.09      754.61
         10        123.08      760.62
         11        130.65      767.16
         12        131.50      768.00
      Circle Center At X =    29.02 ; Y =   876.99 ; and Radius =   149.60
```

```
      Factor of Safety
     ***    1.651   ***
Failure Surface Specified By 12 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         39.83      727.41
    2         49.80      728.18
    3         59.69      729.68
    4         69.43      731.91
    5         78.99      734.85
    6         88.31      738.48
    7         97.33      742.80
    8        106.01      747.77
    9        114.30      753.36
   10        122.15      759.55
   11        129.52      766.31
   12        131.12      768.00
Circle Center At X =    34.55 ; Y =   862.24 ; and Radius =   134.93
      Factor of Safety
     ***    1.655   ***
Failure Surface Specified By 12 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         41.55      728.28
    2         51.47      729.55
    3         61.30      731.40
    4         71.00      733.83
    5         80.54      736.82
    6         89.89      740.37
    7         99.02      744.46
    8        107.88      749.08
    9        116.47      754.21
   10        124.73      759.84
   11        132.66      765.94
   12        135.03      768.00
Circle Center At X =    25.02 ; Y =   897.02 ; and Radius =   169.56
      Factor of Safety
     ***    1.662   ***
Failure Surface Specified By 12 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         41.55      728.28
    2         51.52      729.08
    3         61.40      730.60
    4         71.15      732.82
    5         80.72      735.74
    6         90.05      739.33
    7         99.11      743.58
    8        107.83      748.46
    9        116.18      753.96
   10        124.12      760.04
   11        131.60      766.68
   12        132.89      768.00
Circle Center At X =    35.37 ; Y =   867.36 ; and Radius =   139.22
      Factor of Safety
     ***    1.662   ***
Failure Surface Specified By 11 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         43.28      729.14
    2         53.16      730.67
    3         62.93      732.80
    4         72.55      735.51
    5         82.00      738.81
    6         91.22      742.66
    7        100.20      747.08
    8        108.89      752.02
```



```
    9        117.26      757.49
   10        125.29      763.45
   11        130.69      768.00
Circle Center At X =    22.98 ; Y =   892.81 ; and Radius =   164.92
      Factor of Safety
     ***    1.663   ***
Failure Surface Specified By 12 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         40.69      727.85
    2         50.60      729.18
    3         60.42      731.05
    4         70.13      733.46
    5         79.69      736.39
    6         89.07      739.84
    7         98.26      743.81
    8        107.21      748.26
    9        115.90      753.20
   10        124.31      758.61
   11        132.42      764.47
   12        136.77      768.00
Circle Center At X =    21.49 ; Y =   908.83 ; and Radius =   182.00
      Factor of Safety
     ***    1.667   ***
Failure Surface Specified By 11 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         40.69      727.85
    2         50.66      728.63
    3         60.53      730.21
    4         70.25      732.56
    5         79.76      735.67
    6         88.99      739.52
    7         97.88      744.09
    8        106.38      749.35
    9        114.45      755.27
   10        122.02      761.80
   11        128.14      768.00
Circle Center At X =    35.73 ; Y =   854.08 ; and Radius =   126.33
      Factor of Safety
     ***    1.668   ***
Failure Surface Specified By 11 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         39.83      727.41
    2         49.60      729.53
    3         59.27      732.09
    4         68.80      735.11
    5         78.18      738.57
    6         87.40      742.46
    7         96.41      746.78
    8        105.22      751.52
    9        113.80      756.66
   10        122.12      762.20
   11        130.01      768.00
Circle Center At X =    -0.40 ; Y =   937.31 ; and Radius =   213.71
      Factor of Safety
     ***    1.668   ***
         **** END OF GSTABL7 OUTPUT ****
```

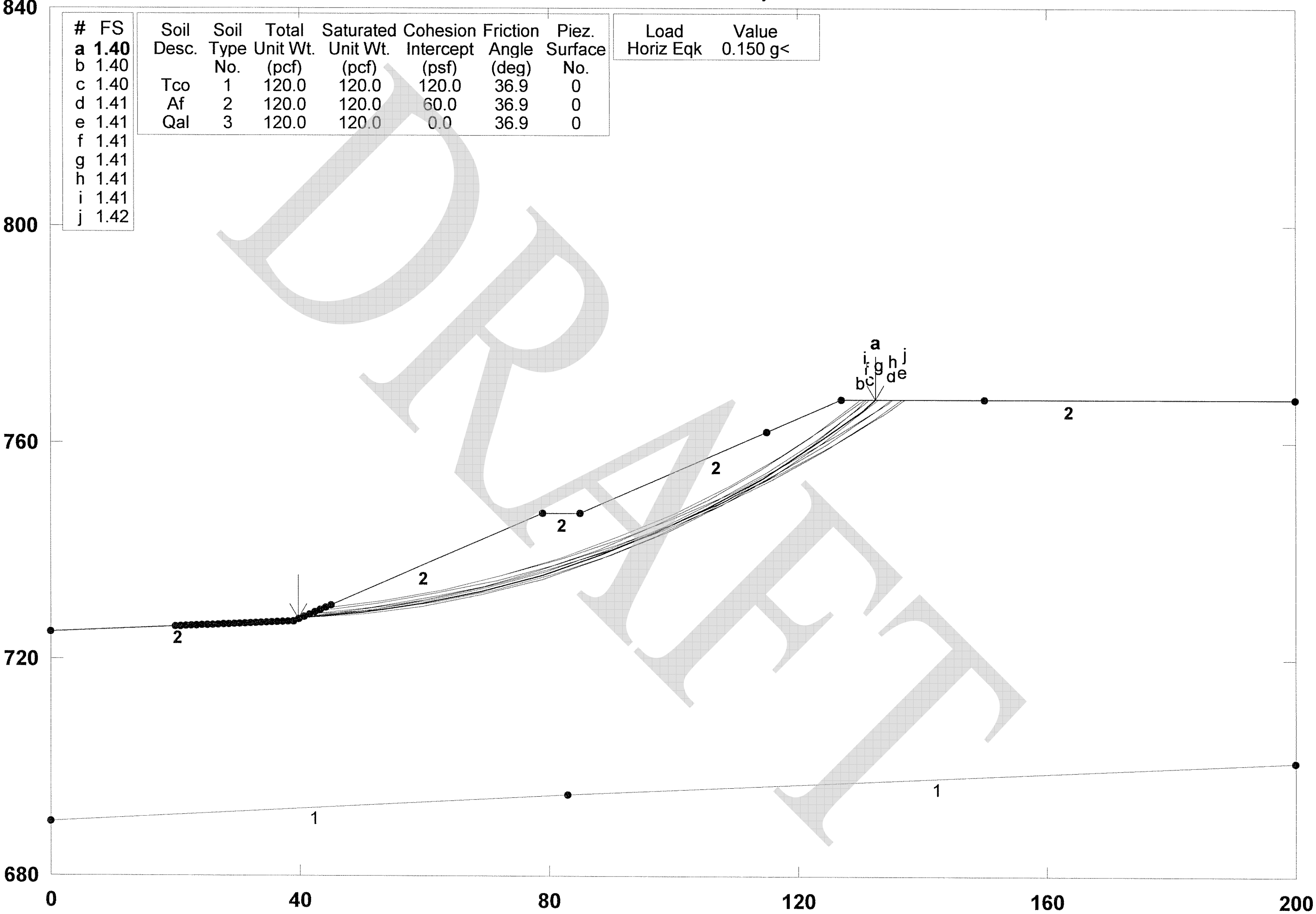
Lake Forest Sport Park 100 Scale, Section B-B', Pseudo, Lower Slope (Fill)

M:\2009PR~1\091069~1\ENGINE~1\BB'2P1.PL2 Run By: Username 3/25/2010 6:54PM

#	FS
a	**1.40**
b	1.40
c	1.40
d	1.41
e	1.41
f	1.41
g	1.41
h	1.41
i	1.41
j	1.42

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Tco	1	120.0	120.0	120.0	36.9	0
Af	2	120.0	120.0	60.0	36.9	0
Qal	3	120.0	120.0	0.0	36.9	0

Load	Value
Horiz Eqk	0.150 g<



GSTABL7 v.2 FSmin=1.40
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **
** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **

****

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static Earthquake, and Applied Force Options.

****

Analysis Run Date: 3/25/2010
Time of Run: 6:54PM
Run By: Username
Input Data Filename: M:bb'2p1.
Output Filename: M:bb'2p1.OUT
Unit System: English
Plotted Output Filename: M:bb'2p1.PLT
PROBLEM DESCRIPTION: Lake Forest Sport Park 100 Scale,
Section B-B', Pseudo, Lower Slope (Fill)

BOUNDARY COORDINATES
5 Top Boundaries
7 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	725.00	39.00	727.00	2
2	39.00	727.00	79.00	747.00	2
3	79.00	747.00	85.00	747.00	2
4	85.00	747.00	127.00	768.00	2
5	127.00	768.00	200.00	768.00	2
6	0.00	690.00	83.00	695.00	1
7	83.00	695.00	200.00	701.00	1

User Specified Y-Origin = 680.00(ft)

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	120.0	36.9	0.00	0.0	0
2	120.0	120.0	60.0	36.9	0.00	0.0	0
3	120.0	120.0	0.0	36.9	0.00	0.0	0

A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned
A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned
Cavitation Pressure = 0.0(psf)
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
6000 Trial Surfaces Have Been Generated.
200 Surface(s) Initiate(s) From Each Of 30 Points Equally Spaced
Along The Ground Surface Between X = 20.00(ft)
and X = 45.00(ft)
Each Surface Terminates Between X = 115.00(ft)
and X = 150.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Evaluated = 6000
Number of Trial Failure Surfaces is Greater Than 5000.
Statistical Data on FS Values are Not Generated.
To Generate Stastical Data, Reduce Number of Trial

Failure Surfaces to 5000 or less.
Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.83	727.41
2	49.77	728.49
3	59.62	730.22
4	69.34	732.58
5	78.88	735.57
6	88.21	739.18
7	97.28	743.38
8	106.06	748.17
9	114.51	753.51
10	122.59	759.40
11	130.28	765.80
12	132.59	768.00

Circle Center At X = 28.37 ; Y = 879.90 ; and Radius = 152.92
Factor of Safety
*** 1.402 ***
Individual data on the 14 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.9	2320.9	0.0	0.0	0.	0.	348.1	0.0	0.0
2	9.9	6490.4	0.0	0.0	0.	0.	973.6	0.0	0.0
3	9.7	9723.8	0.0	0.0	0.	0.	1458.6	0.0	0.0
4	9.5	11998.3	0.0	0.0	0.	0.	1799.7	0.0	0.0
5	0.1	164.8	0.0	0.0	0.	0.	24.7	0.0	0.0
6	6.0	7360.5	0.0	0.0	0.	0.	1104.1	0.0	0.0
7	3.2	3558.0	0.0	0.0	0.	0.	533.7	0.0	0.0
8	9.1	10445.7	0.0	0.0	0.	0.	1566.9	0.0	0.0
9	8.8	10074.9	0.0	0.0	0.	0.	1511.2	0.0	0.0
10	8.5	8926.3	0.0	0.0	0.	0.	1338.9	0.0	0.0
11	8.1	7100.6	0.0	0.0	0.	0.	1065.1	0.0	0.0
12	4.4	2994.3	0.0	0.0	0.	0.	449.1	0.0	0.0
13	3.3	1402.7	0.0	0.0	0.	0.	210.4	0.0	0.0
14	2.3	305.8	0.0	0.0	0.	0.	45.9	0.0	0.0

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	39.83	727.41
2	49.74	728.76
3	59.54	730.73
4	69.20	733.32
5	78.68	736.52
6	87.93	740.31
7	96.92	744.68
8	105.63	749.60
9	114.00	755.08
10	122.00	761.07
11	129.62	767.55
12	130.08	768.00

Circle Center At X = 23.59 ; Y = 884.15 ; and Radius = 157.58
Factor of Safety
*** 1.403 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	40.69	727.85
2	50.63	728.96
3	60.47	730.74
4	70.17	733.16
5	79.69	736.23
6	88.98	739.93
7	98.00	744.24
8	106.72	749.14

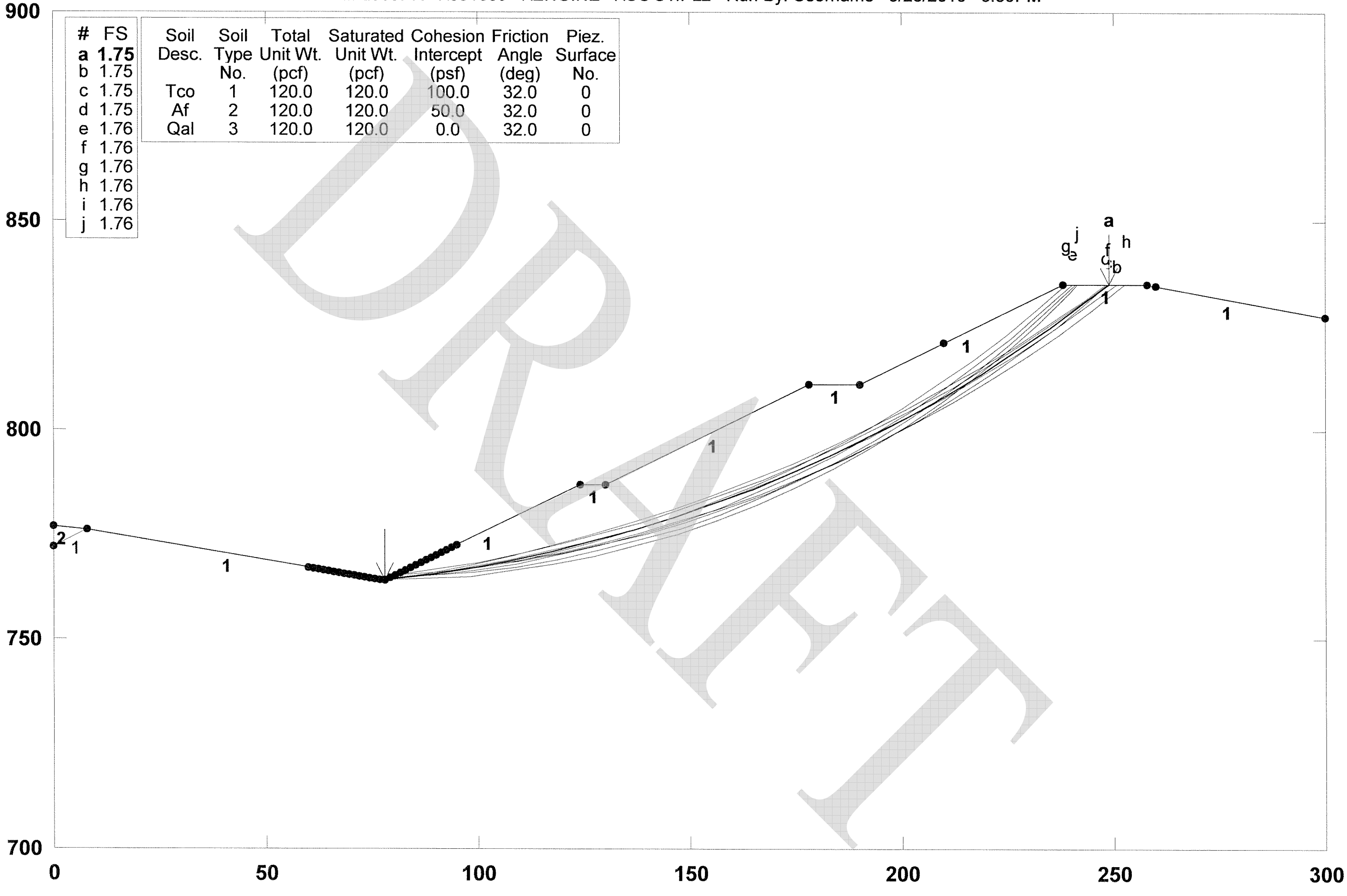
```
    9        115.09      754.61
   10        123.08      760.62
   11        130.65      767.16
   12        131.50      768.00
Circle Center At X =    29.02 ; Y =   876.99 ; and Radius =   149.60
        Factor of Safety
      ***    1.405   ***
Failure Surface Specified By 12 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         41.55      728.28
    2         51.47      729.55
    3         61.30      731.40
    4         71.00      733.83
    5         80.54      736.82
    6         89.89      740.37
    7         99.02      744.46
    8        107.88      749.08
    9        116.47      754.21
   10        124.73      759.84
   11        132.66      765.94
   12        135.03      768.00
Circle Center At X =    25.02 ; Y =   897.02 ; and Radius =   169.56
        Factor of Safety
      ***    1.408   ***
Failure Surface Specified By 12 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         40.69      727.85
    2         50.60      729.18
    3         60.42      731.05
    4         70.13      733.46
    5         79.69      736.39
    6         89.07      739.84
    7         98.26      743.81
    8        107.21      748.26
    9        115.90      753.20
   10        124.31      758.61
   11        132.42      764.47
   12        136.77      768.00
Circle Center At X =    21.49 ; Y =   908.83 ; and Radius =   182.00
        Factor of Safety
      ***    1.409   ***
Failure Surface Specified By 12 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         39.83      727.41
    2         49.80      728.18
    3         59.69      729.68
    4         69.43      731.91
    5         78.99      734.85
    6         88.31      738.48
    7         97.33      742.80
    8        106.01      747.77
    9        114.30      753.36
   10        122.15      759.55
   11        129.52      766.31
   12        131.12      768.00
Circle Center At X =    34.55 ; Y =   862.24 ; and Radius =   134.93
        Factor of Safety
      ***    1.409   ***
Failure Surface Specified By 12 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         41.55      728.28
    2         51.52      729.08
    3         61.40      730.60
```



```
    4         71.15      732.82
    5         80.72      735.74
    6         90.05      739.33
    7         99.11      743.58
    8        107.83      748.46
    9        116.18      753.96
   10        124.12      760.04
   11        131.60      766.68
   12        132.89      768.00
Circle Center At X =    35.37 ; Y =   867.36 ; and Radius =   139.22
        Factor of Safety
      ***    1.413   ***
Failure Surface Specified By 12 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         43.28      729.14
    2         53.15      730.73
    3         62.93      732.83
    4         72.58      735.45
    5         82.08      738.57
    6         91.40      742.18
    7        100.52      746.28
    8        109.41      750.86
    9        118.05      755.90
   10        126.41      761.38
   11        134.48      767.30
   12        135.33      768.00
Circle Center At X =    18.16 ; Y =   917.09 ; and Radius =   189.62
        Factor of Safety
      ***    1.414   ***
Failure Surface Specified By 11 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         43.28      729.14
    2         53.16      730.67
    3         62.93      732.80
    4         72.55      735.51
    5         82.00      738.81
    6         91.22      742.66
    7        100.20      747.08
    8        108.89      752.02
    9        117.26      757.49
   10        125.29      763.45
   11        130.69      768.00
Circle Center At X =    22.98 ; Y =   892.81 ; and Radius =   164.92
        Factor of Safety
      ***    1.414   ***
Failure Surface Specified By 12 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         42.41      728.71
    2         52.31      730.17
    3         62.11      732.14
    4         71.80      734.62
    5         81.34      737.61
    6         90.72      741.08
    7         99.90      745.05
    8        108.86      749.48
    9        117.58      754.38
   10        126.03      759.72
   11        134.20      765.50
   12        137.37      768.00
Circle Center At X =    19.57 ; Y =   918.29 ; and Radius =   190.95
        Factor of Safety
      ***    1.416   ***
          **** END OF GSTABL7 OUTPUT ****
```

Lake Forest Sport Park 100 Scale, Section C-C', Static (Cut)

M:\2009PR~1\091069~1\ENGINE~1\CC'S1.PL2 Run By: Username 3/25/2010 6:59PM



GSTABL7 v.2 FSmin=1.75

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **
** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **

****

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static Earthquake, and Applied Force Options.

****

Analysis Run Date: 3/25/2010
Time of Run: 6:59PM
Run By: Username
Input Data Filename: M:cc's1.
Output Filename: M:cc's1.OUT
Unit System: English
Plotted Output Filename: M:cc's1.PLT
PROBLEM DESCRIPTION: Lake Forest Sport Park 100 Scale,
Section C-C', Static (Cut)

BOUNDARY COORDINATES
9 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	777.00	8.00	776.00	2
2	8.00	776.00	78.00	764.00	1
3	78.00	764.00	124.00	787.00	1
4	124.00	787.00	130.00	787.00	1
5	130.00	787.00	178.00	811.00	1
6	178.00	811.00	190.00	811.00	1
7	190.00	811.00	238.00	835.00	1
8	238.00	835.00	258.00	835.00	1
9	258.00	835.00	300.00	827.00	1
10	0.00	772.00	8.00	776.00	1

User Specified Y-Origin = 700.00(ft)

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	100.0	32.0	0.00	0.0	0
2	120.0	120.0	50.0	32.0	0.00	0.0	0
3	120.0	120.0	0.0	32.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
6000 Trial Surfaces Have Been Generated.
200 Surface(s) Initiate(s) From Each Of 30 Points Equally Spaced
Along The Ground Surface Between X = 60.00(ft)
and X = 95.00(ft)
Each Surface Terminates Between X = 210.00(ft)
and X = 260.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Evaluated = 6000
Number of Trial Failure Surfaces is Greater Than 5000.
Statistical Data on FS Values are Not Generated.
To Generate Stastical Data, Reduce Number of Trial
Failure Surfaces to 5000 or less.
Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.10	764.05
2	88.02	765.33
3	97.90	766.90
4	107.72	768.76
5	117.49	770.92
6	127.18	773.37
7	136.80	776.12
8	146.33	779.14
9	155.76	782.46
10	165.10	786.05
11	174.32	789.92
12	183.42	794.07
13	192.39	798.49
14	201.22	803.17
15	209.91	808.12
16	218.45	813.32
17	226.83	818.78
18	235.04	824.49
19	243.08	830.44
20	248.86	835.00

Circle Center At X = 40.67 ; Y = 1095.11 ; and Radius = 333.16
Factor of Safety
*** 1.746 ***
Individual data on the 24 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.9	2193.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	9.9	6362.8	0.0	0.0	0.	0.	0.0	0.0	0.0
3	9.8	10110.0	0.0	0.0	0.	0.	0.0	0.0	0.0
4	9.8	13427.1	0.0	0.0	0.	0.	0.0	0.0	0.0
5	6.5	10649.9	0.0	0.0	0.	0.	0.0	0.0	0.0
6	3.2	5355.7	0.0	0.0	0.	0.	0.0	0.0	0.0
7	2.8	4472.7	0.0	0.0	0.	0.	0.0	0.0	0.0
8	6.8	11057.1	0.0	0.0	0.	0.	0.0	0.0	0.0
9	9.5	17329.5	0.0	0.0	0.	0.	0.0	0.0	0.0
10	9.4	18935.6	0.0	0.0	0.	0.	0.0	0.0	0.0
11	9.3	20114.8	0.0	0.0	0.	0.	0.0	0.0	0.0
12	9.2	20874.9	0.0	0.0	0.	0.	0.0	0.0	0.0
13	3.7	8539.6	0.0	0.0	0.	0.	0.0	0.0	0.0
14	5.4	11806.0	0.0	0.0	0.	0.	0.0	0.0	0.0
15	6.6	12096.7	0.0	0.0	0.	0.	0.0	0.0	0.0
16	2.4	3924.1	0.0	0.0	0.	0.	0.0	0.0	0.0
17	8.8	14390.8	0.0	0.0	0.	0.	0.0	0.0	0.0
18	8.7	13702.2	0.0	0.0	0.	0.	0.0	0.0	0.0
19	8.5	12673.9	0.0	0.0	0.	0.	0.0	0.0	0.0
20	8.4	11327.2	0.0	0.0	0.	0.	0.0	0.0	0.0
21	8.2	9685.5	0.0	0.0	0.	0.	0.0	0.0	0.0
22	3.0	3080.7	0.0	0.0	0.	0.	0.0	0.0	0.0
23	5.1	3920.6	0.0	0.0	0.	0.	0.0	0.0	0.0
24	5.8	1581.0	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.10	764.05
2	88.01	765.39
3	97.88	767.01
4	107.70	768.91
5	117.46	771.09
6	127.15	773.55
7	136.77	776.28
8	146.31	779.29
9	155.75	782.57
10	165.10	786.12

```
   11        174.35      789.93
   12        183.48      794.01
   13        192.49      798.35
   14        201.37      802.94
   15        210.12      807.79
   16        218.73      812.88
   17        227.18      818.22
   18        235.48      823.79
   19        243.62      829.60
   20        250.74      835.00
Circle Center At X =    36.40 ; Y =  1111.02 ; and Radius =   349.47
        Factor of Safety
       ***    1.750   ***
Failure Surface Specified By 20 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         80.52      765.26
    2         90.49      766.02
    3        100.43      767.13
    4        110.32      768.61
    5        120.15      770.44
    6        129.91      772.63
    7        139.58      775.16
    8        149.15      778.05
    9        158.62      781.28
   10        167.96      784.85
   11        177.16      788.76
   12        186.22      792.99
   13        195.12      797.55
   14        203.85      802.43
   15        212.40      807.63
   16        220.75      813.12
   17        228.90      818.92
   18        236.83      825.01
   19        244.54      831.38
   20        248.61      835.00
Circle Center At X =    64.67 ; Y =  1040.92 ; and Radius =   276.11
        Factor of Safety
       ***    1.754   ***
Failure Surface Specified By 20 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         78.10      764.05
    2         87.96      765.72
    3         97.78      767.64
    4        107.54      769.81
    5        117.24      772.24
    6        126.88      774.91
    7        136.44      777.83
    8        145.93      781.00
    9        155.33      784.41
   10        164.64      788.06
   11        173.85      791.95
   12        182.96      796.07
   13        191.96      800.43
   14        200.84      805.02
   15        209.61      809.84
   16        218.24      814.88
   17        226.74      820.15
   18        235.11      825.63
   19        243.33      831.32
   20        248.36      835.00
Circle Center At X =    18.52 ; Y =  1146.79 ; and Radius =   387.34
        Factor of Safety
       ***    1.754   ***
Failure Surface Specified By 19 Coordinate Points
  Point      X-Surf      Y-Surf
```



```
   No.        (ft)        (ft)
    1         79.31      764.66
    2         89.28      765.39
    3         99.22      766.52
    4        109.10      768.05
    5        118.92      769.97
    6        128.65      772.28
    7        138.28      774.97
    8        147.79      778.05
    9        157.18      781.50
   10        166.41      785.33
   11        175.49      789.52
   12        184.40      794.07
   13        193.12      798.97
   14        201.63      804.21
   15        209.93      809.79
   16        218.00      815.70
   17        225.83      821.92
   18        233.40      828.45
   19        240.41      835.00
Circle Center At X =    65.87 ; Y =  1015.12 ; and Radius =   250.83
        Factor of Safety
       ***    1.756   ***
Failure Surface Specified By 20 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         80.52      765.26
    2         90.41      766.70
    3        100.27      768.42
    4        110.06      770.42
    5        119.80      772.70
    6        129.47      775.25
    7        139.06      778.09
    8        148.56      781.20
    9        157.97      784.57
   10        167.29      788.22
   11        176.49      792.13
   12        185.58      796.30
   13        194.54      800.74
   14        203.37      805.42
   15        212.07      810.36
   16        220.62      815.54
   17        229.02      820.97
   18        237.26      826.64
   19        245.34      832.53
   20        248.52      835.00
Circle Center At X =    35.41 ; Y =  1111.13 ; and Radius =   348.80
        Factor of Safety
       ***    1.756   ***
Failure Surface Specified By 19 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         78.10      764.05
    2         88.04      765.15
    3         97.94      766.60
    4        107.77      768.41
    5        117.54      770.57
    6        127.21      773.09
    7        136.79      775.95
    8        146.27      779.16
    9        155.61      782.71
   10        164.83      786.60
   11        173.90      790.81
   12        182.81      795.36
   13        191.55      800.22
   14        200.10      805.39
   15        208.47      810.87
```

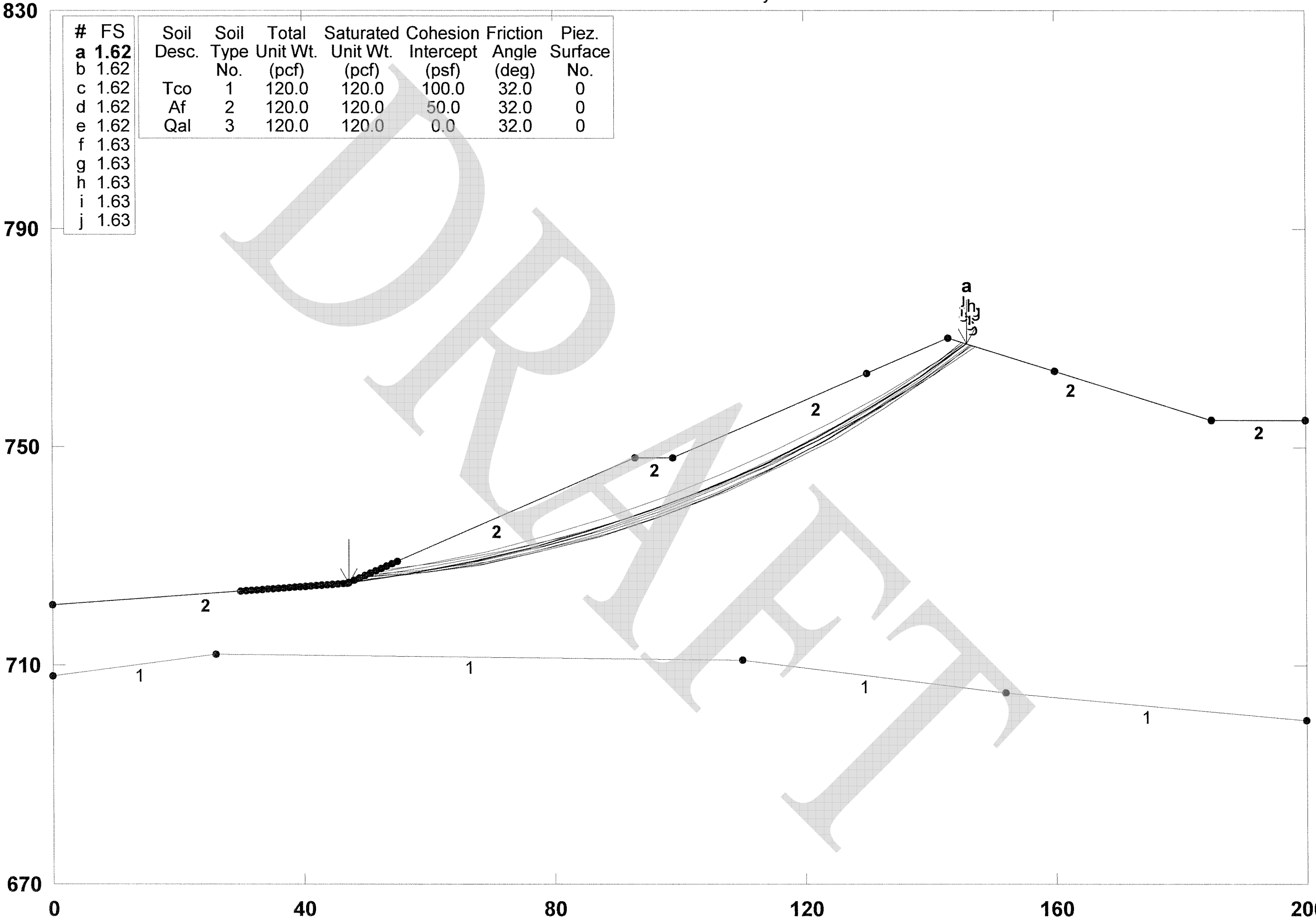
```
   16        216.63       816.65
   17        224.58       822.72
   18        232.30       829.07
   19        238.99       835.00
Circle Center At X =    52.84 ; Y =  1039.31 ; and Radius =   276.41
       Factor of Safety
      ***    1.757   ***
Failure Surface Specified By 21 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1         79.31       764.66
    2         89.26       765.66
    3         99.17       766.98
    4        109.04       768.61
    5        118.85       770.55
    6        128.59       772.80
    7        138.26       775.35
    8        147.84       778.21
    9        157.33       781.37
   10        166.72       784.82
   11        175.99       788.57
   12        185.13       792.61
   13        194.15       796.94
   14        203.03       801.55
   15        211.75       806.43
   16        220.32       811.59
   17        228.72       817.02
   18        236.94       822.70
   19        244.98       828.65
   20        252.83       834.84
   21        253.02       835.00
Circle Center At X =    52.39 ; Y =  1080.80 ; and Radius =   317.28
       Factor of Safety
      ***    1.757   ***
Failure Surface Specified By 20 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1         79.31       764.66
    2         89.30       765.11
    3         99.26       765.99
    4        109.18       767.29
    5        119.03       769.01
    6        128.79       771.16
    7        138.46       773.71
    8        148.01       776.68
    9        157.43       780.05
   10        166.69       783.81
   11        175.79       787.97
   12        184.69       792.52
   13        193.40       797.43
   14        201.89       802.72
   15        210.15       808.36
   16        218.16       814.34
   17        225.91       820.67
   18        233.38       827.31
   19        240.56       834.27
   20        241.25       835.00
Circle Center At X =    73.68 ; Y =   999.19 ; and Radius =   234.60
       Factor of Safety
      ***    1.758   ***
Failure Surface Specified By 20 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1         78.10       764.05
    2         88.10       764.33
    3         98.07       765.04
    4        108.01       766.19
```



```
    5        117.88       767.78
    6        127.67       769.80
    7        137.37       772.26
    8        146.95       775.14
    9        156.39       778.43
   10        165.67       782.14
   11        174.79       786.26
   12        183.71       790.77
   13        192.43       795.67
   14        200.92       800.95
   15        209.17       806.61
   16        217.16       812.61
   17        224.88       818.97
   18        232.32       825.66
   19        239.45       832.67
   20        241.62       835.00
Circle Center At X =    76.96 ; Y =   990.58 ; and Radius =   226.53
       Factor of Safety
      ***    1.758   ***
         **** END OF GSTABL7 OUTPUT ****
```

Lake Forest Sport Park 100 Scale, Section D-D', Static (Fill)

M:\2009PR~1\091069~1\ENGINE~1\DD'S1.PL2 Run By: Username 3/25/2010 7:00PM



GSTABL7 v.2 FSmin=1.62

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

```
                 ***  GSTABL7  ***
        ** GSTABL7 by Garry H. Gregory, P.E. **
 ** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **
         (All Rights Reserved-Unauthorized Use Prohibited)
*********************************************************************************
              SLOPE STABILITY ANALYSIS SYSTEM
      Modified Bishop, Simplified Janbu, or GLE Method of Slices.
      (Includes Spencer & Morgenstern-Price Type Analysis)
      Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
      Nonlinear Undrained Shear Strength, Curved Phi Envelope,
      Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
      Surfaces, Pseudo-Static Earthquake, and Applied Force Options.
*********************************************************************************
Analysis Run Date:        3/25/2010
Time of Run:              7:00PM
Run By:                   Username
Input Data Filename:      M:dd's1.
Output Filename:          M:dd's1.OUT
Unit System:              English
Plotted Output Filename:  M:dd's1.PLT
PROBLEM DESCRIPTION:  Lake Forest Sport Park 100 Scale,
                      Section D-D', Static (Fill)
BOUNDARY COORDINATES
    6 Top   Boundaries
   10 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
  No.         (ft)       (ft)       (ft)       (ft)     Below Bnd
   1          0.00     721.00      47.00     725.00        2
   2         47.00     725.00      93.00     748.00        2
   3         93.00     748.00      99.00     748.00        2
   4         99.00     748.00     143.00     770.00        2
   5        143.00     770.00     185.00     755.00        2
   6        185.00     755.00     200.00     755.00        2
   7          0.00     708.00      26.00     712.00        1
   8         26.00     712.00     110.00     711.00        1
   9        110.00     711.00     152.00     705.00        1
  10        152.00     705.00     200.00     700.00        1
User Specified Y-Origin =        670.00(ft)
ISOTROPIC SOIL PARAMETERS
  3 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant  Surface
 No.  (pcf)    (pcf)     (psf)     (deg)   Param.   (psf)      No.
  1   120.0    120.0     100.0     32.0    0.00      0.0       0
  2   120.0    120.0      50.0     32.0    0.00      0.0       0
  3   120.0    120.0       0.0     32.0    0.00      0.0       0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
6000 Trial Surfaces Have Been Generated.
 200 Surface(s) Initiate(s) From Each Of    30 Points Equally Spaced
Along The Ground Surface Between  X =   30.00(ft)
                             and  X =   55.00(ft)
Each Surface Terminates Between   X = 130.00(ft)
                            and   X = 160.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =       0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Evaluated. They Are
      Ordered - Most Critical First.
      * * Safety Factors Are Calculated By The Modified Bishop Method * *
      Total Number of Trial Surfaces Evaluated =  6000
      Number of Trial Failure Surfaces is Greater Than 5000.
      Statistical Data on FS Values are Not Generated.
      To Generate Stastical Data, Reduce Number of Trial
      Failure Surfaces to 5000 or less.
      Failure Surface Specified By 12 Coordinate Points
```



```
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1         47.24      725.12
          2         57.11      726.76
          3         66.88      728.90
          4         76.52      731.53
          5         86.03      734.64
          6         95.36      738.23
          7        104.50      742.29
          8        113.42      746.81
          9        122.10      751.78
         10        130.51      757.18
         11        138.65      763.00
         12        146.07      768.90
      Circle Center At X =    19.92 ; Y =   920.24 ; and Radius =   197.02
             Factor of Safety
            ***    1.617   ***
           Individual data on the    14  slices
                       Water  Water    Tie      Tie       Earthquake
                       Force  Force   Force    Force        Force    Surcharge
Slice  Width   Weight   Top    Bot    Norm     Tan      Hor     Ver     Load
 No.   (ft)    (lbs)   (lbs)  (lbs)   (lbs)    (lbs)   (lbs)   (lbs)   (lbs)
  1     9.9    1949.7    0.0    0.0     0.       0.      0.0     0.0     0.0
  2     9.8    5472.1    0.0    0.0     0.       0.      0.0     0.0     0.0
  3     9.6    8266.0    0.0    0.0     0.       0.      0.0     0.0     0.0
  4     9.5   10325.5    0.0    0.0     0.       0.      0.0     0.0     0.0
  5     7.0    8597.7    0.0    0.0     0.       0.      0.0     0.0     0.0
  6     2.4    2893.2    0.0    0.0     0.       0.      0.0     0.0     0.0
  7     3.6    3914.2    0.0    0.0     0.       0.      0.0     0.0     0.0
  8     5.5    5476.2    0.0    0.0     0.       0.      0.0     0.0     0.0
  9     8.9    9018.5    0.0    0.0     0.       0.      0.0     0.0     0.0
 10     8.7    8418.6    0.0    0.0     0.       0.      0.0     0.0     0.0
 11     8.4    7246.0    0.0    0.0     0.       0.      0.0     0.0     0.0
 12     8.1    5564.4    0.0    0.0     0.       0.      0.0     0.0     0.0
 13     4.4    2185.0    0.0    0.0     0.       0.      0.0     0.0     0.0
 14     3.1     652.5    0.0    0.0     0.       0.      0.0     0.0     0.0
      Failure Surface Specified By 13 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1         47.24      725.12
          2         57.12      726.69
          3         66.90      728.76
          4         76.57      731.33
          5         86.09      734.37
          6         95.45      737.90
          7        104.62      741.89
          8        113.57      746.35
          9        122.29      751.25
         10        130.74      756.59
         11        138.92      762.34
         12        146.80      768.51
         13        146.91      768.60
      Circle Center At X =    21.12 ; Y =   920.97 ; and Radius =   197.58
             Factor of Safety
            ***    1.619   ***
      Failure Surface Specified By 12 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1         48.10      725.55
          2         58.03      726.80
          3         67.86      728.62
          4         77.57      731.01
          5         87.12      733.96
          6         96.49      737.46
          7        105.64      741.49
          8        114.54      746.05
          9        123.16      751.12
```

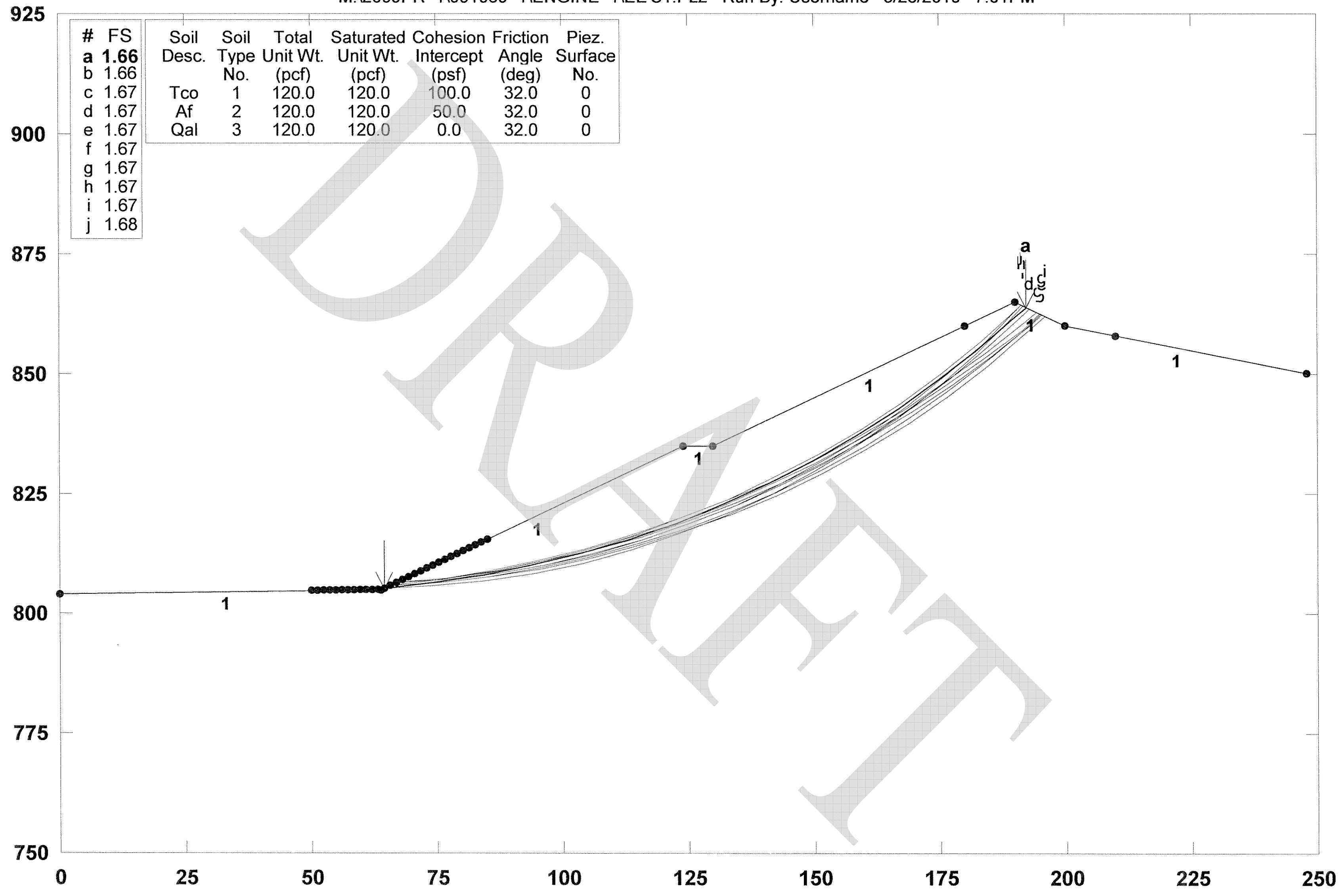
```
   10        131.47      756.69
   11        139.44      762.72
   12        146.51      768.75
 Circle Center At X =     31.64 ; Y =   896.75 ; and Radius =   171.99
        Factor of Safety
       ***    1.622   ***
 Failure Surface Specified By 12 Coordinate Points
   Point       X-Surf       Y-Surf
    No.         (ft)         (ft)
    1          48.10       725.55
    2          58.04       726.65
    3          67.90       728.36
    4          77.62       730.68
    5          87.19       733.60
    6          96.55       737.11
    7         105.68       741.19
    8         114.54       745.84
    9         123.09       751.02
   10         131.30       756.73
   11         139.14       762.93
   12         145.88       768.97
 Circle Center At X =     35.48 ; Y =   885.76 ; and Radius =   160.70
        Factor of Safety
       ***    1.623   ***
 Failure Surface Specified By 12 Coordinate Points
   Point       X-Surf       Y-Surf
    No.         (ft)         (ft)
    1          48.97       725.98
    2          58.88       727.30
    3          68.70       729.19
    4          78.39       731.66
    5          87.92       734.70
    6          97.25       738.29
    7         106.36       742.42
    8         115.20       747.08
    9         123.76       752.25
   10         132.00       757.92
   11         139.90       764.06
   12         145.61       769.07
 Circle Center At X =     31.70 ; Y =   894.65 ; and Radius =   169.55
        Factor of Safety
       ***    1.623   ***
 Failure Surface Specified By 12 Coordinate Points
   Point       X-Surf       Y-Surf
    No.         (ft)         (ft)
    1          48.97       725.98
    2          58.92       726.97
    3          68.78       728.61
    4          78.52       730.90
    5          88.08       733.83
    6          97.43       737.38
    7         106.52       741.53
    8         115.32       746.28
    9         123.79       751.60
   10         131.89       757.47
   11         139.58       763.86
   12         145.22       769.21
 Circle Center At X =     39.08 ; Y =   876.79 ; and Radius =   151.13
        Factor of Safety
       ***    1.628   ***
 Failure Surface Specified By 12 Coordinate Points
   Point       X-Surf       Y-Surf
    No.         (ft)         (ft)
    1          48.97       725.98
    2          58.83       727.64
    3          68.60       729.78
    4          78.25       732.39
```



```
    5          87.76       735.47
    6          97.12       739.01
    7         106.29       743.00
    8         115.25       747.43
    9         123.99       752.30
   10         132.47       757.58
   11         140.70       763.28
   12         147.41       768.43
 Circle Center At X =     20.04 ; Y =   928.46 ; and Radius =   204.53
        Factor of Safety
       ***    1.628   ***
 Failure Surface Specified By 12 Coordinate Points
   Point       X-Surf       Y-Surf
    No.         (ft)         (ft)
    1          49.83       726.41
    2          59.77       727.45
    3          69.63       729.11
    4          79.37       731.39
    5          88.95       734.28
    6          98.32       737.76
    7         107.46       741.82
    8         116.33       746.44
    9         124.88       751.62
   10         133.10       757.32
   11         140.94       763.52
   12         146.68       768.69
 Circle Center At X =     38.37 ; Y =   884.77 ; and Radius =   158.77
        Factor of Safety
       ***    1.631   ***
 Failure Surface Specified By 12 Coordinate Points
   Point       X-Surf       Y-Surf
    No.         (ft)         (ft)
    1          51.55       727.28
    2          61.45       728.73
    3          71.24       730.76
    4          80.90       733.35
    5          90.39       736.50
    6          99.68       740.20
    7         108.74       744.43
    8         117.54       749.17
    9         126.05       754.42
   10         134.24       760.16
   11         142.09       766.36
   12         145.27       769.19
 Circle Center At X =     31.63 ; Y =   897.55 ; and Radius =   171.44
        Factor of Safety
       ***    1.632   ***
 Failure Surface Specified By 12 Coordinate Points
   Point       X-Surf       Y-Surf
    No.         (ft)         (ft)
    1          49.83       726.41
    2          59.62       728.42
    3          69.32       730.87
    4          78.89       733.76
    5          88.33       737.07
    6          97.60       740.81
    7         106.70       744.96
    8         115.60       749.52
    9         124.29       754.48
   10         132.74       759.82
   11         140.94       765.54
   12         145.56       769.08
 Circle Center At X =     10.51 ; Y =   943.36 ; and Radius =   220.48
        Factor of Safety
       ***    1.635   ***
          **** END OF GSTABL7 OUTPUT ****
```

Lake Forest Sport Park 100 Scale, Section E-E', Static (Cut)

M:\2009PR~1\091069~1\ENGINE~1\EE'S1.PL2 Run By: Username 3/25/2010 7:01PM



GSTABL7 v.2 FSmin=1.66

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

```
                         ***  GSTABL7  ***
               ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **
           (All Rights Reserved-Unauthorized Use Prohibited)
*********************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static Earthquake, and Applied Force Options.
*********************************************************************************
Analysis Run Date:         3/25/2010
Time of Run:               7:01PM
Run By:                    Username
Input Data Filename:       M:ee's1.
Output Filename:           M:ee's1.OUT
Unit System:               English
Plotted Output Filename:   M:ee's1.PLT
PROBLEM DESCRIPTION:  Lake Forest Sport Park 100 Scale,
                      Section E-E', Static (Cut)
BOUNDARY COORDINATES
    6 Top   Boundaries
    6 Total Boundaries
Boundary    X-Left     Y-Left    X-Right    Y-Right    Soil Type
  No.        (ft)       (ft)      (ft)       (ft)      Below Bnd
   1          0.00     804.00     64.00     805.00        1
   2         64.00     805.00    124.00     835.00        1
   3        124.00     835.00    130.00     835.00        1
   4        130.00     835.00    190.00     865.00        1
   5        190.00     865.00    200.00     860.00        1
   6        200.00     860.00    248.00     850.00        1
User Specified Y-Origin =        750.00(ft)
ISOTROPIC SOIL PARAMETERS
 3 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept  Angle   Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)    (deg)    Param.   (psf)     No.
  1   120.0    120.0     100.0    32.0    0.00       0.0      0
  2   120.0    120.0      50.0    32.0    0.00       0.0      0
  3   120.0    120.0       0.0    32.0    0.00       0.0      0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
6000 Trial Surfaces Have Been Generated.
 200 Surface(s) Initiate(s) From Each Of    30 Points Equally Spaced
Along The Ground Surface Between  X =  50.00(ft)
                             and  X =  85.00(ft)
Each Surface Terminates Between   X = 180.00(ft)
                             and  X = 210.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =       0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Evaluated. They Are
      Ordered - Most Critical First.
      * * Safety Factors Are Calculated By The Modified Bishop Method * *
      Total Number of Trial Surfaces Evaluated =  6000
      Number of Trial Failure Surfaces is Greater Than 5000.
      Statistical Data on FS Values are Not Generated.
      To Generate Stastical Data, Reduce Number of Trial
      Failure Surfaces to 5000 or less.
      Failure Surface Specified By 16 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1        64.48      805.24
          2        74.42      806.36
```



```
          3        84.29      807.95
          4        94.08      810.00
          5       103.76      812.53
          6       113.30      815.51
          7       122.69      818.94
          8       131.91      822.81
          9       140.94      827.12
         10       149.74      831.86
         11       158.32      837.01
         12       166.63      842.56
         13       174.67      848.51
         14       182.42      854.83
         15       189.86      861.51
         16       192.25      863.87
      Circle Center At X =    46.16 ; Y =  1013.69 ; and Radius =   209.26
             Factor of Safety
           ***    1.663   ***
           Individual data on the    18  slices
                        Water  Water     Tie     Tie      Earthquake
                        Force  Force    Force   Force       Force   Surcharge
Slice  Width   Weight    Top    Bot     Norm     Tan     Hor     Ver     Load
 No.   (ft)    (lbs)    (lbs)  (lbs)   (lbs)   (lbs)   (lbs)   (lbs)   (lbs)
  1     9.9    2297.0    0.0    0.0      0.      0.      0.0     0.0     0.0
  2     9.9    6547.4    0.0    0.0      0.      0.      0.0     0.0     0.0
  3     9.8   10120.2    0.0    0.0      0.      0.      0.0     0.0     0.0
  4     9.7   12998.6    0.0    0.0      0.      0.      0.0     0.0     0.0
  5     9.5   15175.8    0.0    0.0      0.      0.      0.0     0.0     0.0
  6     9.4   16655.5    0.0    0.0      0.      0.      0.0     0.0     0.0
  7     1.3    2421.5    0.0    0.0      0.      0.      0.0     0.0     0.0
  8     6.0   10261.3    0.0    0.0      0.      0.      0.0     0.0     0.0
  9     1.9    2999.9    0.0    0.0      0.      0.      0.0     0.0     0.0
 10     9.0   14339.2    0.0    0.0      0.      0.      0.0     0.0     0.0
 11     8.8   13926.7    0.0    0.0      0.      0.      0.0     0.0     0.0
 12     8.6   12938.2    0.0    0.0      0.      0.      0.0     0.0     0.0
 13     8.3   11425.1    0.0    0.0      0.      0.      0.0     0.0     0.0
 14     8.0    9447.6    0.0    0.0      0.      0.      0.0     0.0     0.0
 15     7.7    7073.1    0.0    0.0      0.      0.      0.0     0.0     0.0
 16     7.4    4376.1    0.0    0.0      0.      0.      0.0     0.0     0.0
 17     0.1      55.8    0.0    0.0      0.      0.      0.0     0.0     0.0
 18     2.3     453.4    0.0    0.0      0.      0.      0.0     0.0     0.0
      Failure Surface Specified By 16 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1        64.48      805.24
          2        74.41      806.48
          3        84.27      808.15
          4        94.05      810.23
          5       103.73      812.73
          6       113.30      815.64
          7       122.73      818.95
          8       132.02      822.66
          9       141.14      826.77
         10       150.07      831.26
         11       158.81      836.13
         12       167.33      841.36
         13       175.61      846.96
         14       183.66      852.90
         15       191.44      859.18
         16       195.13      862.43
      Circle Center At X =    40.47 ; Y =  1037.93 ; and Radius =   233.92
             Factor of Safety
           ***    1.664   ***
      Failure Surface Specified By 16 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1        65.69      805.85
          2        75.60      807.15
```

```
  3        85.45      808.88
  4        95.22      811.03
  5       104.88      813.60
  6       114.43      816.58
  7       123.84      819.98
  8       133.09      823.77
  9       142.17      827.96
 10       151.06      832.54
 11       159.74      837.49
 12       168.21      842.82
 13       176.43      848.51
 14       184.41      854.54
 15       192.12      860.91
 16       194.28      862.86
Circle Center At X =    40.53 ; Y =  1036.10 ; and Radius =   231.63
      Factor of Safety
   ***    1.666   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
  1        66.90      806.45
  2        76.87      807.17
  3        86.79      808.42
  4        96.63      810.21
  5       106.36      812.51
  6       115.95      815.34
  7       125.38      818.68
  8       134.61      822.52
  9       143.63      826.85
 10       152.40      831.65
 11       160.90      836.92
 12       169.10      842.64
 13       176.99      848.79
 14       184.53      855.35
 15       191.72      862.31
 16       192.88      863.56
Circle Center At X =    58.53 ; Y =   992.40 ; and Radius =   186.14
      Factor of Safety
   ***    1.670   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
  1        65.69      805.85
  2        75.66      806.55
  3        85.59      807.77
  4        95.44      809.48
  5       105.20      811.69
  6       114.82      814.39
  7       124.30      817.57
  8       133.61      821.23
  9       142.72      825.36
 10       151.61      829.93
 11       160.26      834.96
 12       168.64      840.41
 13       176.74      846.28
 14       184.53      852.55
 15       191.99      859.21
 16       195.21      862.39
Circle Center At X =    56.75 ; Y =  1002.93 ; and Radius =   197.29
      Factor of Safety
   ***    1.670   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
  1        64.48      805.24
  2        74.47      805.71
  3        84.42      806.76
```



```
  4        94.29      808.37
  5       104.05      810.55
  6       113.66      813.29
  7       123.11      816.57
  8       132.35      820.40
  9       141.35      824.75
 10       150.09      829.60
 11       158.54      834.96
 12       166.67      840.79
 13       174.44      847.08
 14       181.84      853.80
 15       188.85      860.94
 16       191.67      864.17
Circle Center At X =    61.38 ; Y =   978.67 ; and Radius =   173.46
      Factor of Safety
   ***    1.670   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
  1        66.90      806.45
  2        76.84      807.49
  3        86.73      808.98
  4        96.54      810.93
  5       106.25      813.33
  6       115.83      816.18
  7       125.28      819.46
  8       134.57      823.17
  9       143.67      827.30
 10       152.58      831.85
 11       161.26      836.81
 12       169.71      842.16
 13       177.90      847.89
 14       185.83      853.99
 15       193.46      860.46
 16       195.43      862.29
Circle Center At X =    49.39 ; Y =  1022.60 ; and Radius =   216.86
      Factor of Safety
   ***    1.671   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
  1        65.69      805.85
  2        75.62      807.01
  3        85.49      808.66
  4        95.26      810.78
  5       104.91      813.38
  6       114.44      816.44
  7       123.80      819.95
  8       132.98      823.92
  9       141.95      828.33
 10       150.70      833.16
 11       159.21      838.42
 12       167.46      844.08
 13       175.41      850.14
 14       183.07      856.57
 15       190.41      863.36
 16       191.35      864.33
Circle Center At X =    46.65 ; Y =  1010.99 ; and Radius =   206.03
      Factor of Safety
   ***    1.672   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
  1        65.69      805.85
  2        75.67      806.49
  3        85.60      807.64
  4        95.47      809.28
```

5	105.23	811.43
6	114.88	814.06
7	124.38	817.18
8	133.71	820.77
9	142.85	824.83
10	151.77	829.35
11	160.46	834.32
12	168.88	839.71
13	177.01	845.52
14	184.84	851.74
15	192.35	858.35
16	196.07	861.96

Circle Center At X = 58.05 ; Y = 1003.11 ; and Radius = 197.41

Factor of Safety

*** 1.675 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	66.90	806.45
2	76.88	807.11
3	86.80	808.33
4	96.64	810.10
5	106.37	812.43
6	115.94	815.31
7	125.35	818.72
8	134.54	822.65
9	143.50	827.09
10	152.19	832.04
11	160.59	837.46
12	168.67	843.35
13	176.41	849.69
14	183.77	856.45
15	190.75	863.62
16	191.36	864.32

Circle Center At X = 60.25 ; Y = 983.51 ; and Radius = 177.19

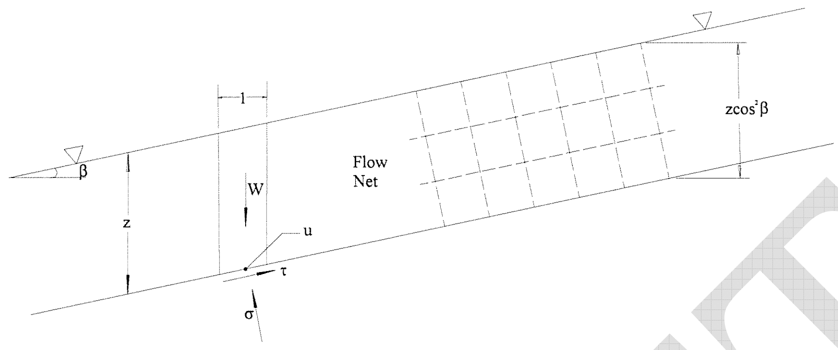
Factor of Safety

*** 1.676 ***

**** END OF GSTABL7 OUTPUT ****

MANUFACTURED 2H:1V FILL SLOPE -DRY

INFINITE SLOPE CONDITION



ASSUMPTION

Depth of Saturation (ft), z	0.1	
(and steady seepage parallel to slope face)		

SOIL PARAMETERS

Angle of Internal Friction, ϕ	32	Af
Cohesion (psf), c	50	Af
Saturated Unit Weight of Soil (pcf), γ_{sat}	130	
Unit Weight of Water (pcf), γ_w	62.4	
Slope Angle (2H:1V), β	26.6	

CALCULATIONS

Normal Stress Along Failure Plane

$\sigma = \gamma_{sat} * z * \cos^2 \beta$ $\sigma =$ 10.3937 lb/ft^2

Shear Stress Along Failure Plane

$\tau_d = \gamma_{sat} * z * \sin \beta * \cos \beta$ $\tau_d =$ 5.20475 lb/ft^2

Pore Pressure Along Failure Plane

$u = \gamma_w * z * \cos^2 \beta$ $u =$ 4.98895 lb/ft^2

Resisting Shear Stress Along Failure Plane

$\tau_r = c + (\sigma - u) \tan \phi$ $\tau_r =$ 53.3772 lb/ft^2

FACTOR OF SAFETY

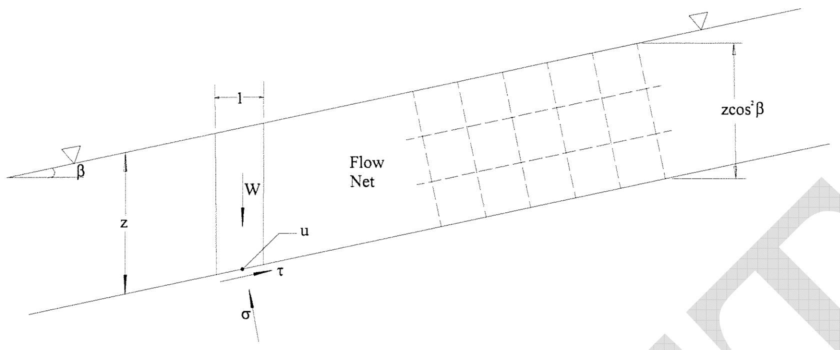
$$FS = \frac{\tau_r}{\tau_d}$$

FS = 10.3

LGC	SURFICIAL STABILITY	Project Name : Project Number : Designed/Checked : Date:	Sports Park 091069-01 DJB Mar-10

MANUFACTURED 2H:1V FILL SLOPE - SATURATED

INFINITE SLOPE CONDITION



ASSUMPTION

Depth of Saturation (ft), z	4	
(and steady seepage parallel to slope face)		

SOIL PARAMETERS

Angle of Internal Friction, ϕ	32	Af
Cohesion (psf), c	50	Af
Saturated Unit Weight of Soil (pcf), γ_{sat}	130	
Unit Weight of Water (pcf), γ_w	62.4	
Slope Angle (2H:1V), β	26.6	

CALCULATIONS

Normal Stress Along Failure Plane

$$\sigma = \gamma_{sat} * z * \cos^2 \beta \qquad \sigma = 415.746 \text{ lb/ft}^2$$

Shear Stress Along Failure Plane

$$\tau_d = \gamma_{sat} * z * \sin \beta * \cos \beta \qquad \tau_d = 208.19 \text{ lb/ft}^2$$

Pore Pressure Along Failure Plane

$$u = \gamma_w * z * \cos^2 \beta \qquad u = 199.558 \text{ lb/ft}^2$$

Resisting Shear Stress Along Failure Plane

$$\tau_r = c + (\sigma - u) \tan \phi \qquad \tau_r = 185.089 \text{ lb/ft}^2$$

FACTOR OF SAFETY

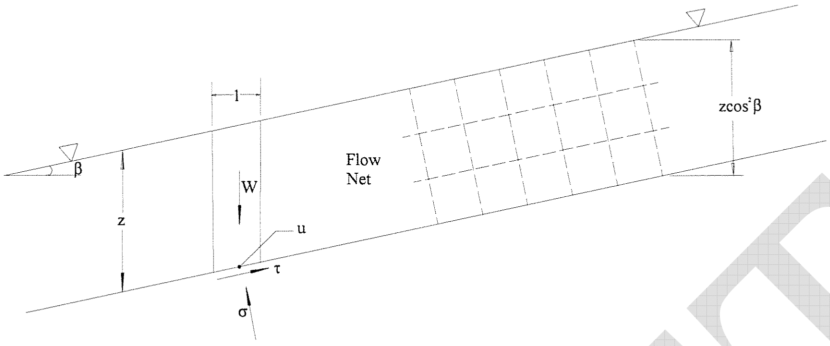
$$FS = \frac{\tau_r}{\tau_d}$$

FS = 0.89

LGC	SURFICIAL STABILITY	Project Name : Project Number : Designed/Checked : Date:	Sports Park 091069-01 DJB Mar-10

2H:1V CUT SLOPE - DRY

INFINITE SLOPE CONDITION



ASSUMPTION

Depth of Saturation (ft), z (and steady seepage parallel to slope face)	0.1

SOIL PARAMETERS

Angle of Internal Friction, ϕ	32	Tco
Cohesion (psf), c	100	Tco
Saturated Unit Weight of Soil (pcf), γ_{sat}	130	
Unit Weight of Water (pcf), γ_w	62.4	
Slope Angle (2H:1V), β	26.6	

CALCULATIONS

Normal Stress Along Failure Plane

$$\sigma = \gamma_{sat} * z * \cos^2 \beta \qquad \sigma = 10.3937 \ \text{lb/ft}^2$$

Shear Stress Along Failure Plane

$$\tau_d = \gamma_{sat} * z * \sin \beta * \cos \beta \qquad \tau_d = 5.20475 \ \text{lb/ft}^2$$

Pore Pressure Along Failure Plane

$$u = \gamma_w * z * \cos^2 \beta \qquad u = 4.98895 \ \text{lb/ft}^2$$

Resisting Shear Stress Along Failure Plane

$$\tau_r = c + (\sigma - u) \tan \phi \qquad \tau_r = 103.377 \ \text{lb/ft}^2$$

FACTOR OF SAFETY

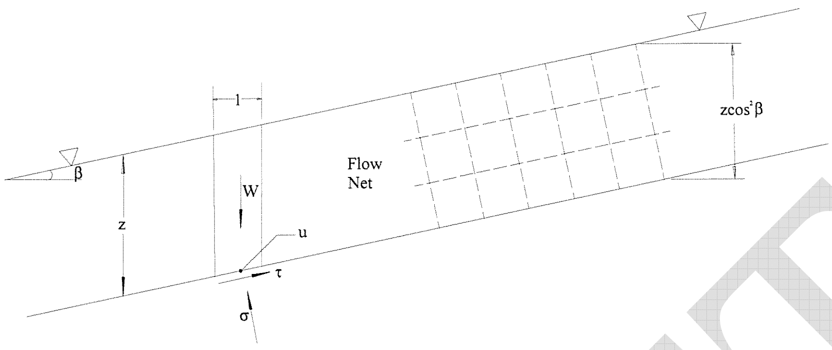
$$\textbf{FS} = \frac{\tau_r}{\tau_d}$$

FS = 19.9

LGC	SURFICIAL STABILITY	Project Name : Project Number : Designed/Checked : Date:	Sports Park 091069-01 DJB Mar-10

2H:1V CUT SLOPE - SATURATED

INFINITE SLOPE CONDITION



ASSUMPTION

Depth of Saturation (ft), z (and steady seepage parallel to slope face)	4

SOIL PARAMETERS

Angle of Internal Friction, ϕ	32	Tco
Cohesion (psf), c	100	Tco
Saturated Unit Weight of Soil (pcf), γ_{sat}	130	
Unit Weight of Water (pcf), γ_w	62.4	
Slope Angle (2H:1V), β	26.6	

CALCULATIONS

Normal Stress Along Failure Plane

$\sigma = \gamma_{sat} * z * \cos^2 \beta$ $\qquad \sigma =$ 415.746 lb/ft^2

Shear Stress Along Failure Plane

$\tau_d = \gamma_{sat} * z * \sin \beta * \cos \beta$ $\qquad \tau_d =$ 208.19 lb/ft^2

Pore Pressure Along Failure Plane

$u = \gamma_w * z * \cos^2 \beta$ $\qquad u =$ 199.558 lb/ft^2

Resisting Shear Stress Along Failure Plane

$\tau_r = c + (\sigma - u) \tan \phi$ $\qquad \tau_r =$ 235.089 lb/ft^2

FACTOR OF SAFETY

$$\mathbf{FS} = \frac{\tau_r}{\tau_d}$$

FS = 1.13

LGC	SURFICIAL STABILITY	Project Name : Project Number : Designed/Checked : Date:	Sports Park 091069-01 DJB Mar-10

Conterminous 48 States
2005 ASCE 7 Standard
Latitude = 33.664295
Longitude = -117.657773

Spectral Response Accelerations Ss and S1

Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0
Data are based on a 0.009999999776482582 deg grid spacing

Period (sec)	Sa (g)
0.2	1.383 (Ss, Site Class B)
1.0	0.495 (S1, Site Class B)

Period (sec)	Sa (g)	Sd (inches)
0.000	0.553	0.000
0.072	1.383	0.069
0.200	1.383	0.541
0.358	1.383	1.733
0.400	1.238	1.936
0.500	0.991	2.419
0.600	0.825	2.903
0.700	0.708	3.387
0.800	0.619	3.871
0.900	0.550	4.355
1.000	0.495	4.839
1.100	0.450	5.323
1.200	0.413	5.807
1.300	0.381	6.291
1.400	0.354	6.775
1.500	0.330	7.258
1.600	0.310	7.742
1.700	0.291	8.226
1.800	0.275	8.710
1.900	0.261	9.194
2.000	0.248	9.678

Conterminous 48 States
2005 ASCE 7 Standard
Latitude = 33.664295
Longitude = -117.657773

Site Modified Response Spectrum (SMs and SM1) for Site Class D

SMs = Fa x Ss and SM1 = Fv x S1
Site Class D - Fa = 1.0 ,Fv = 1.505

Period (sec)	Sa (g)
0.2	1.383 (SMs, Site Class D)
1.0	0.745 (SM1, Site Class D)

Period (sec)	Sa (g)	Sd (inches)
0.000	0.553	0.000
0.108	1.383	0.157
0.200	1.383	0.541

0.539	1.383	3.924
0.600	1.242	4.370
0.700	1.065	5.098
0.800	0.932	5.826
0.900	0.828	6.554
1.000	0.745	7.283
1.100	0.678	8.011
1.200	0.621	8.739
1.300	0.573	9.467
1.400	0.532	10.196
1.500	0.497	10.924
1.600	0.466	11.652
1.700	0.438	12.380
1.800	0.414	13.109
1.900	0.392	13.837
2.000	0.373	14.565

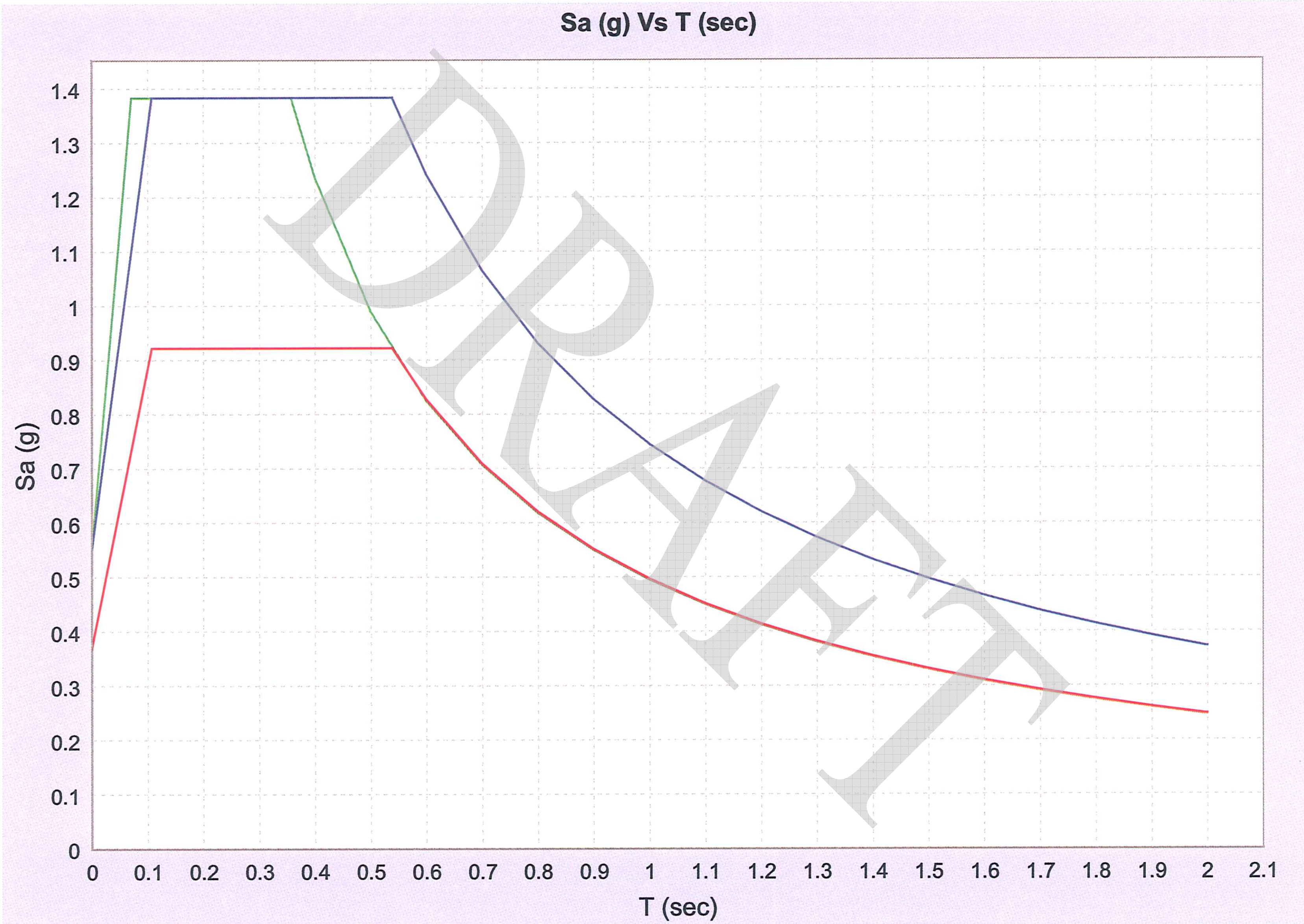
Conterminous 48 States
2005 ASCE 7 Standard
Latitude = 33.664295
Longitude = -117.657773

Design Response Spectrum (SDs and SD1) for Site Class D

SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class D - Fa = 1.0 ,Fv = 1.505

Period (sec)	Sa (g)
0.2	0.922 (SDs, Site Class D)
1.0	0.497 (SD1, Site Class D)

Period (sec)	Sa (g)	Sd (inches)
0.000	0.369	0.000
0.108	0.922	0.105
0.200	0.922	0.360
0.539	0.922	2.616
0.600	0.828	2.913
0.700	0.710	3.399
0.800	0.621	3.884
0.900	0.552	4.370
1.000	0.497	4.855
1.100	0.452	5.341
1.200	0.414	5.826
1.300	0.382	6.312
1.400	0.355	6.797
1.500	0.331	7.283
1.600	0.311	7.768
1.700	0.292	8.254
1.800	0.276	8.739
1.900	0.262	9.225
2.000	0.248	9.710



Sa (g) Vs T (sec)
Sa (g)
T (sec)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
DRAFT

References:

American Society of Civil Engineers, 2006, ASCE Standard 7-05, Minimum Design Loads for Buildings and Other Structures.

California Building Standards Commission, 2007, California Building Code, California Code of Regulations Title 24, Part 2, Volumes 1 and 2, dated June 2007

Cao, T., Bryant, W.A., Rowshandel, B., Branum, D., and Willis, C.J., 2003, The Revised 2002 California Probabilistic Seismic Hazard Maps, June 2003; published by the California Geological Survey; website address: www.consrv.ca.gov/cgs/rghm/psha/fault_parameters/pdf/2002_ca_hazard_maps.pdf

United States Geological Survey, 2009, Seismic Hazards Curves, Response Parameters and Design Parameters, Version 5.0.9a, dated October 21, 2009; web site address: http://earthquake.usgs.gov/research/hazmaps/design

APPENDIX F

General Earthwork and Grading Specifications for Rough Grading

1.0 General

1.1 ***Intent:*** These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 ***The Geotechnical Consultant of Record:*** Prior to commencement of work, the owner shall employ a qualified Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required.

The Geotechnical Consultant shall observe the moisture conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to confirm that the attained level of compaction is being accomplished as specified. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 ***The Earthwork Contractor:*** The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the project plans and specifications. The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of “equipment” of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate personnel will be available for observation and testing. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified. It is the contractor's sole responsibility to provide proper fill compaction.

2.0 Preparation of Areas to be Filled

2.1 ***Clearing and Grubbing:*** Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 10 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed. The contractor is responsible for all hazardous waste relating to his work. The Geotechnical Consultant does not have expertise in this area. If hazardous waste is a concern, then the Client should acquire the services of a qualified environmental assessor.

2.2 ***Processing:*** Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 15 centimeters (6 inches). Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of oversize material and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 ***Overexcavation:*** In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 ***<u>Benching</u>:*** Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 4.6 meters (15 feet) wide and at least 0.6 meters (2 feet) deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 1.2 meters (4 feet) into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

2.5 ***<u>Evaluation/Acceptance of Fill Areas</u>:*** All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 <u>Fill Material</u>

3.1 ***<u>General</u>:*** Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 ***<u>Oversize</u>:*** Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 20 centimeters (8 inches), shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 3 vertical meters (10 feet) of finish grade or within 0.6 meters (2 feet) of future utilities or underground construction.

3.3 ***<u>Import</u>:*** If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 ***Fill Layers:*** Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 20 centimeters (8 inches) in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 ***Fill Moisture Conditioning:*** Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557) or California Test Method 216.

4.3 ***Compaction of Fill:*** After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557 or Cal 216). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity. Compaction is the sole responsibility of the contractor.

4.4 ***Compaction of Fill Slopes:*** In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of approximately 1 meter (3 to 4 feet) in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557 or Cal 216.

4.5 ***Compaction Testing:*** Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 ***Frequency of Compaction Testing:*** Tests shall be taken at intervals not exceeding 0.6 meters (2 feet) in vertical rise and/or 765 cubic meters (1000 cubic yards) of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 465 square meters (5000 square feet) of slope face and/or each 3 meters (10 feet) of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 ***Compaction Test Locations:*** The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the

Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 30 meters (100 feet) and vertically less than 1.5 meters (5 feet) apart from potential test locations shall be provided.

5.0 ***Subdrain Installation***

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 ***Excavation***

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 ***Trench Backfills***

7.1 The Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

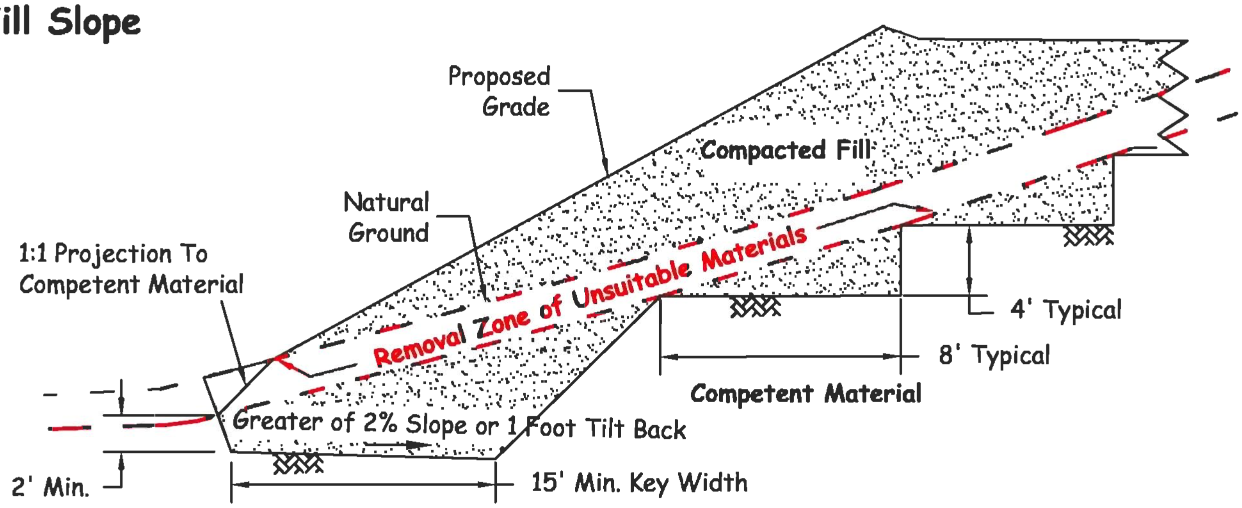
7.2 All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 0.3 meters (1 foot) over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 0.3 meters (1 foot) above the top of the conduit to the surface.

7.3 The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

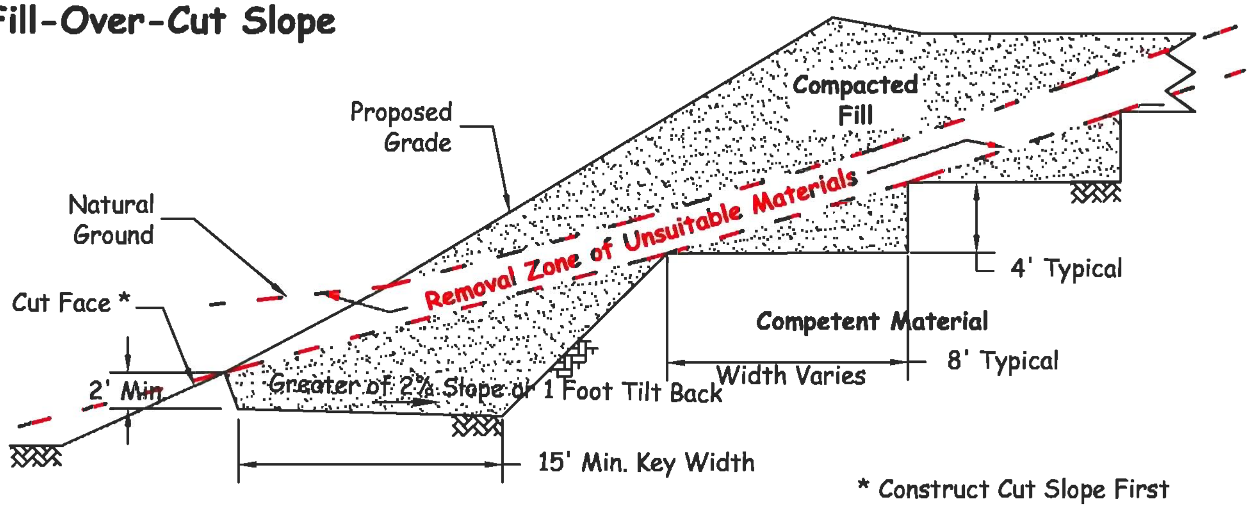
7.4 The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 91 meters (300 feet) of trench and 0.6 meters (2 feet) of fill.

7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

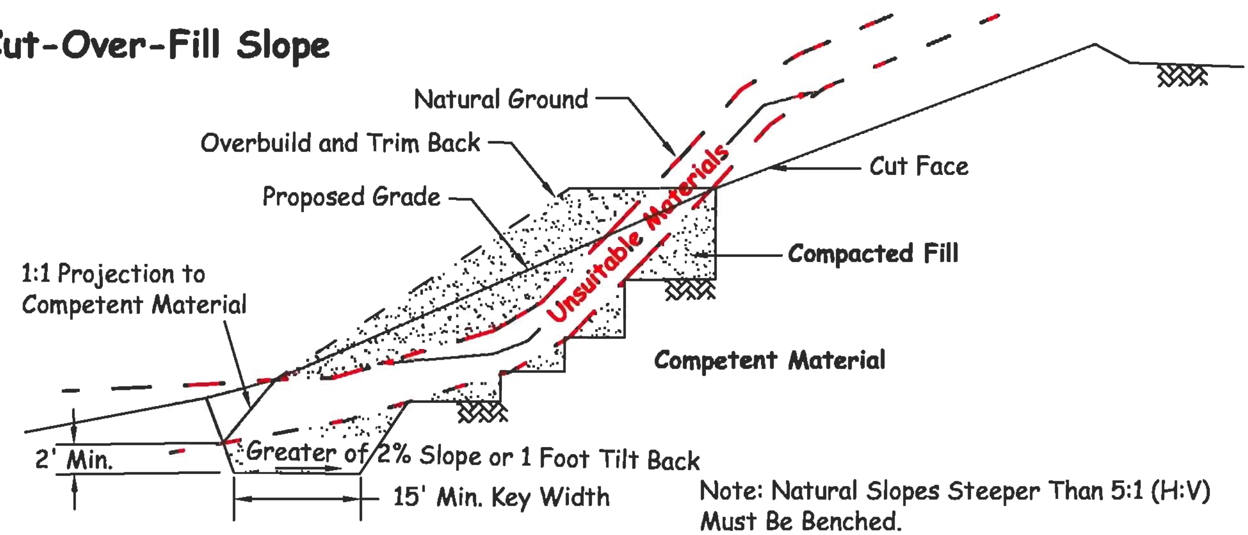
Fill Slope



Fill-Over-Cut Slope

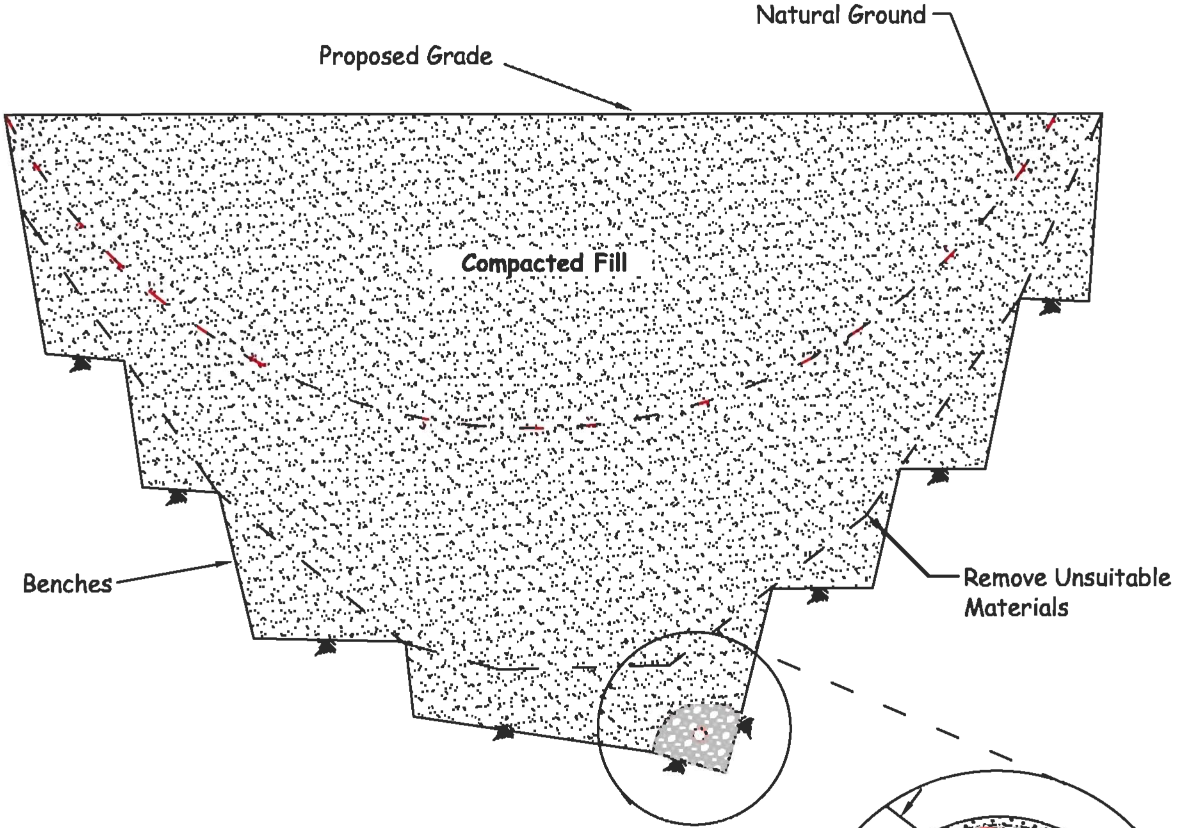


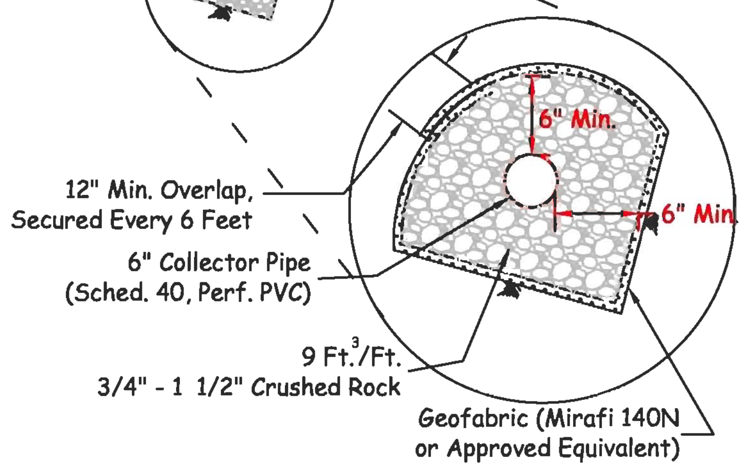
Cut-Over-Fill Slope



LGC

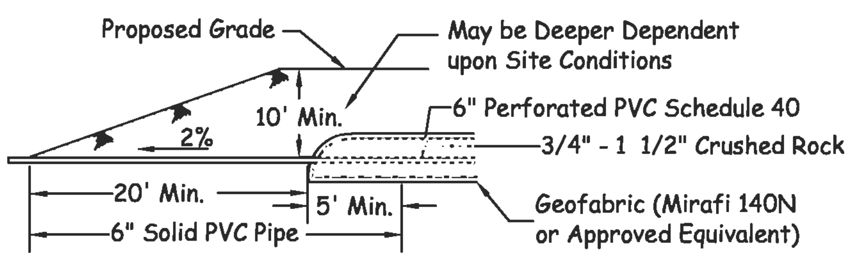
KEYING AND BENCHING





Notes:
1) Continuous Runs in Excess of 500' Shall Use 8" Diameter Pipe.
2) Final 20' of Pipe at Outlet Shall be Solid and Backfilled with Fine-grained Material.

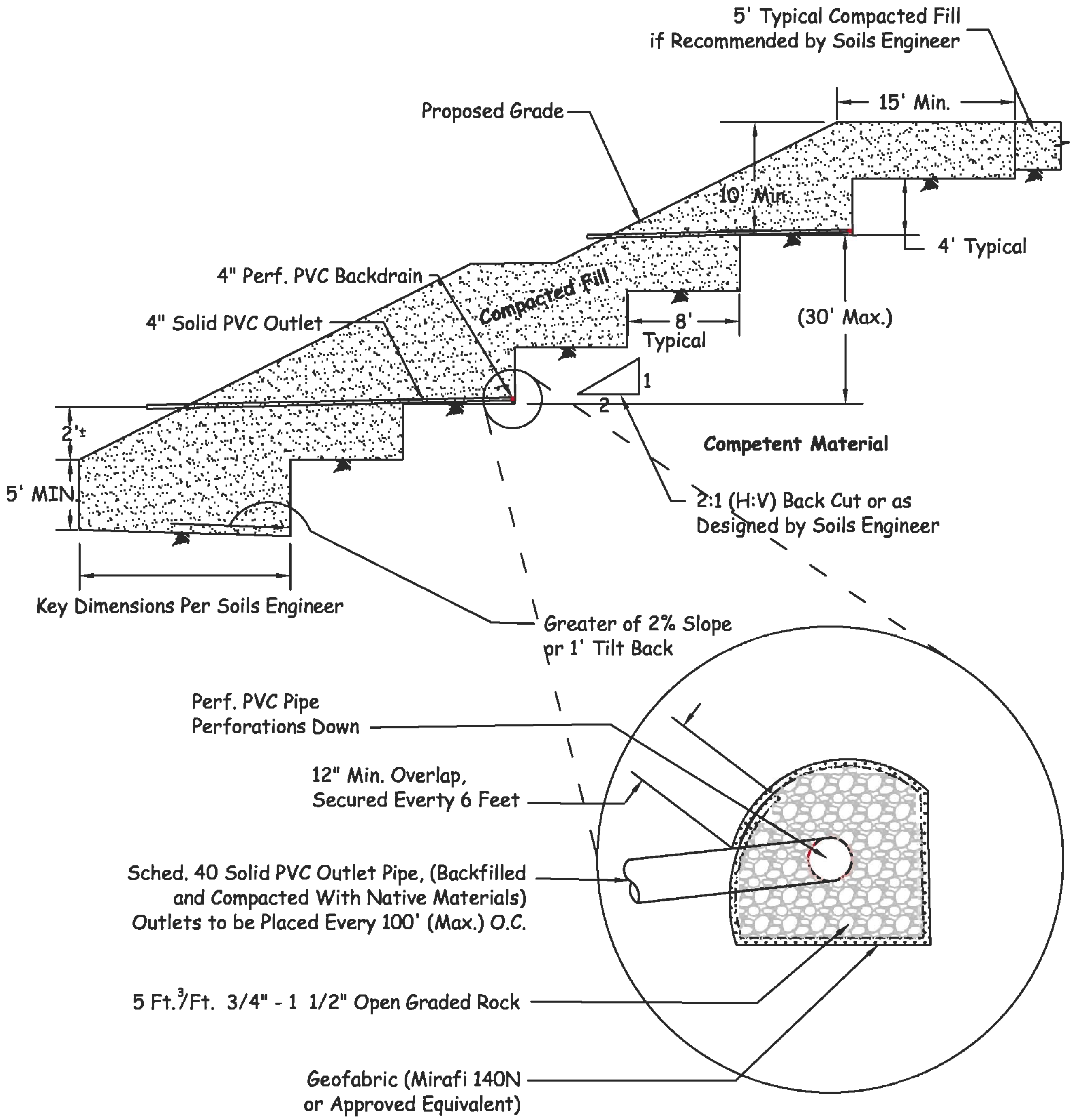
Proposed Outlet Detail



LGC

CANYON SUBDRAINS

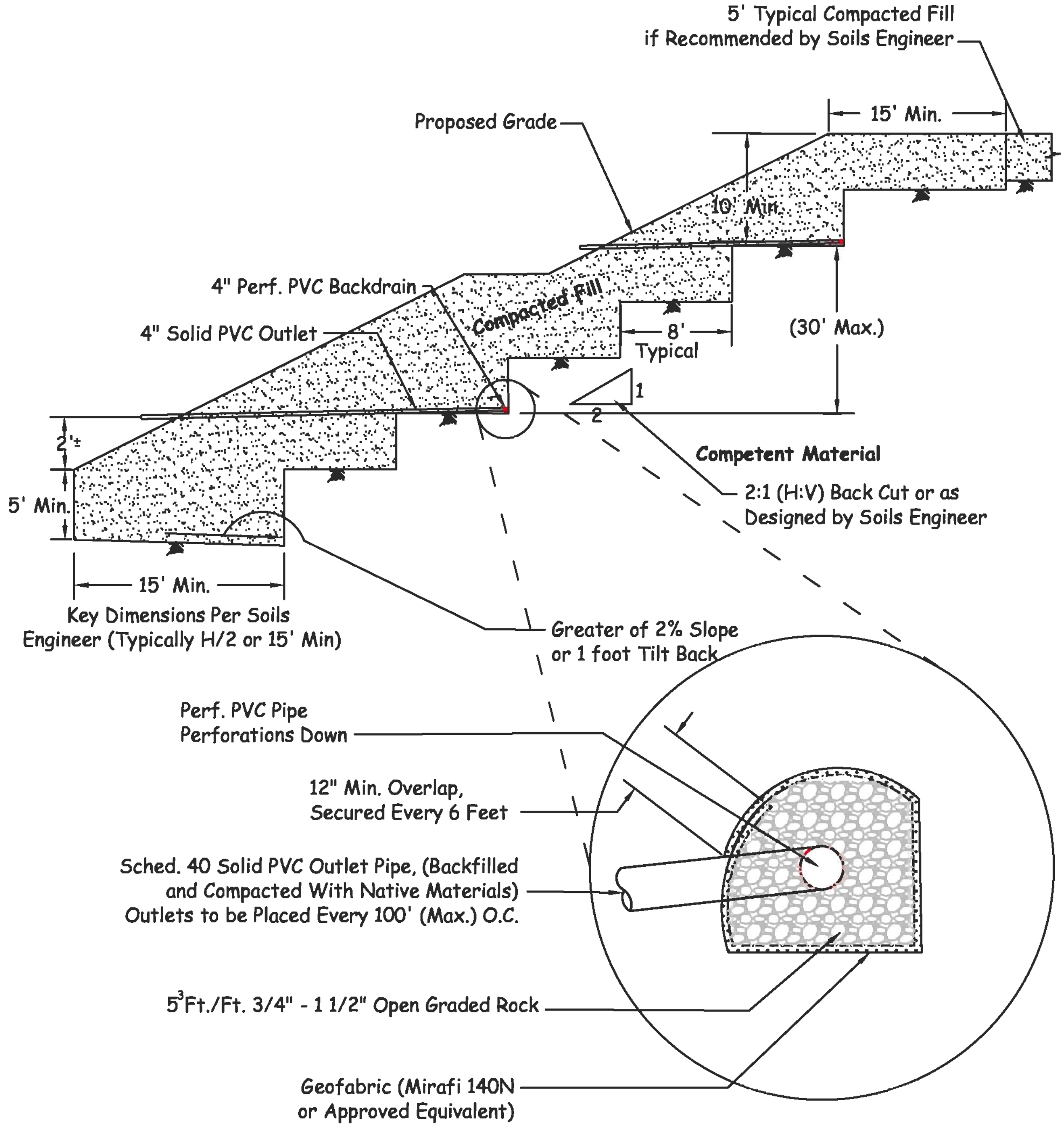
11/26/02



LGC

TYPICAL BUTTRESS DETAIL

11/26/02



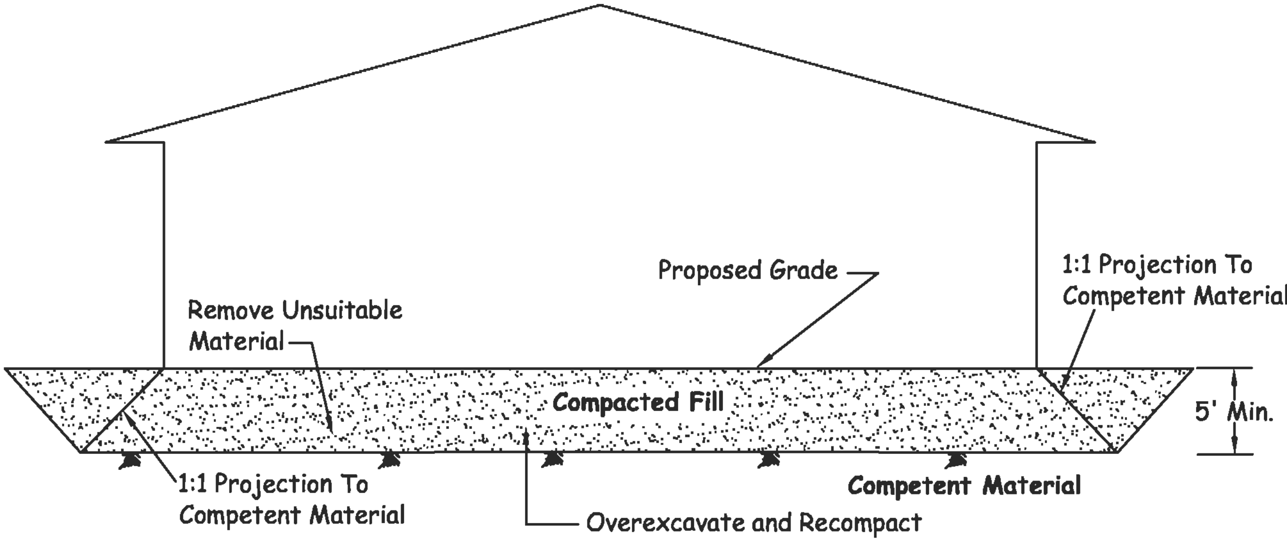
LGC

TYPICAL STABILIZATION FILL DETAIL

11/26/02

Cut Lot

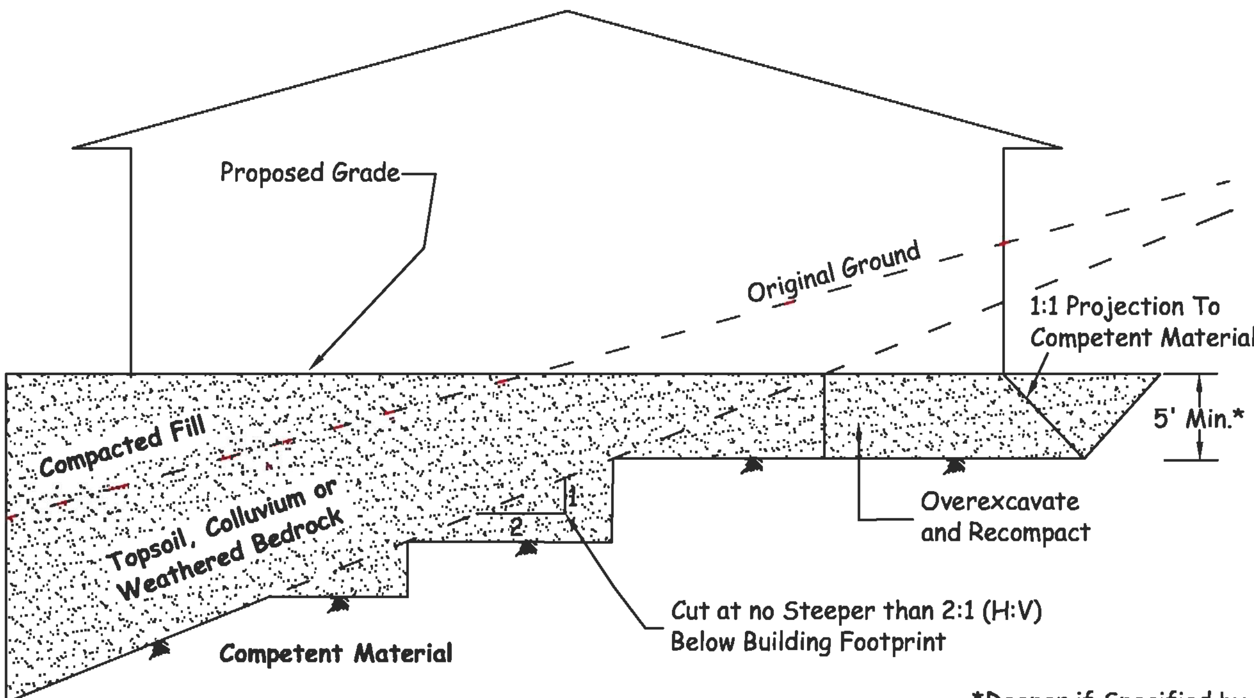
(Exposing Unsuitable Soils at Design Grade)



Note 1: Removal Bottom Should be Graded With Minimum 2% Fall Towards Street or Other Suitable Area (as Determined by Soils Engineer) to Avoid Ponding Below Building

Note 2: Where Design Cut Lots are Excavated Entirely Into Competent Material, Overexcavation May Still be Required for Hard-Rock Conditions or for Materials With Variable Expansion Characteristics.

Cut/Fill Transition Lot

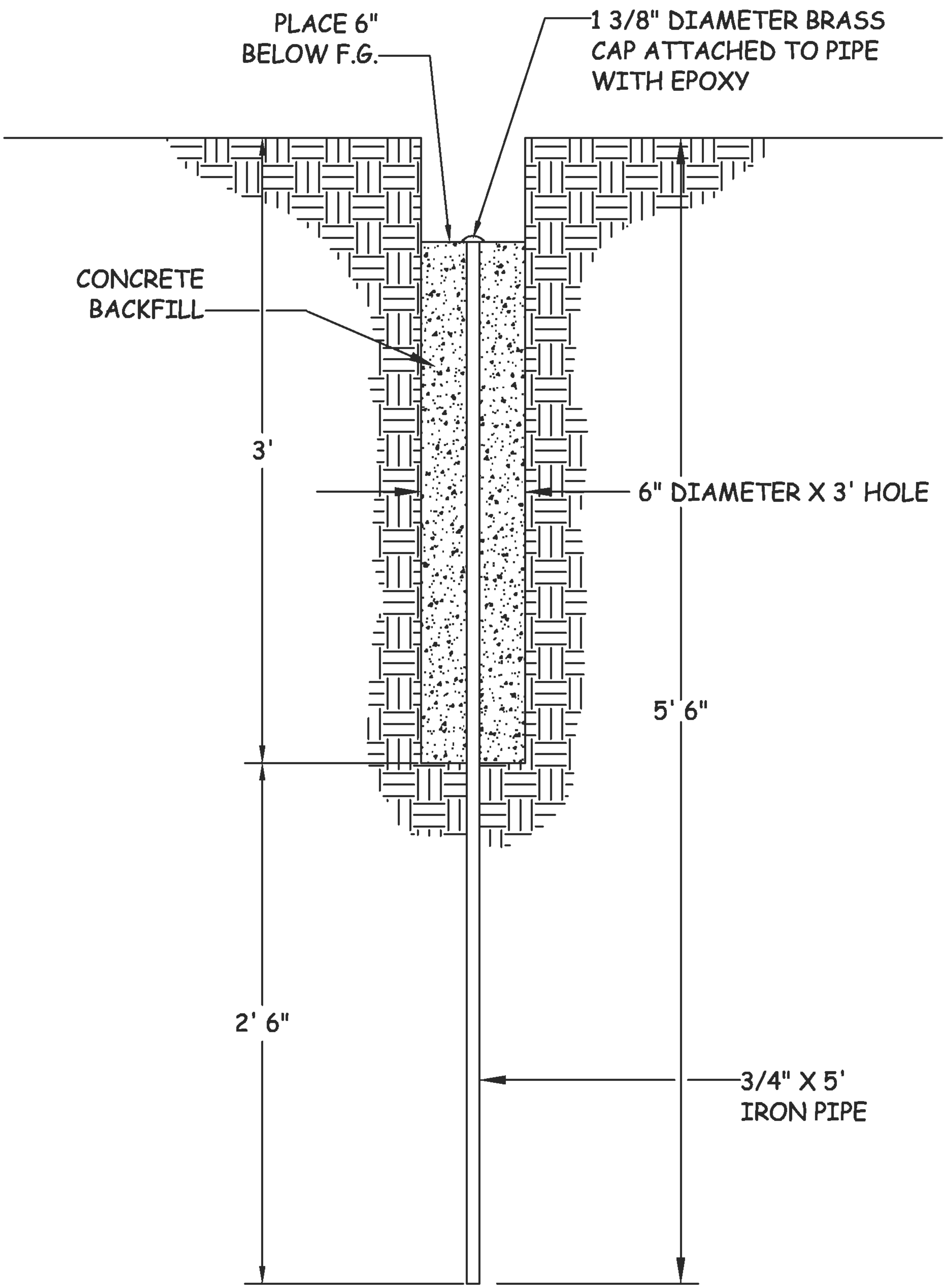


*Deeper if Specified by Soils Engineer

LGC

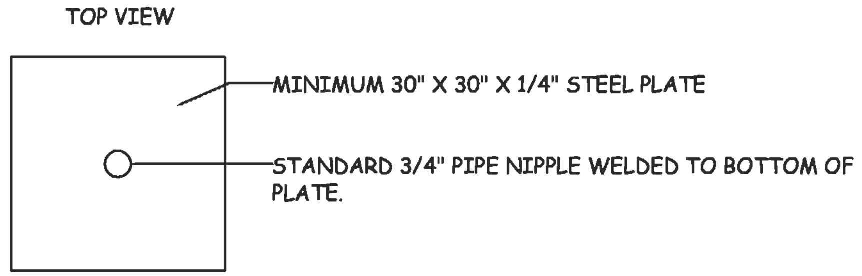
CUT AND TRANSITION LOT OVEREXCAVATION DETAIL

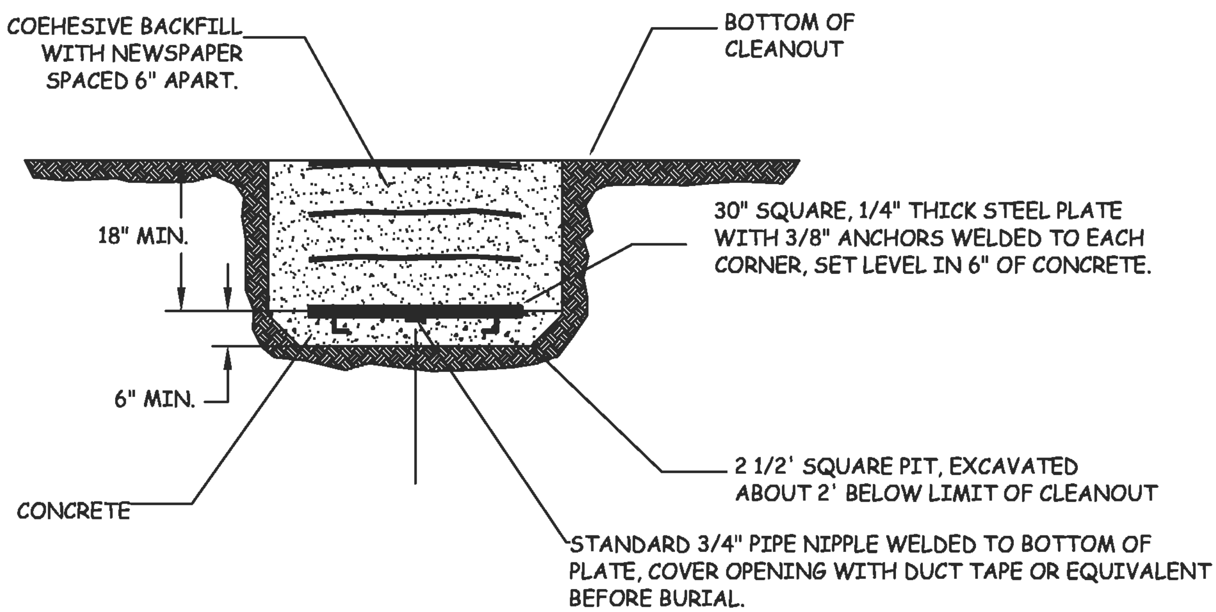
11/26/02



LGC

TYPICAL SURFACE SETTLEMENT MONUMENT

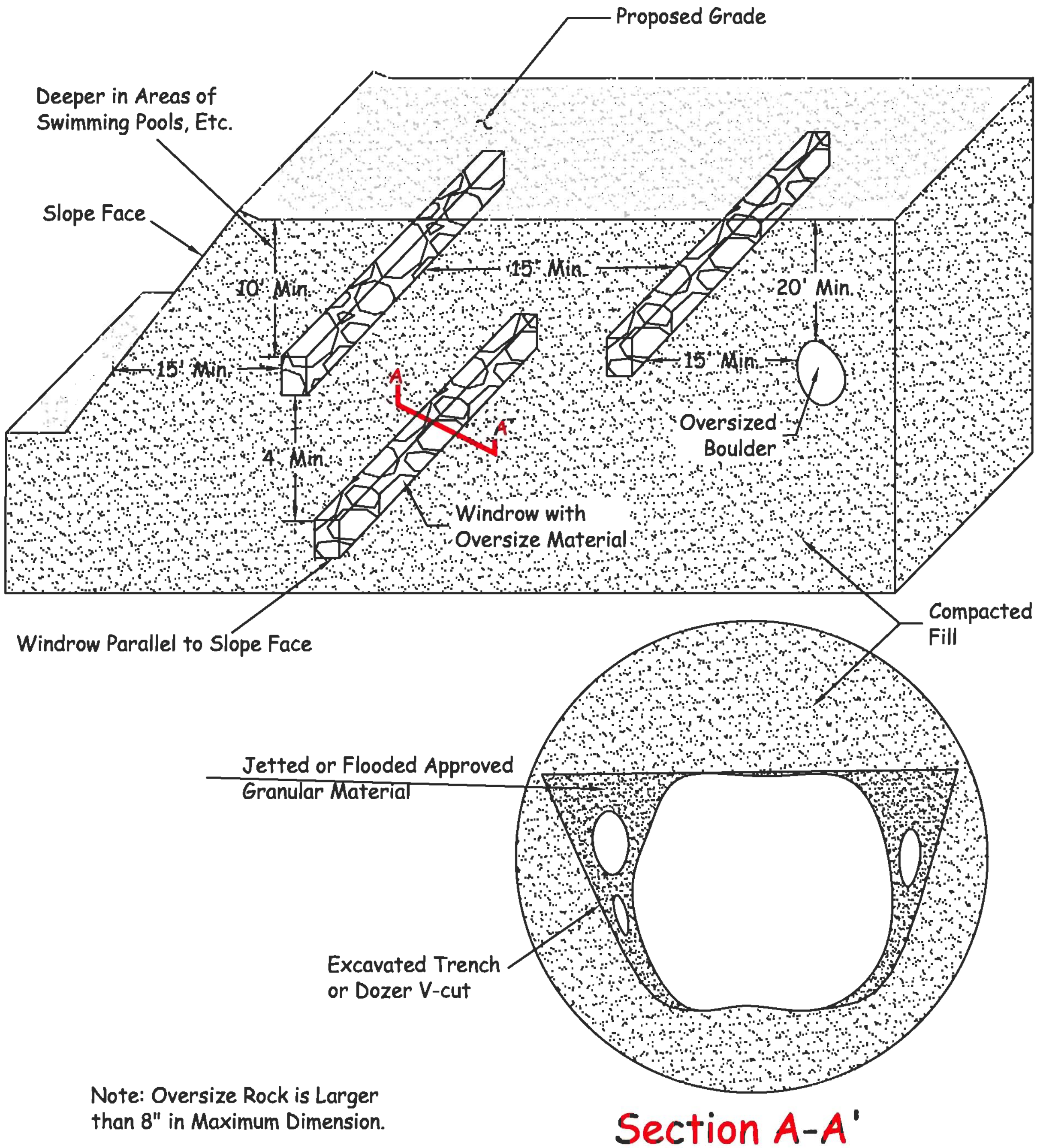




1. SURVEY FOR HORIZONTAL AND VERTICAL LOCATION TO NEAREST .01 INCH PRIOR TO BACKFILL USING KNOW LOCATIONS THAT WILL REMAIN INTACT DURING THE DURATION OF THE MONITORING PROGRAM. KNOW POINTS EXPLICITELY NOT ALLOWED ARE THOSE LOCATED ON FILL OR THAT WILL BE DESTROYED DURING GRADING.
2. IN THE EVENT OF DAMAGE TO SETTLEMENT PLATE DURING GRADING, CONTRACTOR SHALL IMMEDIATELY NOTIFY THE GEOTECHNICAL ENGINEER AND SHALL BE RESPONSIBLE FOR RESTORING THE SETTLEMENT PLATES TO WORKING ORDER.
3. DRILL TO RECOVER AND ATTACH RISER PIPE.

LGC

TYPICAL SETTLEMENT PLATE AND RISER



Note: Oversize Rock is Larger than 8" in Maximum Dimension.

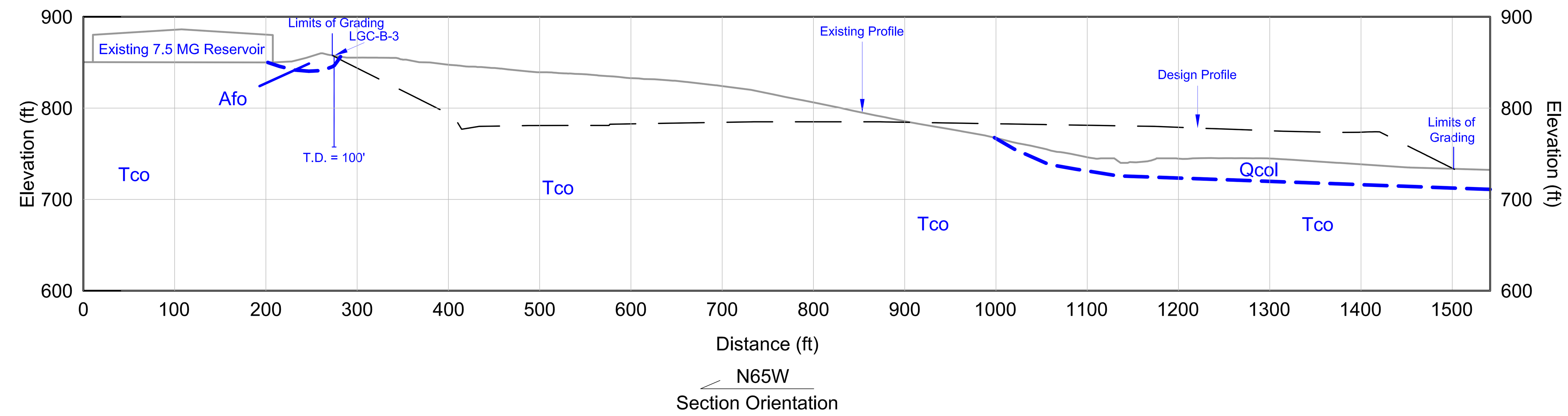
LGC

OVERSIZE ROCK DISPOSAL DETAIL

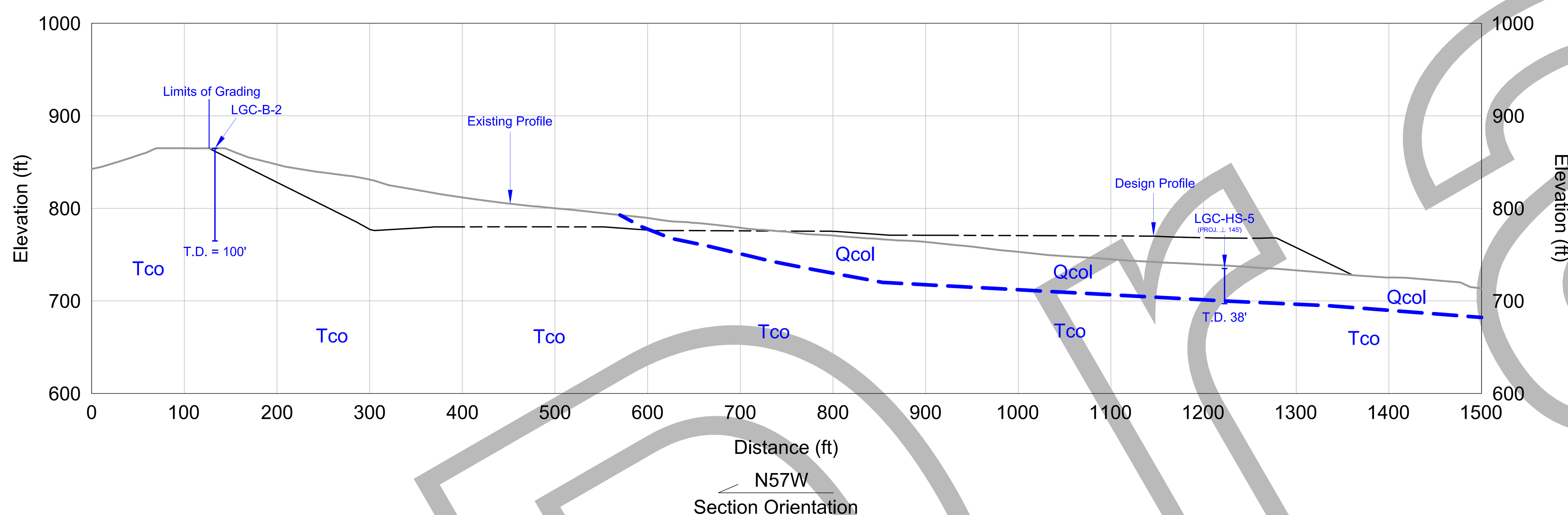
11/26/02

LGC	**LAWSON & ASSOCIATES GEOTECHNICAL CONSULTING, INC.** 1319 Calle Avanzado San Clemente, CA 92673 TEL (949) 369-6141 FAX (949) 369-6142	**Geotechnical Map Lake Forest Sports Park**	CLIENT: City of Lake Forest 25550 Commercentre Drive, Suite 100 Lake Forest, CA 92630	CIVIL ENGINEER: PSOMAS 3 Hutton Center Drive, Suite 200 Santa Ana, CA 92707	PROJECT NAME: Lake Forest Sports Park PROJECT NO.: 091069-01 ENG. / GEOL.: DJB / KBC SCALE: 1 inch = 100 feet DATE: March 2010	**SHEET 1**

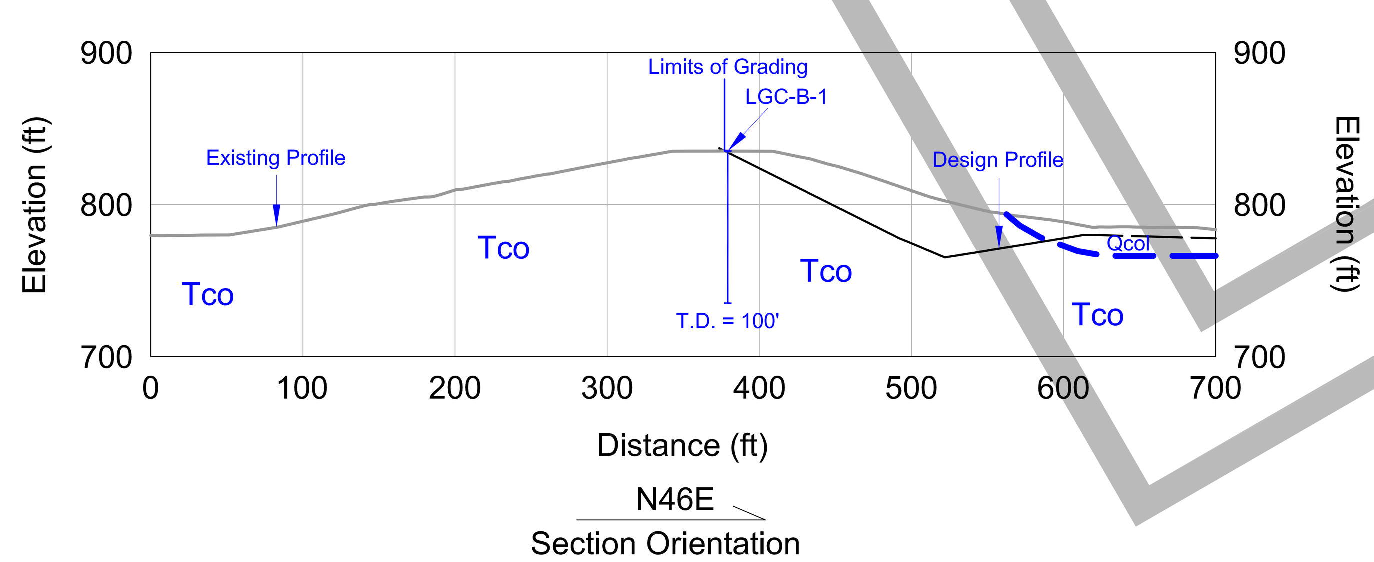
Profile View of Alignment - A-A'



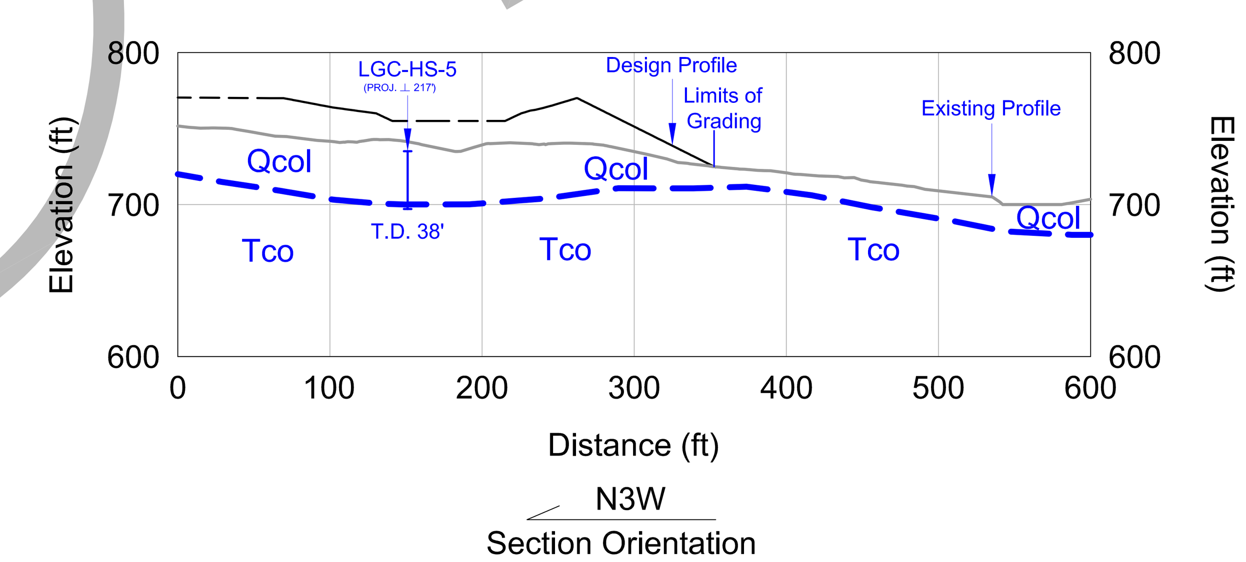
Profile View of Alignment - B-B'



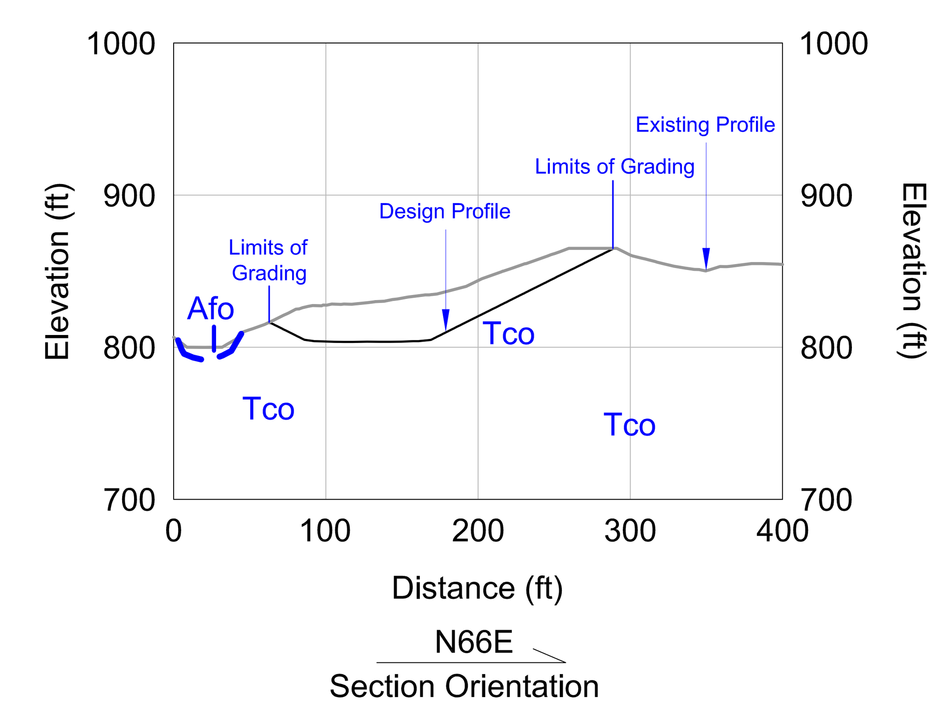
Profile View of Alignment - C-C'



Profile View of Alignment - D-D'



Profile View of Alignment - E-E'



LGC

LAWSON & ASSOCIATES GEOTECHNICAL CONSULTING, INC.
1319 Calle Avanzado
San Clemente, CA 92673
TEL (949) 369-6141 FAX (949) 369-6142

Lake Forest Sports Park
Geotechnical Cross-Sections
A-A' through E-E'

CLIENT:
CITY OF LAKE FOREST
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

CIVIL ENGINEER:
PSOMAS
3 Hutton Center Drive, Suite 200
Santa Ana, CA 92707

PROJECT NAME	Lake Forest Sports Park
PROJECT NO.	091069-01
ENG. / GEOL.	DJB / KBC
SCALE	1 inch = 100 feet
DATE	March 2010

SHEET 2

LEGEND:

Symbols

(35) Depth of Removal Below Existing Grade

(760) Elevation of Removal Bottom

Approximate Location of Recommended Subdrain

Geologic Units

Afs Artificial Fill - Stockpile

Afu Artificial Fill - Undocumented (Circled where buried)

Afo Artificial Fill - Others

Qcol Quaternary Colluvium

Tco Tertiary Capistrano Formation - Oso Member (Circled where buried)

LGC	LAWSON & ASSOCIATES GEOTECHNICAL CONSULTING, INC. 1319 Calle Avanzado San Clemente, CA 92673 TEL (949) 369-6141 FAX (949) 369-6142	Lake Forest Sports Park Preliminary Removals Map	CLIENT: City of Lake Forest 25550 Commercentre Drive, Suite 100 Lake Forest, CA 92630	CIVIL ENGINEER: PSOMAS 3 Hutton Center Drive, Suite 200 Santa Ana, CA 92707

PROJECT NAME	Lake Forest Sports Park	
PROJECT NO.	091069-01	
ENG. / GEOL.	DJB / KBC	SHEET 3
SCALE	1 inch = 100 feet	
DATE	March 2010	